CMS Bundled Payments for Care Improvement (BPCI) Initiative Models 2-4: Year 1 Evaluation & Monitoring Annual Report

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The Lewin Group

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This report represents information about an active initiative as of a particular point in time. While an effort is made to accurately represent the characteristics of the program during the period examined, program policies and approaches are subject to change. For current information about model design, please refer to the Bundled Payments section of the CMMI website.

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Table of Contents

Table of Exhibits

List of Appendices

*The following Appendices: C, D, E, K and O are not included in the publically posted Annual Report.

Executive Summary

The Bundled Payments for Care Improvement (BPCI) initiative is designed to test whether bundled payments can reduce Medicare's costs while maintaining or improving the quality of care. The three-year initiative (which may be extended by up to two years) links payments for services related to an episode of care that is triggered by a hospitalization. BPCI participants may benefit financially from providing services in the bundle more efficiently and are at risk if their costs for the bundle are higher than a historical benchmark. The Lewin Group, with its partners, Abt Associates, Inc., GDIT, Telligen, and Optum, is under contract to the Centers for Medicare & Medicaid Services (CMS) to evaluate and monitor Models 2, 3, and 4 of the BPCI initiative. This is the first Annual Report, which synthesizes the findings from various evaluation and monitoring activities under the contract.

CMS is testing four models of bundled payments, three of which are being evaluated under this contract. Providers and other entities may participate in BPCI in various ways that differ based on whether they are providing services that initiate a bundle, accepting risk, or providing services to patients in a BPCI bundle. The roles and responsibilities may overlap. An Awardee has an agreement with CMS and accepts risk under the initiative. An Episode Initiator (EI) is a provider where a BPCI episode is initiated and it is either also an Awardee or is affiliated with an Awardee. There are several types of Conveners, which are organizations that perform various functions to facilitate the participation of providers. Awardees and EIs may partner with other providers that deliver care to a beneficiary during a BPCI bundle to coordinate care or share in savings.

The services in each payment bundle and basis of payment; clinical episodes; and several other design features differ depending on the BPCI Model. Under each Model, an episode of care is defined by an inpatient hospitalization for one of the 48 BPCI clinical episodes that are designated by the patient's Medicare Severity Diagnosis Related Group (MS-DRG).

- **Model 2** EIs are either hospitals or physician group practices (PGPs) and the bundles include the anchor hospitalization, all concurrent professional services, and all other services delivered within the designated episode length of 30, 60, or 90 days. All individual providers that deliver services to any patient in a BPCI episode continue to be paid on a fee-for-service basis. Total spending is reconciled retrospectively against an established target price with the responsible Awardee receiving any savings or repaying any excess spending.
- **Model 3** EIs are either PGPs or post-acute care providers (home health agencies (HHAs), skilled nursing facilities (SNFs), inpatient rehabilitation facilities (IRFs), or long-term care hospitals (LTCHs)). Episodes start when a patient is admitted to an episode-initiating post-acute care provider within 30 days of an anchor hospitalization and the bundle includes all services within the designated episode length. Individual providers are paid on a fee-for-service basis with retrospective reconciliation against an established target price.
- **Model 4** EIs are hospitals. Bundles include the anchor hospitalization, all concurrent professional services, and any readmissions and associated professional services that occur within 30 days of discharge that are not explicitly excluded from the bundle. Awardees are paid a prospectively determined amount that they use to pay individual providers.

BPCI is being implemented in two phases. In Phase 1, potential Awardees submit applications and receive data on their EIs' historical experience with selected clinical episodes. As of August 5, 2014, applications for approximately 2,368 potential BPCI EIs had been submitted to CMS. Awardees may apply to participate in Phase 2, the risk-bearing phase of the initiative. The first group of Awardees began risk-bearing periods of performance in BPCI on October 1, 2013. At that time, there were 15 Awardees associated with 19 EIs. By the second quarter of BPCI implementation (January through March of 2014, or Q1 2014), there were 93 Awardees and 211 EIs in Phase 2. Although it is unlikely that all of the remaining Phase 1 applicants will be accepted or enter the initiative, participation in BPCI can grow on a quarterly basis until October 2015.

This Annual Report provides a preliminary assessment of the BPCI participants; the effects of the BPCI initiative on episode costs, the Medicare program, and quality of care; and the strategies that Awardees use to achieve these results. It also contains analyses to monitor potential unintended consequences of the initiative, meaning those effects that run counter to the stated objective of lowering costs without adversely affecting quality of care. The quantitative analyses are based on the experience of Phase 2 participants during the first quarter of the initiative (October through December of 2013 or Q4 2013). The qualitative results account for Phase 2 participants during the first two quarters. We are limited in our ability to draw conclusions about the effects of BPCI because of the small sample sizes and short time-frames. As a result, this first Annual Report may be better thought of as the outline for future analyses as more participants enter BPCI and gain greater experience under the initiative. Please note that throughout this report, unless otherwise specified, the term participant will refer to Awardees and EIs in an active period of performance (Phase 2).

A. Analytic Framework

CMS' three major evaluation and monitoring questions provide the framework for our analytic approach and organize the results section of this report. We present analyses of the early experience under BPCI, focusing on the first two questions. The third question will be addressed in subsequent reports.

A. What are the characteristics of the program and participants at baseline and how have they changed during the course of the initiative?

We provide data from Awardees' Implementation Protocols (IPs), Medicare Provider of Services (POS) files and claims, quarterly Awardee interviews, site visits, and other sources to understand program participants, their care redesign activities and plans, and patient characteristics. Awardee characteristics and their implementation of BPCI will be important in understanding the factors that contribute to Awardee success under BPCI and initiative features that may need to be modified. This information will also be useful in understanding whether bundled payments can be implemented more widely.

B. What is the impact of the BPCI initiative on the costs of episodes, the Medicare program, and the quality of care for Medicare beneficiaries?

We provide initial insights into the impact of BPCI through analyses of Medicare claims and interview data. We will also be examining indicators of changes in beneficiary quality of care.

C. What program, provider, beneficiary, and environmental factors contributed to the various results of the BPCI initiative?

This first Annual Report does not include results for question C.

B. Data and Methods

The BPCI Model 2-4 evaluation and monitoring activities conducted during the first year of the initiative are based on both quantitative and qualitative data and methods. The quantitative evaluation relies on a non-experimental design, which uses providers in a comparison group to infer counterfactual outcomes for BPCI participants. Our design accounts for provider selection based on observed time-varying provider and market factors and unobserved time-invariant factors. More specifically, the analysis relies on difference-in-difference (DiD) models to evaluate outcomes of beneficiaries associated with BPCI providers compared with beneficiaries receiving care from similar providers that are not participating in the BPCI program. The DiD model incorporates outcomes from before and after the implementation of BPCI to control for time invariant differences in the mean outcomes between the two groups that arise from unobserved factors.

We used the Medicare Claims and Enrollment Database (EDB) from the Chronic Conditions Data Warehouse (CCW) to identify and construct BPCI episodes of care during the BPCI intervention (Q4 2013) and baseline (Q4 2010 – Q3 2013) periods. We also used claims to create outcome measures and identify risk factors associated with the outcomes. The Provider of Services file (POS) and Area Health Resource File (AHRF) provided information on BPCI participant and market characteristics used in the selection of comparison providers. The BPCI Participant and Salesforce Episode reports provide data on when an Awardee entered Phase 2 for specific episode types.

We created a comparison group of non-BPCI providers ("non-participants") that is similar to the BPCI Phase 2 participants with respect to market, available services, and case mix for each Model and provider type from the universe of Medicare fee-for-service (FFS) providers that had not signed up for BPCI as of October 2013. To improve the comparability of the participants and non-participants, we used propensity score methods to identify further adjustments to the Model 2 and Model 3 SNF comparison groups.

For the Q4 2013 BPCI participants and the comparison non-participants, we created episodes of care by aggregating Medicare claims for patients in the MS-DRGs associated with the participants' selected clinical episodes, across the relevant providers and in the relevant period. We constructed episodes during a baseline period (Q4 2010 through Q3 2013) and the intervention period (Q4 2013) for Model 2, Model 3, and Model 4 BPCI participants and comparison providers. Utilization, payment, and quality of care measures were risk-adjusted using MS-DRG information from the anchor hospitalization, as well as patient demographic factors like age, gender, Medicaid eligibility, and disability, as well as prior health conditions, when there are sufficient sample sizes.[1]

We used qualitative data to describe the factors that influenced the Awardees' decision to join BPCI and the Awardees' implementation, care redesign, and gainsharing approaches. The primary qualitative data sources are the Awardee IPs, EI case studies, and quarterly Awardee interviews. During the first year of the BPCI initiative, we conducted six case studies and 35

[1] Model 3 HHA, Model 3 IRF, and Model 4 results were not risk-adjusted due to insufficient sample size.

quarterly Awardee interviews. We selected the case study sites and Awardees for quarterly interviews that would provide a range of BPCI approaches and perspectives.

During the case study site visits, we gathered information about the design, implementation, and initial results of BPCI from EI clinical and administrative leadership and managers involved with the initiative. Questions pertained to BPCI entry decisions and structure, experience with BPCI, market effects, successes and challenges, the ability to replicate the BPCI approach, quality management, care redesign, and care management. A subset of the case study questions was used in the quarterly Awardee interviews.

C. Results

1. Model 2 Results

There were eight active Awardees with nine hospital EIs in Model 2 of the BPCI initiative in Q4 2013 that participated in 34 of the 48 potential clinical episodes. This first group of participants comprised three single Awardees (all of which initiated episodes, by definition), three Awardee Conveners that did not initiate episodes, and two designated Awardees (that initiated episodes) that joined under Facilitator Conveners. By Q1 2014, participation in the initiative had grown to 107 EIs. Of these participants, there were 15 single Awardees, 17 Awardee Conveners, and 5 Facilitator Conveners, with 27 designated Awardees and 2 designated Awardee Conveners.

Participants Compared with Non-Participants: To understand how BPCI participants differ from other providers, we compared Model 2 EIs with all non-participating hospitals that discharged Medicare patients in the same clinical episodes as BPCI participants. The majority (89%) of Model 2 EIs were non-profit entities, compared with 60% of the non-participants. Model 2 participants tended to be larger than other hospitals. None of the Model 2 EIs had fewer than 100 beds, compared with approximately one third (36%) of the non-participant hospitals. Participants had a higher average occupancy rate (61%) than the non-participants (49%), though both had a similar percent of Medicare inpatient days as a share of total patient days (43% vs. 41%).

Hospitals participating in BPCI (either Model 2 or Model 4) are in more competitive markets than non-participating hospitals, with markets defined as the hospital's Core-Based Statistical Area (CBSA).[2] BPCI markets tend to have multiple competing providers, with none of them dominating in the market, as suggested by a low mean Herfindahl Index value (0.30), a measure of market concentration. In contrast, non-BPCI markets tend to have fewer hospitals with larger market shares; the mean Herfindahl index in non-BPCI markets is 0.69. BPCI Model 2 and 4 hospitals are also located in more densely populated areas with higher median incomes, compared with non-BPCI markets. Consistent with their urban locations, markets with BPCI-participating hospitals tend to have more primary care physicians, specialists, and nurse practitioners for their populations than markets without BPCI participants, although BPCI markets tend to have fewer SNF beds.

We also explored whether patients cared for by BPCI-participating hospitals differed from patients with an inpatient admission for one of the 34 active Model 2 clinical episodes who were

[2] Please note, for the market analyses we combined Model 2 and Model 4 participating hospitals because of the low number of participants in Model 4 during Q4 2013.

discharged from a non-participating hospital. A larger proportion of BPCI patients were aged 65-79 than the non-BPCI patients (55% vs. 46%) and a lower proportion were aged 80 and above (35% vs. 38%). There was also a smaller proportion of BPCI patients in the 20-64 age group (10% vs. 16%), which is consistent with a lower proportion of the BPCI population that qualified for Medicare due to a disability (13% vs. 16%). The most notable difference between the two populations is that a lower proportion of Model 2 BPCI patients was eligible for Medicaid. Among BPCI patients, 14% were eligible for Medicaid, compared with 25% of Medicare beneficiaries with similar conditions admitted to non-participating hospitals.

Participant Decisions Under BPCI: Model 2 Awardees consulted their administrative and clinical leaders when making decisions about participating in BPCI, according to those we interviewed. They discussed five general reasons for participating: 1) wanting to learn about payment reform, 2) pursuing the financial opportunities of BPCI, 3) urging of leadership and wanting to be innovative, 4) BPCI opportunities to improve quality, and 5) alignment with participation in other initiatives.

One of the opportunities and challenges under BPCI is establishing relationships across providers to improve care coordination and gain efficiencies across the entire episode of care, according to Awardees we spoke with. During quarterly Awardee interviews, we asked Awardees to share their experiences with partnerships under the BPCI initiative. Interviewees described a variety of partnerships, including those with external consultants that provided data analysis or IT support, local health care providers, and physicians within their own organizations. Twenty-three of the twenty-four Model 2 Awardees interviewed discussed partnerships with post-acute care (PAC) providers. The Awardees indicated that they discussed quality management with the PAC providers likely to receive the Awardees' patients, even if the providers were not contractually involved in BPCI. Several of the Awardees indicated that they identified higher quality providers that they would include on a preferred list for their patients; although the Awardees affirmed they maintained patient choice.

During the first quarter of the initiative (Q4 2013), Model 2 Awardees were participating in 34 of the 48 potential clinical episodes. By Q1 2014, Awardees were participating in all clinical episodes. The most common clinical episode was major joint replacement of the lower extremity, which was chosen by seven (78%) Awardees in Q4 2013 and 78 (73%) Awardees in Q1 2014. It also accounted for the greatest number of episodes, 698 Model 2 episodes (41%) in the first quarter. Based on Awardee interviews, major joint replacement of the lower extremity was chosen because it is generally a planned, elective procedure with a fairly standardized course of treatment. Awardees indicated that patient education would be a component of their care redesign and many reported that they would focus on reducing PAC costs.

In Q1 2014, other frequently selected clinical episodes included congestive heart failure, with 34% of Awardees participating, chronic obstructive pulmonary disease, with 25% of Awardees, and pneumonia with 23% participating.

Changes in Utilization: Across all Model 2 episodes, we observed changes in the anchor hospitalization length of stay (LOS) and use of PAC that began in the 6 months before the risk bearing phase (Phase 2) of BPCI. Findings across these measures are similar when we examine only the surgical orthopedic excluding spine episodes (the clinical category that includes the major joint replacement of the lower extremity episodes) because of their dominance in the first

quarter of the initiative. We observed a statistically significant difference in the decline in average LOS for the anchor hospitalization in surgical orthopedic excluding spine episodes in BPCI providers relative to the same episodes in comparison providers, after risk adjustment. The LOS of the anchor hospitalization declined from 4.6 days at the beginning of the baseline period, to 4.4 days in the year immediately before BPCI, to 4.3 days in the first quarter under Phase 2 of BPCI. For comparison providers, LOS was 4.7 and 4.6 during the baseline, falling to 4.5 days in the intervention quarter. Additional analyses suggest that the decline in the LOS for the anchor hospitalization is associated with an increase in the number of short-stay transfers to PAC. These are situations in which a patient is discharged from the hospital to a PAC setting with a hospital LOS less than the geographic mean LOS for the patient's MS-DRG.

Over the same period, the percent of BPCI patients discharged to an institutional PAC provider (SNF, IRF, or LTCH) declined from 66% to 47% during the intervention quarter and the proportion discharged home with no HHA remained steady. The reduction in institutional PAC use was statistically different from the pattern for the comparison providers, where this proportion remained relatively steady at 62% to 60%, after risk adjustment. The average number of days in SNF went down in BPCI episodes from baseline to the intervention period while the number of days in HHAs increased; but these changes were not statistically different than the comparison group episodes before or after risk adjustment.

Changes in Payments: We examined Medicare standardized allowed amounts, our payment measure, for several categories of services over different periods, for patients treated by BPCI participants and comparison patients. We did not find any consistent results for total unadjusted episode costs across episodes with and without PAC use or by episode length. In this section, we focus on the surgical orthopedic excluding spine episodes, which provide more meaningful information because they involve a narrower range of similar episodes.

The unadjusted average total Medicare standardized allowed amount for surgical orthopedic excluding spine patients in 90 day episodes who received PAC was higher during the baseline period for patients treated by BPCI providers than for comparison patients ($37,275 vs. $34,102). The total declined from baseline to intervention for both groups, although the decline was greater for BPCI patients so that by the intervention period, average total costs were $32,369 for BPCI patients compared with $32,948 for comparison patients. This change was statistically significant. For similar patients who did not receive PAC, BPCI patients had higher costs during the baseline ($17,672 vs. $17,400) and lower average costs during the intervention ($16,910 vs. $17,600), although this was not statistically significant.

The risk-adjusted Part A payments for surgical orthopedic excluding spine patients treated by BPCI providers were higher during each baseline quarter than for patients treated by comparison providers. The average standardized allowed amount was lower for both groups during the intervention period, but the decline was greater for BPCI patients than for comparison patients. As a result, average payments for BPCI patients were lower ($21,484 vs. $21,596) by the intervention period. The Part A payment results by type of provider indicated statistically significant differences for SNF, which declined more for BPCI patients, and for HHA, which increased more for BPCI patients. The average risk-adjusted Medicare Part A amount for readmissions was higher for BPCI patients than comparison patients during the baseline and the intervention quarters, although the decline in this amount was greater for BPCI patients, but not significant.

The payment results for surgical orthopedic excluding spine patients indicate the same change in PAC use as the utilization data. The average, risk-adjusted SNF payment was higher in the baseline for BPCI patients than for comparison patients. By the intervention period, SNF payments had declined for both groups, but more for BPCI patients. At the same time, HHA payments for BPCI patients went up from the baseline to the intervention period while declining for the comparison patients. Both of these changes were statistically significant. In addition, the increase in anchor hospitalization payment from baseline to intervention periods for the BPCI providers was statistically significantly smaller compared with the increase for comparison providers. Additional analyses suggest that the smaller increase in payments for the anchor hospitalization is associated with an increase in the number of short-stay transfers to PAC.

During the anchor stay and the 90-day post-discharge period, total unadjusted Part B payments were higher for surgical orthopedic excluding spine BPCI patients than for comparison patients during all baseline and intervention quarters. Part B payments declined between the baseline and intervention quarters for both groups, although the decline began earlier for BPCI patients. The average payments were lower in the last four quarters of the baseline period for BPCI patients than for the preceding eight baseline quarters for all but one service category. For the comparison patients, the average amounts were similar between the earlier and later baseline quarters. Although not statistically significant, the largest relative declines in payments occurred during the anchor stay (consistent with the lower LOS) and for physician evaluation and management visits (E&M).

Changes in Quality: Mortality rates were similar for BPCI surgical orthopedic excluding spine episodes and for the comparison group and did not change over the baseline or intervention periods. The 30-day unplanned readmission rate was higher for the BPCI episodes during the early baseline period (8.6%) than for patients of comparison providers (7.3%) and declined for both groups through the intervention period (to 6.7% and 6.3%, respectively), which was not statistically different. Emergency department (ED) visits (without hospitalization) for BPCI surgical orthopedic excluding spine patients within 30 days of discharge rose from 6.9% to 8.7% from baseline to the intervention period. Average ED visits fell for the comparison group patients. The difference between these two patient groups is statistically significant.

Unintended Consequences: We looked for indications of unintended consequences of the BPCI initiative at the provider-clinical episode level. Unintended consequences refer to provider activities to reduce their reported costs that are not related to care redesign. We examined changes in the case-mix classifications associated with the five provider types for evidence of inappropriate changes in patient settings or levels of care. Our preliminary analyses were based on such small samples that we cannot draw any conclusions with respect to unintended consequences.

2. Model 3 Results

There were six Model 3 Awardees and nine EIs in Phase 2 of the BPCI initiative in Q4 2013, participating in six clinical episodes. Five of the Awardees were Designated Awardees that joined under a single Facilitator Convener. The sixth Awardee was a non-episode initiating Awardee Convener with four EIs. The majority (7) of Model 3 EIs in Q4 2013 were SNFs. Only one IRF and one HHA participated in the first quarter.

Phase 2 Participants Compared with Non-Participants: All of the SNF initiators are located in urban areas in the Midwest or the South and are non-profit. Across all Medicare-participating SNFs,

however, 71% are urban and 27% are non-profit, so the first quarter initiators are not similar to non-participating SNFs. The median market penetration rate for BPCI-participating SNFs is 7.5%, considerably higher than for non-participating SNFs and consistent with the lower SNF beds per population in the BPCI markets. Market competition for SNFs within BPCI markets is high (with an average Herfindahl index value of 0.08) and significantly higher than in non-BPCI markets (0.32). BPCI participants are also located in more densely populated areas (averaging about 2.7 million residents). Markets with BPCI-participating SNFs had, on average, higher Medicare Advantage penetration and higher median household income ($50,666 vs. $44,053) than non-BPCI markets. Markets with Model 3 BPCI providers also had more primary care physicians, specialists, and nurse practitioners per 10,000 residents than non-BPCI markets.

Awardee Decisions under BPCI: All of the Model 3 Awardees active in Q4 2013 participated in the major joint replacement of the lower extremity BPCI clinical episode. With the influx of an additional 75 EIs in Q1 2014, the range of clinical episodes expanded so that at least 45% of the episode initiators participated in 35 of the 48 clinical episodes. Awardees we interviewed indicated that they chose to participate in episodes that offered them the opportunity to learn about best practices; have high volume and are therefore big cost drivers; and may have the best opportunity to improve care and reduce readmissions.

Changes in Utilization: Among patients treated by BPCI SNF initiating providers in surgical orthopedic excluding spine episodes, the unadjusted average number of days of SNF, HHA, IRF, or LTCH care during the 90 days after the anchor hospitalization discharge was significantly lower than for patients treated by comparison SNF providers across all quarters of the baseline and intervention periods. During the first eight quarters of the baseline period, the average number of days of PAC was 16 days for BPCI patients compared with 21 days for comparison patients, falling to 15 and 20 days, respectively in the last four quarters of the baseline. During the intervention period, the average for BPCI patients remained the same, but increased to 22 days for the comparison group. This difference, however, was not statistically significant.

Changes in Payments: We examined Medicare standardized allowed amounts, our payment measure, for several categories of services over different periods, for patients treated by BPCI SNF providers and comparison providers. For patients in the surgical orthopedic excluding spine episode group with 60 day episodes, the total unadjusted average payment was lower for BPCI patients than comparison patients during the baseline ($11,311 vs. $16,896). The total increased for both groups and remained higher during the intervention period for the comparison patients. During the intervention quarter, average risk-adjusted SNF payments for the 90-day post discharge period for the comparison SNFs' patients were $12,082 compared with $7,465 for BPCI SNF patients.

The only Part A payment difference between BPCI SNF initiated episodes and comparison patients that was significant was for home health care. Average Part A payments for HHA services increased significantly more from baseline to intervention for BPCI patients relative to comparison group patients during the 90-day post-discharge period. Unadjusted Medicare Part B payments were higher for BPCI patients across all categories we examined (outpatient therapy, imaging and lab, procedures, E&M, all other non-institutional and all other institutional) during the intervention period. Notably, unadjusted payments during the intervention period were higher for BPCI patients for outpatient therapy ($640 vs. $404) and procedures ($237 vs. $146). The

only statistically significant change within Part B payments was for all other non-institutional services ($121), likely due to the shorter SNF stays for BPCI patients.

Changes in Quality: The unadjusted 30-day unplanned readmission rate for BPCI patients increased from 8.5% during the baseline period to 9.8% during the intervention period. After risk adjustment, the readmission rate during the intervention period was 8.0%, consistent with patients treated by comparison providers (8.0%). The proportion of BPCI patients with an ED visit increased from the baseline to intervention period (6.2% to 8.8%). After adjusting for patient risk, this increase was not significantly different than the change in ED use among comparison providers during the same period.

Unintended Consequences: The small sample of SNF participants presented in this report precludes drawing broader conclusions about Model 3. This is particularly the case given that the seven SNF participants in Q4 2013 joined under two Conveners. The SNFs under each Convener had close organizational ties and did not necessarily function as independent entities. One should be mindful of these organizational relationships and the small number of Model 3 participants when considering the characteristics and performance of the Q4 2013 participants. Results for the one IRF and one HHA BPCI participants during Q4 2013 are not included in the main body of this report due to only one provider for each episode initiator type with small sample size (44 and 31 patient-episodes in Q4 2013, respectively).

3. Model 4 Results

There was one active Awardee in Model 4 of the BPCI initiative in Q4 2013, an Awardee Convener with one EI, participating in the major joint replacement of the lower extremity episode. The EI is a for-profit, acute care hospital in an urban area of the South, with more than 249 beds and an occupancy rate of 51%. By Q1 2014, there were 20 EIs participating in 17 clinical episodes in Model 4. Fourteen of these EIs participated in major joint replacement of the lower extremity. Other clinical episodes in Q1 2014 were almost exclusively surgical, led by coronary artery bypass graft and double joint replacement of the lower extremity. Awardees indicated that they chose episodes that provided an opportunity to improve quality and reduce costs and that had highly engaged physician champions who support BPCI.

Claims-based utilization measures for Model 4 participants are based on 94 patient episodes, providing too little information for any inferences.

D. Discussion

This Annual Report provides a summative evaluation of the BPCI initiative to date. It is based on multiple evaluation and monitoring activities involving several sources of data, including the participants' Implementation Protocols, quarterly Awardee interviews, and episode initiator case studies to understand how participants are implementing BPCI; provider of service files for geographic indicators of how participants differ from other providers; and claims to understand BPCI patient service use and changes over time compared to similar patients.

This report reflects quantitative analyses of Phase 2 participants in the first quarter under the initiative (Q4 2013) and qualitative analyses of participants in their first and second quarters (Q4 2013 and Q1 2014). There were eight active Awardees (with nine episode initiators) in Model 2 of the BPCI initiative in Q4 2013. There were six Awardees that actively participated in Model 3 of

the BPCI initiative and one Awardee that actively participated in Model 4 of the BPCI initiative in Q4 2013. The small sample sizes and early experience preclude drawing conclusions although we were able to start identifying possible trends and other areas of interest for further evaluation. As highlighted previously, this first Annual Report may be better thought of as the outline for future analyses as more participants enter BPCI and gain greater experience under the initiative.

Even with strong caveats about small sample sizes and limited experience under BPCI, our preliminary results, taken together, show that BPCI appears to have affected provider performance. Awardees we interviewed indicated they had been preparing for the implementation of BPCI for some time and, indeed, some of the utilization changes we observed began prior to the first quarter of the intervention. Model 2 Awardees said that they thought there were opportunities to reduce spending during the post-acute period. We observed statistically significant declines in SNF use and increases in HHA use, which could indicate substitution of the lower-cost HHA care for the higher-cost SNF stays. Readmissions dropped more for BPCI Model 2 participants, although ED visits without a hospitalization increased relative to the comparison. Due to limited participation in Models 3 and 4, we were not able to make any cross Model comparisons, although the qualitative information on preparation, reasons for participating, and care redesign plans were similar across Models.

Findings presented in this report are limited in several ways. First, findings are based on the experiences from the 15 Awardees who signed up for BPCI during the first quarter of the program and may not be representative of the population of the 90 Awardees currently enrolled in BPCI.[3] Second, in many cases, our sample sizes may have not been large enough to allow us to detect incipient changes in outcomes and therefore non-significant results should be interpreted as inconclusive. Third, also due to small sample sizes, Model 4 and Model 3 HHA and IRF results are not adjusted for differences in case-mix between BPCI and comparison providers or changes over time. Therefore, we cannot draw conclusions about the program effects for those models. Finally, while our DiD approach controls for unobserved differences across BPCI and non-BPCI providers that are constant over time, there is no guarantee that these differences are in fact, constant. It could be the case, for example, that providers with improving outcomes were relatively more likely to sign up for the program, inducing a spurious positive correlation between BPCI participation and outcomes. We will be able to use more information in future reports to refine our comparison groups to account for this.

E. Future Evaluation Activities

This Annual Report reflects quantitative analyses of Phase 2 participants in the first quarter under the initiative and qualitative analyses of participants in their first and second quarters. Though there were a limited number of participants in the initiative during this period, CMS expects participation to grow substantially. As of August 5, 2014, approximately 2,368 potential new participants had joined Phase 1, EIs will continue to be added until April, 2015, and new episodes will continue to be added until October 2015. As a result, subsequent quarterly and annual reports will incorporate analyses based on a much larger sample of participants and episodes across all three models. This growth in the initiative will have implications for our methodology, reporting, and ability to draw meaningful conclusions. Because sample sizes will be much larger and more

[3] Estimate based on analysis of Salesforce data, August 2014.

diverse, we will have the capability to evaluate results across more levels of stratification and calculate more statistically powerful results. We will also have to revisit our methodology each quarter to ensure we are able to account for growing sample sizes, movement in and out of the initiative, and increased variability in the types of episodes and providers.

For next year's Annual Report, we will evaluate all Awardees that participate in BPCI at any time from Q4 2013 to Q4 2014 and we will conduct impact analyses for the first five quarters of the initiative. We will also expand our primary data collection activities. We will be collecting data directly from the Awardees on a quarterly basis using our online reporting platform. The data will include gainsharing activity; beneficiary incentives offered; participant characteristics, including status of care redesign interventions; medication reconciliation activity; and other quality monitoring measures. With these data we will assess adherence to agreement requirements, and document additional participant characteristics and care redesign activities. Awardee data will also be used to investigate the program, provider, beneficiary, and environmental factors that contributed to the various results of the BPCI initiative.

By the next Annual Report, we will have conducted and analyzed data from one wave of the beneficiary survey to obtain information not available on claims data or assessment data. The patient survey will be used to answer questions related to beneficiaries' experiences with care (i.e., care coordination, communication, patient preference), quality (i.e., functional status, mobility, care transition), and access to care. Some of these topics are also being examined with secondary data, for example PAC patient assessment instruments will be used to examine functional status for those patients receiving PAC services.

I. Introduction

The Bundled Payments for Care Improvement (BPCI) initiative is designed to test whether bundled payments can reduce Medicare's costs while maintaining or improving the quality of care. The Lewin Group, with our partners, Abt Associates, Inc., GDIT, Telligen, and Optum, is under contract to the Centers for Medicare & Medicaid Services (CMS) to evaluate and monitor the impact of BPCI Models 2, 3, and 4. This is the first of five Annual Reports that will synthesize the findings from various evaluation and monitoring activities under this contract.

A. BPCI Initiative

The success of Medicare's inpatient prospective payment system for inpatient hospital care and the subsequent expansion of Medicare prospective payment to other settings demonstrated that paying a fixed price for a package of services creates effective incentives for providers to deliver that package more efficiently. BPCI tests the general proposition that it is possible to extend the principles of prospective payment to a package of services that spans multiple providers and extends for longer periods of time. The package of services differs under the three BPCI Models, generally ranging from those provided during a hospitalization and a post-discharge period, the post-acute care following a hospital discharge, or a hospitalization.

Under each BPCI Model, an episode of care is triggered by a hospitalization for one of 48 clinical episodes of Medicare severity-adjusted diagnosis-related groups (MS-DRGs) (see **Appendix A** for a list of the 48 clinical episodes and MS-DRGs).[4] The bundle is defined as the services provided during the episode that are linked for payment purposes. Certain services unrelated to the triggering hospitalization are excluded from the bundle, including readmissions for certain MS-DRGs and some Part B services. The bundle varies by model as follows:

- **Model 2** has the most comprehensive bundle, which includes the triggering hospital stay (i.e., the anchor hospitalization), all concurrent professional services and all post-discharge services delivered within the designated period of 30, 60, or 90 days. Individual providers are paid on a fee-for-service basis with retrospective reconciliation against an established target price.
- The **Model 3** bundle includes only post-discharge services and any readmissions within the designated period of 30, 60, or 90 days. Model 3 bundles start when a patient is admitted to an episode-initiating post-acute care provider following a hospitalization for any of the chosen clinical episodes and includes all services within the designated period. Individual providers are paid on a fee-for-service basis with retrospective reconciliation against an established target price.
- The **Model 4** bundle includes only the anchor hospital stay, concurrent professional services, and any readmissions and associated professional services that occur within 30 days of discharge that are not explicitly excluded from the bundle. Awardees are paid a prospectively determined amount and they, in turn, pay any involved providers.

On August 23, 2011, CMS announced that providers and other organizations could sign up for Phase 1 of the initiative. Phase 1 is an initial period when CMS and BPCI participants can prepare

[4] **Appendix B** includes an acronym list and glossary for common terms used through this report.

for implementation and the assumption of financial risk (Phase 2). The Phase 1 participants that are approved by CMS and intend to assume financial risk for episodes were then able to enter into an agreement with CMS as Awardees and thus become eligible to begin Phase 2. October 1, 2013 was the earliest possible Phase 2 start date for Awardees. There were only 15 Awardees and 19 Episode Initiators (EIs) in Phase 2 in the 4th quarter (October – December) of 2013 (Q4 2013), there were 93 Awardees and 211 EIs in Phase 2 in Q1 2014.

CMS has expanded the time frames for participants to enter BPCI. In November 2013, CMS allowed existing Phase 1 and 2 participants to add new EIs and BPCI clinical episodes to Phase 1. CMS also invited additional entities to submit requests for Phase 1 participation during a subsequent Winter Open Period, which ended on April 18, 2014. As of October 2014, approximately 6,788 participants were in Phase 1. Beginning in January 2015, new Awardees and EIs may enter Phase 2 by transitioning at least one clinical episode to Phase 2. All Awardees and each associated EI must enter at least one episode into Phase 2 by April 2015. Awardees and EIs may transition additional clinical episodes from Phase 1 to Phase 2 in July 2015 and October 2015. Phase 1 will end in October 2015, so all episodes for all EIs must be transitioned to Phase 2 by that time.

1. Participant Roles

Organizations that participate in BPCI may do so in several ways, distinguished by whether the participant is risk bearing, can initiate episodes under BPCI, or serves as an administrator or convener. These terms and roles are described below.

Single Awardee (SA) — Under Models 2, 3 and 4 Single Awardees are individual Medicare providers that assume financial risk under the Model for Medicare beneficiaries that initiate episodes at their institution.[5] These Single Awardees are also Episode Initiators.

Awardee Convener (AC) — Parent companies, health systems, or other organizations that assume financial risk under the Model for Medicare beneficiaries that initiate episodes at their respective Episode Initiating Bundled Payments Provider Organization (EI-BPPO) are Awardee Conveners. An Awardee Convener may or may not be a Medicare provider or initiate episodes.

Facilitator Convener (FC) — An entity that submits a BPCI application and serves an administrative and technical assistance function on behalf of one or more Designated Awardees or Designated Awardee Conveners. Designated Awardees and Designated Awardee Conveners function as Single Awardees and Awardee Conveners, respectively, but join the initiative under a Facilitator Convener. Facilitator Conveners do not have an agreement with CMS, nor do they bear financial risk under the Model, or receive payment from CMS as part of the Model. The Designated Awardee or Designated Awardee Convener would have an agreement with CMS and assume financial risk under the Model for Medicare beneficiaries that initiate episodes.

Episode Initiating Bundled Payments Provider Organization (EI-BPPO) — Under Models 2, 3 and 4, Episode Initiating Bundled Payments Provider Organizations are Medicare providers that

[5] Under BPCI, assuming financial risk means that the entity would be obligated to repay the Medicare Trust Funds any Model 2 or 3 Net Payment Reconciliation Amounts Model 4 Reconciliation of Readmissions Amounts, and Excess Spending Amounts resulting from the Post Episode Spending Calculation.

deliver care to beneficiaries. Episodes start at EI-EPPOs. EI-EPPOs do not assume financial risk. They are associated with an Awardee Convener or a Designated Awardee Convener that assumes the financial risk.

Episode Initiators — Under Model 2 an Episode Initiator is the participating hospital where the BPCI episode begins or a participating physician group practice (PGP) if one of its members is the patient's admitting physician or surgeon for the anchor hospitalization. Under Model 3 an EI may be a participating PGP or a participating SNF, HHA, IRF, or LTCH that admits the patient within 30 days following a hospital discharge in a MS-DRG for the relevant clinical episodes (anchor hospitalization). Under Model 4 an EI is the participating hospital where the BPCI episode begins. Single Awardees and Designated Awardees are EIs. Awardee Conveners and Designated Awardee Conveners may or may not be EIs themselves, and may also have one or more Episode Initiators under their Awardee structure.

2. BPCI Waiver Options

The design of the BPCI initiative allows Awardees to choose among several waivers of Medicare requirements to facilitate the implementation of care redesign interventions. To use any of these waivers, an Awardee must describe its use in its Implementation Plan (IP). An EI may or may not elect to use a waiver chosen by its Awardee.

Three-day SNF waiver: In general, Medicare beneficiaries are not eligible for Medicare-covered SNF care unless they have been a hospital inpatient for at least three consecutive days within 30 days of the SNF admission. Under this BPCI waiver, available only under Model 2, the SNF-qualifying hospital admission can be shorter than three days, as deemed appropriate by the treating clinicians. As a condition of this waiver, the majority of an Awardee's partner network must consist of SNFs rated three stars or better under the five-star quality rating system of Nursing Home Compare. In the IP, Awardees must describe criteria for targeting beneficiaries for changes in care, the guidelines that will apply to discharging beneficiaries to SNFs prior to completing the three-day inpatient hospitalization, and how patient safety will be assessed while using this waiver.

Beneficiary incentives: With the beneficiary incentive waiver, an EI under any of the three Models may provide a service or product to a beneficiary that is related to the episode but not typically covered by Medicare. There must be a reasonable connection between the service or product and the beneficiary's medical care and the incentive must advance the beneficiary's clinical goal. Awardees must describe in their IP the criteria for beneficiary eligibility to receive the incentive as well as the clinical goal of the incentive.

Telehealth waiver: Geographic restrictions on coverage of telehealth services furnished to Medicare beneficiaries may be waived as long as the service is furnished consistent with other coverage and payment criteria. (We have not collected data on the use of this waiver. We will report on its use in the next Annual Report.)

Post-discharge home visit waiver: The direct supervision requirement for home visits can be waived so that beneficiaries may receive a limited number of home visits (1 in a 30-day episode, 2 in a 60-day episode, 3 in a 90-day episode) in the beneficiary's home by licensed clinical staff paid under the physician fee schedule. (We have not collected data on the use of this waiver. We will report on its use in the next Annual Report.)

Gainsharing: A gainsharing waiver under Models 2, 3, or 4 allows BPCI participants to share incentive payments with gainsharing partners. Awardees must describe in their IP the specific methods for calculating and distributing these payments. The gainsharing partners may include an Awardee's EIs and other providers with a gainsharing agreement with the Awardee or the EI. Gainsharing is used to offer incentives to providers to support Awardees' care redesign initiatives.

Awardees have many options for customizing their gainsharing methodology. Awardees can share savings generated internally, Internal Cost Savings (ICS) or incentive payments received from CMS, Net Payment Reconciliation Amounts (NPRA) or both. Awardees may choose to share savings with individual physicians, determine when and how savings are calculated and distributed, and the manner in which the savings are contributed to various savings pools. The gainsharing calculation, which determines who receives incentive payments and how much they receive, may also differ across Awardees. Awardees can establish a fixed distribution schedule, or require gainsharers to meet specific efficiency, patient satisfaction, or cost savings metrics to qualify for distributions. However, gainsharers must meet the quality metrics specified by the Awardee in its IP.

B. Purpose of the Annual Report

This Annual Report provides a summative evaluation of the BPCI initiative to date. It is based on the multiple evaluation and monitoring activities that The Lewin Team completed during the year. We analyze multiple data sources, including the participants' Implementation Protocols (IPs), quarterly Awardee interviews, and episode initiator case studies to understand how participants are implementing BPCI; provider of service files and geographic for indicators of how participants differ from other providers; and claims to understand BPCI patient service use, changes over time, and comparison to similar patients. In the next Annual Report, this information will be supplemented by patient survey results and additional participant-provided data. In addition, with larger sample sizes, we will make comparisons across Awardees and Models to distinguish factors that contribute to the success or failure of bundled payments in achieving the initiative's objectives. These activities are intended to describe the characteristics of program and participants and how they change; to evaluate the impact of the BPCI initiative on the costs of episodes, the Medicare program, and the quality of care for Medicare beneficiaries; and to assess the program, provider, beneficiary, and environmental factors that contribute to the various results.

The Annual Report provides a preliminary assessment of the effects of the BPCI initiative on episode costs, the Medicare program and quality of care, and to understand the strategies that Awardees use to achieve those results. It also contains analyses to monitor potential unintended consequences of the initiative, meaning those effects that run counter to the stated objective of lowering costs without adversely affecting quality of care. The Q4 2013 Model-specific Program Monitoring/Rapid Cycle (PM/RC) reports are included as **Appendices C, D, and E**.

This report reflects quantitative analyses of Phase 2 participants in the first quarter under the initiative (Q4 2013) and qualitative analyses of participants in their first and second quarters (Q4 2013 and Q1 2014). The small sample sizes and early experience preclude drawing any conclusions. Rather, this first Annual Report may be better thought of as the outline for future analyses as more participants enter BPCI and gain greater experience under the initiative.

II. Research Questions

CMS' three major evaluation and monitoring questions provide the framework for our analytic approach and organize the results section of this report. Under each major question are more detailed research questions that will be addressed in this or future Annual Reports.

A. What are the characteristics of the program and participants at baseline and how have they changed during the course of the initiative?

B. What is the impact of the BPCI initiative on the costs of episodes, the Medicare program, and the quality of care for Medicare beneficiaries?

C. What program, provider, beneficiary, and environmental factors contributed to the various results of the BPCI initiative?

This first Annual Report does not include results for question C, given the small number of Awardees and episode initiators with experience under BPCI at this time and the fact that we only have one quarter of data since the BPCI initiative began.

A. What are the characteristics of the program and participants at baseline and how have they changed during the course of the initiative?

The objectives of research question A are to understand program participants, their care redesign, model incentive structures, and program adherence, and to examine the characteristics of their BPCI patients and the care they received. (Please note that future Annual Reports will also include information submitted directly from Awardees, the Provider Enrollment and Chain/Ownership System (PECOS), and additional qualitative data to address this question.) These data are supplemented by information from case studies, quarterly interviews, and Awardee Implementation Protocols (IPs). We use the Provider of Service (POS), Area Health Resource Files (AHRF), and other secondary data sources to describe the characteristics of the markets where BPCI participants are located.

- **A1: Participants—**We describe BPCI Awardees and episode initiators and how they compare to non-participants, with respect to multiple characteristics including, but not limited to size, profit status, market dominance, and Medicare share.
- **A2: Market characteristics—**The structure of the health care market of the episode initiators may affect the ability of BPCI participants to develop relationships with other providers or partnerships to deliver care across the entire bundle more efficiently. The market may also affect the care redesign opportunities for BPCI participants. We examine the geographic distribution of BPCI participants across the country. We also compare characteristics of markets where BPCI participants are located to characteristics of markets without a BPCI participant, including, the overall competitiveness among providers, the availability of various types of providers, and Medicare managed care penetration.
- **A3: Model incentive structure characteristics—**The BPCI initiative allows Awardees to choose among many design features, including BPCI Model and episodes; the level of risk; and use of waivers, including gainsharing. CMS has allowed this diversity in BPCI implementation to test the various effects of these design choices on achieving program objectives. We document Awardee choices among these design features and the motivation for these choices. For this Annual Report, these characteristics will provide an initial snapshot of how the early Awardees structured their BPCI participation.

- **A4: Care redesign and cost saving strategy characteristics—**BPCI is designed to provide incentives to deliver care more efficiently while maintaining or improving quality. Awardees can achieve these objectives through care redesign or by implementing cost saving strategies. Awardees must document these strategies in their IPs and any changes have to be accepted by CMS. We supplement the information from Awardee implementation protocols with data from the quarterly interviews with a select group of Awardees and site visits.
- **A5: Patient Population Characteristics—**We compare characteristics of BPCI patients from BPCI providers who began their episode in Q4 2013 with characteristics of all Medicare beneficiaries with an admission for the same MS-DRG in Q4 2013. We examine age, gender, Medicaid eligibility, HCC score, and utilization prior to the anchor hospital stay.

B. What is the impact of the BPCI initiative on the costs of episodes, the Medicare program, and the quality of care for Medicare beneficiaries?

The Annual Report provides initial insights into the impact of BPCI on the costs of episodes[6], the Medicare program, utilization of services, and the quality of care for Medicare beneficiaries. There are many ways that Awardees may reduce their episode costs below the target amount. Lowering the cost of care may involve substituting more intensive with less intensive services (for example, using home health care rather than skilled nursing care), providing fewer services, using more efficient providers, shifting services outside of the bundle period, or reducing costly adverse events by improving the quality or coordination of care. Awardees may also reduce their costs by changing their mix of patients by avoiding patients who are likely to be higher cost, enticing lower cost patients, or steering higher cost patients elsewhere; changing their coding practices so that less intensive patients are coded as more intensive ones; or reducing access to services for higher cost patients. Some of these responses achieve 'real' cost savings for the Medicare program, for example when care is provided more efficiently or adverse events are reduced. Others, however, may increase Medicare program costs if services are merely shifted outside of the bundle or if inadequate care results in costly follow up. Whether these responses improve or diminish quality of care may not always be apparent. For example, reductions in services may maintain or improve quality if those services were of limited value. Alternatively, quality may decline if patients are not receiving necessary services. These behaviors, in turn, can affect the local health care market, quality of care, or costs in ways that may be desirable or undesirable.

Our evaluation is designed to measure providers' responses to the BPCI incentives and how those behaviors affect the market, quality and costs. Medicare claims data is the foundation of analyses of episode service use and costs and changes over time, quality of care for Medicare beneficiaries, as well as broader assessments of the impact of BPCI on overall Medicare costs in this first Annual Report.

- **B1: Impact on utilization, payment, and efficiency—** Changes in service use and costs, compared to historical trends and comparison providers, provides information about how providers are responding to BPCI. Depending on the sample size, we distinguish changes in service use and costs that are due to differences in patient needs through risk adjustment. In addition, utilization may change because of clinical innovations that

[6] Standardized payment outcomes will be included in the second draft annual report.

change patterns of care, which we account for through the comparison providers that would be responding to the same innovations in care. After accounting for patient case-mix changes and secular trends in health care delivery, we attribute changes in use and costs to BPCI. We examine treatment patterns and costs in the bundle, as well as in the entire episode that includes the hospitalization and post-acute care (PAC) services during the relevant period post-discharge. Changes in bundle costs are examined with standardized allowed amounts. These amounts combine the Medicare program payments with the patient coinsurance and copayment amounts. Further, they are adjusted for Medicare payment policy adjustments to ensure that any differences across time and among providers reflect real differences in resource use rather than Medicare payment policies (e.g. teaching payments or differential payment updates).

- **B2: Impact on quality—**We examine changes in indicators of quality of care, accounting for changes in patient mix through risk adjustment when there is adequate sample size, and secular changes by using a difference-in-difference estimate relative to a comparison group.
- **B3: Other unintended consequences –** Potential unintended consequences of BPCI that we examine in this Annual Report include indicators of whether providers have engaged in "cherry- picking"—that is, changing their patient mix through increasing admissions of less complex patients—or "lemon-dropping"—avoiding high cost patients. We examine historical patterns of patients across the MS-DRGs that comprise the Awardees' bundles to discern any changes. We also look at the use of outpatient services that are similar to the MS-DRGs for signs that BPCI providers are treating as inpatients individuals who otherwise would have been treated in the outpatient setting to lower the costs of patients treated under BPCI. Similarly, we examine inpatient admissions to BPCI providers of patients in related but non-BPCI MS-DRGs to determine if BPCI providers are shifting patients in to or out of the bundles. These analyses are intended to help determine if changes in the BPCI participants' mix of patients could be related to the incentives of BPCI to reduce the acuity of patients within an episode or any other unintended consequences of the initiative.

Distinguishing desirable changes in care, e.g., increased efficiency, from unintended consequences will require careful comparisons across multiple measures over time. Therefore, our evaluation of unintended consequences associated with BPCI will require more observations over longer periods than what is available for this report. However, we present the initial information to begin addressing this issue. The analyses provide some insight as to whether unintended consequences may be occurring, but caution is necessary in interpreting the results because they may relate to other phenomena (e.g., increased volumes may be observed for a provider as it becomes recognized for innovation and/or quality). The analyses of unintended consequences will furthermore be incomplete because of the need to examine these outcomes over longer periods. To the extent possible, we have incorporated qualitative information that may provide insights into any unintended consequences.

III. Methods

The BPCI Model 2-4 evaluation and monitoring activities conducted during the first year of this contract used a combination of qualitative and quantitative data and methods. This section provides an overview of the quantitative analytical approach, including the data sources, identification of the comparison group, outcome definitions, and the statistical approach and of the qualitative analytical approach, including the data sources, the study sample, the interview protocol, and the thematic coding analysis. Section IX. Future Evaluation Activities describes the data sources and analyses that will be added in the second year of this contract and incorporated into the next annual report. These include the Awardee-provided information, patient assessment data, and the beneficiary survey.

A. Quantitative Analytical Approach

The quantitative evaluation relies on a non-experimental design, which uses providers and their episodes in a comparison group to infer the characteristics of BPCI providers and episodes if there had been no BPCI initiative. The quantitative analysis presented in this report is based on the participants and their episodes that were initiated during the first quarter of the initiative, Q4 2013. By inferring these counterfactual outcomes, we can discern the impact of the BPCI initiative. We use difference-in-difference (DiD) models to evaluate episodes initiated by BPCI providers and comparison group providers. The DiD model incorporates outcomes from before and after BPCI implementation to control for time invariant differences in the mean outcomes between the two groups due to unobserved factors. By comparing mean outcomes over time and between the episodes for the BPCI and comparison group providers, we can attribute differences to the BPCI initiative.

The discussion below outlines the main elements of our approach. First, we describe the data sources. Second, we describe the methods for identifying the study population. We also discuss the criteria used to select providers in the comparison group and create episodes of care. We then define the outcomes and describe the statistical methods used to examine any relationships between the BPCI program and the outcomes.

1. Quantitative data sources[7]

We used data from the Medicare Claims and Enrollment Database (EDB) and the Chronic Conditions Data Warehouse (CCW) to identify and construct episodes of care for beneficiaries at BPCI-participating sites (BPCI episodes) and at comparison sites (comparison episodes) during the BPCI intervention (Q4 2013) and baseline (Q4 2010 – Q3 2013) periods. We also used claims to create outcome measures and beneficiary risk factors associated with the outcomes (described below). Claims data include claims incurred October 1, 2010 through March 31, 2014 and processed as of June 1, 2014.

The Provider of Services (POS) file and Area Health Resource File (AHRF) provided information on BPCI participants and market characteristics, which we used in the selection of comparison providers (described below). Salesforce, CMS's interactive database to track BPCI initiative

[7] Our evaluation will incorporate additional data sources for the next annual report, including a beneficiary survey. See Section IX: Future evaluation activities at the end of the report.

participation and activities, was the primary source of data for BPCI participant information. Exhibit 1 provides detail on each of the source datasets and the purpose of the variables created from each.

Exhibit 1: Summary of Quantitative Data Sources used in Analysis in Year 1

Dataset Name	Date Range	Dataset Contents	Use in Year 1 Evaluation and Monitoring Activities
Medicare Claims	Oct 2010-Mar 2014	Medicare Part A and B claims.	Used to create episodes of care, outcome measures such as readmissions, emergency department (ED) visits, number of days in each setting (e.g., acute care hospital, home health agency (HHA), skilled nursing facility (SNF)), and payments.[8] Also used to create risk factors including Hierarchical Condition Categories (HCCs) and health care use prior to anchor hospitalization.
The Master Beneficiary Summary File (MBSF)	Jan 2010-Mar 2014	Beneficiary and enrollment information, including beneficiary unique identifier, address, date of birth/death, sex, race, age, and Medicare enrollment status.	Used to identify eligibility for episodes of care, beneficiary demographic characteristics, and beneficiary eligibility for inclusion in the denominator for each of the outcome measures.
Provider of Services (POS) file	2011-2013	Information on Medicare-approved institutional providers, including provider number, size, and staffing.	Descriptive analysis of BPCI and non-BPCI providers to create predictors in provider propensity model on participation in BPCI.
Area Health Resource File (AHRF)	2011	County-level data on population, environment, geography, health care facilities, and health care professionals.	Descriptive analysis of BPCI and non-BPCI market characteristics. Predictors in provider propensity model on participation in BPCI.
Salesforce –BPCI Participant and Episode Salesforce Reports	2013-2014	Information compiled by CMS on BPCI participants and potential future participants and their clinical episodes, including participant name, CMS Certification Number, location, type (ACH, SNF, etc.), BPCI "role," clinical episode type(s) and length(s), BPCI participation start and end dates, and contact information.	Used to identify Q4 2013 BPCI participating providers and clinical episodes. Identified potential future participants to exclude from comparison group.

2. Study sample

We identified the Q4 2013 study sample through four main steps:

- Identify the BPCI participating providers and the clinical episodes for which they were participating in BPCI during Q4 2013
- Select similar non-BPCI participating providers that were not Phase 1 BPCI participants as of October 2013
- Construct episodes for BPCI participants and comparison group providers

[8] Standardized allowed amounts will be included in the next draft of this Annual Report. We are receiving these data from the CMS contractor that provides CMS with standardized payments for use across multiple contracts.

- Select episodes from the comparison provider group using a stratified random sampling approach to match the distribution of clinical episodes among BPCI providers.

This section describes each of these four sequential steps.

a. BPCI participating provider identification

There were 19 Episode Initiators (EIs) [9] in the three Models, comprised of three Single Awardees (SA), seven Designated Awardees (DA), and nine additional Episode Initiating Bundled Payments Provider Organizations (EI-BPPOs) that participated in BPCI during Q4 2013.[10] Exhibit 2 lists the EIs, their provider type, and participant role. (**Appendix F** includes a complete list of the clinical episodes by participant for each Model.) The 19 EIs began participation with 37 clinical episodes.

Exhibit 2: Episode Initiators in Q4 2013, by Model, Provider Type and Role

Model	Episode Initiator Name	Type of Provider	Episode Initiator Role
Model 2	Lodi Memorial Hospital Association, Inc.	ACH	Single Awardee
	Baptist Medical Center	ACH	Single Awardee
	St. Vincent Infirmary Medical Center	ACH	Episode Initiating Bundled Payments Provider Organization
	Cleveland Clinic Health System	ACH	Single Awardee
	Maine Medical Center	ACH	Episode Initiating Bundled Payments Provider Organization
	St. Luke's Hospital	ACH	Episode Initiating Bundled Payments Provider Organization
	St. Luke's Hospital-Warren Campus	ACH	Episode Initiating Bundled Payments Provider Organization
	New York University Hospital Center	ACH	Designated Awardee
	Methodist Medical Center of Illinois	ACH	Designated Awardee
Model 3	Brooks Bartram Crossing	SNF	Episode Initiating Bundled Payments Provider Organization
	Brooks Home Care Advantage	HHA	Episode Initiating Bundled Payments Provider Organization
	Brooks Rehabilitation Hospital	IRF	Episode Initiating Bundled Payments Provider Organization
	St. Vincent Medical Center - Southside	SNF	Episode Initiating Bundled Payments Provider Organization
	Good Samaritan Society - Ambassador	SNF	Designated Awardee
	Good Samaritan Society - Maplewood	SNF	Designated Awardee

[9] The participant that has a signed agreement with CMS indicating that it will assume risk under BPCI is referred to as an Awardee. The participant where an episode starts is referred to as an episode initiator (EI). This is a hospital or physician group practice (PGP) under Model 2, a hospital under Model 4, or a PGP, skilled nursing facility (SNF), home health agency (HHA), inpatient rehabilitation facility (IRF), or long-term care hospital (LTCH) under Model 3. An Awardee may also be an EI.

[10] The final list of episode initiators and their clinical episodes was based on those with a start date of October 2013 on the February 2014 monthly report received from CMS. CMS creates a monthly report of all current, past, and future BPCI participants and clinical episodes. The final monthly report is a Salesforce report with minor modifications based on CMS' determination of final eligibility. We will use the monthly reports on an ongoing basis to identify the active BPCI participants and clinical episodes by month.

Model	Episode Initiator Name	Type of Provider	Episode Initiator Role
Model 3	Good Samaritan Society - Sioux Falls Center	SNF	Designated Awardee
	Good Samaritan Society - Sioux Falls Village	SNF	Designated Awardee
	Good Samaritan Society - Luther Manor	SNF	Designated Awardee
Model 4	Valley Baptist Medical Center - Harlingen (VBMC-H)	ACH	Episode Initiating Bundled Payments Provider Organization

Source: Lewin analysis of February 2014 Salesforce report

b. Selection of providers in comparison group

The DiD approach requires a comparison group of non-BPCI providers ("non-participants") that is similar to the BPCI participants with respect to market, available services, and case-mix. Because providers voluntarily enroll in BPCI, BPCI participants are likely to be different than non-participants, which could affect patient outcomes. BPCI participants may have less efficient care and larger room for improvement relative to non-participants. This self-selection could result in a biased estimate of the impact of BPCI on outcomes. BPCI participants may have improved outcomes over time even without participating in BPCI. Moreover, program evaluation literature indicates that treatment effect estimates based on standard regression models can be very sensitive to untestable model assumptions when the intervention and comparison group are dissimilar in one or more dimensions (Dehejia and Wabha (2002), Zhao (2004), Smith and Todd (2005)).

To try to account for the potential selection effect, we compared Q4 2013 participants to non-participants with the goal of selecting non-participants that were similar to BPCI participants. We constructed comparison groups for each Model and provider type from the universe of Medicare providers that had not signed up for BPCI in either Phase 2 (active period of performance) or in Phase 1 (active preparatory period) as of October 2013.[11] We found key differences between these two groups of providers. BPCI participants operate almost exclusively in urban markets that are larger and more concentrated relative to markets where no provider signed up for BPCI (non-BPCI markets). BPCI participants also tend to be larger than non-participants and treat more patients in MS-DRGs included in the 48 BPCI clinical episodes. (See **Appendix A** for a complete list of the MS-DRGs by BPCI clinical episode.) These findings were used to develop a set of exclusion rules to restrict the group of providers included in the comparison group. These exclusion rules are listed and described below. Exhibit 3 includes a summary of each exclusion criterion by Model and provider type.

Market exclusions

We defined the market for a given provider as its Core-Based Statistical Area (CBSA). CBSAs are non-overlapping geographic areas defined by the U.S. Office of Management and Budget that exhibit market-related behaviors. CBSAs are socially and economically interdependent areas that are geographically circumscribed by commuting times to the core geographic area. For the few

[11] We excluded providers that had entered Phase 1 prior to the November or Winter Open Periods. Phase 1 is the period after a provider has indicated that it is considering joining BPCI, but it is not yet participating. If a provider entered Phase 1 in the November or Winter Open Periods, it may be in the comparison group because we did not have that information when we constructed the comparison group.

providers that were not located within a CBSA, we assigned them to the largest CBSA located within their Hospital Referral Region (HRR), which are regional health care markets for tertiary hospital care.

Based on our market definition, we excluded markets from our comparison group if they were very difference from the markets with Q4 2013 BPCI participants. To this end, we first characterized BPCI markets by urban location and population size, and identified which market types did not have any BPCI participants. For example, all Model 2 BPCI participants were in urban markets with more than 50,000 people. Thus, we excluded from the comparison group acute care hospitals (ACHs) in rural markets with fewer than 50,000 people. Market-level exclusions varied by Model and by provider type (See Exhibit 3).

Additional exclusions were imposed to control for differences in regulatory environments that may relate to differences in outcomes. For instance, for Model 2 we excluded all markets in the state of Maryland, because Maryland hospitals are not paid under Medicare's Inpatient Prospective Payment System (IPPS). For Model 3, we excluded non-participants that were not in the same states as BPCI Model 3 participants since Medicaid nursing home reimbursement policies may affect outcomes from SNF and HHA EIs.

We excluded non-BPCI providers in markets where BPCI participants have over 30% of the discharges in the 48 BPCI clinical episodes. This was to avoid including providers that may be exposed to spillover effects of BPCI. The presence of a BPCI participant in a market may cause changes in utilization or referral patterns for other beneficiaries in the market. This spillover effect may confound interpretation of results because non-BPCI beneficiaries may receive some care from BPCI participants, comparison providers may adopt practices similar to BPCI participants, or BPCI may affect referral patterns in the market.[12]

Provider exclusions

We also excluded providers with characteristics that were not exhibited by BPCI providers. For example, we classified Model 2 BPCI ACH providers by ownership type (i.e., government, for-profit, and non-profit), size (under 100 beds, between 101 and 250 beds, over 250 beds), and by the number of admissions for a BPCI clinical episode in 2013. Based on Model 2 participant characteristics, we only included in the comparison group non-profit hospitals over 100 beds with over 300 BPCI qualifying cases in 2013. All provider-level exclusions are listed in Exhibit 3.

Propensity score exclusions

In addition to the market and provider attributes described above, BPCI participants differed from non-participants in less obvious ways. Overall, BPCI participants were located in markets with greater competition, but some BPCI participants were located in markets with little competition.[13] Model 2 BPCI participants were located in all regions (Midwest, Northeast, South,

[12] We will evaluate the impact of BPCI on market spillover in the second Annual Report when we have a year of post-BPCI outcome measures.

[13] We measured the competition of a market using the Herfindahl index. The Herfindahl index is defined as the sum of the square of the market shares (i.e., market penetration) of all providers (BPCI and non-BPCI) of a particular type (ACH, SNF, HHA, etc.). The Herfindahl Index values can range from 0 to 1, where values closer to zero signify a higher degree of competition among providers and values closer to 1 signify less competition (i.e., one or a few providers dominate the market).

and West), but relative to all ACHs, there were fewer participants in the South and more in the Northeast. Relative to non-participants, BPCI participants were located in markets with more providers per capita, including primary care practitioners (PCP), specialists, and SNFs, but there was significant variation across BPCI participants.

Because of these differences, we used propensity score methods to identify adjustments to the Model 2 and Model 3 SNF comparison groups to help ensure a better match.[14] *Propensity score* is defined as the probability of receiving the treatment (in this case, participating in BPCI) conditional on a set of characteristics. This probability was estimated using a logistic model that included additional market factors (i.e., population size, per capita measures of the number of IRF beds, SNF beds, primary care, and specialty physicians) as well as provider characteristics, including size. Using the coefficients from the logistic regression model, we constructed a propensity score as the log of the odds ratio of the predicted probability of participating in BPCI. We used the calculated propensity score to exclude providers from the comparison group that had a propensity score outside the range of the distribution of propensity scores among providers in the Q4 2013 BPCI participant group.

Exhibit 3: Comparison Group Exclusion Criteria by Model and Provider Type

Category	Criteria	Model 2	Model 3			Model 4
		ACH	SNF	HHA	IRF	ACH
Market Level Exclusions	Urban/Rural status	Rural	Rural		Rural	Rural
	Population	Under 50,000	Under 150,000	Under 18,500		
	Providers not in the same state as BPCI participants		Exclude all	Exclude all	Exclude all	
	Maryland hospitals	Exclude all				Exclude all
	Market share in CBSA	Exclude CBSA with BPCI market share over 30%				
Provider Level Exclusions	Provider size	Under 100 beds	Under 36 beds			Under 250 beds
	Ownership status	Government	Government and For-profit	Government		Government and For-profit
	Number of episodes per year	Under 300	Under 4	Under 90	Under 1[15]	Under 300
	Provider on-site resources		Providers without physical or occupational therapist on-site			
	Quality Rating		Under 2 stars			

[14] There was only one Model 3 HHA, one Model 3 IRF, and one Model 4 ACH participating in Q4 2013, so a propensity score method was not feasible to construct these comparison groups

[15] The minimum threshold was determined by the minimum number of cases per year that BPCI participants had during the baseline and intervention period. One of the Model 3 IRF participants had only one case per year during one of the years in the baseline period.

Category	Criteria	Model 2	Model 3			Model 4
		ACH	SNF	HHA	IRF	ACH
Propensity Score Exclusions	Exclude provider if propensity score was outside the range of BPCI providers	Yes	Yes	NA[16]	NA[16]	NA[16]

Exhibit 4: Number of Comparison Providers

Provider	Model 2	Model 3			Model 4
	ACH	SNF	HHA	IRF	ACH
Number of Non-BPCI providers with valid POS data	3,115	20,614	23,440	451	3,115
Number of excluded providers	2,532	20,571	23,249	441	3,082
Final number of non-BPCI providers in comparison group	583	43	191	10	33

Appendix G includes five tables (Model 2, Model 3 SNF, Model 3 IRF, Model 3 HHA, and Model 4) that compare the distribution of providers across market and provider characteristics for three groups: 1) Q4 2013 BPCI episode initiators, 2) Non-participant providers excluded from the comparison group, and 3) Comparison group. As mentioned above, the steps just described were used to construct the comparison group similar to the Q4 2013 BPCI providers only. Because there was a very small number of participants in the first quarter, providers in the comparison group were matched on a limited set of variables. In particular, we did not match on potential outcomes, such as readmissions and episodes costs, that could be correlated with participation. With fewer than 10 observations per BPCI provider type, we could not assess to what extent providers that selected into BPCI had lower or higher average costs relative to other non-BPCI participants. Providers with high historical episodes costs could potentially generate significant NPRA. At the same time, high costs providers may treat more complex and riskier patients, which would make gains from participating in BPCI uncertain. As new providers become active under BPCI in future quarters, we will investigate if additional factors, including previous outcomes, could determine participation in BPCI and should be included as matching variables.

c. Episode construction methodology

This section describes the process used to define the episodes, that is, the aggregation of Medicare claims for a patient across the relevant providers and in the relevant period, to correspond to the Model 2, 3, and 4 episodes tested under BPCI. We identified inpatient stays that could potentially trigger a BPCI episode during the baseline period (Q4 2010 through Q3 2013) and intervention period (Q4 2013) for Model 2, Model 3, and Model 4 BPCI participants and comparison providers. For the patients with these inpatient stays, we constructed episodes by grouping qualifying Part A and Part B claims according to the specifications from the BPCI Operations Contractor. We tested the algorithm on the same sample (BPCI Phase I participants between July 1, 2009 and June

[16] There was only one Model 3 HHA, one Model 3 IRF, and one Model 4 ACH participating in Q4 2013, so a propensity score method was not feasible to construct these comparison groups.

30, 2012) used by the Operations Contractor.[17] We resolved all discrepancies between our episodes and those defined by the Operations Contractor before applying the algorithm to our study sample.

There are six major steps in constructing the BPCI episodes, as described below.

Step 1: Extract all claims necessary to construct the episodes

We extracted all Medicare Part A and Part B claims from the Chronic Condition Warehouse (CCW). For the baseline period, this was all claims with "thru" dates between January 2010 and December 2013 that were processed prior to June 1, 2014, when the claims were used for this report. For the intervention period, this was all claims with "thru" dates between January 2013 and March 2014 that were processed prior to June 1, 2014.

Step 2: Identify qualifying inpatient stays and PAC claims

Before potential episodes can be defined, the acute care hospital inpatient claims are grouped into stays, PAC claims are identified that are preceded by a qualifying inpatient stay within 30 days, and the inpatient MS-DRG is associated with the appropriate PAC claims. Then the inpatient stays and the qualifying PAC claims are restricted as follows:

Model	Baseline Period	Intervention Period
Models 2 & 4	ACH admissions between October 1, 2010 and September 30, 2013	ACH admissions between October 1, 2013 and December 31, 2013
Model 3	SNF, HHA, IRF admissions between October 1, 2010 and September 30, 2013 that are within 30 days of qualifying inpatient discharge	SNF, HHA, IRF admissions between October 1, 2013 and December 31, 2013 that are within 30 days of qualifying inpatient discharge

Step 3: Select eligible inpatient and PAC admissions and build bundles

The eligible admissions were restricted to those that occurred in a BPCI participant or comparison provider, as determined by the CMS Certification Number (CCN) and the MS-DRG. For BPCI providers, we excluded admissions for the MS-DRGs that were not in the clinical episodes they were participating in during Q4 2013. The length of the bundle (30, 60, or 90 days for Models 2 and 3) corresponding to the BPCI participant/clinical episode combination was then assigned to the inpatient stay (Model 2) or PAC claim (Model 3).[18]

We identified the admissions for the MS-DRGs associated with the clinical episodes that were "active" in Q4 2013[19] in the baseline and intervention periods for each comparison provider. If the provider had at least an average of one admission per quarter for an MS-DRG in an active clinical episode, we retained all admissions for that clinical episode for the provider. Then, we randomly assigned an episode length (30, 60, or 90 days) to each Model 2 and 3 comparison provider-clinical

[17] The Operations contractor for BPCI is Mathematica Policy Research. They perform a variety of functions including the calculation of the target price amounts and the determination of Awardee savings amounts via reconciliation reports.

[18] Model 4 bundles are 30 days.

[19] For Model 2 comparison group, this included 34 clinical groups; for Model 3 comparison group, this included 8 clinical groups; and for Model 4, it was 1 clinical group.

episode combination based on the distribution of length of episodes among the BPCI participant clinical episodes.

For each qualifying admission and PAC claim that was retained, we constructed episodes by grouping claims based on the admission date, length of episode, and program exclusions rules.

Step 4: Apply overlapping episode exclusion criteria

At this point in the process, two episodes could overlap when a second qualifying episode for a beneficiary starts before the first one ended. Therefore, the next step was to apply the within-model and cross-model overlapping episode exclusion criteria, as outlined in the episode algorithm specifications. For each beneficiary with overlapping episodes within a model, we identified potential episode initiating stays and compared the MS-DRGs of the stays to determine which episode was retained based on the episode construction logic. In general, the first stay was retained as the anchor stay and the second stay was dropped. If the second stay, however, was for an MS-DRG that is excluded from the first stay, then the second stay was retained as the anchor stay and the first was dropped.

We applied the within-model overlapping episode exclusion criteria to all baseline episodes and separately in the intervention period. We did not apply the overlapping episode exclusion criteria when a baseline period episode overlapped with an episode that started during the intervention period, to be consistent with how the program is being implemented. When these exclusion criteria are applied to the first quarter within a dataset, there is a lower likelihood that episodes in the first quarter will be excluded compared to episodes in subsequent quarters. The episodes in the first quarter cannot be trumped by episodes that began in the prior quarter, given that the prior quarter is not included in the episode algorithm. Therefore, the first quarter of the baseline time period and the first (and only) BPCI quarter in this research dataset have a different mix of episodes than the second through 12th quarters of baseline. In particular, the episodes that remain in the first quarter of baseline and first quarter of BPCI are more likely to be for beneficiaries who had a prior readmission or prior post-acute care use. The result is that some outcomes (such as mortality) appear to be higher during the first quarter of baseline and intervention periods relative to the other quarters.

BPCI rules also have cross-model exclusion criteria. The cross-model exclusion only allows one episode per beneficiary in a given Model during the episode length. In general, Model 4 episodes take precedence, followed by Model 2, and then Model 3. The Operations Contractor runs the algorithm only on BPCI providers. If we had applied these rules to include the comparison providers it would have resulted in a loss of a significant number of episodes, particularly Model 3. Therefore, we did not apply these criteria.

Step 5: Apply beneficiary coverage exclusion criteria

The next step was to determine which potential episodes derived from Step 1 to 4 should be retained as near final episodes. To do so, the potential episode files were merged with the

beneficiary enrollment source files. Episodes were excluded if the beneficiary did not satisfy the BPCI program coverage criteria. To be included, beneficiaries must:

- be enrolled in fee-for-service Medicare with Medicare as the primary payer during the entire span of the episode[20]
- not have ESRD during the entire episode
- have survived the anchor inpatient stay, for Model 2 only

Step 6: Create balanced comparison group

Finally, we created a sample of episodes for the inclusion in the final research analytical file among all episodes from comparison group providers. The sample was selected to match the empirical distribution of episodes for BPCI providers. For example, while Q4 2013 Model 2 BPCI providers together signed up for 34 clinical episodes, 35% of the BPCI patient episodes were for clinical episode "major joint replacement of the lower extremity". This clinical episode represented only 10% of all eligible episodes in the comparison provider group. To balance the BPCI and comparison group sample by clinical episodes, the comparison group data was sampled so that the distribution of clinical episodes matched the BPCI distribution for the same Model and provider type. The sampling of episodes in the comparison group was performed by iteratively computing the largest number of comparison episodes necessary to populate each of the clinical episodes with the same proportions as the BPCI population. This process involved first computing the distribution by clinical episode by Model and provider type. Next, these shares were applied to the total number of episodes in the comparison group in each Model and provider type in order to calculate a target number of episodes by clinical group required to match the distribution of the BPCI population. Exhibit 5 summarizes the number of episodes resulting from the episode construction logic for Q4 2013 of the BPCI initiative when applied to our sample of BPCI and comparison providers by model.[21]

Exhibit 5: BPCI Episodes by Participants and Comparison Providers by Model, Q4 2013

Sample	Model 2	Model 3 SNF[a]	Model 3 IRF	Model 3 HH	Model 4
BPCI	1,713	200	44	31	94
Comparison	60,852	239	406	4,460	994

Source: Lewin analysis of Medicare claims data.

[a] Limited to surgical orthopedic excluding spine episodes.

[20] To reduce processing time, we identified Medicare as the primary payer based on enrollment data, not on actual claims payment data for the baseline period. Prior to deviating from the episode algorithm specifications, we conducted a test and found that using enrollment data instead of claims payment information to identify Medicare as the primary payer excluded an additional 3% of episodes, therefore making our inclusion of episodes more conservative as opposed to inadvertently including additional episodes where the beneficiary may not necessarily have had Medicare as his/her primary payer.

[21] For Model 2, approximately 8% of comparison group beneficiaries and 4% of BPCI participant beneficiaries had overlapping episodes between the baseline and intervention periods. For Model 3, approximately 10% of both comparison group and BPCI participant beneficiaries had overlapping episodes between the baseline and intervention periods. For Model 4, there were no overlapping episodes for the comparison group beneficiaries and only one BPCI participant beneficiary (1.1%) had overlapping episodes.

The episode algorithm was built to identify BPCI participant episodes to determine each participant's target price per MS-DRG. The algorithm did not consider episodes across different periods or episode construction for a comparison group. Therefore, we are exploring alternative ways to apply the episode algorithm to a combined BPCI and comparison group sample across baseline and intervention periods to meet the needs of the evaluation while minimizing any bias.

3. Clinical episode aggregation

With only 19 EIs participating in 34 clinical episodes in Q4 2013, there were not sufficient sample sizes to report outcomes by model, by clinical episode, or by episode length. Small sample sizes would have limited our ability to draw any inferences or generalizations. To accommodate small sample sizes, we consulted with clinicians at Telligen to group clinically similar episodes. Our goal was to aggregate as little as possible while ensuring clinically meaningful subgroups of clinical episodes with sufficient sample sizes. **Appendix H: Aggregation of Clinical Episodes** presents a detailed table depicting how we combined the 48 clinical episodes nine clinical groups. In conversations with CMS and Telligen, we decided nine clinical episode groups would be the most appropriate level at which to stratify the results by Model, if sample sizes were sufficient. The distribution of episodes by clinical group among the 19 BPCI participants in Q4 2013 is shown in Exhibit 6.

Exhibit 6: Aggregated Episodes by Model, Q4 2013 [22]

Clinical Episode Groupings:	Number of Episodes	Percent of Model Episodes
Model 2: Q4 2013 Episodes by Clinical Episode Groupings		
Non-surgical and surgical: GI	109	6.36
Non-surgical: cardiovascular	135	7.88
Non-surgical: neurovascular	17	0.99
Non-surgical: ortho	14	0.82
Non-surgical: other medical	284	16.58
Non-surgical: respiratory	163	9.52
Surgical: cardiovascular	149	8.7
Surgical: ortho excluding spine	778	45.42
Surgical: spinal	64	3.74
Total	**1,713**	**100**
Model 3 SNF Initiated: Q4 2013 Episodes by Clinical Episode Groupings		
Non-surgical: ortho	725	82.8%
Surgical: ortho excluding spine	118	13.5%
Non-surgical: cardiovascular	33	3.8%
Total	**876**	**100%**
Model 3 HHA Initiated: Q4 2013 Episodes by Clinical Episode Groupings		
Non-surgical: ortho	2	6.5%
Surgical: ortho excluding spine	29	93.5%
Total	**31**	**100%**

[22] Model 2 results by Level 4 clinical episode groupings will be included in the second draft PMRC and annual reports.

Clinical Episode Groupings:	Number of Episodes	Percent of Model Episodes
Model 3 IRF Initiated: Q4 2013 Episodes by Clinical Episode Groupings		
Non-surgical: ortho	3	6.8%
Surgical: ortho excluding spine	41	93.2%
Total	**44**	**100%**
Model 4: Q4 2013 Episodes by Clinical Episode Groupings		
Surgical: ortho excluding spine	94	100
Total	**94**	**100**

Source: Lewin analysis of February 2014 Salesforce data.

Note: **Appendix H: Aggregation of Clinical Episodes** presents the 48 clinical episodes that were aggregated into these groupings.

Based on the small number of clinical episodes for Model 3 HH and IRF, we only present the results across all clinical episodes combined. For Model 3 SNF, we present the results only for surgical orthopedic excluding spine.[23] For Model 2, there was sufficient sample size to present results in seven clinically related groups. Exhibit 7 depicts the final levels of clinical aggregation used for Q4 2013, Model 2 analysis.

Exhibit 7: Clinical Episode Aggregation for Q4 2013, Model 2

Clinical Episode Groupings: Aggregation level 4	Clinical Group: Aggregation for Q4 2013, Model 2
Non-surgical and surgical: GI	All GI
Non-surgical: cardiovascular	Non-surgical: cardiovascular and neurovascular
Non-surgical: neurovascular	
Non-surgical: orthopedic	Non-surgical: other
Non-surgical: other medical	
Non-surgical: respiratory	Non-surgical: respiratory
Surgical: cardiovascular	Surgical: cardiovascular
Surgical: ortho excluding spine	Surgical: orthopedic excluding spine
Surgical: spinal	Surgical: spinal

Note: **Appendix H: Aggregation of Clinical Episodes** presents the 48 clinical episodes that were aggregated into these groupings.

4. Measurement periods

For this evaluation, we defined two sets of *measurement periods* for which we calculated the outcomes of interest: the *bundle timeline* and the *patient timeline*. The bundle timeline measurement periods vary by model and by episode length. In contrast, the patient timeline measurement periods are consistent across models and bundle lengths. This allows us to compare outcomes regardless of the bundle lengths and models. Every outcome was calculated for one or more defined *measurement periods*. For example, for Models 2 and 4, all-cause, unplanned readmission rates were calculated for three *patient timeline* measurement periods: within 30 days of hospital discharge, within 60 days, and within 90 days of hospital discharge. These measurement periods

[23] Since the Model 4 participant was only participating in one clinical episode, no clinical episode groupings needed to be considered.

are labeled *post-discharge 30, post-discharge 60, and post-discharge 90*. Exhibits 8 and 9 describe the bundle timeline measurement periods and the patient timeline measurement period.

This report does not include the presentation of results across all *measurement periods* due to insufficient time for claims run-out[24] at the time claims were pulled for this report. We only include outcomes defined during *patient timeline* periods of 90 days or shorter and the *bundle timeline* period "within bundle" in this report. We do not include outcomes defined during *patient timeline* periods of 120 days or more or "post-bundle" *bundle timeline* periods. The next Program Monitoring/Rapid Cycle (PM/RC) Report (to be delivered Q4 2014) and next year's annual report will include outcomes defined during these additional *measurement periods* once sufficient run-out is available.

Episodes were dropped from measure denominators on a case-by-case basis in situations where there was not enough claims run-out to cover the measurement period. Specifically, if the end of our current observational period (March 31, 2014) occurred within the *measurement period* for the given episode, we dropped the episode from the denominator. For example, if a Model 2 episode began on December 23, 2013 and had a post discharge period beginning January 4, 2014, we dropped the episode from any 90-day post discharge measures, since the 90-day post discharge period for this episode extends beyond March 31, 2014. As a result of these exclusions, the outcomes measured during the 90 day post discharge *patient timeline* period (or episode start plus 90 days) have smaller denominators than outcomes measured during the 30 day post discharge *patient timeline* period (or episode start plus 30 days).

[24] Claims run-out is the period of time after a claim is incurred until it is paid by Medicare. The typical 'claims run-out' that is desired for complete analysis of inpatient claims, for example, is three months because approximately 97% of inpatient claims are paid within three months of when they were incurred.

Exhibit 8: Definition of Measurement Periods Relative to the Bundle across Models

Definition of Measurement Periods Relative to the Bundle											
Model	Pre-bundle 30	Bundle Dates		Within Bundle Services		Episode Start +30	Episode Start +60	Episode Start +90	Post PAC 30	Post-bundle (PB) 30	Post-bundle (PB) 60
		Start date	End date	Acute	Post-Discharge						
Model 2	Anchor IP stay admission date minus 30 days	Anchor IP stay admission date	Anchor IP stay discharge date plus bundle length	Anchor IP stay from IP admission date to IP discharge date[b]	From IP discharge date to bundle end date	Anchor IP stay admission date plus 30 (60, or 90) days			NA	30 days after the end of the bundle	31 to 60 days after the end of the bundle
Model 3	EI PAC admission date minus 30 days	EI PAC admission date	EI PAC admission date plus bundle length	N/A	From EI PAC discharge date to bundle end date	EI PAC admission date plus 30 (60, or 90) days			EI PAC discharge date plus 30 days	30 days after the end of the bundle	31 to 60 days after the end of the bundle
Model 4	Anchor IP stay admission date minus 30 days	Anchor IP stay admission date	IP stay discharge date (anchor IP stay if no readmission occurs OR qualifying readmission)[a]	Anchor IP stay from IP admission date to IP discharge date[b]	Duration of qualifying readmissions started within the 30-day readmission window	Anchor IP stay admission date plus 30 (60, or 90) days			NA	30 days after anchor IP discharge date excluding days related to qualifying readmissions[c]	31 to 60 days after anchor IP discharge date excluding days related to qualifying readmissions[c]

Notes:

a If a qualifying readmission occurs within 30 days after anchor admission discharge date, the period between anchor hospital discharge and hospital readmission date belongs to the post-bundle period.

b For BPCI patients who were transferred from an anchor hospital to another hospital, the acute care period ends at the discharge date of the transfer hospital.

c For utilization and payments we will separately observe LOS and payments for within-bundle versus post-bundle care. For other outcomes, including mortality and readmissions, claims for related readmissions are not included.

Exhibit 9: Definition of Measurement Periods Relative to the Patient Timeline across Models and episode lengths

Model	Pre-Admission	Anchor IP	30-day Post-Discharge Period (PDP)	60-day PDP	90-day PDP	120-day PDP	150-day PDP	180-day PDP
Model 2	30 days prior to anchor hospital stay	Anchor IP stay from IP admission date to IP discharge date	PD Period from anchor IP discharge date to 30 days	PD Period from anchor IP discharge date to 60 days	PD Period from anchor IP discharge date to 90 days	PD Period from anchor IP discharge date to 120 days	PD Period from anchor IP discharge date to 150 days	Anchor IP discharge date to 180 days
Model 3								
Model 4								

We will measure outcomes during the 120-, 150-, and 180-day post discharge period to evaluate impact of program past the bundle length.

5. *Outcome definitions*

We evaluate the impact of BPCI on the utilization of health care services, payment, quality of care, and unintended consequences by measuring a number of outcomes within each of these domains. The complete list of outcomes included in the Q4 2013 analysis reported in the results section appear in Exhibit 10, which includes the outcome name and description, organized by domain. **Appendix I** provides the definitions of all other variables used in our analysis, including market characteristics, provider characteristics, and risk factors.

Exhibit 10: Outcomes used in Evaluating BPCI in Q4 2013

Outcome Name	Definition/ Description	Measurement period(s)	Technical Definition	Eligible Sample
Quality				
Unplanned Readmission Rate following inpatient hospital discharge (Models 2 & 4)	Episodes with one or more unplanned, all-cause readmissions after inpatient discharge for any eligible condition	30-day Post-discharge, 60-day Post-discharge, 90-day Post-discharge	Binary outcome (1= at least one readmission during measurement period; 0= no eligible readmissions during measurement period). Eligible readmissions inpatient prospective payment system claims with a DRG not on the list of excluded DRGs for the given clinical episode. Measure was based on specifications for the NQF-endorsed all-cause unplanned readmission measure (NQF measure 1789). Similar to the NQF-endorsed measure, we excluded planned admissions, based on AHRQ Clinical Classification System Procedure and Diagnoses codes.	Beneficiaries who: 1) have a complete FFS enrollment history six months prior to admission; 2) have non-missing age & gender data; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) are discharged from the anchor hospital stay in accordance with medical advice); 5) have a measurement period that ends on or before March 31, 2014.

Outcome Name	Definition/ Description	Measurement period(s)	Technical Definition	Eligible Sample
Unplanned Readmission Rate during first 30 days of Home Health use following inpatient discharge (Model 3)	Episodes with one or more unplanned, all-cause readmissions within first 30 days of Home Health use for any eligible condition	First 30 days of Home Health use	Binary outcome (1= at least one readmission during measurement period; 0= no eligible readmissions during measurement period). Eligible readmissions are inpatient prospective payment system claims with a DRG not on the list of excluded DRGs for the given clinical episode. Readmissions must be unplanned, based on AHRQ Clinical Classification System Procedure and Diagnoses codes.	Beneficiaries for which the initiating PAC setting is Home Health and who: 1) have a complete FFS enrollment history six months prior to admission; 2) have non-missing age & gender data; 3) are discharged from the anchor hospital in accordance with medical advice; 4) have a measurement period that ends on or before March 31, 2014.
Unplanned 30-day Readmission Rate following discharge from institutional PAC (Model 3)	Episodes with one or more unplanned, all-cause readmissions within 30 days following discharge from institutional PAC setting for any eligible condition	First 30 days post-discharge from institutional PAC	Binary outcome (1= at least one readmission during measurement period; 0= no eligible readmissions during measurement period). Eligible readmissions are inpatient prospective payment system claims and with a DRG not on the list of excluded DRGs for the given clinical episode. Readmissions must be unplanned, based on AHRQ Clinical Classification System Procedure and Diagnoses codes.	Beneficiaries for whom the initiating PAC setting is *not* Home Health and who: 1) have a complete FFS enrollment history six months prior to admission; 2) have non-missing age & gender data; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) are discharged from the institutional PAC setting in accordance with medical advice; 5) are alive at the time of discharge; 6) are discharged from the qualifying hospital stay in accordance with medical advice ; 7) have a measurement period that ends on or before March 31, 2014.
Emergency Department (ED) use without hospitalization following inpatient hospital stay (Models 2 & 4)	Episodes with one or more ED visit for which the beneficiary requires medical treatment but is not admitted to the hospital after discharge from an inpatient hospital stay	30-day Post-discharge, 60-day Post-discharge, 90-day Post-discharge	Binary outcome (1= at least one ED visit without readmission during measurement period; 0= no eligible ED visits without readmission during measurement period). Eligible ED visits are outpatient claims with a code indicating the beneficiary used the emergency room but was not admitted.	Beneficiaries who: 1) have a complete FFS enrollment history six months prior to admission; 2) have non-missing age & gender data; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) are discharged from the anchor hospital in accordance with medical advice; 5) are living at the time of discharge; 6) have a measurement period that ends on or before March 31, 2014.

Outcome Name	Definition/ Description	Measurement period(s)	Technical Definition	Eligible Sample
Emergency Department (ED) use without hospitalization during first 30 days of Home Health use following inpatient hospital stay (Model 3)	Episodes with one or more ED visit for which the beneficiary requires medical treatment but is not admitted to the hospital during the first 30 days of Home Health use	First 30 days of Home Health Use	Binary outcome (1= at least one ED visit without hospital readmission during measurement period; 0= no eligible ED visits without hospital readmission during measurement period). Eligible ED visits are outpatient claims with a code indicating the beneficiary used the emergency room but was not admitted.	Beneficiaries for whom Home Health is the initial PAC setting and who: 1) have a complete FFS enrollment history six months prior to admission; 2) have complete demographic data; 3) are discharged from the anchor hospital in accordance with medical advice; 4) have a measurement period that ends on or before March 31, 2014.
Emergency Department (ED) use without hospitalization following discharge from institutional PAC (Model 3)	Episodes with one or more ED visit for which the beneficiary requires medical treatment but is not admitted to the hospital during 30 days following discharge from institutional PAC	First 30 days post-discharge from institutional PAC	Binary outcome (1= at least one ED visit without hospital readmission during measurement period; 0= no eligible ED visits without hospital readmission during measurement period). Eligible ED visits are outpatient claims with a code indicating the beneficiary used the emergency room but was not admitted.	Beneficiaries for whom the initiating PAC setting is *not* Home Health: 1) have a complete FFS enrollment history six months prior to admission; 2) have complete demographic data; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) are discharged from the anchor hospital in accordance with medical advice; 5) are alive at the time of discharge; 6) have a measurement period that ends on or before March 31, 2014.
Acute hospital all-cause inpatient mortality (Model 4)	Death from any cause during anchor hospital stay (rate)	Acute	If date of death is on or before discharge date from the anchor hospital stay (including transfers), then mortality outcome =1.	Beneficiaries who: 1) have complete FFS enrollment history six months prior to admission; 2) were not enrolled in the Medicare Hospice program in the six months prior to the index admission; 3) have consistent, reliable and known mortality status data. *For beneficiaries with multiple anchor hospitalizations, one hospitalization per quarter is randomly selected for inclusion in this measure.*

Outcome Name	Definition/ Description	Measurement period(s)	Technical Definition	Eligible Sample
All-cause mortality (Models 2 and 4)	Death from any cause during measurement period	30-day Post-discharge	If date of death occurs during measurement period, then mortality outcome =1.	Beneficiaries who: 1) have complete FFS enrollment history six months prior to admission; 2) were not enrolled in the Medicare Hospice program in the six months prior to the index admission; 3) have consistent, reliable and known mortality status data. *For beneficiaries with multiple anchor hospitalizations, one hospitalization per quarter is randomly selected for inclusion in this measure.*
All-cause mortality (Model 3)	Death from any cause during measurement period	Episode start +30, episode start + 60, episode start +90	If date of death occurs during measurement period, then mortality outcome =1.	Beneficiaries who: 1) have complete FFS enrollment history six months prior to admission; 2) were not enrolled in the Medicare Hospice program in the six months prior to the index admission; 3) have consistent, reliable and known mortality status data. *For beneficiaries with multiple anchor hospitalizations, one hospitalization per quarter is randomly selected for inclusion in this measure.*
Utilization				
Acute Inpatient Length of Stay (All Models)	Total number of inpatient days during the anchor stay (Models 2 and 4) or qualifying stay (Model 3)	Acute	For Model 2 and Model 4, the number of days between the anchor admission date and the anchor discharge date (including any transfer stays). For Model 3, the number of days between the qualifying admission date and the qualifying stay discharge date (including any transfer stays).	Beneficiaries who have: 1) complete FFS enrollment history six months prior to admission 2) consistent, reliable and known mortality status data
Post-Acute Care Number of days (various settings) (All Models)	Total number of institutional days of care per institutional setting	30-day Post-discharge, 60-day Post-discharge, 90-day Post-discharge	The total number of days of care (not necessarily consecutive) during the measurement period in each of the following PAC settings: skilled nursing facility (SNF), long-term care hospital (LTCH), inpatient rehabilitation facility (IRF), home health agency (HHA), and inpatient (readmissions). The outcome for each setting is limited to patients who had at least one day in the setting during the post -discharge period.	Beneficiaries who: 1) are alive at the time of discharge; 2) have a complete FFS enrollment history six months prior to admission; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) have consistent, reliable and known mortality status data; 5) have a measurement period that ends on or before March 31, 2014.

Outcome Name	Definition/ Description	Measurement period(s)	Technical Definition	Eligible Sample
Post-Acute Care Total Number of Days in an Institutional Setting (All Models)	Total number of days of institutional care in any institutional setting (SNF, IRF, LTCH, inpatient)	30-day Post-discharge, 60-day Post-discharge, 90-day Post-discharge	The sum of the total number of days of care (not necessarily consecutive) during the measurement period in all of the following PAC settings: skilled nursing facility (SNF), long-term care hospital (LTCH), inpatient rehabilitation facility (IRF), and inpatient. The outcome is limited to patients who had at least one day of institutional care during the post-discharge period.	Beneficiaries who: 1) are alive at the time of discharge; 2) have a complete FFS enrollment history six months prior to admission; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) have consistent, reliable and known mortality status data; 5) have a measurement period that ends on or before March 31, 2014.
First PAC setting following inpatient discharge (Models 2 & 4)	The first PAC setting following inpatient discharge. Institutional PAC use must have started within 5 days of discharge or home health must have started within 14 days of discharge.	Admission to an IRF (freestanding facility or distinct unit within acute hospital), LTCH, or SNF within 5 days of discharge from an acute hospital. HHA within 14 days of discharge from an acute hospital. All other patient discharges are classified as discharges to a residential care setting, without home health.	The first PAC setting following inpatient discharge. Identified as: ▪ The first institutional PAC setting used within 5 days of hospital discharge (SNF, LTCH, or IRF) or HHA use if started within 14 days of discharge. If none of these conditions were met, the patient was defined as "home with none" ▪ Possible outcomes include SNF, LTCH, IRF, HHA, or home with none.	Beneficiaries who have: 1) complete FFS enrollment history six months prior to admission; 2) consistent, reliable and known mortality status data; 3) are alive at the time of discharge; 4) maintain FFS A&B enrollment throughout the measurement period or until death; 5) have a measurement period that ends on or before March 31, 2014.
Patient mix/shifting				
MS-DRG case-mix index (Models 2 & 4)	Weighted relative value of MS-DRG for clinical episode	NA	Cross walks from MS-DRG weights were used to assign weights to anchor stays by linking by MS-DRG and fiscal year. The geometric mean of the weights of all anchor MS-DRGs of episodes was computed for each provider, DRG group, and quarter.	All patients

Outcome Name	Definition/ Description	Measurement period(s)	Technical Definition	Eligible Sample
Home Health Agency case-mix index (Models 2 & 3)	Weighted relative value of Home Health Resource Groups across HHA users.	NA	Cross walks from HHA RUG weights and HIPPS Code were used to assign weights to HHA PAC stays by linking to the PAC claim by RUG and year. The geometric mean of the weights of all HHA episodes was computed for each provider (episode initiator), DRG group, and quarter.	Patients with a HHA episode as the first PAC setting for Model 2; all patients in a HHA episode initiator for Model 3
Skilled Nursing Facility case-mix index (Models 2 & 3)	Weighted relative value of Resource Use Groups IV across SNF users.	NA	Cross walks from SNF RUG IV weights were used to assign weights to SNF PAC stays by linking by SNF RUG IV and fiscal year. The simple mean, weighted by units of each RUG, of the weights of all SNF RUGs for a SNF stay was computed for each episode. The geometric mean of the weights of all SNF episodes was computed for each provider (episode initiator), DRG group, and quarter.	Patients with a SNF episode as the first PAC setting for Model 2; all patients in a SNF episode initiator for Model 3
Long-term Care Hospital case-mix index (Models 2 & 3)	Weighted relative value of Long-term Care Diagnosis Related Groups (MS-LTC-DRGs) of LTCH users	NA	Cross walks from LTC DRG weights were used to assign weights to LTC PAC stays by linking to the PAC claim by DRG and fiscal year. The geometric mean of the weights of all LTC episodes was computed for each provider (episode initiator),, DRG group, and quarter.	Patients with a LTCH episode as the first PAC setting for Model 2; all patients in a LTCH episode initiator for Model 3
Inpatient Rehabilitation Facility case-mix index (Models 2 & 3)	Weighted relative value of Case-Mix Groups (CMGs) across IRF users	NA	Cross walks from IRF RUG weights and HCPCS codes were used to assign weights to IRF PAC stays by linking to the PAC claim by RUG and fiscal year. Comorbidity tier was determined from the first character of the HCPCS code. The geometric mean of the weights of all IRF episodes was computed for each provider (episode initiator), DRG group, and quarter.	Patients with an IRF episode as the first PAC setting for Model 2; all patients in an IRF episode initiator for Model 3
Rate of outpatient APCs of Similar BPCI Episodes (Models 2 & 4)	Rate of outpatient APCs similar to BPCI episodes per hospital	Claims finishing within quarter	The number of claims with a related APC was calculated per provider (episode initiator), and divided by the sum of the number of claims with related APC and number of BPCI episodes. See **Appendix J** for a listing of outpatient APCs by each of the 48 clinical episodes.	Patients with an inpatient admission included in BPCI or patients with an outpatient visit related to providers' selected MS-DRGs

Outcome Name	Definition/ Description	Measurement period(s)	Technical Definition	Eligible Sample
Rate of Inpatient Admissions of Related but Non-BPCI MS-DRGs (Models 2 & 4)	Proportion of admissions in BPCI MS-DRGs and related MS-DRGs that are for the related MS-DRGs per hospital	Claims finishing within quarter	The number of discharges with a related MS-DRG to the providers' selected BPCI MS-DRGs was summed per provider (episode initiator), DRG group, quarter, and divided by the sum of the number of discharges with related MS-DRGs and number of discharges with BPCI MS-DRGs selected by the provider. See **Appendix J** for a listing of related non-BPCI MS-DRGs by each of the 48 clinical episodes.	Patients with an inpatient admission included in BPCI or patients with an inpatient admission related to providers' selected BPCI MS-DRGs
Payment				
Medicare Part A Standardized Allowed Amount (various settings)	Average Medicare Part A standardized allowed amount, converted to 2014 dollars using Medical CPI, across various settings and totaled within the measurement period.	Acute, bundle period, 90-day Post-discharge	The sum of Medicare payment and beneficiary out-of-pocket amounts for Part A health care services provided during the anchor stay, readmissions, SNF, HHA, IRF, LTCH, and hospice, trended to 2014. Payment in the lower/upper ends are winsorized[25].	Beneficiaries who: 1) have a complete FFS enrollment history six months prior to admission; 2) have non-missing age & gender data; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) have a measurement period that ends on or before March 31, 2014; 5) do not have missing data for any Part A category.
Medicare Part B Standardized Allowed Amount (various service categories)	Average Medicare Part B standardized allowed amount, converted to 2014 dollars using Medical CPI, across various service categories and totaled within the measurement period.	Acute, bundle period, 90-day Post-discharge	The sum of Medicare payment and beneficiary out-of-pocket amounts for Part B outpatient therapy (speech, occupation, and physical therapy), imaging and lab services, procedures, physician evaluation & management services, all other non-institutional services, and other institutional services trended to 2014. Payment in the lower/upper ends are winsorized.	Beneficiaries who: 1) have a complete FFS enrollment history six months prior to admission; 2) have non-missing age & gender data; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) have a measurement period that ends on or before March 31, 2014; 5) do not have missing data for any Part B category.

[25] Except for Part A acute, all payments are winsorized by quarter at the 1st and 99th percentiles. Part A acute payments are winsorized by quarter and by MS DRG, at the 2nd and 98th percentiles.

Outcome Name	Definition/ Description	Measurement period(s)	Technical Definition	Eligible Sample
Medicare Total Part A and Part B Standardized Allowed Amount Included in the Bundle Definition	Average total Medicare Part A and Part B standardized allowed amount, converted to 2014 dollars using Medical CPI, included in the definition of the bundle	Bundle period	The sum of Medicare payment and beneficiary out-of-pocket amounts for all Part A and Part B services included in the bundle definition Payment in the lower/upper ends are winsorized.	Beneficiaries who: 1) have a complete FFS enrollment history six months prior to admission; 2) have non-missing age & gender data; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) have a measurement period that ends on or before March 31, 2014; 5) do not have missing data for any Part A or Part B category.
Medicare Total Part A and Part B Standardized Allowed Amount Not Included in the Bundle Definition	Average total Medicare Part A and Part B standardized allowed amount, converted to 2014 dollars using Medical CPI, not included in the definition of the bundle	Bundle period	The sum of Medicare payment and beneficiary out-of-pocket amounts for all Part A and Part B services that are NOT included in the bundle definition. Payment in the lower/upper ends are winsorized.	Beneficiaries who: 1) have a complete FFS enrollment history six months prior to admission; 2) have non-missing age & gender data; 3) maintain FFS A&B enrollment throughout the measurement period or until death; 4) have a measurement period that ends on or before March 31, 2014; 5) do not have missing data for any Part A or Part B category.

6. Statistical approach

The goal of the quantitative analysis is to estimate how outcomes of the population treated by BPCI providers after the program was implemented differ from the counterfactual outcomes they would have experienced had the BPCI program not been implemented. Our empirical approach relies on a non-experimental study design, which uses providers in a *comparison group* (See Section III.A.2) to infer counterfactual outcomes for BPCI participants. To draw conclusions on the impact of BPCI on utilization, costs, and quality, we conduct three types of analysis:

- ***Trend Analysis on Risk-Adjusted Outcomes.*** We calculate quarterly risk-adjusted outcomes for BPCI patients and for non-BPCI comparison group patients from Q4 2010 to Q4 2013.
- ***Difference-in-Difference Analysis.*** We estimate the differential change in outcomes for beneficiaries receiving care from BPCI providers between the baseline and the intervention period relative to that same change for a beneficiaries receiving care from non-BPCI providers in a comparison group. To illustrate this approach, we have selected the baseline period to include Q4 2010 to Q3 2013 for this first Annual Report. The intervention period is Q4 2013. Phase 1, the period in which Awardees could be preparing for participation in the initiative and gearing up care redesign activities, is associated with Q9 to Q12 in the baseline period.
- ***Unadjusted Time Trend Analysis and Unadjusted Difference-in-Difference.*** Model 4, Model 3 IRF, and Model 3 HHA results were not risk-adjusted due to insufficient sample size. For these models, we calculated simple descriptive statistics stratified by time period and BPCI participation status.

This section outlines our empirical approach for each of these analyses.

a. Trend analysis on risk-adjusted outcomes

To illustrate differences in outcomes over time between patients treated by BPCI providers and patients treated by providers in the comparison group, we calculate quarterly risk-adjusted rates from Q4 2010 to Q4 2013. Without adequate risk-adjustment, providers with a sicker or more service-intensive patient mix would have worse outcomes, and providers with healthier patients would have better outcomes even if nothing else differed. We calculate separate time trends for BPCI and comparison patients. To this end, we use multivariate regression methods to control for differences in patient demographics and clinical characteristics, provider size, and market characteristics that might be related to the outcome. We use episode-level data from Q4 2010 to Q4 2013, supplemented with Part A and B claims data for services received during the six months preceding the start of the episode. In addition, we used data on the Area Health Resource File (AHRF) and the Provider of Service (POS) files to control for market and provider characteristics, respectively.

We decided to use a common set of variables in all of our models for simplicity and ease of data collection and analysis. All measures were risk-adjusted for service mix using MS-DRG information from the episode triggering inpatient stay (Model 2) or qualifying inpatient stay (Model 3). Demographic factors included age brackets, gender, age and gender interactions, Medicaid eligibility status, and disability status. To control for prior health conditions, we use Hierarchical Chronic Conditions (HCC) indicators, which could be used individually or

aggregated. To further control for case-mix differences, we include measures of prior care use in the following settings: hospital, long-term care hospital, skilled nursing facility, inpatient rehabilitation facility, hospice, home health agency, psychiatric facility, and emergency department. Provider characteristics included region, bed count, and for-profit status. Interaction terms between the three provider variables are also included.

While the same demographic and enrollment status indicators are included for all measures, we considered alternative specifications to control for service mix, clinical factors, and prior care use. These are listed in Exhibit 11. To assess different specifications, we split the sample into a model development and a validation sample, and estimated each model using data from the model development sample. We then evaluate models in terms of their goodness of fit (AIC criteria, R-square, t-tests on differences in conditional expectations by subgroup) in the model development sample and their predictive performance in the validation sample. Exhibit 12 lists the final specifications for each of the outcome measures discussed in this report.

Exhibit 11: Predictive Risk Factors Used to Risk-Adjust Outcomes

Domain	Variables
Service Mix	Alternative specifications ▪ Anchor MS-DRG ▪ MS-DRG group: anchor MS-DRG grouped with and without complications together ▪ 48 clinical episodes ▪ Clinical groups (see Section III.A.4)
Patient Demographics and Enrollment	▪ Age brackets (under 65, 65-80,80+) ▪ Gender ▪ Medicaid status ▪ Disability Status
Clinical Factors	Alternative specifications ▪ HCCs indicators from qualifying services and diagnoses26 from claims and data for months preceding the anchor admission or qualifying stay ▪ HCC aggregated to 45 risk variable groups (RV-HCC) according to NQF measure 1789 (**Appendix I** shows a crosswalk from HCC groups to RV-HCC) ▪ HCC index, HHCs indicators weighted by their relative weight in the CMS-HCC model
Utilization measures preceding the start of the anchor stay/qualifying inpatient stay	Alternative specifications ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in the month preceding the start of the episode ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in the six month preceding the start of the episode ▪ Number of days of ED, inpatient, SNF, IRF, HHA service use in the month preceding the start of the episode ▪ Number of days of ED, inpatient, SNF, IRF, HHA service use in the six months preceding the start of the episode
Market Factors	▪ Managed care penetration ▪ Median household income in the market ▪ State indicators (Model 3)

[26] The hierarchical condition categories (CMS-HCC) model is a prospective risk-adjustment model used by CMS to adjust Medicare Part C capitation payments for beneficiary health spending risk. The model adjusts for demographic and clinical characteristics. The clinical component of the model uses diagnoses from qualifying services grouped into several HCC indicators.

Domain	Variables
Provider Characteristics	▪ Size ▪ Ownership status

Exhibit 12: Risk Adjustment Model Specifications for Model 2 and Model 3 (SNF episode initiators), by outcome group

Outcome Group	Model Specification	Model 2	Model 3 (SNF)
Mortality	Logistic regression	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ MS-DRG group: anchor MS-DRG grouped with and without complications together ▪ RV-HCC: aggregated HCC indicators ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in **the month** preceding the start of the episode ▪ Provider size, ownership status, Census region	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ MS-DRG group 469/470: anchor MS-DRG grouped with and without complications together
Readmissions	Logistic regression	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ MS-DRG group: anchor MS-DRG grouped with and without complications together ▪ RV-HCC: aggregated HCC indicators ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in **6 months** preceding the start of the episode ▪ Provider size, ownership status, Census region	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Anchor MS-DRG 469 and 470 ▪ HCC index ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in the **6 months** preceding the start of the episode ▪ Provider size, Census region
ED Use	Logistic regression	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Anchor MS-DRG ▪ HCC indicators ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in **the month** preceding the start of the episode ▪ Provider size, ownership status, Census region	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Anchor MS-DRG 469 and 470 ▪ HCC index ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in **the month** preceding the start of the episode ▪ Provider size, Census region
Discharge by Setting	Multinomial regression	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ 48 MS-DRG clinical episode groups ▪ HCC indicators ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in **6 months** preceding the start of the episode ▪ State indicators	▪ NA. Not a Model 3 outcome.
Discharge to Institution vs Home Health	Logistic regression	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Anchor MS-DRG ▪ HCC indicators ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in **6 months** preceding the start of the episode ▪ State indicators	▪ NA. Not a Model 3 outcome.

Outcome Group	Model Specification	Model 2	Model 3 (SNF)
Number of Days in PAC Settings	OLS regression	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Anchor MS-DRG or MS-DRG group (anchor MS-DRG grouped with and without complications together) ▪ HCC indicators ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in **6 months** preceding the start of the episode ▪ Provider size, ownership status, Census region	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Anchor MS-DRG 469 and 470 ▪ HCC index ▪ Indicators for utilization of ED, inpatient, SNF, IRF, HHA services in **6 months** preceding the start of the episode ▪ Provider size, Census region
Duration Inpatient Stay	Duration models	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Anchor MS-DRG ▪ HCC index ▪ Indicators for utilization of SNF, IRF, HHA services in **6 months** preceding the start of the episode, and indicator for utilization of inpatient in **the month** preceding the start of the episode ▪ Provider size, Census region, Medicare penetration	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Anchor MS-DRG 469 and 470 ▪ HCC index ▪ Indicators for utilization of SNF, IRF, HHA services in **6 months** preceding the start of the episode, and indicator for utilization of inpatient in **the month** preceding the start of the episode ▪ Provider size, Census region
Part A Payment, Inpatient Acute Stay	OLS regression	**90-day post discharge** ▪ Age, gender ▪ Anchor MS-DRG ▪ Prior SNF use **30-day bundle** ▪ Age, gender, interaction ▪ Anchor MS-DRG 470 ▪ Prior SNF use **90-day bundle** ▪ Age, gender, interaction ▪ Anchor MS-DRG ▪ Prior SNF use	**90-day post discharge** ▪ Age, gender, interaction ▪ Anchor MS-DRG ▪ Prior SNF use **60-day bundle** ▪ Age, gender, interaction ▪ Anchor MS-DRG 470 ▪ Prior SNF use **90-day bundle** ▪ Age, gender, interaction ▪ Anchor MS-DRG ▪ Prior SNF use

Outcome Group	Model Specification	Model 2		Model 3 (SNF)
Part A Payment, Readmissions	Two part model	**Part 1: Probit** **90-day post discharge** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ MS-DRG group ▪ HCC indicators ▪ Provider size, ownership status, Census region **30-day bundle** Insufficient sample size **90-day bundle** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ MS-DRG group ▪ RV-HCCs ▪ Provider size, ownership status, Census region	**Part 2: OLS** ▪ Age, gender ▪ MS-DRG group ▪ Age, gender ▪ MS-DRG group	Insufficient sample size
Part A Payment, Skilled Nursing Facility	Two part model	**Part 1: Probit** **90-day post discharge** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ RV-HCCs ▪ State indicators **30-day bundle** Insufficient sample size	**Part 2: OLS** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ RV-HCCs ▪ State indicators	**OLS Regression** **90-day post discharge** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG 470 ▪ HCC index **60-day bundle** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG 470 ▪ HCC index

Outcome Group	Model Specification	Model 2		Model 3 (SNF)	
Part A Payment, Skilled Nursing Facility (cont.)	Two part model	**90-day bundle** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ RV-HCCs ▪ State indicators	▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ RV-HCCs ▪ State indicators	**90-day bundle** Insufficient sample size	
Part A Payment, Home Health	Two part model	**Part 1: Probit** **90-day post discharge** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ RV-HCCs ▪ State indicators **30-day bundle** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG 470 ▪ HCC index ▪ State indicators **90-day bundle** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ RV-HCCs ▪ State indicators	**Part 2: OLS** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ RV-HCCs ▪ State indicators ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG 470 ▪ HCC index ▪ State indicators ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ RV-HCCs ▪ State indicators	**Part 1: Probit** **90-day post discharge** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ HCC index **60-day bundle** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ HCC index **90-day bundle** Insufficient sample size	**Part 2: OLS** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ HCC index ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ Anchor MS-DRG ▪ HCC index

Outcome Group	Model Specification	Model 2		Model 3 (SNF)
Part A Payment, Inpatient Rehabilitation Facility	Two part model	**Part 1: Probit** **90-day post discharge** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ MS-DRG group ▪ RV-HCCs ▪ State indicators **30-day bundle** Insufficient sample size **90-day bundle** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ MS-DRG group ▪ RV-HCCs ▪ State indicators	**Part 2: OLS** ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ MS-DRG group ▪ RV-HCCs ▪ State indicators ▪ Age, gender, Medicare status, disability status (no ESRD) ▪ Prior SNF use ▪ MS-DRG group ▪ RV-HCCs ▪ State indicators	Insufficient sample size
Part A Payment, Hospice	Two part model	Insufficient sample size		Insufficient sample size
Part A Payment, Long Term Care Hospital	Two part model	Insufficient sample size		Insufficient sample size

Once risk-adjustment variables were selected, we added quarterly indicators that interacted with an indicator on BPCI participation to our models. Due to the small number of episodes in Model 3 SNF, we calculated yearly indicators instead. Estimates from these models were used to calculate average risk-adjusted outcomes for BPCI providers and providers in the comparison group for each quarter from Q4 2010 to Q4 2013. To control for changes in service and case-mix over time as well as differences between BPCI and non-BPCI patients, we used the same reference population of patients to calculate quarterly predicted outcomes for BPCI providers and providers in the comparison group. The reference population used in this first report is all patients treated by BPCI providers during the baseline period.[27]

b. Difference-in-Difference estimator

The DiD model uses an outcome measure, Y, and estimates the differential change in Y for beneficiaries receiving care from BPCI providers between the baseline and the intervention periods relative to that same change for a beneficiaries receiving care from providers in the comparison group. More specifically, to mitigate the selection bias, the DiD model incorporates outcomes from before and after the implementation of BPCI to control for time invariant differences in the mean outcomes between the two groups that arise.[28] To illustrate the DiD approach, define:

- Y_{ikt} as the outcome for the i^{th} individual with provider k^{th} during the t^{th} quarter.
- BPC_{Iik} is an indicator that takes the value of 1 if an episode was initiated by a BPCI provider
- Xi_{kt} service-mix, case-mix , provider , and market factors (See Exhibit 12 for a list of risk factors used in each model)
- E[Y|t BPCI X] is the expected value of outcome measure Y for given values of t, BPCI, and X

The difference-in-difference estimator is:

$$DiD = [E(Y|t = Q4\ 2013, BPCI = 1, X) - E(Y|t = Baseline, BPCI = 1, X] - [E(Y|t = Q4\ 2013\ , BPCI = 0, X) - E(Y|t = Baseline, BPCI = 0, X] \quad \textbf{(1)}$$

To illustrate the calculation of the DiD, consider the linear model listed below:

$$Y_{ikt} = b_0 + b_1 * Q4\ 2013 + b_2 * BPCI_{ik} + b_3 * BPCI_{ik} * Q4\ 2013 + B * X_{ikt} + u_{ikt} \quad \textbf{(2)}$$

Coefficient B measures the differential effects of risk factors (X) on outcome Y. The value of b_1 captures aggregate factors that could cause changes in outcome Y in Q4 2013 relative to the

[27] We used the delta method to construct confidence intervals around the predicted risk-adjusted rate.

[28] While the DiD model controls for unobserved heterogeneity that is fixed over time, there is no guarantee that this unobserved heterogeneity is, in fact, fixed. It could be the case, for example, that providers with improving outcomes are relatively more likely to sign up for the program inducing a spurious positive correlation between BPCI participation and outcomes. Future developments of the comparison group of providers will use information on historical trends in outcomes as matching variables.

baseline period that are common across BPCI and non-BPCI patients. Coefficient b_2 captures differences in outcomes between BPCI and non-BPCI patients during the baseline period. The coefficient *b3* determines the differential in outcome Y experienced by beneficiaries receiving services from BPCI providers during Q4 2013.

The difference-in-difference estimator is:

$DiD = [b_1 + b_3] - [b_1]$ **(3)**

For the lineal example listed in (1) DiD estimator is equal to coefficient b_3.

To calculate the DiD estimate for outcome measures that were risk-adjusted with non-lineal models (See Exhibit 12), we used the regression model's coefficient estimates to calculate each of the four conditional expectations that make up the DiD estimator in equation (1). Standard errors were computed using the delta method.

c. Unadjusted time trends and Difference-in-Difference analysis

Because the samples sizes for Model 4 and Model 3 HHA, IRF and LTCH are not large enough to support the estimation of the risk-adjustment models described above, we calculated time trends and differences estimators using sample averages without conditioning for risk factors. For that reason, results from this analysis should be interpreted with caution.

B. Qualitative Analytical Approach

Qualitative data contribute a rich source of information about the characteristics of participants, markets, and care redesign efforts; how these characteristics change over time; and their relative importance in affecting outcomes under BPCI. Qualitative data collection and analyses complement quantitative analyses by providing information about the context for BPCI implementation, which may not be gleaned from administrative data. Qualitative data may also suggest additional measures that can be derived from claims or other data sources.

We use qualitative data to describe the factors that influenced the participants' decision to join BPCI, and Awardee implementation, care redesign, and gainsharing approaches. The qualitative data will also inform discussions about the ability to replicate the BPCI initiative. During the episode initiator case studies and quarterly Awardee interviews, we asked questions about why organizations chose to participate in BPCI, how they selected their Model, bundle length(s), clinical episode(s), and partner(s), as well as their initial investments—both capital and human resources—to participate in BPCI and their goals for participating. For the case studies, we also focused on participants' implementation experiences, their care redesign processes, and how they monitor quality and costs under the BPCI initiative.

1. Qualitative data sources

The primary data sources are the Awardee Implementation Protocols, episode initiator case studies, and quarterly Awardee interviews. During this first year of the BPCI initiative, we conducted 6 case studies and 35 quarterly Awardee interviews. Episode initiator case studies are based on two-day, in-person site visits that involved interviews with key individuals responsible for different aspects of BPCI implementation and management, including clinical and

administrative leaders and operational staff, at episode initiating sites. **Appendix K** includes the summary reports of the case studies. Awardee quarterly interviews were semi-structured interviews lasting up to one hour with the Awardee's choice of representatives. Exhibit 13 summarizes the sites for the case studies. **Appendix L** includes additional details about each of the case studies, including their BPCI start date, waiver use, and clinical episode selection, as well as a listing of all Awardees with whom we conducted a quarterly interview. We present additional detail on the criteria that were considered in selecting these sites in the next section.

Exhibit 13: Case Study Participants, Year 1

BPCI Participant Name	City, State	Provider Type	Convener Approach	Participant Role
New York University Hospital Center	New York, NY	ACH	Facilitator Convener	Designated Awardee – episode initiating
Brooks Bartram Crossing	Jacksonville, FL	SNF	Awardee Convener	Episode Initiating Bundled Payments Provider Organization
St. Vincent Medical Center-Southside	Jacksonville, FL	SNF	Awardee Convener	Episode Initiating Bundled Payments Provider Organization
Valley Baptist Medical Center - Harlingen (VBMC-H)	Harlingen, TX	ACH	Awardee Convener	Episode Initiating Bundled Payments Provider Organization
Golden Living Center Hy-Lond	Fresno, CA	SNF	Awardee Convener	Episode Initiating Bundled Payments Provider Organization
Signature Medical Group, Inc.	St. Louis, MO	PGP	Awardee Convener	Awardee Convener – episode initiating

2. Study sample

Case study sites and Awardees for quarterly interviews were selected based on descriptive characteristics that informed a broad range of BPCI approaches and perspectives. This section summarizes how we selected the Awardees for interviews and the episode initiators for case studies.

a. Study sample: quarterly Awardee interviews

We conduct Awardee interviews on a quarterly basis with the goal of interviewing each Awardee once a year. In selecting the Awardees for a given quarter, we aim to ensure that each quarter's sample had a comparable mix of Awardees and coordinated interviewee selection with the case study selection to ensure that no Awardee had an interview and a case study in the same quarter.[29] This year we conducted 35 quarterly interviews with a total of 37 Awardees.[30] We interviewed all of the Awardees that started Q4 2013 and a portion of the Awardees that started Q1 2014. Exhibit 14 compares the model, size, number of episode initiators, and gainsharing participation among the sample of Awardees with whom we held interviews and all Phase 2 Awardees (Q4 2013 or Q1 2014). The listing of Awardees interviewed is included in **Appendix L**.

[29] We did not hold quarterly interviews with the two Awardees who hosted case studies.
[30] We combined interviews with some Awardees who had a shared Convener and identical Implementation Protocols.

Exhibit 14: Characteristics of Awardees interviewed compared to all Awardees

Category	Level	Quarterly Interview Awardees (N=37)		All Awardees (N=92)[31]	
		N	%	N	%
Model	2	24	65%	61	66%
	3	10	27%	20	22%
	4	3	8%	11	12%
Role	DA	16	43%	39	42%
	AC	10	27%	26	28%
	SA	9	24%	24	26%
	DAC	2	5%	3	3%
Number of EIs	>1	11	30%	28	30%
	>10	1	3%	5	5%
Gainsharing		20	54%	57	62%

Source: Lewin analysis of Awardee Implementation Protocols and Sales Force data, for Phase 2 Awardees as of April 2014.

b. Study sample: case study sites

Our overall goal in selecting episode initiators for case studies is to collect information from across the range of BPCI participants. For the six case studies, we tried to ensure a range of characteristics across all three models. We selected sites and Awardees for quarterly interviews based on the following characteristics:

- BPCI Model (2, 3, or 4)
- Single Awardee or part of a larger convening group
- Tenure in the initiative
- Type of participant (ACH, PGP, SNF, etc.)
- Size of participant
- Geographic location
- Clinical episodes
- Episode length
- Gainsharing models used

Exhibit 15 compares the characteristics of the case study sites to all Q4 2013 and Q1 2014 BPCI episode initiators. Over time, the final proportion of sites in each cell will more closely reflect the proportion of participants that have that characteristic. The process to set up the episode initiator case studies, conduct the study, and report the findings is described in detail in the Evaluation and Monitoring Design Plan (Chapter 4: *Case Study Process Overview*).

[31] The total number of Phase 2 Awardees in Salesforce at the time we had created our quarterly Awardee interview sample (May 2014).

Exhibit 15: Characteristics of case study participants and all BPCI Episode Initiators, Q4 2013 and Q1 2014

Variable	Case studies conducted during first year (N=6)		All BPCI episode initiators in October 2013 and January 2014 (N=219)	
Model				
2	2	33%	109	50%
3	3	50%	91	42%
4	1	17%	19	9%
Participant Role				
Designated Awardee	1	2%	38	17%
Single Awardee	0	-	24	11%
Episode Initiator	4	67%	155	71%
Awardee Convener	1	2%	2	.5%
Type of Participant				
Skilled Nursing Facility	3	50%	61	28%
Home Health Agency	0	-	27	12%
Acute Care Hospital	2	33%	127	58%
Physician Group Practice	1	17%	2	1%
Inpatient Rehabilitation Facility; Long-term Care Hospital	0	-	2	1%
Clinical Episodes				
1) Surgical: Ortho excluding spine	5	83%	158	72%
2) Non-surgical: other medical	1	17%	84	38%
3) Non-surgical: neurovascular	0		68	31%
4) Non-surgical: respiratory	1	17%	103	47%
5) Non-surgical: cardiovascular	1	17%	130	59%
6) Non-surgical and surgical: GI	0	-	52	24%
7) Surgical: cardiovascular	2	33%	101	46%
8) Non-surgical: Ortho	2	33%	59	27%
9) Surgical: spinal	2	33%	67	31%
Geographic Region				
Northeast	1	17%	72	33%
South	3	50%	49	23%
West	1	17%	30	14%
Midwest	1	17%	67	30%

Source: Lewin analysis of Sales Force data, as of April 2014, on BPCI participants from Q4 2013 and Q1 2014.

3. Interview Protocols

The site visit protocols were designed to gather information about the design, implementation, and initial results of BPCI from EI clinical and administrative leadership and managers involved with the initiative. Questions pertained to BPCI entry decisions and structure, experience with BPCI, market effects, successes and challenges, ability to replicate, quality management, care redesign, and care management. We tailored specific questions to the interviewees' role in BPCI and the organization. A subset of the questions was used in the quarterly Awardee interview protocols. The Awardee interview protocols were the same for both quarters, with minor changes

made to improve the clarity and flow of the interviews. Protocols for case studies and quarterly Awardee interviews are attached in **Appendix M**.

During episode initiator case studies, BPCI leadership was asked about decisions that led to joining the initiative and why they chose to participate. They were asked about their network, care redesign approaches, gain-sharing, and why they chose their options for each of these topics. They were also asked how they will determine whether their approaches are successful and what they expect to gain.

Operational managers were also interviewed, including financial managers, clinical managers, quality and outcomes directors, case managers, and data and IT managers involved in the BPCI initiative in each site. These individuals were asked about their expected goals for their tasks related to the initiative, how their efforts differ from prior practice in their organizations, how their jobs have changed, the types of materials or practice programs they put in place to effect changes, and why the approaches were chosen. They were also asked about their perceptions about actual implementation and whether they view the initiative as meeting its stated goals.

The Awardee quarterly interviews were with organizational leaders and included questions about their decision to participate in the initiative, rationale for decisions on model characteristics (i.e., model, episodes, bundle length, gainsharing), leadership involved in early decision making, and formal and informal partnerships. Awardees chose which representatives to include in the interviews.

4. Thematic coding and analysis

We recorded all site visit and quarterly Awardee interviews. The audio recordings were uploaded to a secure file transfer protocol site (SFTP) for a transcription services vendor to download and transcribe. The transcripts were returned through the SFTP site and we coded each interview using Atlas.Ti. We adopted conventional approaches for coding themes, which were based on the questions and characteristics of the BPCI initiative. Themes were developed during the course of coding transcripts and recurring themes and sub-themes were coded accordingly. Initially, two people coded each site visit transcript to establish a common understanding of how themes would be identified and coded.

Each person who coded interviews received training in using Atlas.Ti and was familiar with the BPCI Initiative through program documents, IPs, and the evaluation and monitoring plan. After coding, we discussed the site visit and quarterly interview during team meetings to establish a common understanding and debrief about what was learned from our analyses. This exercise, in addition to writing short case summaries after each site visit, helped us hone in on the most important discussion points by going back through transcripts to re-examine quotes or sections, cross-reference discussion topics across different interviewees within a given site, across quarterly Awardee interviews, and code additional themes that arose that may have been missed.

Analysis of qualitative themes from case studies and quarterly Awardee interviews for the report was guided broadly by Research Question A as outlined in Section II above. We coded transcripts for site visits and quarterly Awardee interviews by corresponding questions in the respective protocols, by theme, and in some cases by the respondents and models. After coding transcripts, we reviewed our coded themes for each site and catalogued themes that were relevant to the

specified research questions. We further catalogued themes by specific topics (e.g., care redesign, entry decisions, data use and challenges, gainsharing) and highlighted quotes that directly addressed these topics from interviews and site visits. We further identified common themes across sites, common themes by topic within sites (e.g., minimizing risk as a factor in the choice length of episode), common themes within model (e.g., data considerations in Model 4), and in some cases the frequency of recurring themes within a given site or across sites in a model.

IV. Model 2 Results

This section presents a summary of Model 2 results, organized by research question, based on quantitative analyses of Model 2 BPCI participants in the first quarter under the initiative (Q4 2013) and qualitative analyses of Model 2 BPCI participants in the first and second quarters (Q4 2013 and Q1 2014). The claims-based outcomes are risk-adjusted as described in Section III.B.6 above. The qualitative data were collected through 24 Awardee interviews and two Episode Initiator site visit case studies. The quantitative results summarized in this section, as well as additional results, are located in **Appendix C-1** and **Appendix C-2**.

A. Characteristics of the Program and Participants

1. Participants

Eight Awardees (with nine Episode Initiators) were active in Model 2 of the BPCI initiative in Q4 2013. Their Awardee structure varied as illustrated in Exhibit 16**.** There were three single Awardees, three Awardee Conveners, and two designated Awardees that joined under Facilitator Conveners. In Q1 2014, participation grew significantly to include 61 active Awardees (with 107 Episode Initiators). This includes 15 single Awardees, 17 Awardee Conveners, 27 Designated Awardees, and two Designated Awardee Conveners. As noted in the introduction, this report primarily discusses the characteristics of the participants that joined the initiative in Q4 2013. Participants that joined the initiative after Q4 2013 will be discussed in greater detail in subsequent Annual Reports.

Exhibit 16: Model 2 Participants by BPCI Role, Q4 2013 and Q1 2014

BPCI Role	Q4 2013 (N)	Q1 2014 (N)
Single Awardee	3	15
Awardee Convener	3	17
Episode Initiating Bundled Payments Provider Org.	4	59
Facilitator Convener	2	5
Designated Awardee	2	27
Designated Awardee Convener	0	2
Episode Initiating Bundled Payments Provider Org.	0	4
Total number of Episode Initiators	9	107
Acute Care Hospital	9	105
PGP	0	2

Source: Lewin analysis of Salesforce data for all Awardees participating in the BPCI initiative during Q4 2013 and Q1 2014.

As described in Exhibit 17, all of the Q4 2013 EIs and the majority (94%) of the Q1 2014 hospital EIs are located in urban areas. Although there are EIs in every region, the greatest concentration is in the Northeast. EIs also tended to be large; all of the Q3 2013 EIs and the majority (97%) of the Q1 2014 hospital EIs have more than 100 beds and over half have more than 250 beds.

Q4 2013 and Q1 2014 BPCI-participating hospitals differ from hospitals that did not participate in BPCI. We compared Model 2 hospital EIs with non-participating hospitals that discharged the

same types of Medicare patients as the EIs (that is, Medicare patients in the same clinical episodes that were active in BPCI during Q4 2013 and Q1 2014). Model 2 EIs were more likely than non-participants to be non-profit entities. The majority of Q4 2013 EIs (89%) and Q1 2014 EIs (84%) were non-profit entities, whereas only 60% of non-participants were non-profit. EIs were also less likely to be small hospitals than non-participants. None of the Q4 2013 EIs and 3% of Q1 2014 EIs had fewer than 100 beds, compared with approximately a third (37%) of the non-participant hospitals. Participants had a higher average occupancy rate (61% in Q4 2013 and 62% in Q1 2014) than non-participants (49%). Both groups had a similar percent of inpatient days attributable to Medicare patients (43% in Q4 2013 and 37% in Q1 2014 vs. 41% for non-participants).

Exhibit 17: Model 2 Episode Initiating Hospitals and Non-Initiating Hospitals, Q4 2013 and Q1 2014

Variable	BPCI Q4 2013 participating hospitals (N=9)		BPCI Q1 2014 participating hospitals (N=104)		Non-participant hospitals (N=3,000)	
	N	%	N	%	N	%
Ownership						
For Profit	1	11%	13	13%	662	22%
Government	0	0%	4	4%	547	18%
Non-Profit	8	89%	87	84%	1,791	60%
Urban/Rural						
Rural	0	0%	6	6%	865	29%
Urban	9	100%	98	94%	2,135	71%
Region						
Midwest	2	22%	25	24%	722	24%
Northeast	4	44%	41	39%	462	15%
South	2	22%	21	20%	1,268	42%
West	1	11%	17	16%	548	18%
Bed Count						
0 - 99	0	0%	3	3%	1,122	37%
100-249	4	44%	36	35%	1,130	38%
250+	5	56%	65	63%	748	25%
Occupancy Rate						
Mean	-	61%	-	62%	-	49%
Medicare Days Percent						
Mean	-	43%	-	37%	-	41%

Source: Lewin analysis of 2013 Provider of Service (POS) and2013 and 2014 Medicare claims. BPCI participating hospitals are defined as Episode Initiators, Q4 2013 and Q1 2014. Non-Participant hospitals are all other hospitals with the same types of Medicare patients.

The quarterly Awardee and site visit interviews provide insights into the reasons this early cohort of hospitals chose to participate in BPCI. Providers identified five general reasons for participation: (1) learning about payment reform, (2) financial opportunities, (3) leadership and innovation, (4) quality improvement, and (5) participation in other initiatives. More specific information about their responses is discussed below (see Exhibit 18).

Exhibit 18: Reasons for Joining the BPCI initiative, Q4 2013 and Q1 2014 Model 2 Awardees

Themes mentioned by Awardees as important considerations in the decision to join the BPCI initiative	Number of Awardees Interviewed (N=24)*
Opportunity to learn about bundled payments and experiment with new payment models	13
Have or would like experience with commercial bundles	10
Expect payment reform to shift away from FFS	8
Saw potential financial opportunities	8
Comfortable with the initiative's risk level	5
See themselves as innovative leaders in health care	5
Desired ability to align incentives through gainsharing	4
Saw an opportunity to improve quality	4
Opportunity to learn about optimizing and managing care for particular populations	4

Source: Lewin interviews with Q4 2013 and Q1 2014 Model 2 Awardees, conducted from March through June 2014.
*Note: Awardees could cite multiple reasons, so the numbers in this column do not sum to 24.

a. Learning and payment reform

In response to an open ended question about what attracted them to the BPCI initiative, nearly half (13) of the Awardees participating in quarterly interviews said that the BPCI initiative provides an opportunity to learn about bundled payments and experiment with new payment models. Eight Awardees indicated that they expect payment methods to shift away from fee-for-service. These Awardees felt that by voluntarily experimenting with a new payment model now, they would be better positioned for future payment changes. This also came up during the site visits. Interviewees at both Model 2 sites indicated that they expected fee-for-value to replace fee-for-service payments. One interviewee said that participating in the BPCI initiative would give the facility an advantage over non-participants, should Medicare payment models change in the future. Another sentiment was that lessons learned in the BPCI initiative could be applied to the non-Medicare market, such as positioning them to work with commercial payers on bundled payments. Some Awardees (4) also indicated that BPCI provided an opportunity to learn about optimizing and managing care for particular populations.

> *"We knew that the payment system for the future of Medicare would be changing, and if we got in on the beginning of it we could work out some of the kinks and determine what were lessons learned."*
> *–Model 2 Awardee*

b. Financial opportunities and risk

In the quarterly interviews, Model 2 Awardees that began in Q4 2013 or Q1 2014 also discussed the financial reasons for joining the initiative. About one-third of Awardees interviewed indicated they joined the initiative because they saw financial opportunities and identified areas to reduce costs, particularly in the post-acute care setting. One Awardee, for instance, noted that if they "did nothing differently except reduce the number of people who go to skilled nursing, [they] potentially could make some money." Four Awardees

> *"I think the part that attracted us most was being able to participate in the development of it. And being able to have some feedback and say in the overall progression of the criteria." – Model 2 Awardee*

specifically mentioned that the ability to align incentives through gainsharing played a role in their decision to enter. Awardees we interviewed recognized the financial risk under BPCI, although five Awardees noted they either felt the risk was low or they structured their initiatives to minimize risk. For instance, some Awardees said that the ability to test a particular bundle among a small patient population allowed them to participate without bearing substantial risk.

c. Leadership and innovation

Approximately one-fifth of Awardees we interviewed referred to their organization as innovative and regarded themselves as leaders in health care reform. They indicated that the commitment to innovation exists among the organization's leadership as well as among physician leaders. As such, participating in the BPCI initiative was a natural next step that would allow them to play an active role in shaping the future of health care reform.

d. Quality improvement

Awardees (4) also indicated that the opportunity to improve the quality of care was a factor in their decision to participate in the initiative. Those who spoke about quality improvement noted that the initiative provides an opportunity to improve quality across the continuum of care.

e. Participation in other initiatives

Many (10) Awardees we interviewed indicated that they either have experience with commercial bundles, which positions them well to work with Medicare bundled payments, or are assessing future opportunities with commercial payers. In addition to BPCI many Awardees, or their partners, participate in other initiatives. As indicated in Exhibit 19, 15 Awardees that responded to a question about participation in other initiatives noted they participated in ACOs or shared savings programs and 12 said they participate in medical homes.

Exhibit 19: Q4 2013 or Q1 2014 Model 2 Awardees Participation in Other Initiatives

Initiatives	Number of Interviewed Awardees (N= 24)*
ACO/Shared Savings	15
Medical Home	12
Commercial/State Bundles	6
Medicare Acute Care Episode ACE Demonstration	1
Program of All-inclusive Care for the Elderly PACE	1

Source: Lewin interviews with Q4 2013 or Q1 2014 Model 2 Awardees, conducted from March through June 2014.

*Note: Awardees could cite multiple initiatives, so the numbers in this column do not sum to 24.

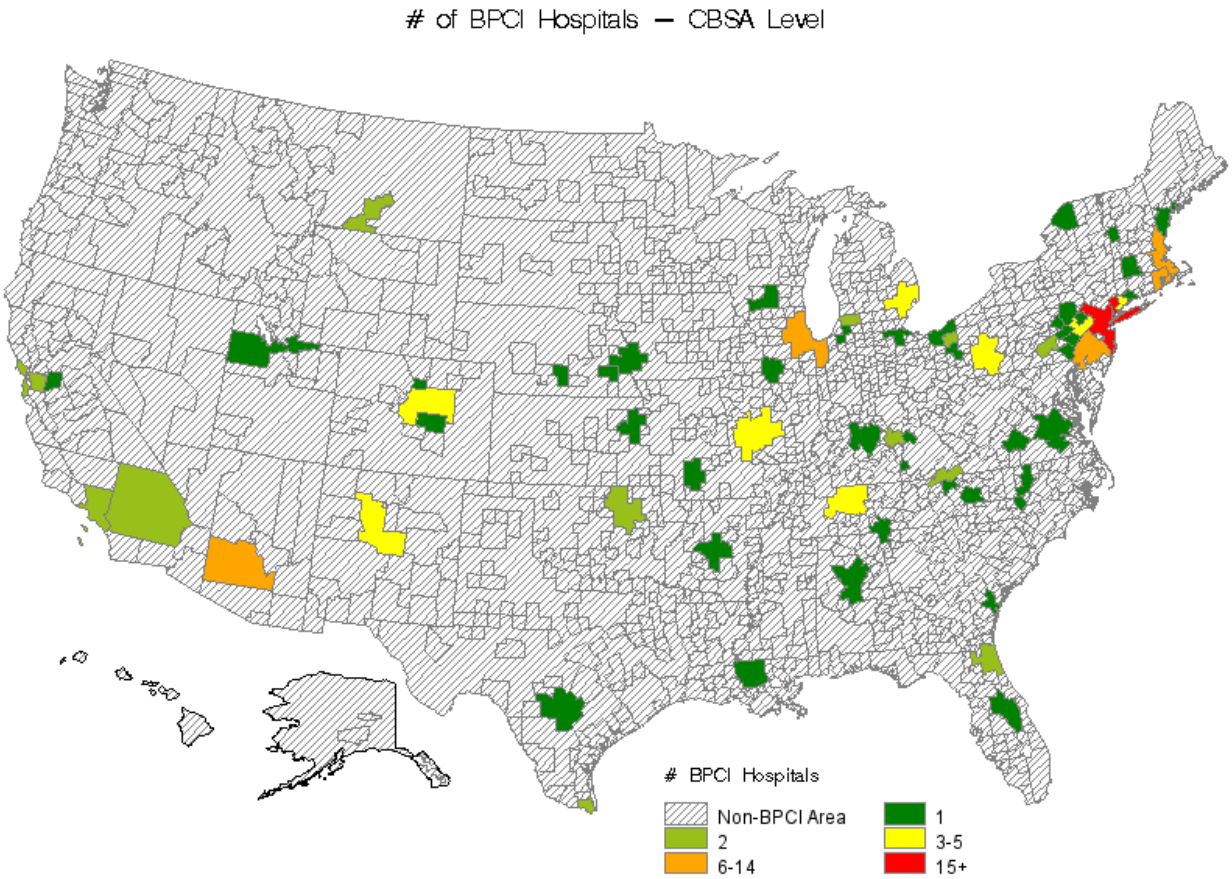
Some Awardees (5) we interviewed spoke about having prior experience with care redesign or bundled payments (e.g., ACE, commercial bundles) as a reason for participating in BPCI. A similar number, however, consider BPCI to be distinct from other initiatives, and their participation in other initiatives did not influence their decision to participate in BPCI. Awardees that participate in other initiatives indicated there are often synergies between BPCI and other

initiatives (8). Two Awardees, however, said that there are conflicts between BPCI and ACOs, noting that when ACO members become BPCI beneficiaries, Awardees have to coordinate with the ACO to manage the overlap.

2. Market characteristics

The 61 Model 2 BPCI-participating hospitals and 13 Model 4 BPCI-participating hospitals are located throughout the country, as pictured in Exhibit 20. In this section, we present the market characteristics[32] of the hospitals that participate in Models 2 and 4 (BPCI markets) and the characteristics of markets with no BPCI-participating hospital (non-BPCI markets).[33] It should be noted that the non-BPCI markets include those markets with EIs in Phase 1 of the program. Thus, some non-BPCI markets will become BPCI markets in subsequent analyses.

Exhibit 20: BPCI Participating Hospitals by CBSA, Q4 2013 – Q1 2014



Source: Lewin analysis of Salesforce data for all Q4 2013 and Q1 2014 BPCI participating hospital episode initiators.

[32] The market is defined as the Core Based Statistical Area (CBSA). Providers not located within a CBSA were assigned to the largest CBSA within their Hospital Referral Region (HRR).

[33] Non-BPCI markets represent all CBSAs that do not have a Model 2 or 4 BPCI participant. Areas of the country that are not in a CBSA are therefore not included in these non-BPCI markets.

As shown in Exhibit 21, Q4 2013 and Q1 2014 Model 2 and Model 4 BPCI-participating hospitals tend to be in CBSAs that are more competitive than non-participating hospitals. The average market penetration rate for BPCI Model 2 or 4 hospitals, defined as the percentage of admissions in the 48 clinical episodes in the market attributable to the BPCI provider is 38.1%. The Herfindahl index, defined as the sum of the squares of the market shares within a provider type, was used in assessing market concentration. Higher Herfindahl index values generally indicate lower competition and greater market power. The low mean Herfindahl index (0.30) for hospitals in BPCI markets suggests a high degree of competition among hospitals, with none of them dominating the market. In contrast, the mean Herfindahl index in non-BPCI markets is higher (0.69), suggesting that these markets are less competitive and probably dominated by fewer hospitals with more market share.

Markets with BPCI-participating hospitals differ from those without BPCI hospitals. BPCI markets tend to be more densely populated (~1.8M residents, on average), whereas non-BPCI markets are less populous (~210K residents, on average). Median household income is higher in BPCI markets (almost $50,000) than non-BPCI markets (just under $43,000). BPCI markets have, on average, higher Medicare Advantage (MA) penetration than non-BPCI markets (26.7% vs. 17.7%).

There is a higher concentration of primary care physicians (PCPs) per 10,000 residents (8.2 vs. 6.3) in the BPCI markets. The difference between BPCI and non-BPCI markets is more pronounced with respect to specialists (11.1 vs. 5.1) and physician assistants/nurse practitioners (PA/NPs) (7.8 vs. 6.0) per 10,000 residents. BPCI markets have fewer SNF beds (58.3 vs. 71.4) per 10,000 residents than non-BPCI markets. The proportion of Medicare-aged residents is similar for BPCI and non-BPCI markets. On average, 14% of residents in BPCI markets are 65 or older, relative to 15% in non-BPCI markets.

See **Appendix N** for comparison of characteristics of BPCI Markets (a CBSA that includes at minimum one BPCI participant from Model 2, Model 3, or Model 4) and non-BPCI Markets (no provider participating in Model 2, 3, or 4 within that CBSA).

Exhibit 21: Markets with Model 2 or 4 BPCI-Participating Hospitals and Markets without BPCI-Participating Hospitals – Q4 2013 and Q1 2014

Market Characteristics Models 2 & 4	BPCI Markets N=58; 6.2% of Markets				Non-BPCI Markets N=884; 93.8% of Markets			
	Mean	Median	25th	75th	Mean	Median	25th	75th
Hospital Penetration[34]	38.1%	28.5%	16.0%	46.0%	NA	NA	NA	NA
Herfindahl Index -hospital	0.30	0.25	0.12	0.34	0.69	0.94	0.42	1.00
Herfindahl Index - SNF	0.07	0.04	0.02	0.08	0.33	0.28	0.15	0.41
Herfindahl Index - HH	0.22	0.14	0.07	0.28	0.54	0.51	0.23	1.00
Herfindahl Index - IRF	0.41	0.30	0.00	1.00	0.11	0.00	0.00	0.00
Medicare Advantage Penetration	26.7%	25.0%	17.8%	36.5%	17.7%	14.8%	8.3%	23.7%
Population	1,841,238	694,709	355,576	1,617,142	209,697	67,733	38,932	151,859
Median Household Income	$50,853	$49,818	$46,133	$54,796	$43,772	$42,571	$38,289	$48,057
% Age 65+	14%	13%	12%	15%	15%	15%	13%	17%
PCPs Per 10,000	8.2	7.9	7.2	8.8	6.3	6.1	4.7	7.5
Specialists Per 10,000	11.1	10.2	7.5	13.1	5.1	4.3	2.5	6.5
PA/NPs Per 10,000	7.8	7.2	5.5	9.0	6.0	5.5	3.8	7.5
SNF Beds Per 10,000	58.3	57.8	41.6	74.3	71.4	65.1	43.7	91.5
LTCH Beds Per 10,000	1.1	0.8	0.3	1.7	0.5	0.0	0.0	0.0
IRF Beds Per 10,000	0.7	0.2	0.0	1.1	0.3	0.0	0.0	0.0
CAH Beds Per 10,000	0.4	0.0	0.0	0.7	1.8	0.0	0.0	1.5

Source: Lewin analysis of 2013 Medicare claims and 2011AHRF. Variable definitions are in Appendix I.

[34] "Hospital Penetration is the percentage of Medicare admissions in the 48 clinical episodes in the market attributed to the BPCI-participating hospitals in the market. See **Appendix I** for additional variable definitions.

3. Model Incentive Structure Characteristics

a. Model 2 – Model, Episode, and Length Selection

During the first two quarters of the initiative, 61 of the 94 Awardees participated in Model 2, accounting for 107 of the 211 EIs. In Q4 2013, Model 2 participants accounted for 1,713 (88%) of the episodes observed across the three models. According to the Awardees we interviewed, Model 2 was selected because the bundles include the hospital stay and post-acute care (PAC). Many Awardees indicated that PAC offers the greatest opportunity for achieving savings. Two interviewees also noted that they want to include the *inpatient* setting (in deciding between Model 2 and Model 3) to realize potential savings in that part of the care continuum. Awardees that chose Model 2 also indicated that they wanted to continue to receive retrospective, fee-for-service payments, citing the difficulty of adapting to prospective payments because of the increased risk and need for infrastructure changes (e.g., revamped internal accounting systems).

Model 2 Awardees participated in 34 of the 48 potential clinical episodes in Q4 2013. By Q1 2014, Awardees were participating in all 48 clinical episodes. Approximately three quarters of EIs participated in major joint replacement of the lower extremity in both quarters. Congestive heart failure was the next most common clinical episode, chosen by 22% of EIs in Q4 2013 and 34% in Q1 2014. Fewer Model 2 Awardees participated in chronic obstructive pulmonary disease and simple pneumonia clinical episodes. The count of EIs participating in each of the 48 clinical episodes during Q4 2013 and Q1 2014 is shown in Exhibit 22.

Exhibit 22: Model 2 Episode Initiators Participating in Each Clinical Episode, Q4 2013 and Q1 2014

Clinical Episode	Q4 2013 Episode Initiators (N=9)		Q1 2014 Episode Initiators (N=107)	
	N	%	N	%
Non-surgical and surgical: Gastrointestinal (GI)				
Esophagitis, gastroenteritis and other digestive disorders	0	0%	5	5%
Gastrointestinal hemorrhage	2	22%	9	8%
Gastrointestinal obstruction	1	11%	4	4%
Major bowel procedure	3	33%	9	8%
Total	**3**	**33%**	**14**	**13%**
Non-surgical: Cardiovascular				
Acute myocardial infarction	2	22%	14	13%
Atherosclerosis	0	0%	9	8%
Cardiac arrhythmia	1	11%	9	8%
Chest pain	0	0%	5	5%
Congestive heart failure	2	22%	36	34%
Medical peripheral vascular disorders	0	0%	7	7%
Syncope & collapse	1	11%	5	5%
Total	**2**	**22%**	**38**	**36%**
Non-surgical: Neurovascular				
Stroke	0	0%	13	12%
Transient ischemia	1	11%	5	5%
Total	**1**	**11%**	**15**	**14%**

Clinical Episode	Q4 2013 Episode Initiators (N=9)		Q1 2014 Episode Initiators (N=107)	
	N	%	N	%
Non-surgical: Orthopedic				
Fractures of the femur and hip or pelvis	1	11%	12	11%
Medical non-infectious orthopedic	1	11%	12	11%
Total	**2**	**22%**	**13**	**14%**
Non-surgical: Other medical				
Cellulitis	2	22%	10	9%
Diabetes	2	22%	7	7%
Nutritional and metabolic disorders	0	0%	5	5%
Red blood cell disorders	1	11%	5	5%
Renal failure	2	22%	7	7%
Sepsis	2	22%	13	12%
Urinary tract infection	1	11%	5	5%
Total	**2**	**22%**	**16**	**15%**
Non-surgical: Respiratory				
Chronic obstructive pulmonary disease, bronchitis, asthma	2	22%	27	25%
Other respiratory	2	22%	5	5%
Simple pneumonia and respiratory infections	2	22%	23	21%
Total	**2**	**22%**	**31**	**29%**
Surgical: cardiovascular				
AICD generator or lead	0	0%	3	3%
Cardiac defibrillator	0	0%	6	6%
Cardiac valve	1	11%	12	11%
Coronary artery bypass graft	1	11%	17	16%
Major cardiovascular procedure	0	0%	6	6%
Other vascular surgery	2	22%	10	9%
Pacemaker	2	22%	9	8%
Pacemaker device replacement or revision	0	0%	4	4%
Percutaneous coronary intervention	0	0%	8	7%
Total	**4**	**44%**	**27**	**25%**
Surgical: Orthopedic excluding spine				
Amputation	2	22%	5	5%
Double joint replacement of the lower extremity	1	11%	13	12%
Hip & femur procedures except major joint	2	22%	17	16%
Lower extremity and humerus procedure except hip, foot, femur	2	22%	14	13%
Major joint replacement of the lower extremity	7	78%	78	73%
Major joint replacement of the upper extremity	2	22%	11	10%
Other knee procedures	0	0%	1	1%
Removal of orthopedic devices	1	11%	13	12%
Revision of the hip or knee	2	22%	15	14%
Total	**7**	**78%**	**80**	**75%**

Clinical Episode	Q4 2013 Episode Initiators (N=9)		Q1 2014 Episode Initiators (N=107)	
	N	%	N	%
Surgical: Spinal				
Back & neck except spinal fusion	0	0%	5	5%
Cervical spinal fusion	1	11%	8	7%
Combined anterior posterior spinal fusion	0	0%	9	8%
Complex non-cervical spinal fusion	1	11%	9	8%
Spinal fusion (non-cervical)	1	11%	12	11%
Total	**2**	**22%**	**17**	**16%**

Source: February, 2014 BPCI Master list of Participants and Episodes from CMS.

Awardees indicated in the interviews that the decisions about BPCI model and episode selection were typically made jointly by hospitals' administrative (e.g., CEOs, CFOs) and clinical (e.g., chief medical officer, physician champions) leadership. Model 2 Awardees considered risk and opportunity when making choices about the structure of BPCI design. Interviewees frequently cited risk or opportunity or both as important in their model, episode, and episode length decisions.

"Orthopedics does lend itself to more standardization… there's not as much variation in the population health overall or levels of risk." – Model 2 Awardee

Awardees' reasons for selecting particular episodes included a number of business considerations, as summarized in Exhibit 23. Major joint replacement of the lower extremity is the most commonly selected episode because, as the Awardees we interviewed indicated, it is typically an elective and relatively predictable procedure, with less variable outcomes. Because it is usually an elective procedure, providers can prepare patients, which is not possible for unplanned episodes. Awardees also noted in the interviews that they selected episodes based on whether there were opportunities for savings or for quality improvement, which is consistent with another reason--the ability to plan or standardize the procedure. Current provider strengths or product lines were also mentioned as considerations.

"You don't make a data management decision without getting input from finance and without getting input from care managers and the physicians. Everyone has to be engaged in the decision making." – Model 2 Awardee

Exhibit 23: Reasons for Selecting Particular Episodes, Model 2 Awardee Interviews, Q4 2013 – Q1 2014

Themes from Awardee Interviews	Number of Interviewed Awardees (N=24)*
Data indicated there were financial or quality improvement opportunities	14
Ability to plan or standardized procedure	12
Strong physician champion/engagement	11
Alignment with skill set/service lines.	9
Volume	6

Source: Lewin interviews with Q4 2013 or Q1 2014 Model 2 Awardees, conducted from March through June 2014.
*Note: Awardees could cite multiple reasons for their decisions, so the numbers in this column do not sum to 24.

Q4 2013 Model 2 participants chose either 30- or 90-day episodes. Three EIs chose 30-day episodes for the major joint replacement of the lower extremity clinical episode. Six EIs selected 90-day episodes across all their clinical episodes. By the second quarter of the initiative, 18 Model 2 EIs selected 30-day episodes, three EIs selected 60-day episodes, and 89 EIs chose 90-day episodes. Though the vast majority of Q1 2014 Awardees applied a common length across all clinical episodes, two Awardees selected multiple episode lengths for their EIs, which vary with clinical episode. According to the Awardee quarterly interviews, choice of episode length is based on the ability to enhance opportunities or mitigate risk.

For those that chose the 30-day episode length, the most common reason, as indicated in our Awardee interviews, is that the shorter window allows for greater risk control. These Awardees indicated that a longer period is riskier because they felt the bundles do not exclude enough unrelated complications that might cause a patient to be readmitted.

Among Awardees that chose the 90-day episode length, three reasons were commonly cited in our Awardee interviews: 1) the desire to control a longer continuum of care, 2) the cost reduction opportunities in PAC, and 3) the lower discount rate (applied to the target amount) for the 90-day period. Recall that the desire to include PAC for the potential savings is also a reason that Awardees choose Model 2. Three respondents also noted that the 90-day joint replacement episodes are low risk because their care approach is well-tested and they can control care for these patients over a longer period.

Awardees also indicated that they considered the episode length that is clinically appropriate for the episode. For example, four respondents noted that 90 days is more appropriate for a chronic condition like chronic obstructive pulmonary disease (COPD), while two respondents indicated that 30 days is most appropriate for joint replacements. The Awardees did not necessarily agree on the appropriate length of particular episodes, however, because in Q1 2014 some selected 30 days for chronic conditions and some selected 90 days for joint replacements. It is worth noting that, while we heard a variety of scenarios regarding episode length on the quarterly Awardee interviews and site visits, the 90-day episode is by far the most common selection among Model 2 Awardees (See **Appendix C-1**).

b. Partners

In the context of BPCI, Awardees may partner with multiple types of organizations to support the initiative. We asked Awardees about these partnerships through several open-ended questions in our quarterly calls. The questions probed the types of partnership entities, the role of partners, and ongoing partnerships. Awardees could define partnerships as they wished, although we provided examples, such as physicians, data vendors and analysts, and other health care providers in the community that may treat BPCI patients. In their responses, interviewees described working with a variety of partners, including external data analysis or IT consultants, local health care providers, and physicians within their own organizations.

Many Awardees described other providers as partners to improve care in the post-acute period of the episode. Twenty-three Model 2 Awardees, representing both Q4 2013 and Q1 2014 starters, described partnerships with PAC providers. Of these, 20 reported discussing quality management with PAC providers that were likely to receive the Awardees' patients, even when the PAC providers were not contractually involved in BPCI. In such a relationship, Awardees said, they

may identify higher quality PAC providers and recommend them to their patients while maintaining patient choice. Some did so by creating a list of preferred SNFs for their patients. Six Awardees indicated that PAC providers are part of their health care organizations.

A second category of partnership included entities that could provide information or management support for activities under BPCI. Fifteen Model 2 Awardees reported partnering with a company for data analysis or IT support during any stage of their participation. Twelve of these Awardees reported having such a partner organization analyze internal data at the time of BPCI entry to help with decision-making or program design. Some of these Awardees have contracted with third-party administrators to assist with data management, program administration, or gainsharing distribution. One Awardee partnered with one contractor to perform claims data analysis and manage gainsharing arrangements and another to oversee accounting practices. This Awardee relied on these "neutral third parties" to provide oversight, ensure comprehensive program compliance, and affirm the accuracy of its financial outcomes.

A third category of partnership included physicians and, in particular, physicians treating BPCI patients during the initial hospital stay. Fifteen of the 24 Awardees interviewed indicated that they have partnerships in place with physicians in their organizations. Physician partnership takes various forms, including formal gainsharing participation and incentive alignment, information sharing, identification of potential care redesign opportunities, coordination of patient care with other providers, and strategic activities such as participation in program committees and decision-making.

Model 2 Awardees reported several anticipated benefits of their partnerships. For example, seven Awardees said that partners will help them coordinate their efforts under BPCI and maintain accountability to the program by working together on quality improvements. Others discussed benefits like a sense of community, education, and unity; an improved ability to track patients and monitor their status; new capabilities such as data analysis programs; alignment of financial incentives across organizations; and increase of BPCI's geographic reach.

Interviewees also described limitations of the partnerships. Because Medicare beneficiaries maintain their choice of provider, Awardees cannot direct their patients to preferred PAC facilities. For Model 2 Awardees, whose success at least partly relies on influencing post-acute care, the inability to control where their patients are treated after hospital discharge was identified as challenging. Other challenges include patient tracking across providers, difficulty working towards change with partners that do not have the same financial incentives, and competition among providers to attract patients.

c. Waiver Use

The design of the BPCI initiative allows Awardees to choose among several waivers of Medicare requirements to facilitate the implementation of care redesign interventions. To use any of these waivers, an Awardee must describe its use in its IP. An EI may or may not elect to use a waiver chosen by its Awardee. All Q4 2013 and Q1 2014 EIs participated in the waivers chosen by their respective Awardees. In this section we describe the use of the three waivers described in the IPs and provide an overview of the rationale for choosing these waivers and how they were implemented based on the Awardee interviews and the site visit case studies.

Exhibit 24: Model 2 episode initiators participating in Various BPCI waivers, Q4 2013 and Q1 2014

Model 2 Participants Waiver Selection	Number of Q4 2013 EIs (N=9)[a]	Number of Q1 2014 EIs (N=107)[b]
3 day SNF waiver	6	71
Beneficiary Incentives	4	41
Gainsharing	6	77

[a] The nine EIs in Q4 2013 are distributed among eight Awardees.

[b] The 107 EIs in Q1 2014 are distributed among 60 Awardees.

Source: Lewin analysis of Awardee Implementation Protocols for Q4 2013 and Q1 2014 BPCI participants.

Three-day SNF waiver

This waiver, available only in Model 2, allows Medicare coverage of SNF care for beneficiaries discharged from an inpatient hospital stay that was less than three days. Under normal coverage rules, a beneficiary must have an inpatient hospital stay of at least three days before Medicare will cover needed SNF care. With this waiver, hospitals may discharge beneficiaries to a SNF at any time after admission as deemed appropriate by the treating clinicians and within 30 days of that discharge. Six of the Q4 2013 and 71 of the Q1 2014 EIs are using the three-day SNF waiver.

Beneficiary incentives

The beneficiary incentive waiver allows the EI to offer a service or product to the beneficiary that is related to the episode, but that is not typically covered by Medicare. Four of the Q4 2013 and 41 of the Q1 2014 EIs offered beneficiary incentives, ranging in value from $1.54 to $2,000.[35] Q4 2013 Awardees reported that no Model 2 beneficiary incentives were delivered. See Exhibit 25 for a full description of beneficiary incentives offered in Q4 2013.

Exhibit 25: Beneficiary incentive waivers offered by Model 2 Awardees, Q4 2013

Service offered	Value	Purpose of incentive as described by Awardee
Transportation services to joint education class	$14 for round-trip within 20 mile radius $28 for round-trip outside 20 mile radius	This is provided to help ensure that beneficiaries attend a mandatory pre-surgery education class.
Electronic tablet	<$400	Beneficiaries, family members, or caregivers may receive a tablet, but the recipient(s) must use the tablet daily to respond to alerts, questions, and other information requests. This is intended to assist in disseminating care plans and reminding beneficiaries about their role in the care plan. This is also a means for conducting patient surveys.
Weight, blood pressure, heart rate, oxygen level, and other measurement devices	<$100	These are provided to high-risk beneficiaries who need a home monitoring device. It will help identify patients in decline who require clinical intervention to prevent worsening beneficiary health.

[35] The incentive valued at $2,000 is a community care management nurse service. Items or services involving technology provided to beneficiaries are subject to a $1,000 limit.

Service offered	Value	Purpose of incentive as described by Awardee
Additional home health aide hours for beneficiaries medically cleared to be discharged home	$20 per hour	For beneficiaries who are cleared to be discharged home but may not have sufficient support, additional home health aide hours will allow beneficiaries to recover in their own homes and avoid or shorten an institutional stay.

Source: Lewin analysis of Awardee Implementation Protocols for Q4 2013 BPCI participants.

In discussing the beneficiary incentives during one of the case studies, the EI noted that waivers can be used to address the "socioeconomic barriers" that practitioners could not affect prior to this initiative. That Awardee covers the cost of a home health agency risk assessment under the waiver to provide information about the appropriate site of post-hospitalization recovery. Prior to the waiver, very few beneficiaries took advantage of this informative assessment because the service was not a covered benefit, so they would have to pay out-of-pocket.

Gainsharing

"[Gainsharing] is an opportunity to align a shared goal working towards quality metric and cost saving initiatives, and be able to share in some of those realized savings."

Gainsharing enables Awardees to share any savings among providers with a gainsharing agreement, including its EIs. Based on a review of Awardee IPs, six of the Q4 2013 and 77 of the Q1 2014 EIs indicate an intention to participate in gainsharing. Based on quarterly interviews with Awardees, gainsharing is generally viewed as a tool to change practice patterns (including aligning previously disparate incentives), improve quality, and produce cost savings.

"We're not opposed to gainsharing… we're reluctant to pull physicians into something that we really don't have our arms around."

Awardees that opt not to gainshare cite financial risk as one of the primary inhibitors. Some Awardees note that because their physicians are employees, they do not need gainsharing to engage them. Nevertheless, the majority (7 of the 9 interviewed Awardees not currently gainsharing) indicate that they are open to gainsharing in the future. The results of these quarterly Awardee interviews related to gainsharing are summarized in Exhibit 26. See **Appendix O** for additional detail on the gainsharing options available to Awardees and for a summary of gainsharing details for all Awardees active in Q4 2013.

Exhibit 26: Rationale for Gainsharing Decisions, Q4 2013 and Q1 2014 Model 2 Awardees

Gainsharing considerations	Number of Awardee Interviewees (N=24)*
Gainsharing (reasons cited):	**15**
Quality improvement	9
Incentive alignment	9
Provider engagement	9
Not gainsharing (reasons cited):	**9**
Financial risk	5
Awardee structure/process	5
Open to gainsharing in the future	**7**

Source: Lewin interviews with Q4 2013 or Q1 2014Model 2 Awardees, conducted from March through June 2014.

*Note: Awardees could cite multiple reasons for their decisions, so the numbers in this column do not sum to 24.

4. Care redesign and cost saving strategy characteristics

All of the Q4 2013 and Q1 2014 Model 2 EIs have interventions in every one of the five major care redesign categories: redesign of care pathways; enhancements in care delivery; patient activation, engagement, and risk management; care coordination; and system changes to support care. Within each care redesign category, EIs vary in how these interventions are implemented.

Some of the care redesign interventions were already in place prior to entering BPCI and other care redesign activities were new interventions. Some Awardees began developing and initiating new interventions prior to Phase II with the plan to further develop it throughout the initiative and other initiatives began with the start of Phase II. New interventions include: developing patient navigation programs; developing episode-specific care pathways and protocols to track both anchor episodes and patient comorbidities; and conducting patient assessments for readmission risk, barriers to care, and recovery pathways.

> *"I think communication is the key, and I think also the idea of the case manager, who is able to explore that patient and their setting and their family members beforehand, and convey that information to us, helps us to set out a strategic plan that works for that patient…"*
> *– Model 2 Awardee*

The case studies provided more detail on the care redesign initiatives in practice. One EI began many of its care redesign activities during Phase I of BPCI. Two of the activities initiated prior to the start of BPCI include a discharge planning tool to standardize the discharge process and the onboarding of care coordinators. Although some of the programs were operational at the time of the visit, the EI indicated that they will continue developing their redesign activities during the active phase of participation. Another EI spoke of the success of their new case manager position. The case manager is tasked with meeting a patient when surgery is scheduled, discussing options for care settings after discharge, and tracking patient progress throughout the episode of care. For this Episode Initiator, the case manager improved communication and coordination among providers. In the coming months, the EI is looking to expand its case management practices to include all Medicare beneficiaries.

5. Patient population characteristics

Patients cared for by BPCI participants in Q4 2013 differ from other Medicare beneficiaries who were admitted with one of the same MS-DRGs, but did not receive care from a BPCI participant. Exhibit 27 compares Model 2 BPCI patients to all Medicare beneficiaries who had an inpatient admission in one of the 34 Model 2 clinical episodes active in Q4 2013.[36] Compared to all Medicare beneficiaries hospitalized with one of the same MS-DRGs in Q4 2013, the BPCI population had a larger proportion of patients aged 65-79 (55% vs. 46%), and a smaller proportion of patients in both the 20-64 age group (10% vs. 16%) and the 80+ age group (35% vs. 38%). The BPCI population and the population of all Medicare beneficiaries with admissions for the same conditions had a similar gender distribution. The most notable difference between the two populations is that a lower proportion of Model 2 BPCI patients were eligible for Medicaid. Among BPCI patients at Model 2 sites, 14% were eligible for Medicaid, compared with 25% of

[36] Exhibit 27 compares Model 2 BPCI patients to *all* Medicare beneficiaries with the same MS-DRG, not to the comparison group.

Medicare beneficiaries with similar admissions. The proportion of beneficiaries who qualified for Medicare due to a disability was also slightly lower among BPCI patients (13% vs. 16%).

Exhibit 27: Characteristics of Model 2 BPCI Patients and All Medicare Beneficiaries with an Inpatient Admission in one of the 34 Active Model 2 Clinical Episodes, Episodes initiated Q4 2013

Characteristics	Model 2 BPCI Patients (N=1,713)		All Medicare Beneficiaries with same MS-DRG admission (N=1,228,074)[37]	
	N	%	N	%
Age				
20-64	173	10.1%	198,125	16.13%
65-79	944	55.1%	563,109	45.85%
80+	596	34.8%	466,672	38.0%
Gender				
Female	995	58.1%	695,684	56.65%
Male	718	41.9%	532,389	43.35%
Percent Eligible for Medicaid	240	14.0%	309,866	25.23%
Percent Disability, no ESRD	216	12.6%	202,329	16.48%

Source: Lewin analysis of 2013 Medicare claims.

Exhibit 28 compares Model 2 BPCI patients admitted for a surgical orthopedic excluding spine clinical episode to all Medicare beneficiaries admitted for one of the same clinical episodes.[38,39] Model 2 patients admitted for a surgical orthopedic excluding spine clinical episode were more likely to be younger than all Medicare beneficiaries admitted for one of the same clinical episodes. Compared with all Medicare beneficiaries in the same clinical grouping, the BPCI population for this clinical grouping had a larger proportion of patients aged 65-79 (70% vs. 60%) and a smaller proportion of patients in the 80+ age group (21% vs. 29%). Model 2 BPCI patients in the surgical orthopedic excluding spine clinical grouping were also less likely to be eligible for Medicaid than all Medicare beneficiaries in the same clinical grouping (12% vs. 14%). Both populations had a similar gender distribution and a similar proportion of beneficiaries who qualified for Medicare due to a disability.

[37] The sum of Ns across the categories for a given characteristic may not total the number of episodes due to missing values.
[38] Exhibit 28 compares Model 2 BPCI patients in the surgical orthopedic excluding spine clinical episode to *all* Medicare beneficiaries in the same clinical grouping, not to the comparison group.
[39] Comparisons for the other clinical groupings are located in **Appendix C-2**.

Exhibit 28: Characteristics of Model 2 BPCI Patients and All Medicare Beneficiaries with an Inpatient Stay in one of the same Clinical Episodes, Surgical Orthopedic Excluding Spine Episodes, Q4 2013

Characteristics	Model 2 BPCI Patients (N=778)		All Medicare Beneficiaries with same MS-DRG (N=203,056)	
	N	%	N	%
Age				
20-64	73	9.4%	23,148	11.4%
65-79	542	69.7%	121,631	59.9%
80+	163	21.0%	58,277	28.7%
Gender				
Female	498	64.0%	127,113	62.6%
Male	280	36.0%	75,943	37.4%
Percent Eligible for Medicaid	91	11.7%	29,037	14.3%
Percent Disability, no ESRD	96	12.3%	26,194	12.9%

Source: Lewin analysis of 2013 Medicare claims.

B. Impact of BPCI

This section describes the health care utilization, payments, quality of care, and indicators of potential unintended consequences for the nine Model 2 BPCI (hospital) participants relative to the non-BPCI comparison hospitals. The impact analysis presented in this first Annual Report is based on episodes that were initiated between October 1, 2013 and December 31, 2013; that is, episodes and providers active during Q4 2013. The Model 2 participants were active across 34 clinical episodes for Q4 2013 as presented under A3 above.

We present results for all Model 2 episodes combined and separately for clinical episodes in the surgical orthopedic excluding spine clinical grouping. The trend analyses reflect risk-adjusted outcomes for patients of BPCI participants and patients of comparison providers. We also present the estimated differential change in risk-adjusted outcomes for patients receiving care from BPCI providers between the baseline and the intervention period relative to that same change for the patients receiving care from providers in a comparison group (DiD). See Section III.A.6 for additional details on the statistical approach. See **Appendix C-1** for the full results and **Appendix C-2** for unadjusted results for the six clinical groupings not presented in this section.

The reader should keep in mind several caveats in reviewing this section. These results only reflect the first three months of experience under BPCI. Although the results are risk-adjusted to account for patient differences that may affect the outcomes, the combined sample is heavily weighted towards the surgical orthopedic excluding spine clinical grouping (particularly hip and knee replacements) and results associated with those clinical episodes will influence the overall patterns observed.

1. Characteristics of Model 2 BPCI Patients Compared With Patients treated by Comparison Group Providers

Exhibit 29 illustrates that the characteristics and prior health care utilization of Model 2 BPCI patients are generally similar to those of the comparison group patients during Q4 2013. Relative to the comparison group, the BPCI patients in Q4 2013 had a similar age and gender distribution. The two patient populations also exhibited comparable use of medical services in the six months prior to the anchor hospitalization. The most notable difference between BPCI and comparison group patients is that a lower proportion of Model 2 BPCI patients were eligible for Medicaid (14% vs. 21%). This was consistent across the baseline period as well (data not shown; see **Appendix C-1**). The proportion of patients who qualified for Medicare due to a disability was also lower among BPCI providers (13% vs. 15%). Our risk-adjusted models controlled for the characteristics and prior health care utilization measures to account for any differences between the BPCI and comparison group patients.

Exhibit 29: Characteristics of Model 2 BPCI Patients and Comparison Group Patients, Episodes Initiated Q4 2013

Characteristics	Model 2 BPCI Patients (N=1,713)		Model 2 Comparison Group Patients (N=60,852)	
	N	%	N	%
Age				
20-64	173	10.1%	7,806	12.8%
65-79	944	55.1%	32,422	53.3%
80+	596	34.8%	20,624	33.9%
Gender				
Female	996	58.1%	35,097	57.7%
Male	717	41.9%	25,755	42.3%
Eligible for Medicaid	240	14.0%	12,528	20.6%
Disabled, no ESRD	216	12.6%	9,129	15.0%
Inpatient hospitalization in the six months prior to anchor hospitalization	438	25.6%	15,350	25.2%
No institutional use in the six months prior to anchor hospitalization	1,243	72.6%	44,277	72.8%
	Mean	**SD**	**Mean**	**SD**
Average HCC case mix index	0.888	1.108	0.901	1.125
Average number of ED visits in the six months prior to anchor hospitalization	0.47	1.49	0.48	1.47
Average number of inpatient hospitalizations in the six months prior to anchor hospitalization	0.39	0.86	0.39	0.85

Source: Lewin analysis of 2013 Medicare claims.

Patient characteristics—Surgical Orthopedic Excluding Spine

Exhibit 30 illustrates the characteristics and prior health care utilization of Model 2 BPCI patients in surgical orthopedic excluding spine episodes. Compared to Model 2 overall, BPCI patients in surgical orthopedic excluding spine episodes were healthier, as indicated by a lower average HCC

case-mix index (0.501 vs. 0.888), a lower average number of ED visits in the six months prior to the anchor hospitalization (0.26 vs. 0.47), and a lower average number of inpatient hospitalizations in the six months prior to the anchor hospitalization (0.18 vs. 0.39). As expected, BPCI patients in surgical orthopedic excluding spine episodes are more similar to the comparison group of patients in the same group of episodes than the comparison of all Model 2 episodes. Relative to the comparison group, the BPCI patients in Q4 2013 had a similar age and gender distribution. The small differences between BPCI patients in surgical orthopedic excluding spine episodes and patients in the same clinical episode grouping treated by comparison providers were a slightly higher HCC index (0.50 vs. 0.47), a higher proportion with prior hospitalization (14.4% vs. 13.2%), and a smaller proportion with prior institutional use in the past six months (83.7% vs. 85.4%). Our risk-adjusted models controlled for the characteristics and prior health care utilization measures to account for any differences between the BPCI and comparison group patients.

Exhibit 30: Characteristics of Model 2 BPCI Patients and Comparison Group Patients, Surgical Orthopedic Excluding Spine Episodes Initiated Q4 2013

Characteristics	Model 2 BPCI Patients (N=778)		Model 2 Comparison Group Patients (N=24,914)	
	N	%	N	%
Age				
20-64	73	9.4%	2,146	8.6%
65-79	542	69.7%	16,124	64.7%
80+	163	21.0%	6,644	26.7%
Gender				
Female	498	64.0%	15,681	62.9%
Male	280	36.0%	9,233	37.1%
Eligible for Medicaid	91	11.7%	2,978	12.0%
Disabled, no ESRD	96	12.3%	2,647	10.6%
Inpatient hospitalization in the six months prior to anchor hospitalization	112	14.4%	3,300	13.2%
No institutional use in the six months prior to anchor hospitalization	651	83.7%	21,283	85.4%
	Mean	**SD**	**Mean**	**SD**
Average HCC index	0.501	0.779	0.467	0.708
Average number of ED visits in the six months prior to anchor hospitalization	0.26	0.64	0.26	0.86
Average number of inpatient hospitalizations in the six months prior to anchor hospitalization	0.18	0.51	0.17	0.49

Source: Lewin analysis of 2013 Medicare claims.

2. Utilization

This section presents the results for the risk-adjusted utilization measures for the Model 2 BPCI participants. Results are presented for both all Model 2 episodes combined and episodes in the surgical orthopedic excluding spine clinical episode group. Utilization measures in this section

include average inpatient length of stay (LOS), number of days during the 90 days post anchor admission discharge in each PAC setting (HHA, SNF, and IRF)[40] and number of days in any setting (HHA, SNF, IRF, LTCH, or hospital) after the anchor admission discharge, and use of PAC following the anchor hospitalization. Number of days of PAC use is limited to the patients who had at least one day in that setting during the 90-day post discharge period. See Section III.A.5 for detailed outcome definitions. Quality-related utilization measures, such as readmissions and ER use, are presented in the quality section.

a. PAC utilization

Use of Post-Acute Care Following Anchor Hospitalization

Exhibits 31, 32 and 33 present the unadjusted and risk-adjusted distribution of patients across discharge settings within 14 days after the anchor hospitalization for Model 2 BPCI patients and patients treated by comparison group providers. Through the baseline and initial intervention quarter, the share of patients (risk-adjusted) discharged home without home health remained relatively stable and was similar for BPCI and comparison patients. During the baseline period, the most common institutional discharge setting for BPCI and comparison group patients was a SNF. During the intervention period, the proportion of BPCI patients discharged to a SNF decreased four percentage points relative to the final quarters of the baseline period. At the same time, the share of patients discharged to a HHA increased nearly six percentage points from the last four baseline quarters, reaching 34% during the intervention period. This shift was not evident among the patients treated by comparison group providers. There was little variation in hospitalization discharge patterns among comparison group providers across the 13 quarters of analysis.

Exhibit 31: Trends: Unadjusted and Risk-Adjusted Percentage of Patients by Discharge Setting Following Anchor Hospitalization, Model 2

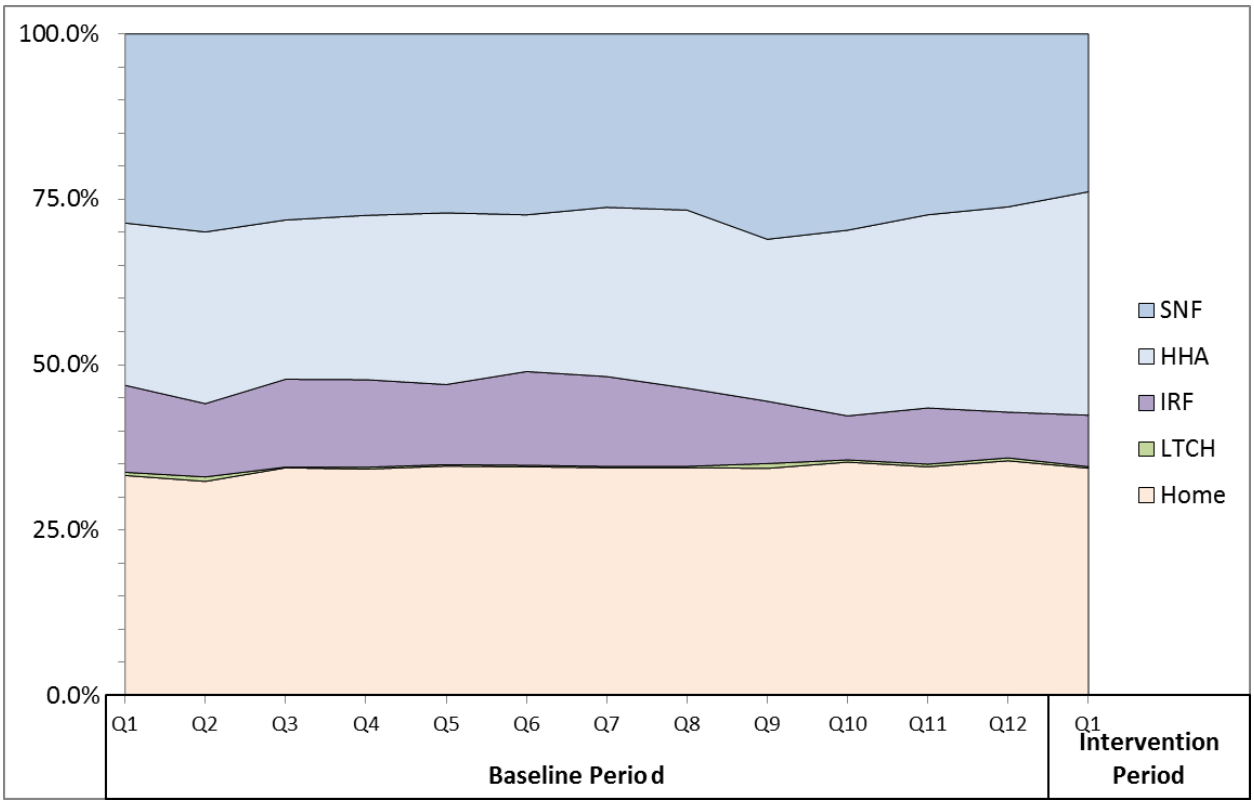
Discharge Setting	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
SNF	N	13,867	6,366	1,657	441,159	220,865	58,672
	Unadjusted	27.6%	28.7%	23.8%	29.5%	29.5%	28.9%
	Risk-adjusted	27.6%	28.5%	23.8%	28.9%	29.1%	28.5%
HHA	N	13,867	6,366	1,657	441,159	220,865	58,672
	Unadjusted	24.9%	28.8%	35.2%	27.0%	27.4%	27.4%
	Risk-adjusted	25.2%	28.2%	33.8%	27.0%	27.3%	27.2%
IRF	N	13,867	6,366	1,657	441,159	220,865	58,672
	Unadjusted	12.5%	8.1%	8.4%	6.1%	5.7%	5.4%
	Risk-adjusted	12.8%	7.9%	7.8%	10.0%	9.4%	9.0%
LTCH	N	13,867	6,366	1,657	441,159	220,865	58,672
	Unadjusted	0.3%	0.5%	0.2%	1.2%	1.1%	1.2%
	Risk-adjusted	0.3%	0.5%	0.2%	0.8%	0.8%	0.8%

[40] There was insufficient sample size to examine average LTCH number of days among LTCH users.

Discharge Setting	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
Home without HH	N	13,867	6,366	1,657	441,159	220,865	58,672
	Unadjusted	34.7%	33.8%	32.4%	36.1%	36.3%	37.1%
	Risk-adjusted	34.1%	34.9%	34.4%	33.2%	33.5%	34.5%

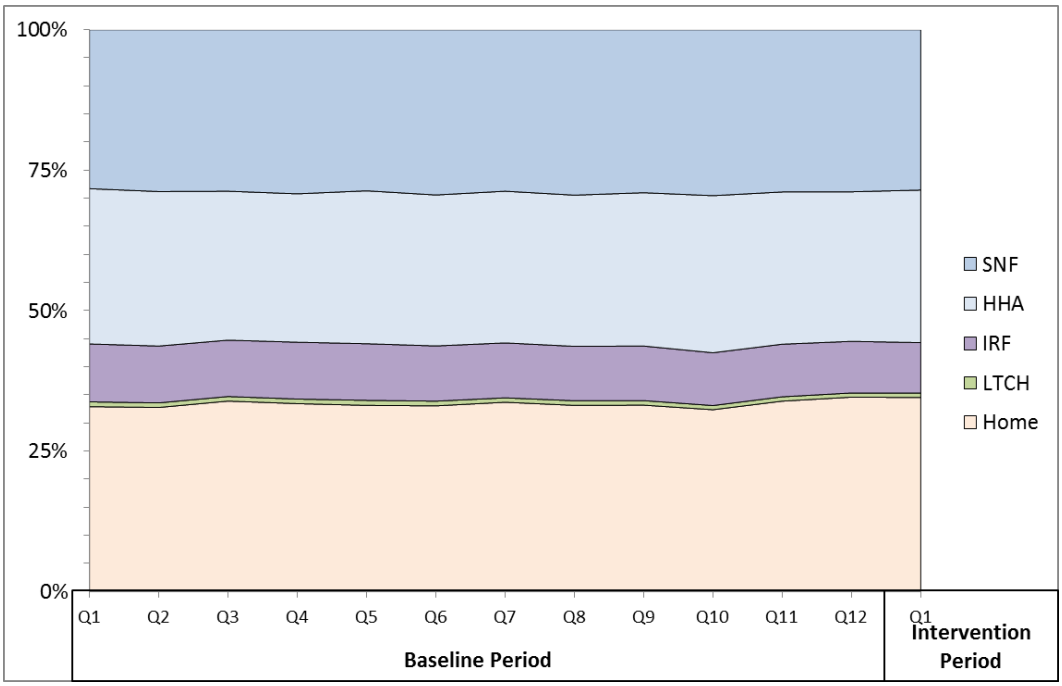
Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 32: Trends: Risk-Adjusted Percentage of Patients by Discharge Setting Following Anchor Hospitalization, Model 2 BPCI Providers



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants.

Exhibit 33: Trends: Risk-Adjusted Percentage of Patients by Discharge Setting Following Anchor Hospitalization, Model 2 Comparison Group Providers



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for balanced comparison group.

Exhibits 34 and 35 display the risk-adjusted proportion of BPCI patients discharged to an institutional PAC setting (SNF, IRF, or LTCH) out of patients receiving any PAC (HHA, SNF, IRF, or LTCH) within 14 days after the anchor hospitalization. Variations in this measure across the baseline and intervention period mirror the trends observed in patient discharge patterns. During the first eight quarters of the baseline period, BPCI and comparison group providers discharged approximately 60% of their patients to an institutional PAC setting after the anchor hospitalization. However, during the last four quarters of the baseline period, the proportion of patients from BPCI providers discharged to an institutional PAC setting declined from 62% to 56%. This trend continued during the intervention period, when institutional PAC use among BPCI providers decreased eight percentage points relative to the last four quarters of the baseline period to 48%. The proportion of patients treated by comparison group providers discharged to an institutional PAC setting remained stable throughout the baseline and intervention quarters (60%).

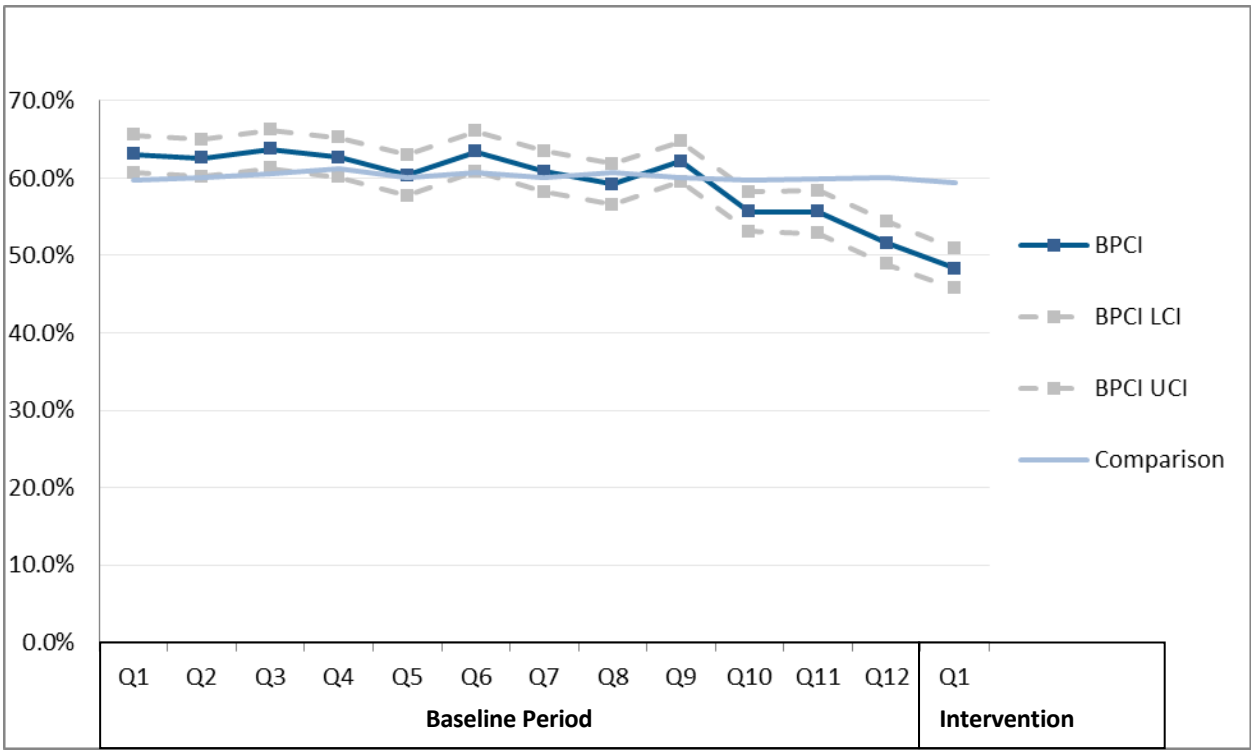
Exhibit 34: Trends: Unadjusted and Risk-Adjusted Percentage of PAC Users Discharged to Institutional PAC Setting (vs. Home Health) After Anchor Hospitalization, by Period, Model 2

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	9,048	4,210	1,120	281,751	140,653	36,915
Unadjusted	61.9%	56.5%	47.9%	57.7%	56.9%	56.4%
Risk-adjusted	62.0%	56.3%	48.3%	60.4%	59.9%	59.4%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 35: Trends: Risk-Adjusted Percentage of PAC Users Discharged to Institutional PAC Setting After Anchor Hospitalization, Model 2



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 36 presents the difference-in-difference (DiD) results for this measure. From the baseline to the intervention period, the risk-adjusted proportion of patients discharged to an institutional PAC setting out of all patients receiving any PAC declined 10.9 percentage points more for BPCI patients relative to the comparison group patients.

Exhibit 36: DID: Unadjusted and Risk-Adjusted Percentage of PAC Users Discharged to Institutional PAC Setting After the Anchor Hospitalization, Model 2

Measure	BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
% discharged to an institution (i.e., SNF, IRF,LTCH) out of those who received any post-acute care (i.e., HHA,SNF, IRF, or LTCH)	1,120	36,915	-11.3% *	-10.9% *

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Use of PAC Following Anchor Hospitalization — Surgical Orthopedic Excluding Spine Episodes

We repeated the analyses for only those patients in the surgical orthopedic excluding spine episodes. Exhibit 37 displays the proportion of PAC users discharged to an institutional PAC setting within 14 days after the anchor hospitalization for BPCI and comparison group patients in this clinical episode group. Because the BPCI episodes in the first quarter were dominated by the surgical orthopedic excluding spine clinical episode group, these trends mirror those of all Model 2 episodes. The risk-adjusted proportion of PAC users in the surgical orthopedic excluding spine clinical episode group discharged to an institutional setting was significantly higher for BPCI patients than comparison group patients until the last four quarters of the baseline period. During the last four quarters of the baseline period, the proportion of PAC users discharged to an institutional setting was lower for BPCI patients than for the comparison group and was even lower during the intervention quarter. HHA use increased more for BPCI patients in the surgical orthopedic excluding spine clinical episode group than for all Model 2 episodes. The share of comparison group patients discharged to institutional PAC settings remained steady.

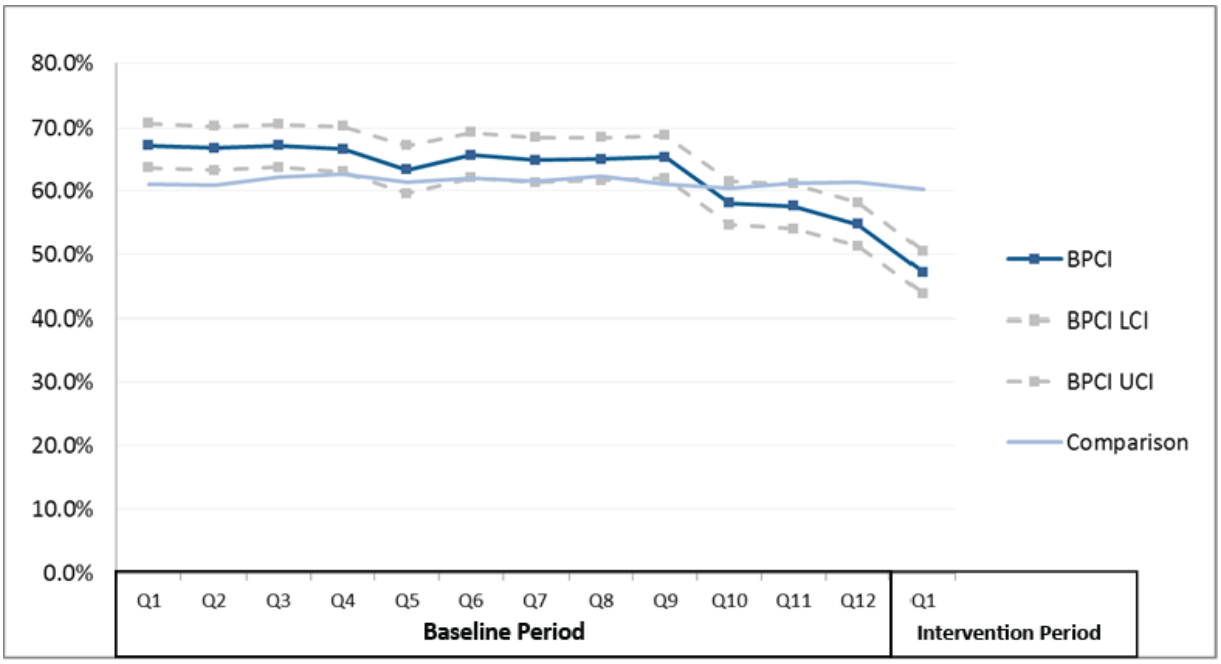
Exhibit 37: Trends: Unadjusted and Risk-Adjusted Percentage of PAC Users Discharged to Institutional PAC Setting After Anchor Hospitalization, by Period, Model 2 *Surgical Orthopedic Excluding Spine* Episodes

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	4,381	2,254	608	151,927	75,813	19,688
Unadjusted	66.4%	58.2%	44.9%	62.9%	61.4%	60.2%
Risk-adjusted	65.8%	58.9%	47.2%	61.8%	61.0%	60.2%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 38: Trends: Risk-Adjusted Percentage of PAC Users Discharged to Institutional PAC After Anchor Hospitalization, Model 2 *Surgical Orthopedic Excluding Spine* Episodes



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

The DiD results, presented in Exhibit 39, confirm this finding. Just as for all Model 2 episodes, the proportion of BPCI patients discharged to an institutional PAC setting out of all patients receiving any PAC dropped from the baseline to the intervention period for this clinical group. In fact, the change from baseline to intervention for BPCI patients relative to comparison group patients was even greater for surgical orthopedic excluding spine episodes than for all episodes. Among the surgical orthopedic excluding spine episodes, the proportion of institutional PAC discharges for PAC users fell 14.8 percentage points more for the BPCI patients than for the patients of the comparison providers. Across all episodes, the decline in institutional PAC was 10.9 percentage points more for BPCI patients than for the comparison patients.

Exhibit 39: DID: Unadjusted and Risk-Adjusted Percentage of PAC Users Discharged to Institutional PAC Setting After Anchor Hospitalization, Model 2 *Surgical Orthopedic Excluding Spine* Episodes

Measure	BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
% discharged to an institution (i.e., SNF, IRF, LTCH) out of those who received any post-acute care (i.e., HHA, SNF, IRF, LTCH)	608	19,688	-16.6% *	-14.8% *

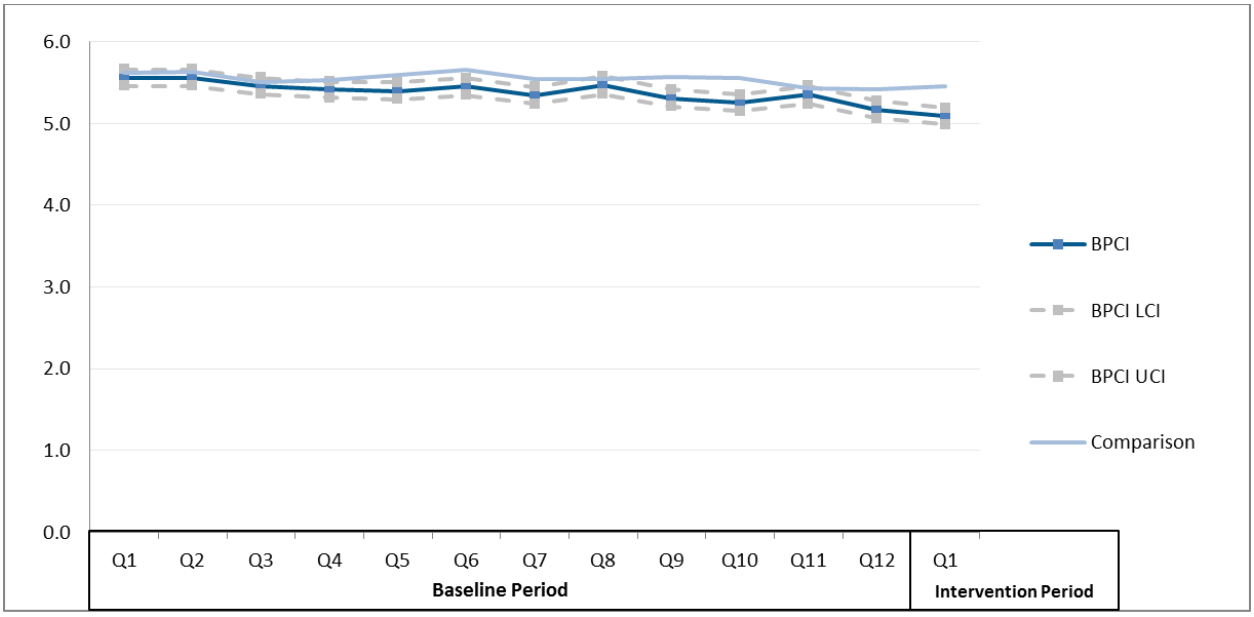
* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

b. Inpatient Length of Stay and PAC Number of Days

Exhibits 40 and 41 present the unadjusted and risk-adjusted trends for the average length of stay of the anchor hospitalization for BPCI patients and patients treated by comparison group providers. In most quarters of the baseline and intervention period, length of stay for BPCI patients was statistically significantly shorter than for comparison group patients. The length of the anchor hospitalization for BPCI patients declined over time, while comparison group patients' length of stay was relatively stable. The average risk-adjusted average length of stay for BPCI patients fell from 5.5 days during the initial quarters of the baseline period (quarters 1-8) to 5.3 days in the latter quarters of the baseline (quarters 9-12). It declined an additional 3.8 % during the intervention period to 5.1 days. Thus, the decline in risk-adjusted length of stay from the baseline to the intervention period was 0.2 days greater for BPCI patients than for patients of the comparison group (see Exhibit 42). Additional analyses suggest that this decline in the anchor stay is associated with an increase in the number of short-stay transfers to PAC. These are situations in which a patient is discharged from the hospital to a PAC setting with a hospital LOS less than the geographic mean LOS for the patient's MS-DRG.

Exhibit 40: Trends: Average Risk-Adjusted Anchor Hospitalization Length of Stay, Model 2



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 41: Trends: Average Unadjusted and Risk-Adjusted Anchor Hospitalization Length of Stay, by Period, Model 2

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	13,876	6,368	1,658	441,368	220,967	58,699
Unadjusted	6.2	6.2	6.2	6.0	6.0	6.0
Risk adjusted	5.5	5.3	5.1	5.6	5.5	5.5

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 42: DiD: Average Unadjusted and Risk-Adjusted Acute Inpatient Care Length of Stay, Model 2

BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
1,658	58,699	0.09	-0.2 *

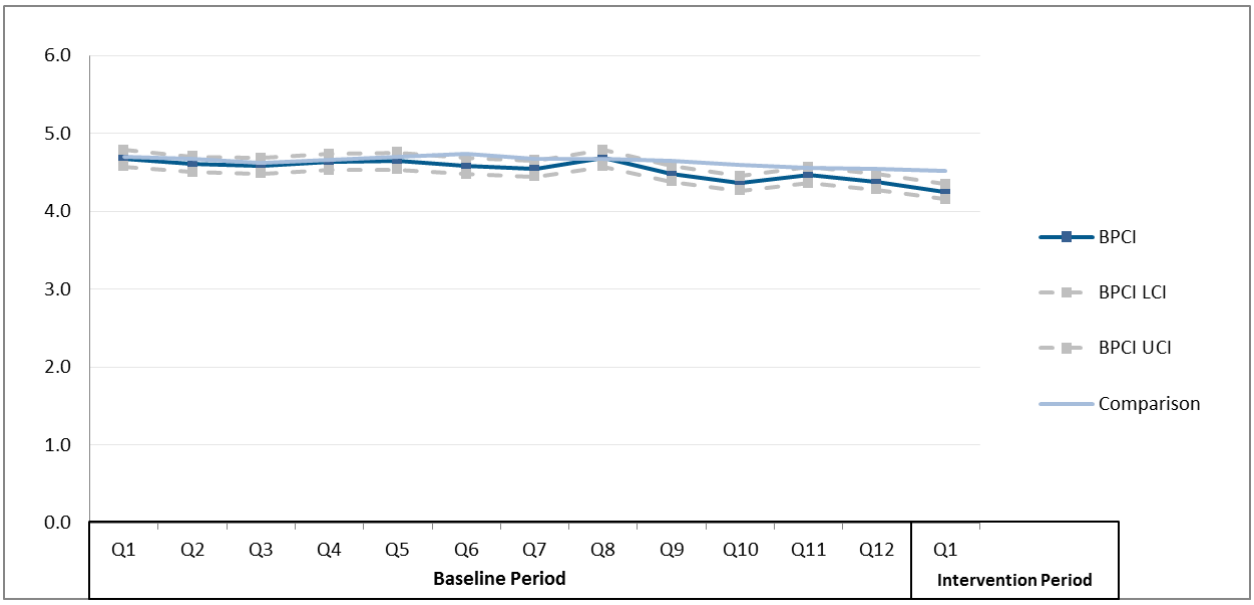
* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Inpatient Length of Stay—Surgical Orthopedic Excluding Spine

Exhibits 43 and 44 present the unadjusted and risk-adjusted trend results for the anchor hospitalization average length of stay for surgical orthopedic excluding spine episodes. The risk-adjusted length of stay for surgical orthopedic excluding spine episodes was lower over the entire period than for all Model 2 episodes, for both BPCI and comparison group patients. Although unadjusted average length of stay during the baseline period was higher for BPCI patients than for comparison patients, after adjusting for risk, the average length of stay was similar. The anchor hospitalization average length of stay for BPCI patients with surgical orthopedic excluding spine episodes declined more (0.2 days) than for comparison group patients from the baseline to the intervention period (see Exhibit 45).

Exhibit 43: Trends: Average Risk-Adjusted Acute Inpatient Care Length of Stay, Model 2 Surgical Orthopedic Excluding Spine



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 44: Trends: Risk-Adjusted Anchor Hospitalization Average Length of Stay, by Period, Model 2 Surgical Orthopedic Excluding Spine Episodes

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	5,288	2,750	741	177,486	90,112	23,898
Unadjusted	5.4	5.6	5.4	5.1	5.0	4.9
Risk adjusted	4.6	4.4	4.3	4.7	4.6	4.5

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 45: DiD: Unadjusted and Risk-Adjusted Anchor Hospitalization Average Care Length of Stay, Model 2 Surgical Orthopedic Excluding Spine Episodes

BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
741	23,898	0.1	-0.2 *

* Denotes statistical significance at the 5% level.

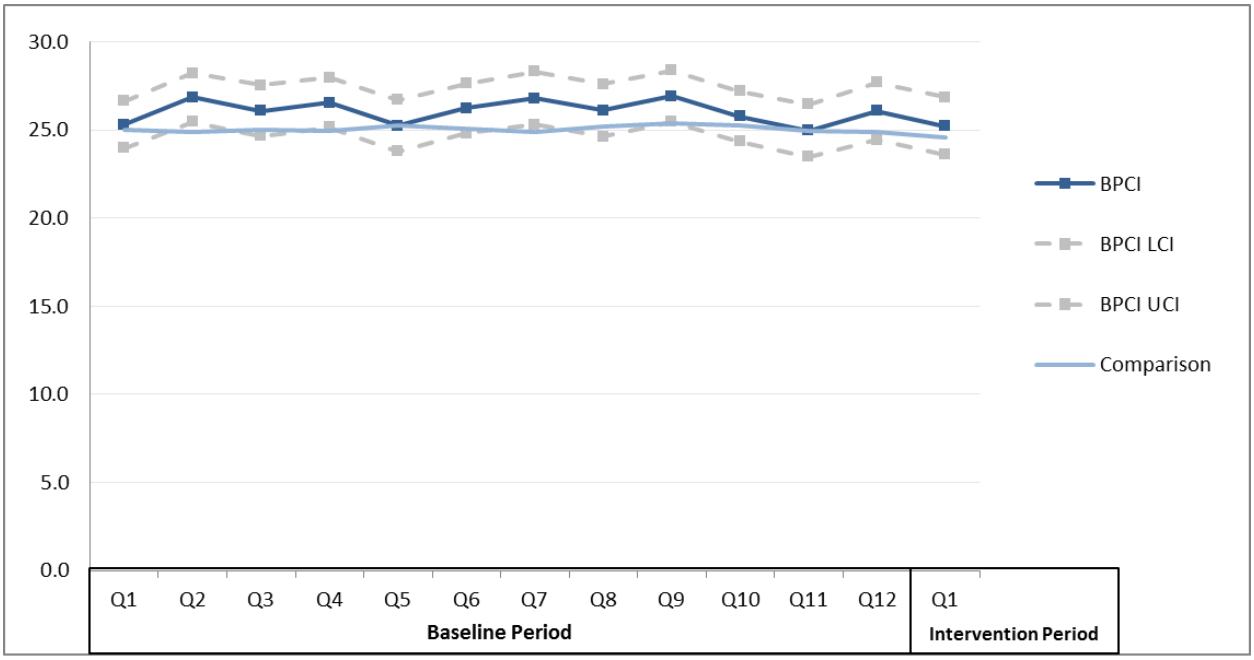
Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

c. Institutional Number of Days of PAC Use

Exhibits 46 and 47 present the unadjusted and risk-adjusted number of days of institutional PAC use among patients who received PAC in a SNF, IRF, or LTCH during the 90-day post discharge

period. The number of PAC institutional days was stable across time for both the BPCI and non-BPCI patients. Although the comparison group patients spent fewer days in PAC institutions during this period, the difference from the BPCI patients was not statistically significant for the majority of the quarters, including the BPCI intervention quarter. Without risk adjustment, the days for BPCI patients dropped from 26.0 and 26.1 days during initial and latter baseline quarters, respectively, to 25.2 days during the intervention period. These results did not change after adjusting for the risk of the patients. The change from baseline to intervention for BPCI patients was not statistically significantly different from the change for the comparison group (see Exhibit 48).

Exhibit 46: Trends: Average Risk-Adjusted Institutional Number of Days, 90-day Post Discharge, Model 2 [a]



[a] Number of days aggregates all stays during the measurement period, even if the days were not consecutive. It includes all settings, not only the first PAC setting for the patient.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 47: Trends: Average Risk-Adjusted Institutional Number of Days, 90-day Post Discharge, by Period, Model 2

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	7,614	3,239	706	224,140	109,957	27,614
Unadjusted	26.0	26.1	25.2	25.6	25.6	25.2
Risk adjusted	26.1	25.9	25.2	25.0	25.1	24.6

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 48: DiD: Average Institutional Number of Days, 90-day Post Discharge, Unadjusted and Risk-Adjusted Model 2

BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
706	27,614	-0.5	-0.4

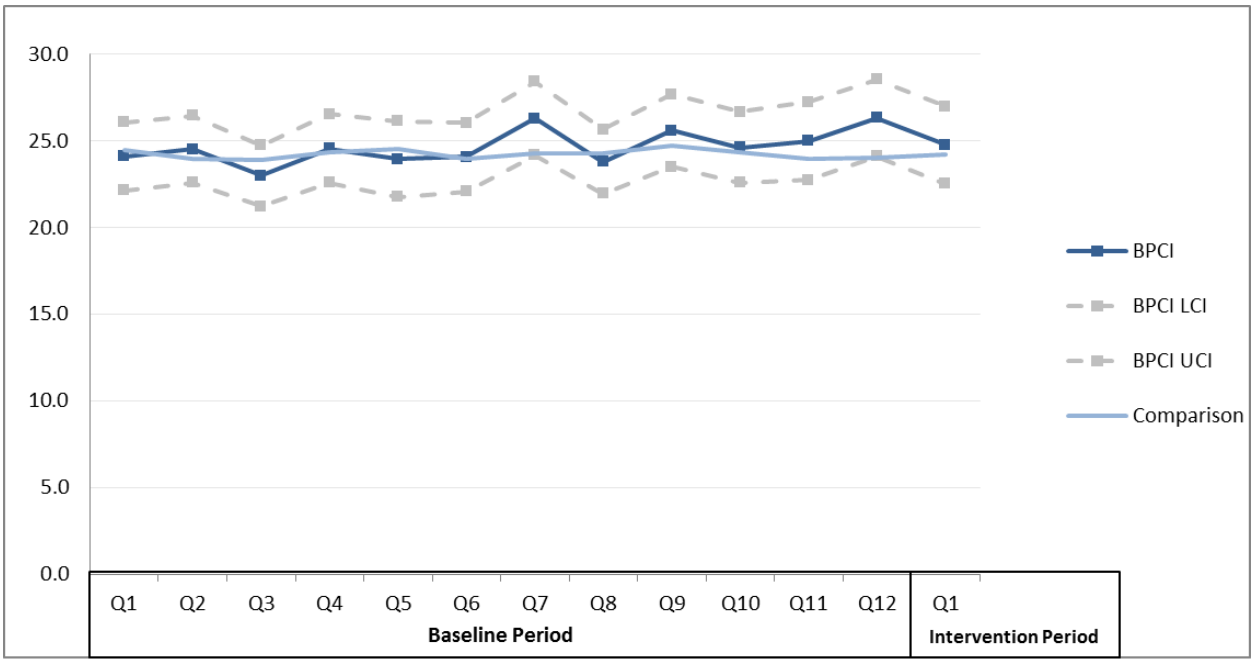
* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Institutional Number of Days of PAC Use—Surgical Orthopedic Excluding Spine

We repeated the analyses of the number of PAC institutional days for just the surgical orthopedic excluding spine episodes. Exhibits 49 and 50 present the unadjusted and risk-adjusted results for BPCI and comparison group patients. The risk-adjusted number of PAC days was slightly lower than for Model 2 overall, but the trends are similar. The number of days was relatively stable across time for both, and the change from baseline to intervention for BPCI patients was not statistically significantly different from the change for the comparison group (see Exhibit 51).

Exhibit 49: Trends: Average Risk-Adjusted Institutional Number of Days, 90-day Post Discharge, Model 2 Surgical Orthopedic Excluding Spine



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 50: Trends: Average Risk-Adjusted Institutional Number of Days, 90-day Post Discharge, by Period, Model 2 Surgical Orthopedic Excluding Spine

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	3,127	1,437	298	101,728	49,689	12,241
Unadjusted	24.3	25.5	24.4	25.2	25.1	24.9
Risk adjusted	24.3	25.4	24.8	24.2	24.3	24.2

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 51: DiD: Average Unadjusted and Risk-Adjusted Institutional Number of Days, 90-day Post Discharge, Model 2 Surgical Orthopedic Excluding Spine

BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
298	12,241	0.0	0.2

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

d. Days by PAC Setting

Exhibit 52 presents the unadjusted number of days by PAC setting among patients who had at least one day in the setting during the baseline and intervention period. For BPCI patients, the risk-adjusted average number of days decreased each period from baseline to intervention for SNF and HHA users, while the number of days among IRF users increased during this period. Similarly, days of SNF and HHA care decreased for patients of the comparison providers from baseline to intervention. HHA days did not change for the comparison patients.

Exhibit 52: Trends: Unadjusted and Risk-adjusted Days of PAC by Setting for Setting Users During 90-day PDP, by Period, Model 2

PAC Setting	Statistic	BPCI		Comparison	
		Baseline Period (Q4 2010 – Q3 2013)	Intervention Period (Q4 2013)	Baseline Period (Q4 2010 – Q3 2013)	Intervention Period (Q4 2013)
SNF	**N**	6,681	433	222,195	18,339
	Unadjusted	31.6	30.7	29.5	29.0
	Risk-adjusted	32.1	31.4	29.5	28.9
HHA	**N**	10,027	854	326,266	26,733
	Unadjusted	32.3	29.7	34.3	31.9
	Risk-adjusted	33.4	32.5	34.2	32.6
IRF	**N**	2,386	136	44,181	3,377
	Unadjusted	11.7	13.2	12.2	12.2
	Risk-adjusted	11.7	12.8	12.2	12.2

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 53 presents the DiD results for the unadjusted and risk-adjusted PAC-specific number of days. The change in risk-adjusted SNF and HHA number of days for BPCI patients using those services from baseline to intervention period was not statistically different than the change for comparison group patients using those services. The risk-adjusted number of days of IRF use increased more for BPCI patients relative to the comparison group (1.1 days).

Exhibit 53: DiD: Average Unadjusted and Risk-Adjusted Days of PAC by Setting for Setting Users During 90-day PDP, Model 2

PAC Setting	BPCI Episodes Q4 2013(N)	Comparison Episodes Q4 2013(N)	Unadjusted DiD	Risk-adjusted DiD
SNF	433	18,339	-0.5	-0.1
HHA	854	26,733	-0.3	0.7
IRF	136	3,377	1.6	1.1 *

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Days by PAC Setting—Surgical Orthopedic Excluding Spine

Exhibit 54 presents the unadjusted number of days by PAC setting among surgical orthopedic excluding spine episodes for Model 2 BPCI and comparison group patients. Because of the small sample size, we were not able to risk-adjust these outcomes. For BPCI patients, the unadjusted average number of days decreased each period from baseline to intervention for HHA, while the number of days among IRF users increased each period. Days of SNF care increased in the latter portion of the baseline period, but fell below early baseline averages during the intervention period. Among comparison group providers, days of HHA care decreased across periods. Days of SNF and IRF care remained relatively stable for the comparison patients.

Exhibit 54: Trends: Unadjusted Days of PAC by Setting for Setting Users During 90-day PDP, by Period, Model 2 Surgical Orthopedic Excluding Spine Episodes

PAC Setting	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
SNF	**N**	1,949	1,012	205	80,482	39,942	9,812
	Unadjusted	28.9	29.1	27.2	26.8	26.7	26.5
HHA	**N**	3,380	1,790	487	114,928	56,547	14,033
	Unadjusted	30.2	29.1	26.0	28.3	27.5	26.2
IRF	**N**	1,226	412	86	19,977	8,857	2,088
	Unadjusted	10.7	11.8	12.6	11.8	11.7	11.9

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 55 presents the DiD results for the unadjusted PAC-specific number of days among surgical orthopedic excluding spine episodes for Model 2 BPCI and comparison group patients. Given the small sample size, we were not able to risk-adjust these outcomes. Therefore, these results should be interpreted with caution. Days of SNF and HHA use declined more for BPCI patients in surgical

orthopedic excluding spine episodes than for patients of comparison providers. However, the difference was statistically significant only for HHA use. IRF days increased more for BPCI than for comparison patients (1.5 days), which was statistically significant.

Exhibit 55: DiD: Average Unadjusted Days of PAC by Setting for Setting Users During 90-day PDP, Model 2 Surgical Orthopedic Excluding Spine Episodes

PAC Setting	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
SNF	205	9,812	-1.5	---
HHA	487	14,033	-1.9 *	---
IRF	86	2,088	1.5 *	---

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

3. Payment

We calculated the Medicare standardized allowed payment amount by type of service for two measurement periods. The first measurement period is the actual length of the episode (30-, 60-, or 90 days). We present the total payments (Part A and B combined) for the 90 day episodes for patients who used PAC. We distinguished between those services included in the bundled amount and the services provided during the relevant period that were excluded from the bundled amount. The second measurement period is the anchor hospitalization and the 90 days after the hospital discharge (90 day post-discharge period or PDP), regardless of the episode time period. This allowed us to increase our sample size by grouping all episodes, regardless of length. The common measurement period is also consistent with the measurement period for the majority of the utilization and quality results. Please note that total payments and Part B payments are not risk adjusted. Complete results are included in **Appendix C-1**.

a. Average Total Medicare Standardized Allowed Amount

Exhibits 56 and 57 display the unadjusted average total Medicare standardized allowed amount for 90-day episodes for BPCI and comparison patients who used PAC. The average total amount was higher during the baseline period for BPCI patients relative to patients treated by the comparison group ($38,002 vs. $36,153). The average total amount decreased from baseline to intervention for BPCI and comparison patients, though the total amount for BPCI patients still exceeded that of comparison group patients. For BPCI patients, the Medicare standardized allowed amount for services included under the bundle averaged $36,496 in the intervention period, compared with $35,129 for comparison group patients. The Medicare standardized allowed amount for services excluded from the bundle for BPCI patients averaged $484, compared with $426 for the comparison group. Changes or differences in the non-included services payments are examined as they may be an indication of providers shifting services out of those included under the bundle. The change in the unadjusted average total included and non-included Medicare standardized allowed amount for 90-day episodes with PAC use from baseline to intervention was not statistically different for BPCI patients relative to the comparison patients.

For those beneficiaries in 90-day episodes without PAC use, the unadjusted average total Medicare standardized allowed amount was lower among BPCI than comparison patients ($13,824 vs. $15,097) during the baseline period as well as during the intervention period ($15,246 vs. $15,671). The unadjusted average total amount increased from baseline to intervention for both groups of patients. The change for BPCI patients was not statistically different from that of the comparison group for either payments included in the bundle definition or excluded payments.

The unadjusted average total Medicare standardized allowed amount for 30-day episodes with PAC use was lower for BPCI patients than comparison patients during the baseline period ($25,357 vs. $25,600). Although the unadjusted total declined from baseline to intervention for BPCI and comparison groups, it was lower for BPCI patients in the intervention period. This decrease was driven by reductions in payments for services included under the bundle. During the intervention quarter, the total amount included in the bundle averaged $23,212 for BPCI patients compared with $24,968 for the comparison group. The change from baseline to intervention was significant for 30-day episodes for BPCI patients who used PAC relative to the change for comparison patients. The change in non-included services was not significant.

For 30-day episodes without PAC use, the average total Medicare standardized allowed amount was higher for BPCI patients than comparison patients during the baseline period ($16,994 vs. $16,072) as well as during the intervention period ($16,469 vs. $16,188). This change was not significant for included or non-included services. Complete payment information can be found in Appendix C-1.

It should be noted that all of the 30-day episodes initiated by Model 2 providers in Q4 2013 were in the surgical orthopedic excluding spine clinical group. Therefore, analysis of 30-day episodes for Model 2 overall results and Model 2 *surgical orthopedic excluding spine* episodes are identical.

Exhibit 56: Trends: Unadjusted Average Total Medicare Standardized Allowed Amount ($2014) included and not included in the Bundle Definition, 90-day episodes *with* PAC use, Model 2

Measure	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
Total amount included in bundle definition	N	8,310	3,628	910	251,632	125,097	31,578
	Unadjusted	$37,715	$35,665	$36,496	$35,712	$34,766	$35,129
Total amount not included in bundle definition	N	8,310	3,628	910	251,632	125,097	31,578
	Unadjusted	$994	$922	$484	$750	$770	$426

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 57: DiD: Unadjusted Average Total Medicare Standardized Allowed Amount ($2014) included and not included in the Bundle Definition, 90-day episodes *with* PAC use, Model 2

Measure	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD
Total amount included in bundle definition	910	31,578	-$351
Total amount not included in bundle definition	910	31,578	-$162

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Average Total Medicare Standardized Allowed Amount – Surgical Orthopedic Excluding Spine

Exhibits 58 and 59 display the average total Medicare standardized allowed amount for Model 2 BPCI and comparison group patients with surgical orthopedic excluding spine episodes that used PAC. As observed for all Model 2 episodes, the average total Medicare standardized allowed amount was higher during the baseline period for BPCI patients than for comparison patients ($37,275 vs. $34,102). The total amount for included and non-included services decreased from baseline to intervention for BPCI and comparison group patients. However, unlike for all episodes, BPCI patients with surgical orthopedic excluding spine episodes had lower total payments than comparison patients during the intervention period. In Q4 2013, the included Medicare standardized allowed amount for BPCI patients averaged $32,369 compared with $32,948 for comparison group patients. The non-included Medicare standardized allowed amount for BPCI patients averaged $133, compared with $127 for the comparison group. Although the change from baseline to intervention was insignificant for all Model 2 episodes, the change in average total amount included in the bundle definition for 90-day surgical orthopedic excluding spine episodes with PAC was statistically different from the amount for the comparison group episodes.

For beneficiaries with 90-day surgical orthopedic excluding spine episodes who did not use PAC, the average total Medicare standardized allowed amount was also higher during the baseline period for BPCI relative to comparison group patients ($17,672 vs. $17,400). During the intervention period, the total Medicare allowed amount decreased for BPCI patients but increased for comparison group patients ($16,910 vs. $17,600). However, the change from baseline to intervention for BPCI patients was not statistically different than the change for comparison group patients.

As noted above, all of the Model 2 30-day episodes in Q4 2013 were in the surgical orthopedic excluding spine clinical group. Therefore, our analysis of all Model 2 30-day episodes and for the surgical orthopedic excluding spine episodes is identical. Please see the above section for the analysis of beneficiaries in 30-day surgical orthopedic excluding spine episodes with PAC use and without PAC use. Complete payment information for 30-day episodes can also be found in **Appendix C-1** and **Appendix C-2**.

Exhibit 58: Trends: Unadjusted Average Total Medicare Standardized Allowed Amount ($2014) included and not included in the Bundle Definition, 90-day episodes with PAC use, Model 2 *Surgical Orthopedic Excluding Spine*

Measure	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
Total amount included in bundle definition	N	2,553	1,214	335	86,625	43,333	10,926
	Unadjusted	$37,936	$34,683	$32,369	$34,262	$32,789	$32,948
Total amount not included in bundle definition	N	2,553	1,124	335	86,625	43,333	10,926
	Unadjusted	$413	$445	$133	$317	$358	$127

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 59: DiD: Unadjusted Average Total Medicare Standardized Allowed Amount ($2014) included and not included in the Bundle Definition, 90-day episodes with PAC use, Model 2 *Surgical Orthopedic Excluding Spine*

Measure	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD
Total amount included in bundle definition	335	10,926	-$3,724*
Total amount not included in bundle definition	335	10,926	-$88

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

b. Average Medicare Part A Standardized Allowed Amount

Exhibit 60 displays the unadjusted and risk-adjusted average Medicare Part A standardized allowed amount for the anchor stay and care received[41] during the 90-day post-discharge period for patients treated by BPCI and comparison group providers. Across the anchor stay and all PAC settings for 90-days post-anchor discharge, risk-adjusted Part A payments were higher for BPCI patients than for comparison group patients during all but two quarters of the baseline period. However, Part A payments were lower for BPCI patients during the intervention period (Q4 2013). The average, risk-adjusted Part A amount across all settings during the baseline period was $24,369 for patients treated by BPCI providers and $23,921 for patients treated by comparison group providers. The average during the intervention period was $22,724 for BPCI episodes and $23,336 for comparison group episodes.

The risk-adjusted Medicare Part A standardized allowed amounts by setting during the 90-day post-discharge period mirror the utilization findings. The average, risk-adjusted Medicare Part A standardized allowed amount for readmissions in the 90-day post-discharge period was higher for BPCI patients than comparison patients during the first eight quarters of the baseline period

[41] For purposes of the Part A payment discussion, the post discharge costs include inpatient readmissions, SNF, home health, IRF, and LTCH.

($3,419 vs. $2,953). The risk-adjusted average for BPCI episodes declined to $2,952 during the last four quarters of the baseline period, but was still higher than for comparison patients. In the intervention period, the average payment for readmissions was $2,910 for BPCI patients and $2,890 for comparison patients. The average, risk-adjusted SNF payment in the baseline period was $5,498 for BPCI patients compared with $5,359 for comparison patients. In the intervention period, however, SNF payments were lower for BPCI patients than for comparison patients ($4,581 vs. $5,040). Conversely, risk-adjusted HHA payments, which were similar in the baseline period for BPCI and comparison patients, increased for BPCI patients and went down for comparison patients during the intervention period.

Exhibit 60: Trends: Unadjusted and Risk-Adjusted Average Medicare Part A Standardized Allowed Amount, Model 2, Anchor Stay and 90-day Post-discharge Period

Setting	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
Number of observations		13,846	6,348	1,570	440,354	220,549	55,687
Inpatient anchor stay	**Unadjusted**	$11,961	$12,152	$13,310	$12,061	$12,024	$12,087
	Risk-adjusted	$12,149	$11,998	$12,137	$12,277	$12,094	$12,133
Readmissions	**Unadjusted**	$3,476	$2,901	$2,783	$2,949	$2,810	$2,962
	Risk-adjusted	$3,419	$2,952	$2,910	$2,953	$2,834	$2,890
Skilled Nursing Facility	**Unadjusted**	$5,762	$5,431	$4,502	$5,554	$5,206	$5,124
	Risk-adjusted	$5,600	$5,295	$4,581	$5,455	$5,167	$5,040
Home Health Agency	**Unadjusted**	$1,565	$1,612	$1,770	$1,688	$1,588	$1,564
	Risk-adjusted	$1,593	$1,577	$1,720	$1,637	$1,541	$1,517
Inpatient Rehabilitation Facility	**Unadjusted**	$2,002	$1,411	$1,517	$1,152	$1,093	$1,090
	Risk-adjusted	$2,177	$1,409	$1,378	$1,849	$1,784	$1,757

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 61 presents the risk-adjusted, DiD estimate for changes from the baseline to intervention period for BPCI patients relative to comparison group patients. Similar to utilization results, SNF and IRF payments decreased significantly more from baseline to intervention for BPCI patients relative to comparison group patients. HHA payments increased significantly more for BPCI patients relative to comparison group patients. The average Medicare Part A standardized allowed amount for SNF decreased $670 more from the baseline period to the intervention period for BPCI patients than for comparison patients. HHA payments increased $233 more from the baseline period to the intervention period for BPCI patients than for comparison patients. Payments for IRF decreased $332 more from the baseline period to the intervention period for BPCI patients than for comparison patients. The changes in risk-adjusted payments for the anchor stay and readmissions for BPCI episodes from baseline to intervention were not statistically different than the changes for comparison patients. Sample sizes were insufficient to evaluate risk-adjusted payments for LTCH during the 90-day post-discharge period.

Exhibit 61: DiD: Unadjusted and Risk-adjusted Average Medicare Part A Standardized Allowed Amount, Q4 2013 Relative to Baseline (Q4 2010 through Q3 2013), Model 2

Setting	BPCI episodes Q4 2013(N)	Comparison episodes Q4 2013(N)	Unadjusted DiD	Risk-adjusted DiD
Inpatient Anchor Stay	1,570	55,687	$1266*	$120
Readmissions	1,570	55,687	-$580*	-$338
SNF	1,570	55,687	-$862*	-$670*
HHA	1,570	55,687	$283*	$233*
IRF	1,570	55,687	-$253	-$332*

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

The results were the same for the 30- and 90-day bundle lengths, with the exception of the anchor stay amount for 30 day episodes. The average allowed amount for the anchor stay declined during the intervention period for BPCI patients in 30-day episodes. The change in the average payment for the anchor stay for BPCI patients from baseline to intervention was significantly less relative to comparison group patients. This result appears to be due to an increase in short-stay transfers to PAC, which reduced the anchor stay payment amount below the standard MS-DRG allowed amount. We do not know if this was due to BPCI providers using the 3-day SNF waiver.

Average Medicare Part A Standardized Allowed Amount, Model 2 surgical orthopedic excluding spine

Exhibit 62 displays the unadjusted and risk-adjusted average Medicare Part A standardized allowed amount for the anchor stay and post-discharge settings[42] during the 90-day post-discharge period for Model 2 BPCI and comparison group surgical orthopedic excluding spine episodes. As observed for all Model 2 episodes, risk-adjusted Part A payments were higher for surgical orthopedic excluding spine patients treated by BPCI providers than for patients treated by comparison group providers during each baseline period quarter. During the baseline period the average, risk-adjusted amount was $22,643 for patients treated by BPCI providers and $22,008 for patients treated by comparison providers. The average was lower for both groups during the intervention period, but the decline was greater for BPCI patients ($21,484) than for comparison patients ($21,596).

The risk-adjusted Medicare Part A standardized payments by setting in the 90-day post discharge period mirrored the results of all Model 2 episodes. Among surgical orthopedic without spine episodes, the average, risk-adjusted Medicare Part A standardized allowed amount for readmissions was higher for BPCI patients than comparison group patients during the baseline period ($1,736 vs. $1,499), with statistical significance in two of the baseline period quarters. During one baseline period quarter, BPCI patients had statistically significantly lower Part A readmissions

[42] For purposes of the Part A payment discussion for surgical orthopedic excluding spine clinical episodes, the settings during the post-discharge period are hospital readmissions, SNF, and HHA. There was insufficient sample size to risk-adjust IRF and LTCH payments.

payments relative to comparison group patients. During the intervention period, the average readmissions amount was $1,503 for BPCI episodes and $1,425 for comparison group episodes. The average, risk-adjusted SNF payment in the baseline period was higher for BPCI patients than comparison group patients ($5,755 vs. $5,454), with statistical significance in two of the baseline period quarters. The SNF amount went down by the intervention period for surgical orthopedic excluding spine episodes for BPCI providers to $4,726 and to $5,146 for comparison patients. The average, risk-adjusted HHA payment was $2,283 for BPCI patients during the baseline period, and reached $2,420 during the intervention period. For comparison patients, HHA payments averaged $2,237 in the baseline, declining to $2,069 during the intervention period.

Exhibit 62: Trends: Unadjusted and Risk-Adjusted Average Medicare Part A Standardized Allowed Amount, Model 2 *Surgical Orthopedic Excluding Spine*, Anchor Stay and 90-day Post-discharge Period

Setting	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
Number of observations		5,261	2,735	710	176,899	89,830	22,913
Inpatient anchor stay	Unadjusted	$12,910	$12,632	$12,793	$12,856	$12,690	$12,922
	Risk-adjusted	$12,948	$12,649	$12,835	$12,869	$12,718	$12,956
Readmissions	Unadjusted	$1,898	$1,438	$1,449	$1,555	$1,448	$1,424
	Risk-adjusted	$1,862	$1,484	$1,503	$1,523	$1,452	$1,425
Skilled Nursing Facility	Unadjusted	$6,133	$5,868	$4,402	$7,070	$6,487	$6,278
	Risk-adjusted	$5,748	$5,829	$4,726	$5,564	$5,233	$5,146
Home Health Agency	Unadjusted	$2,288	$2,248	$2,372	$2,315	$2,103	$2,050
	Risk-adjusted	$2,304	$2,242	$2,420	$2,305	$2,100	$2,069

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 63 presents the risk-adjusted, DiD estimate for changes from the baseline to intervention period for Model 2 BPCI and comparison group surgical orthopedic excluding spine episodes. Similar to all Model 2 episodes, SNF payments decreased significantly more from baseline to intervention for BPCI patients while HHA payments increased significantly more for BPCI patients relative to comparison group patients. The average Medicare Part A SNF standardized allowed amount decreased $909 more from the baseline period to the intervention period for BPCI patients than for comparison patients. HHA payments increased $304 more from the baseline to the intervention period for BPCI than for comparison patients. The change in payments for readmissions from baseline to intervention was not statistically different between BPCI and comparison patients. Finally, as stated above, the average Medicare Part A standardized allowed amount for the inpatient anchor stay decreased significantly more from baseline to intervention for BPCI providers. This may be due to an increase in the number of short-stay transfers to PAC, which reduced the allowed amount to the hospital. Sample sizes were insufficient to evaluate risk-adjusted payments for IRF and LTCH during the 90-day post-discharge period.

Exhibit 63: DiD: Unadjusted and Risk-adjusted Average Medicare Part A Standardized Allowed Amount, Q4 2013 Relative to Baseline (Q4 2010 through Q3 2013), Model 2
Surgical Orthopedic Excluding Spine

Setting	BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
Inpatient Anchor Stay	710	22,913	-$145	-$151*
Readmissions	710	22,913	-$192	-$147
SNF	710	22,913	-$1,056*	-$909*
HHA	710	22,913	$293*	$304*

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

c. Average Medicare Part B Standardized Allowed Amount

Exhibit 64 displays the unadjusted Average Part B standardized allowed amount for the anchor stay and six mutually exclusive service categories[43] during the 90-day post-discharge period for all BPCI and comparison group episodes. Total Part B payments were higher for BPCI patients than patients treated by comparison group providers during all quarters of the baseline period and intervention period. The average Part B standardized allowed amount during the baseline period was $5,695 for BPCI patients and $5,390 for comparison group patients. Average Part B payments for BPCI patients declined by $163 from the first eight quarters of the baseline period to the last four quarters. In contrast, for comparison patients, average Part B payments increased by $15 from the first eight quarters to the last four quarters. The average during the intervention period was $5,642 for BPCI patients and $5,345 for comparison patients.

For each service category, average Part B payments during the baseline period were higher for BPCI patients than for comparison patients. This difference was statistically significant for the majority of quarters during the baseline period. Average Part B payments for BPCI patients were also higher during the first eight quarters of the baseline period than the last four quarters for all services except all other institutional. Payments for comparison patients showed the same pattern, except that payments for physician evaluation and management visits (E&M) increased from the first eight quarters ($1,071) to the last four quarters ($1,085). Average Part B payments during the intervention period were higher for BPCI patients than for comparison patients for all services except E&M ($1,081 vs. $1,110) and all other non-institutional ($576 vs. $604).

[43] The six service categories that sum to the Total Part B payments during the 90-day post-discharge period are outpatient therapy, imaging and lab, procedures, E&M, all other non-institutional, and all other institutional.

Exhibit 64: Trends: Unadjusted Average Medicare Part B Standardized Allowed Amount ($2014), Anchor Stay and Service Categories, 90-day post-discharge period, Model 2

Measure	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
During anchor stay	N	13,865	6,355	1,572	440,971	220,706	55,707
	Unadjusted	$2,244	$2,206	$2,353	$2,160	$2,156	$2,119
Part B standardized allowed amount after anchor stay:							
Outpatient therapy	N	13,815	6,333	1,561	438,635	219,414	55,318
	Unadjusted	$382	$374	$342	$319	$308	$281
Imaging and lab	N	13,815	6,333	1,561	438,635	219,414	55,318
	Unadjusted	$430	$426	$386	$407	$400	$380
Procedures	N	13,815	6,333	1,561	438,635	219,414	55,318
	Unadjusted	$325	$303	$293	$281	$280	$269
E&M	N	13,815	6,333	1,561	438,635	219,414	55,318
	Unadjusted	$1,209	$1,112	$1,081	$1,071	$1,085	$1,110
All other non-institutional	N	13,815	6,333	1,561	438,635	219,414	55,318
	Unadjusted	$675	$630	$576	$668	$632	$604
All other institutional	N	13,815	6,333	1,561	438,635	219,414	5,5318
	Unadjusted	$484	$535	$611	$479	$539	$582

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 65 presents the DiD estimate for changes from the baseline to intervention period for BPCI patients relative to comparison group patients. Across the anchor stay and six mutually exclusive service categories included in this analysis, average Part B payments for BPCI patients declined by $54 ($5,695 vs. $5,641) from the baseline to the intervention period. For comparison episodes, the decline was $45, from $5,390 to $5,345.

The difference in Part B payments during the anchor stay and post-discharge E&M visits from baseline to intervention period for BPCI patients was statistically significant relative to comparison group patients. During the inpatient anchor stay, Part B payments increased from the baseline to intervention period by $164 more for BPCI patients than for comparison patients. This was primarily due to higher payments for procedures during the anchor stay.[44] During the post-discharge period, Part B payments for E&M visits declined by $133 for BPCI patients from baseline to the intervention period, relative to comparison patients. While not statistically significant, Part B payments for outpatient therapy, imaging and lab, procedures, and other non-institutional services decreased for BPCI patients relative to comparison patients, while Part B payments for other institutional services increased from baseline to intervention.

[44] Please see **Appendix C-1 and Appendix C-2** for those results.

Exhibit 65: DiD: Unadjusted Average Medicare Part B Standardized Allowed Amount ($2014), Anchor Stay and Service Categories, 90-day post-discharge period, Model 2

Measure	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD
During anchor stay	1,572	55,707	$164*
Part B standardized allowed amount after anchor stay:			
Outpatient therapy	1,561	55,318	-$4
Imaging and lab	1,561	55,318	-$18
Procedures	1,561	55,318	-$14
E&M	1,561	55,318	-$133*
All other non-institutional	1,561	55,318	-$34
All other institutional	1,561	55,318	$28

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Medicare Part B Standardized Allowed Amount - Surgical orthopedic excluding spine

Exhibit 66 presents the unadjusted Average Part B Medicare standardized allowed mounts during the anchor stay and for six mutually exclusive service categories during the 90-day post-discharge period for all Model 2 surgical orthopedic excluding spine episodes. The total Part B payments were higher for surgical orthopedic excluding spine BPCI patients than for comparison patients during all quarters of the baseline and the intervention period. The average Part B standardized allowed amount was $5,569 for BPCI patients and $5,129 for comparison group patients during the baseline period. Average payments declined by $387 from the first eight quarters of the baseline period ($5,698) to the last four quarters ($5,311) for BPCI patients. For comparison patients, average Part B payments were the same ($5,129) in the first eight and the last four quarters of the baseline period. Part B payments declined for both groups in the intervention period, reaching $5,158 for BPCI patients and $4,926 for comparison group patients.

Average Part B payments during the baseline period were higher for BPCI surgical orthopedic patients than those treated by comparison group providers for all service categories except all other institutional. For BPCI patients, average Part B payments were also higher during the first eight quarters of the baseline period than the last four quarters of the baseline period for all service categories except all other institutional. For comparison group patients, however, average Part B payments increased from the first eight quarters to the last four quarters of the baseline period for services provided during the anchor stay, and procedures, E&M, and all other institutional services during the post-discharge period. Average Part B payments were higher for BPCI patients during the intervention period than for comparison group patients for all services except all other institutional ($243 vs. $300).

Exhibit 66: Trends: Unadjusted Average Medicare Part B Standardized Allowed Amount ($2014), Anchor Stay and Service Categories, 90-day post-discharge period, Model 2 *Surgical Orthopedic Excluding Spine*

Measure	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
During anchor stay	N	5,277	2,738	712	177,118	89,882	22,919
	Unadjusted	$2,547	$2,407	$2,430	$2,377	$2,381	$2,352
Part B standardized allowed amount after anchor stay:							
Outpatient therapy	N	5,264	2,731	707	176,548	89,543	22,803
	Unadjusted	$703	$645	$584	$629	$618	$558
Imaging and lab	N	5,264	2,731	707	176,548	89,543	22,803
	Unadjusted	$366	$357	$337	$312	$308	$284
Procedures	N	5,264	2,731	707	176,548	89,543	22,803
	Unadjusted	$310	$289	$266	$262	$264	$250
E&M	N	5,264	2,731	707	176,548	89,543	22,803
	Unadjusted	$967	$841	$808	$797	$798	$767
All other non-institutional	N	5,264	2,731	707	176,548	89,543	22,803
	Unadjusted	$562	$527	$490	$487	$460	$415
All other institutional	N	5,264	2,731	707	176,548	89,543	22,803
	Unadjusted	$243	$245	$243	$265	$299	$300

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 67 presents the DiD estimate for changes from the baseline to intervention period for BPCI patients relative to comparison group patients. Average Part B payments during the anchor stay and the 90-day post-discharge period for BPCI patients declined by $409 (from $5,569 to $5,160). For comparison patients, the average declined by $203, from $5,129 to $4,926.

The differences in Part B payment changes for BPCI and comparison patients from the baseline to the intervention period were not statistically significant for any service category. While not statistically significant, the DiD estimate was positive only for imaging and lab and all other non-institutional services. This outcome differs from the results for all episodes combined, in which Part B payments showed a statistically significant increase for the services during the anchor stay and a statistically significant decrease for E&M services, while Part B payments for imaging and lab and all other non-institutional services decreased.

Exhibit 67: DiD: Unadjusted Average Medicare Part B Standardized Allowed Amount ($2014), Anchor Stay and Service Categories, 90-day post-discharge period,Model 2 Surgical Orthopedic Excluding Spine

Measure	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD
During anchor stay	712	22,919	-$43
Part B standardized allowed amount after anchor stay:			
Outpatient therapy	707	22,803	-$31
Imaging and lab	707	22,803	$1
Procedures	707	22,803	-$24
E&M	707	22,803	-$85
All other non-institutional	707	22,803	$4
All other institutional	707	22,803	-$23

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

4. Quality outcomes, including quality-related utilization measures

This section describes claims-based quality of care measures Model 2 BPCI patients and comparison patients. The quality of care measures we examined are mortality, unplanned readmission rates (30, 60, and 90 days post-discharge) and emergency department (ED) use without hospitalization. See Section III.A.5 for detailed outcome definitions.

a. All-cause mortality

Exhibits 68 and 69 present the unadjusted and risk-adjusted 30-day mortality rate trends for BPCI patients and patients treated by comparison group providers. The mortality rates were higher during the intervention quarter than baseline period for BPCI patients and comparison group patients. For BPCI patients, the risk-adjusted mortality rate remained steady (4.1% to 4.0%) from the first eight quarters of baseline to the last four quarters of baseline and then increased to 4.6% during the intervention period. Although the mortality rate remained relatively steady for this entire period for the comparison patients, the differences between the BPCI patients and comparison patients during baseline or the intervention periods were not statistically significant.

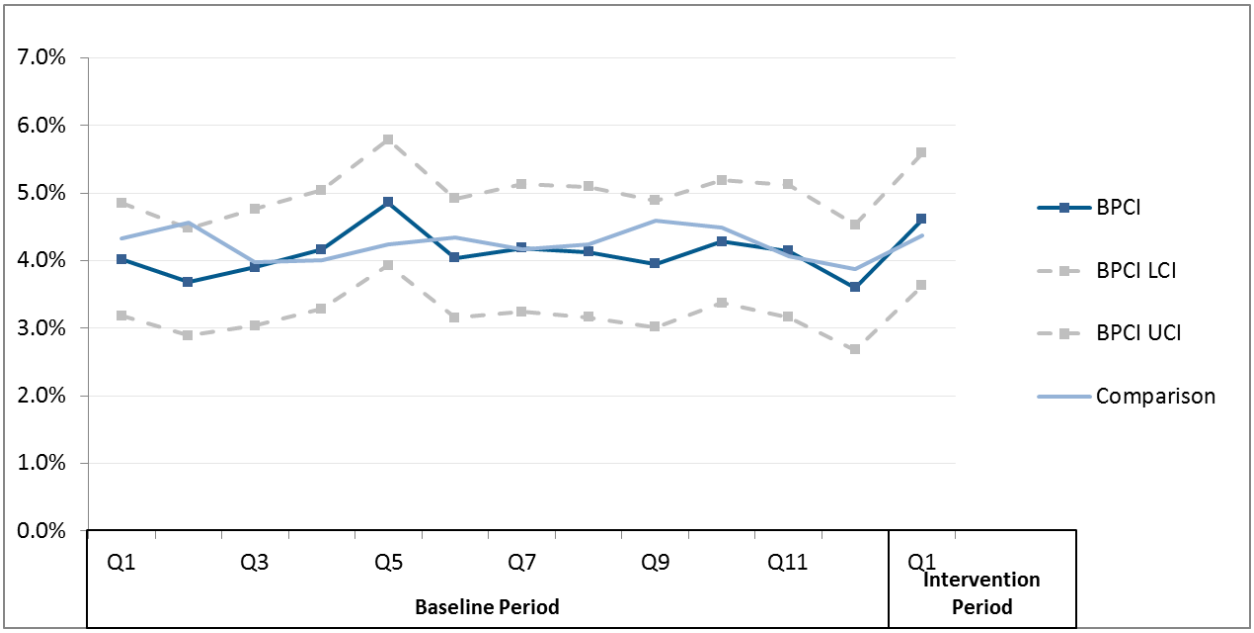
Exhibit 68: Trends: Unadjusted and Risk-Adjusted 30-day All-cause Mortality Rate, Model 2

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	13,834	6,347	1,651	438,745	219,693	58,414
Unadjusted	4.2%	3.9%	4.5%	4.1%	4.1%	4.5%
Risk adjusted	4.1%	4.0%	4.6%	4.2%	4.3%	4.4%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 69: Trends: Risk-Adjusted 30-day All-cause Mortality Rate, Model 2



Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 70 presents the DiD results for the unadjusted and risk-adjusted 30-day all-cause mortality rate. The change in the unadjusted and risk-adjusted 30 day mortality rates was not statistically significantly different between the patients treated by BPCI participants and patients treated by comparison providers.

Exhibit 70: DiD: Unadjusted and Risk-Adjusted 30-day All-cause Mortality Rate,Q4 2013 Relative to Baseline (Q4 2010 through Q3 2013)

Measurement Period	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
30-day post discharge	1,651	58,414	0.0%	0.4%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

All-cause Mortality Rate — Surgical Orthopedic Excluding Spine

Exhibits 71 and 72 present the unadjusted and risk-adjusted trend results for 30-day mortality rate among both BPCI patients and patients treated by comparison group providers in the surgical orthopedic excluding spine clinical episode group. The unadjusted and risk adjusted 30-day all-cause mortality rates were lower than the overall Model 2 rate, but the rates remained fairly steady over time. The risk-adjusted 30-day mortality rate was 1.2% during the initial quarters of the baseline period (quarters 1-8), it was 0.9% during the latter quarters (quarters 9-12), and it was 1.2% during the intervention period. There were no significant differences between BPCI and comparison patients during baseline or intervention periods.

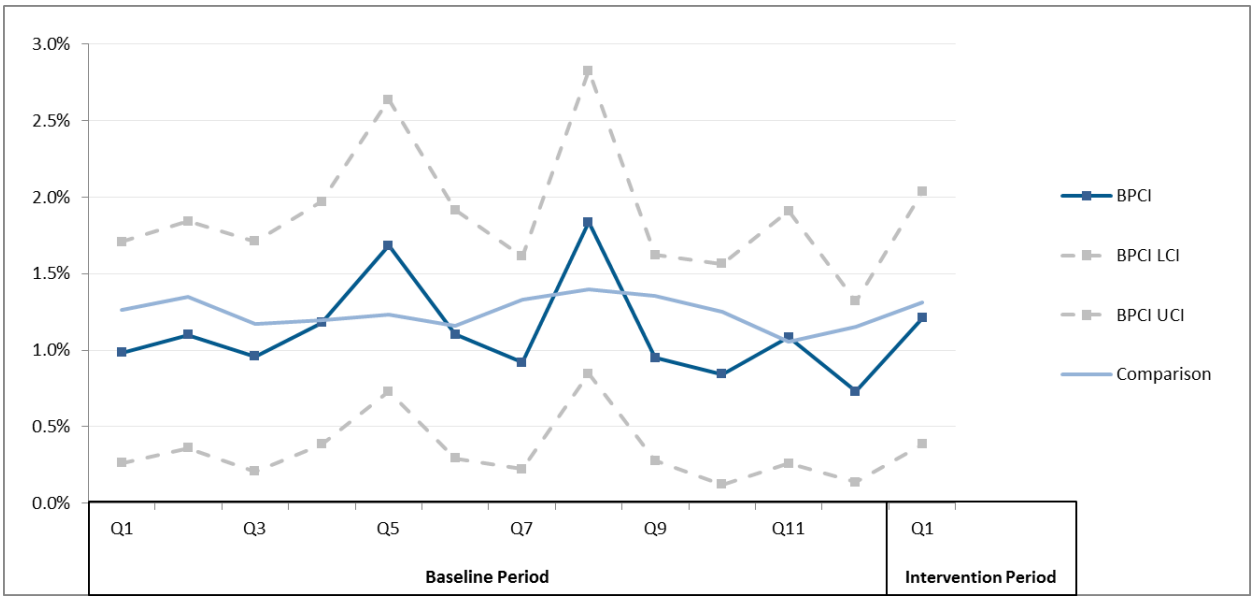
Exhibit 71: Trends: Unadjusted and Risk-Adjusted 30-day All-cause Mortality Rate, Model 2 Surgical Orthopedic Excluding Spine Episodes

	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	5,284	2,749	739	176,674	89,736	23,844
Unadjusted	1.3%	0.9%	1.1%	1.3%	1.2%	1.2%
Risk adjusted	1.2%	0.9%	1.2%	1.3%	1.2%	1.3%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 72: Trends: Risk-Adjusted 30-day All-cause Mortality Rate, Model 2 *Surgical Orthopedic Excluding Spine* Episodes



*Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 73 presents the DiD results for the unadjusted and risk-adjusted mortality rates for surgical orthopedic excluding spine episodes. Similar to Model 2 overall, the unadjusted and risk-adjusted 30 day mortality rates did not change significantly for patients treated by BPCI participants relative to patients treated by comparison providers.

Exhibit 73: DiD: Risk-Adjusted 30-day All-cause Mortality Rate, Q4 2013 relative to baseline (Q4 2010 through Q3 2013), *Model 2 Surgical Orthopedic Excluding Spine*

Measurement Period	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
30-day post discharge	739	23,844	0.0%	0.0%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

b. Unplanned readmissions

Exhibits 74 and 75 present the unadjusted and risk-adjusted trends for 30-day unplanned readmission rates among BPCI patients and patients treated by comparison group providers. We defined the outcome following the specifications for the National Quality Forum (NQF)-endorsed all-cause unplanned readmission measure (NQF measure 1789). Similar to the NQF-endorsed measure, we excluded planned admissions, defined by AHRQ Clinical Classification System Procedure and Diagnoses codes. The measure also excludes readmissions that were excluded from the BPCI episode definition. Approximately 5% of all readmissions within 30 days of discharge were excluded from the readmission rate measure because the MS-DRG was excluded from the BPCI clinical episode bundle. An additional 0.02% of readmissions were excluded because they were defined as planned according to the measure specification. It is important to keep in mind that the ACA, signed into law in March 2010, established the Medicare Readmissions Reduction Program which allowed CMS to penalize hospitals for excessive readmission rates beginning in FY 2013 (October 2012).

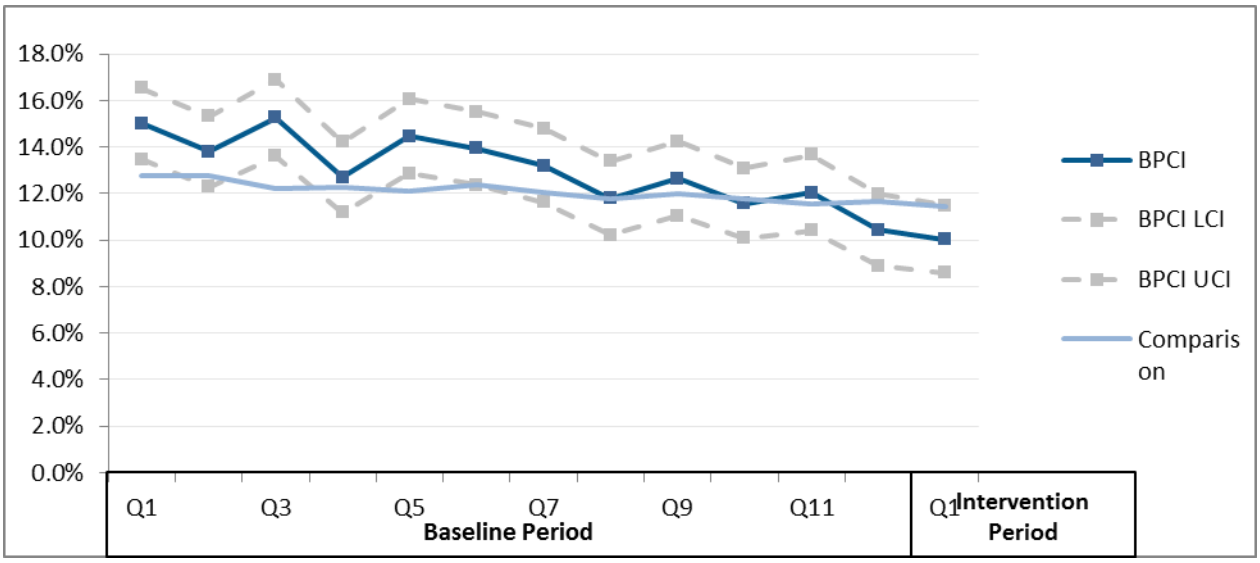
In general, the unadjusted and risk-adjusted 30-day unplanned readmission rates were lower in the intervention quarter than the baseline period for BPCI patients and comparison group patients. For BPCI patients, the risk-adjusted 30-day unplanned readmission rate declined from 13.6% to 11.7% from the first eight quarters of baseline to the last four quarters of baseline. The rate went down to 10.0% during the intervention period. With the exception of three early baseline quarters, there were no significant differences between the risk-adjusted 30-day unplanned readmission rate for BPCI patients and comparison group patients during the baseline or intervention periods.

Exhibit 74: Trends: 30-day Unplanned Readmission Rate, Model 2, Unadjusted and Risk-Adjusted

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	13,841	6,348	1,653	439,672	220,146	58,493
Unadjusted	14.0%	11.3%	9.7%	12.2%	11.5%	11.6%
Risk adjusted	13.8%	11.7%	10.0%	12.3%	11.7%	11.5%

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 75: Trends: 30-day Unplanned Readmission Rate, Model 2, Risk-Adjusted



Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 76 presents the DiD results for the unadjusted and risk-adjusted unplanned readmission rates for all three measurement periods. The risk-adjusted 30-day unplanned readmission rate fell 2.5 percentage points more from the baseline period to the intervention period for patients treated by BPCI participants than for patients treated by comparison providers. This was statistically significantly different than the decline for the comparison group. The DiD estimate for the 60- and 90-day unplanned readmission rates were also negative, but not significantly different between the BPCI participants and comparison.

Exhibit 76: DiD: Unplanned Readmission Rate by Post Discharge Period, Q4 2013 Relative to Baseline (Q4 2010 through Q3 2013)

Unplanned Readmission Rate	BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
30-day PDP	1,653	58,493	-3.1%	-2.5%*
60-day PDP	1,650	58,368	-2.9%	-1.8%
90-day PDP	1,567	55,506	-3.4%	-1.8%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Readmissions: Surgical Orthopedic Excluding Spine

Exhibits 77 and 78 present the unadjusted and risk-adjusted trend results for 30-day unplanned readmission rates among BPCI patients and patients treated by comparison group providers in the surgical orthopedic excluding spine clinical episode group. For BPCI patients and comparison group patients in the surgical orthopedic excluding spine clinical episode group, the unadjusted and risk-adjusted 30-day unplanned readmission rates were lower than the overall Model 2 rates.

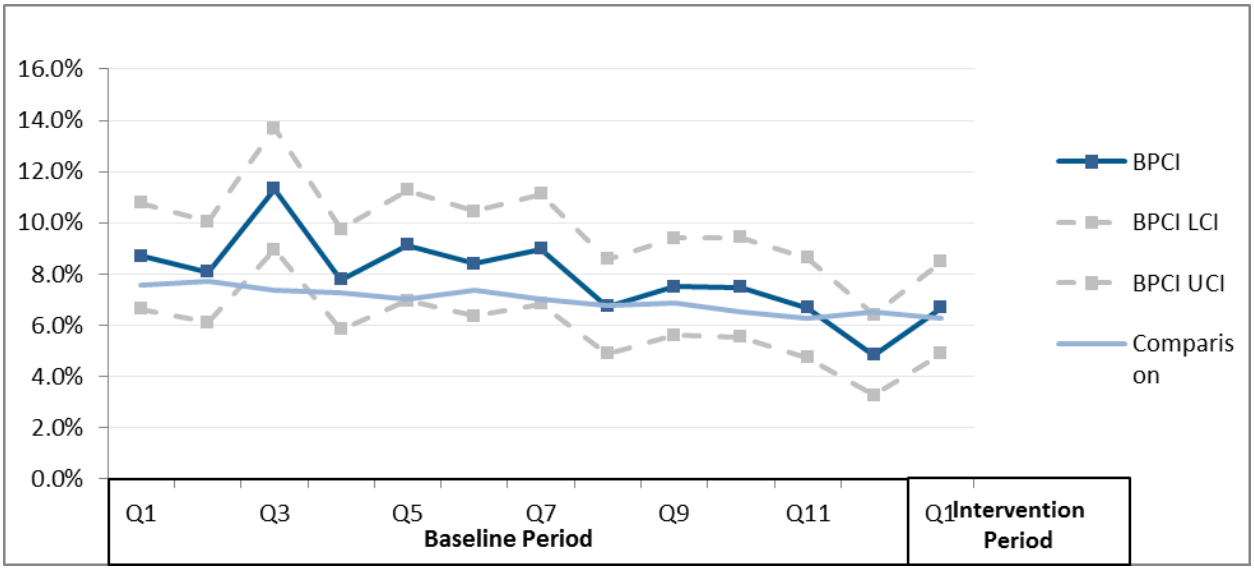
The 30-day unplanned readmission rates also declined from the baseline to the intervention period. The decline For BPCI patients in the surgical orthopedic excluding spine clinical episode group, the risk-adjusted 30-day unplanned readmissions rate declined from 8.6% to 6.6% from the first eight quarters of baseline to the last four quarters of baseline. The risk-adjusted rate during the intervention period was 6.7%.

Exhibit 77: Trends: 30-day Unplanned Readmission Rate, Model 2 *Surgical Orthopedic Excluding Spine* Episodes, Unadjusted and Risk-Adjusted

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	5,278	2,750	740	177,419	90,085	23,891
Unadjusted	8.7%	6.5%	6.6%	7.2%	6.4%	6.1%
Risk adjusted	8.6%	6.6%	6.7%	7.3%	6.6%	6.3%

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 78: Trends: 30-day Unplanned Readmission Rate, Model 2 *Surgical Orthopedic Excluding Spine* Episodes, Risk-Adjusted



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 79 presents the DiD results for the unadjusted and risk-adjusted unplanned readmission rates for surgical orthopedic excluding spine episodes. The change in the unadjusted and risk-adjusted 30-, 60-, and 90-day unplanned readmission rates was not significantly different for patients treated by BPCI participants relative to patients treated by comparison participants.

Exhibit 79: DiD: Unplanned Readmission Rate by Post Discharge Period, Q4 2013 Relative to Baseline (Q4 2010 through Q3 2013), Model 2 *Surgical Orthopedic Excluding Spine*

Unplanned Readmission Rate	BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
30-day PDP	740	23,891	-0.5%	-0.5%
60-day PDP	737	23,778	0.9%	1.0%
90-day PDP	711	22,912	-0.6%	-0.5%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

c. Emergency department use, without hospitalization

Exhibit 80 presents the unadjusted and risk-adjusted trend results for 30-, 60- and 90-day emergency department (ED) use rates among patients treated by BPCI and comparison group providers. For BPCI patients, the unadjusted and risk-adjusted ED use during the first 30 days after discharge increased slightly from baseline to intervention period. For comparison group patients, the risk-adjusted 30-day ED rate decreased from baseline to intervention period. During the 60- and 90-days post discharge measurement periods, the risk-adjusted ED rate without hospitalization for both BPCI and comparison group patients decreased slightly from baseline to the intervention period. Please note that the observed decline in ED use among BPCI and comparison group providers may be attributable in part to a lag in claims submissions. Claims during the baseline period have a longer run-out than those in the intervention period. See section VII for a more detailed description of the limitations presented by claims submission dates.

Exhibit 80: Trends: Unadjusted and Risk-Adjusted Rate of Emergency Department Use without Hospitalization, by Post-discharge Period, Model 2

Post-discharge period (PDP)	Statistic	BPCI		Comparison Group	
		Baseline Period (Q4 2010 – Q3 2013)	Intervention Period (Q4 2013)	Baseline Period (Q4 2010 – Q3 2013)	Intervention Period (Q4 2013)
30-day PDP	**N**	20,189	1,653	659,818	58,493
	Unadjusted	8.5%	9.1%	9.4%	9.4%
	Risk-adjusted	8.6%	8.8%	9.4%	8.9%
60-day PDP	**N**	20,180	1,650	659,552	58,368
	Unadjusted	13.4%	13.4%	14.2%	14.3%
	Risk-adjusted	13.6%	13.2%	14.3%	13.7%
90-day PDP	**N**	20,165	1,567	659,179	55,506
	Unadjusted	17.2%	16.7%	18.0%	18.1%
	Risk-adjusted	17.4%	16.5%	18.0%	17.4%

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 81 presents the DiD estimates for the unadjusted and risk-adjusted ED use without hospitalization for all three measurement periods. The unadjusted and risk-adjusted ED rates did not change significantly for patients treated by BPCI participants relative to patients treated by comparison participants.

Exhibit 81: DiD: Unadjusted and Risk-Adjusted Emergency Department Use, Intervention Period (Q4 2013) Relative to Baseline (Q4 2010 through Q3 2013), by Post-discharge Period, Model 2

Post-discharge Period	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
30-day PDP	1,653	58,493	0.6%	0.6%
60-day PDP	1,650	58,368	0.0%	0.1%
90-day PDP	1,567	55,506	-0.6%	-0.2%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Emergency Department Use—Surgical Orthopedic Excluding Spine

Exhibit 82 presents the unadjusted and risk-adjusted trends in ED use without hospitalization during the 30-, 60- and 90-day post discharge period for both BPCI patients in the surgical orthopedic excluding spine clinical episode group and patients treated by comparison group providers. The unadjusted ED use without hospitalization rate was lower for Model 2 BPCI patients in the surgical orthopedic excluding spine clinical episode group than for all Model 2 BPCI patients. The risk-adjusted 30-, 60-, and 90- day ED use increased from baseline to intervention period for surgical orthopedic excluding spine BPCI patients. ED use for surgical orthopedic excluding spine episode patients of comparison providers was relatively stable between baseline and intervention periods across all three post-discharge periods.

Exhibit 82: Trends: Unadjusted and Risk-Adjusted Emergency Department Use Rate, by Post-discharge Period, Model 2 *Surgical Orthopedic Excluding Spine* Episodes

Post-discharge period	Statistic	BPCI		Comparison Group	
		Baseline Period (Q4 2010 – Q3 2013)	Intervention Period (Q4 2013)	Baseline Period (Q4 2010 – Q3 2013)	Intervention Period (Q4 2013)
30-day PDP	**N**	8,037	740	267,504	23,891
	Unadjusted	6.6%	8.6%	7.6%	7.2%
	Risk adjusted	6.9%	8.7%	7.6%	7.2%
60-day PDP	**N**	8,028	737	267,241	23,778
	Unadjusted	10.3%	11.9%	11.2%	10.7%
	Risk adjusted	10.7%	12.0%	11.2%	10.6%
90-day PDP	**N**	8,014	711	266,925	22,912
	Unadjusted	13.0%	14.8%	14.0%	13.0%
	Risk adjusted	13.5%	14.9%	13.9%	13.0%

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 83 presents unadjusted and risk-adjusted difference-in-difference (DiD) results for ED use among patients with *surgical orthopedic excluding spine* episodes. The increase in risk-adjusted ED use among BPCI patients with surgical orthopedic excluding spine episodes was statistically significant relative to comparison group patients during the 30-day post discharge period. While ED use increased during the 60- and 90- day post-discharge periods more for the BPCI patients than those treated by comparison providers, the difference was not statistically significant.

Exhibit 83: DiD: Risk-Adjusted Emergency Department Use, Intervention Period (Q4 2013) Relative to Baseline (Q4 2010 through Q3 2013), by Post-discharge Period, Model 2 *Surgical Orthopedic Excluding Spine* Episodes

Post-discharge Period	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
30-day PDP	740	23,891	2.3%	2.2% *
60-day PDP	737	23,778	2.2%	2.0%
90-day PDP	711	22,912	2.6%	2.3%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

5. Other unintended consequences

This section describes measures of patient mix that could indicate unintended consequences of the BPCI initiative. These unintended consequences generally refer to provider activities to reduce their reported costs that are not related to care redesign. There are several ways that providers could do this, for example, by encouraging admissions of lower cost patients or changing their coding practices so that less intensive patients are categorized into more resource-intensive patient categories. To understand whether providers are engaging in patient shifting, up-coding, cherry-picking, or lemon-dropping to improve their financial outcomes under BPCI, we examine patient severity and clinical classifications over time and across the BPCI episodes and episodes of comparison providers. These measures may indicate unintended consequences of the initiative. They may also indicate other consequences, such as shifts in patient volume due to improved processes of care or changes in market referral patterns as providers develop new relationships or specialize. To discern the meaning of changes in patient severity and clinical classifications, we will be examining these results in the context of other quantitative and qualitative analyses. We will combine analyses of outcome measures in our next annual report to examine the potential unintended consequences of the BPCI initiative.

Potential unintended consequences were examined at the provider-clinical episode level using the case-mix classifications associated with the five provider types and two measures of shifting. Results are unadjusted and should be interpreted with caution. In this section, results are presented for the one clinical episode, major joint replacement of lower extremity, which had sufficient sample size in Q4 2013 for analysis. See **Appendix C-2** for results across all 34 clinical episode groups with any episodes in Q4 2013.

The case-mix measures are the geometric mean of the MS-DRG weight of the anchor hospital stay and geometric means of the case weights associated with the patient classification system of first discharge setting (either the HHRG for HHA admissions, RUGS IV for SNF admissions, CMGs for IRF admissions, or MS-LTC-DRGs for LTCH admissions). If providers were selecting less

severe patients who require fewer resources to treat, we would expect to see declines in the case-mix measures for the BPCI providers, but not for the comparison providers. These declines may be apparent for the anchor admission. Changes in the average case weights among the various PAC settings may indicate changes in practice patterns that could signal stinting on inpatient hospital care—if patients enter PAC at a higher acuity level. Alternatively, changes in patient PAC needs (as measured by changes in the average case weight for the provider type) may indicate more appropriate discharge decisions that better match patients and provider types. Potential patient shifting was evaluated by examining changes in outpatient cases that are similar to BPCI episodes to determine if the less severe outpatients are being shifted to the inpatient setting. We also examined changes in non-BPCI cases that are in MS-DRGs that are related or similar to BPCI MS-DRGs to discern if hospitals may be changing their coding so that more complex (i.e., higher cost) patients are in MS-DRGs that are not considered under the initiative. See Section III.A.5 for detailed outcome definitions.

Based on these preliminary measures for major joint replacement of the lower extremity episodes, there are no indications that providers have changed their mix of patients or coding of patient episodes under BPCI during the first quarter. Exhibit 84 displays the DiD results of the average case weights across the anchor hospitalization and the four PAC settings for major joint replacement of lower extremity in Q4 2013. Our results indicate that there is no statistically significant difference in the change of average case weights for BPCI participants between the baseline and intervention period relative to the comparison group. Unadjusted for risk, the average anchor MS-DRG case weight for BPCI hospitals decreased 0.03 % more than for comparison hospitals, a difference that was not statistically significant. There were similarly small and not statistically significant differences in average case weights across the 4 PAC settings. It should be noted that case-mix calculations were performed on a small number of BPCI episodes that were initiated in Q4 2013.

Exhibit 84: Change in Average Case Weights for Anchor Hospitalization and First Site of PAC for Model 2 Major Joint Replacement of the Lower Extremity Episodes, Q4 2013

Measure	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	BPCI Q4 2010-Q3 2013 Average	BPCI Q4 2013 Average	Comparison Q4 2010-Q3 2013 Average	Comparison Q4 2013 Average	Diff-in-Diff
Anchor admission MS-DRG case weight	698	29,160	2.15	2.17	2.18	2.22	-0.03
Resource Use Groups IV among discharges to SNF	162	10,854	1.49	1.41	1.43	1.32	0.03
Home Health Resource Groups among discharges to HHA	340	10,242	1.37	1.39	1.48	1.49	0.02
Case-Mix Groups (CMGs) among discharges to IRF	61	2,359	0.95	0.81	1.03	1.06	-0.17
Long-term Care Diagnosis Related Groups (MS-LTC-DRGs) among discharges to LTCH	0	35	0.85		0.91	0.85	0

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

We examined changes in the number of outpatient visits for patients with conditions similar to BPCI episodes (as coded by the Ambulatory Patient Category or APC) by specific provider, and clinical episode, for any indications that there were shifts from the outpatient setting to BPCI episodes. For BPCI providers participating in major joint replacement of the lower extremity, we examined outpatient visits related to fractures of the femur or fractures of the hip and pelvis. Similarly, we examined admission trends for MS-DRGs that were related to the BPCI clinical episode, but were not included in the definition of the BPCI clinical episode.

As shown in Exhibit 85, we found no significant difference in the change in APCs related to major joint replacement of the lower extremity among BPCI participants relative to comparison group providers. When examining the change in the proportion of MS-DRGs that are related to major joint replacement of the lower extremity clinical episode but not included in the BPCI definition of the episode, we also found that the change among BPCI participants was not significantly different than that for the comparison group providers. See **Appendix J** for additional details on related outpatient APCs and related non-BPCI MS-DRGs.

Exhibit 85: Change in Outpatient Visits and Admissions for Conditions Similar to Major Joint Replacement of the Lower Extremity Episodes, Model 2, Q4 2013

Measure	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	BPCI Q4 2010-Q3 2013 Average	BPCI Q4 2013 Average	Comparison Q4 2010-Q3 2013 Average	Comparison Q4 2013 Average	Diff-in-Diff
Rate of Outpatient APCs	698	29,160	2.3%	1.8%	3.2%	3.3%	-0.7
Inpatient Admissions of Related but non-BPCI MS-DRGs	698	29,160	8.7%	7.2%	12.1%	11.9%	-1.4

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

V. Model 3 Results

This section presents a summary of the quantitative analyses of Q4 2013 Model 3 BPCI participants and qualitative analyses of Q4 2013 and Q1 2014 Model 3 BPCI participants. The Model 3 SNF initiator claims-based outcomes are risk-adjusted as described in Section III.B.6 above.[45] The quantitative results summarized in this section, as well as additional results, are located in **Appendix D:** Model 3 PMRC Q4 2013 Report. The qualitative data are from eight quarterly Awardee interviews and three EI case studies of Model 3 participants.

A. Characteristics of the Program and Participants

1. Participants

There were six active Awardees with nine EIs in Model 3 in Q4 2013. As illustrated in Exhibit 86, five SNFs joined as Designated Awardees under a single Facilitator Convener. These DAs are all in the same SNF chain and have almost identical IPs, so their organizational arrangement is similar to a single AC with multiple EIs. There was also one non-episode initiating AC with four EIs, including two SNFs, one HHA, and one IRF. Model 3 expanded significantly in Q1 2014, particularly in terms of the number of EIs. There were 20 active Awardees (with 84 EIs) in Q1 2014. This includes seven ACs, 12 DAs, and one DA Convener. As noted earlier, this discussion focuses primarily on the characteristics of the participants that joined the initiative in Q4 2013. Participants that joined the initiative after Q4 2013 will be discussed in greater detail in subsequent Annual Reports.

Exhibit 86: Model 3 Participants by BPCI Role, Q4 2013 and Q1 2014

BPCI Role	Q4 2013 (N)	Q1 2014 (N)
Single Awardee	0	0
Awardee Convener	1	7
Episode Initiating Bundled Payments Provider Org.	4	66
Facilitator Convener	1	4
Designated Awardee	5	12
Designated Awardee Convener	0	1
Episode Initiating Bundled Payments Provider Org.	0	5
Total number of Episode Initiators	9	84
SNF	7	63
HHA	1	18
IRF	1	1
LTCH	0	1
PGP	0	1

Source: Lewin analysis of Salesforce data for all Awardees participating in the BPCI initiative during Q4 2013 and Q1 2014.

[45] IRF and HHA results are not risk-adjusted due to insufficient sample size.

Seven SNFs participated in the initiative in Q4 2013 and 63 SNFs participated in Q1 2014. As discussed above, of the seven participating SNFs in Q4 2013, five joined under the same FC and two participated under the same AC. One should bear in mind the close organizational relationships between the Q4 2013 SNF participants and the small number of participating SNFs when considering the characteristics of the Q4 2013 participants. Exhibit 87 compares the characteristics of the SNFs that participated in Q4 2013 and Q1 2014 with non-participating SNFs. SNF participants were more likely to be located in urban areas than non-participants. In both quarters, all of the SNF participants were located in urban areas, compared with 71% of non-BPCI-participating SNFs. Participating SNFs were also more likely to be located in the Midwest than non-participating SNFs. The majority of SNFs in both Q4 2013 (71%) and Q1 2014 (55%) were located in the Midwest, compared with 31% of non-participants.

Though all Q4 2013 participating SNFs were non-profit, the majority of SNFs that joined in the second quarter were for profit, so that only 18% of Q1 2014 SNF participants were non-profit. Q1 2014 SNF participants were more likely to be for-profit than non-participants (82% vs. 68%). Participating SNFs were also less likely to be small facilities than non-participants. Only 29% of SNFs in Q4 2013 and 10% of SNFs in Q1 2014 had 82 or fewer beds, compared to 41% of non-participants.

Similar to non-participants, a minority of participating SNFs were hospital-based. One of the Q4 2013 SNFs and two of the Q1 2014 SNFs were hospital-based, compared with 4% of non-participants. While the majority (86%) of SNFs participating in Q4 2013 did not have an IRF located in their geographic area (as designated by CBSA), the majority (55%) of SNFs participating in Q1 2014 did have an IRF located in their area. Q1 2014 SNFs were also more likely to have an IRF in their area than non-participants (55% vs. 29%).

Exhibit 87: Characteristics of Model 3 SNF Episode Initiators and Non-BPCI SNFs, Q4 2013 and Q1 2014

Variable	BPCI Q4 2013 SNF Initiators (N=7)		BPCI Q1 2014 SNF Initiators (N=62)		Non-BPCI SNF Initiators (N=20,559)	
	N	%	N	%	N	%
Ownership						
For Profit	0	0%	51	82%	13,926	68%
Government	0	0%	0	0%	1,133	6%
Non-Profit	7	100%	11	18%	5,500	27%
Urban/Rural						
Rural	0	0%	0	0%	6,015	29%
Urban	7	100%	62	100%	14,544	71%
Region						
Midwest	5	71%	34	55%	6,313	31%
Northeast	0	0%	23	37%	3,432	17%
South	2	29%	3	5%	7,493	36%
West	0	0%	2	3%	3,313	16%
Bed Count						
0 - 82	2	29%	6	10%	8,356	41%
83-142	4	57%	26	42%	8,346	41%
143+	1	14%	30	48%	3,849	19%

Variable	BPCI Q4 2013 SNF Initiators (N=7)		BPCI Q1 2014 SNF Initiators (N=62)		Non-BPCI SNF Initiators (N=20,559)	
	N	%	N	%	N	%
IRF in CBSA						
No	6	86%	28	45%	14,497	71%
Yes	1	14%	34	55%	6,054	29%
Hospital-Based						
No	6	86%	60	97%	19,758	96%
Yes	1	14%	2	2%	793	4%

Source: Lewin analysis of 2013 Provider of Service (POS) and 2013 and 2014 Medicare claims. Non-participant SNFs are defined as all SNFs except those participating in BPCI in Q4 2013 and Q1 2014.

Exhibit 88 provides information on the sole episode initiating IRF compared to the non-participating IRFs.

Exhibit 88: Characteristics of Model 3 IRF Episode Initiators and Non-BPCI IRFs, Q4 2013 and Q1 2014

Variable	BPCI Q4 2013 IRF Initiators (N=1)		BPCI Q1 2014 IRF Initiators (N=1)		Non-BPCI IRF Initiators (N=451)	
	N	%	N	%	N	%
Urban/Rural						
Rural	0	0%	0	0%	45	10%
Urban	1	100%	1	100%	406	90%
Region						
Midwest	0	0%	0	0%	62	14%
Northeast	0	0%	0	0%	62	14%
South	1	100%	1	100%	268	59%
West	0	0%	0	0%	59	13%
Number of Nurses employed by IRF						
Mean	87.2		87.2		19.7	

Source: Lewin analysis of 2013 POS and 2013 and 2014 Medicare claims. Non-participant IRFs are IRFs other than the IRFs participating in BPCI in Q4 2013 and Q1 2014.

Exhibit 89 provides information on the Model 3-participating HHAs and all non-participating HHAs.

Exhibit 89: Characteristics of Model 3 HHA Episode Initiators relative to Non-BPCI HHAs, Q4 2013 and Q1 2014

Variable	BPCI Q4 2013 HHA Initiators (N=1)		BPCI Q1 2014 HHA Initiators (N=18)		Non-BPCI HHA Initiators (N=23,423)	
	N	%	N	%	N	%
Ownership						
For Profit	0	0%	16	89%	17,400	74%
Government	0	0%	0	0%	1,877	8%

Variable	BPCI Q4 2013 HHA Initiators (N=1)		BPCI Q1 2014 HHA Initiators (N=18)		Non-BPCI HHA Initiators (N=23,423)	
	N	%	N	%	N	%
Non-Profit	1	100%	2	11%	4,146	18%
Urban/Rural						
Rural	0	0%	5	28%	4,694	20%
Urban	1	100%	13	72%	18,729	80%
Region						
Midwest	0	0%	1	6%	6,072	26%
Northeast	0	0%	2	11%	2,001	9%
South	1	100%	15	83%	11,109	47%
West	0	0%	0	0%	4,235	18%
Number of Employed Nurses in HHA						
Mean	23.6		101.0		8.4	

Source: Lewin analysis of 2013 POS and 2013 and 2014 Medicare claims. Non-participant HHAs are HHAs other than the HHAs participating in BPCI in Q4 2013 and Q1 2014.

As described in **Appendix L**, we spoke with representatives from five of the six Q4 2013 Awardees (the sixth was involved in a case study) and five Awardees that joined the initiative in Q1 2014. In total, we reached out to eight DAs, one AC, and one DA Convener. The five Q4 2013 Awardees were all DAs that were part of the same chain of nursing facilities and joined under the same FC. To reduce the burden on the Awardees and the Convener, we combined three of these calls (with representation from each Awardee), resulting in a total of eight interviews.

During the quarterly Awardee interviews and EI case studies, we asked Model 3 participants about their decision to participate in BPCI. Awardee responses about the decision to participate in BPCI can be grouped into four categories: (1) quality improvement, (2) learning and payment reform, (3) leadership and innovation, and (4) participation in other initiatives. Exhibit 90 displays the number of quarterly interviews in which Awardees cited specific reasons for entry.

Exhibit 90: Reasons for Participating in the BPCI Initiative, Model 3 Awardee Interviews, Q4 2013 – Q1 2014

Important considerations in Participating in BPCI	Quarterly Awardee Interviews (N=8)*
Opportunity to improve care across the continuum	5
Want to test new payment models as they expect payment reform to shift away from FFS	3
Leaders in payment reform	3
Learn from and test care redesign model	2
Saw potential financial opportunities	1

Source: Lewin interviews with Q4 2013 and Q1 2014 Model 3 Awardees, conducted from March through June 2014.

*Note: Awardees could cite multiple reasons, so the numbers in this column do not sum to eight.

a. Quality improvement

In five of the eight Model 3 Awardee interviews, Awardees indicated that they associated their involvement with the BPCI initiative with their investment in improvements across the continuum of care. One Awardee indicated that Model 3 offered opportunities to "disrupt how health care moved through the continuum." Awardees noted that they wanted to be valued partners with hospitals in particular and they engaged with hospitals while deciding to participate in the initiative. During a site visit, one episode-initiating Awardee indicated that improving the relationships they had built with their hospital partners would be a key to their future success in the initiative. Although leading the hospital in the initiative felt a bit like the "tail wagging the dog" for this Model 3 participant, they believed that hospital engagement was essential for information dissemination and patient tracking.

> *"And we are looking for ways to be able to demonstrate that we can do a better job working together as a unit than organizations that are just stand-alone and have lots of handoffs to unrelated organizations."* – Model 3 Awardee

b. Learning and payment reform

Awardees also said that they joined the initiative because it offered opportunities to learn about both payment reform and care redesign. Awardees in three of the quarterly interviews said that they joined the initiative to test a new payment model because they expect payment reform to shift away from FFS. One Awardee said that they were interested in bundled payments because it more closely aligns with their value-based revenue model than FFS. Two Awardees indicated that the initiative provided an opportunity to learn from and test their care redesign initiatives.

> *BPCI is -"the first time when a PAC facility like us could then be the leader and be part of a program where we would be the one putting it together. What it means is that we've been out talking, sharing, asking, and now we have a chance to put it into action."* – Model 3 Awardee

c. Leadership and innovation

In three of the quarterly interviews, Awardees noted that they perceive themselves as innovative and are excited to be leaders in payment reform. One Awardee elaborated that the BPCI initiative aligns with their innovative model of care. Another Awardee shared that the organization's leadership is engaged and supported participation in BPCI because it is "the right thing to do." Model 3 case studies reinforced the importance of strong executive commitment to innovation. During one site visit, an EI lauded their administration for "embracing technology and getting ahead of trends on new government programs."

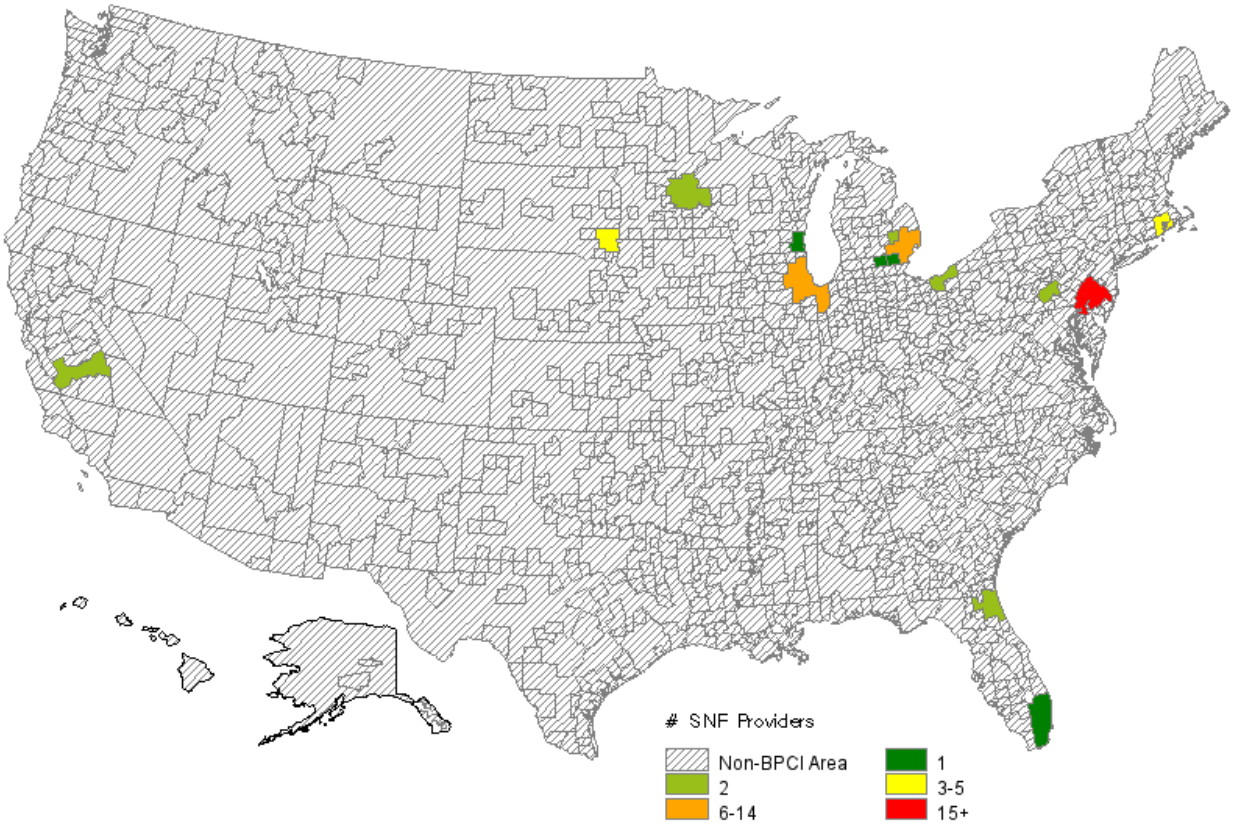
d. Participation in other initiatives

In addition to BPCI, some Awardees are engaged with other initiatives, primarily ACOs. Awardees on three of the quarterly interviews noted that they are part of ACOs. While Awardees indicated there are some potential synergies between ACOs and BPCI, two Awardees said their experience with ACOs did not influence their decision to participate in BPCI. In addition to ACOs, one Awardee said they are exploring options to partner with a commercial payer on bundled payments, but have not yet finalized any arrangements.

2. Market characteristics

The 20 Model 3 BPCI participants in the first two quarters of the BPCI initiative are located throughout the country. Exhibits 91 to 94 display the geographic locations of the episode-initiating SNF, IRF, HHA, and LTCH facilities. In this section, we present characteristics[46] of the markets where Model 3 BPCI PAC providers are located compared with areas with no BPCI-participating PAC providers.

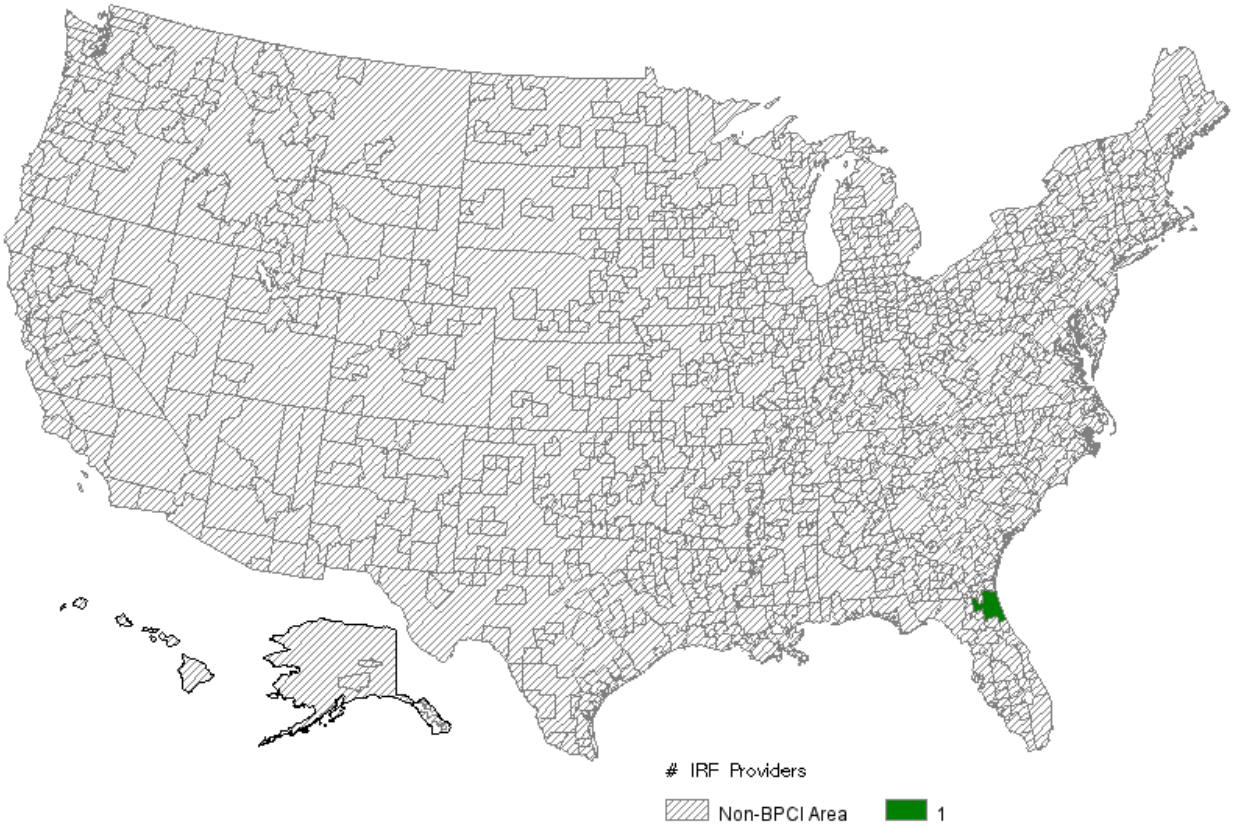
Exhibit 91: Number of SNF Providers, Q4 2013 – Q1 2014: CBSA Level



Source: Lewin analysis of Salesforce data for all Q4 2013 and Q1 2014 BPCI participating SNF episode initiators.

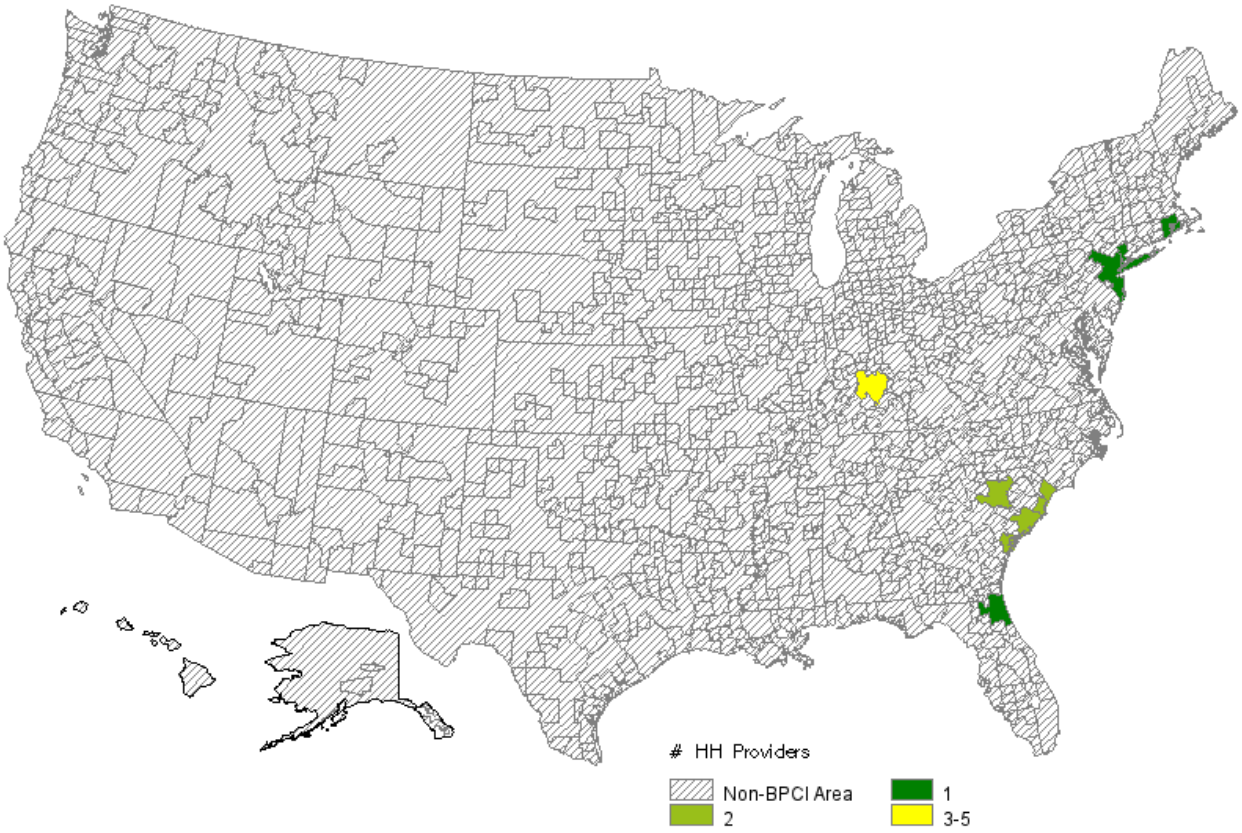
[46] The market is defined as the Core Based Statistical Area (CBSA). Providers not located within a CBSA were assigned to the largest CBSA within their Hospital Referral Region (HRR). Non-BPCI markets represent all CBSAs that do not have a Model 3 BPCI participant. Areas of the country that are not in a CBSA are therefore not included in these non-BPCI markets.

Exhibit 92: Number of IRF Providers, Q4 2013 – Q1 2014: CBSA Level



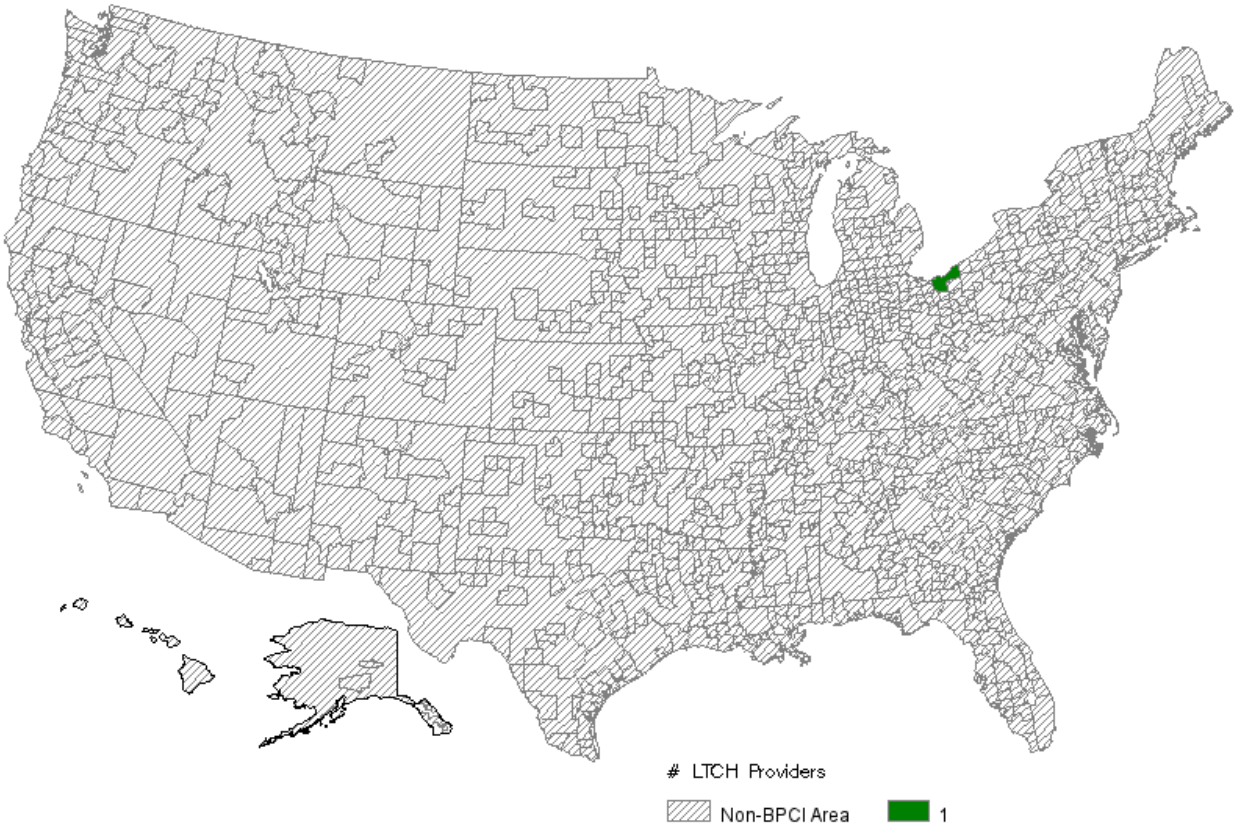
Source: Lewin analysis of Salesforce data for all Q4 2013 and Q1 2014 BPCI participating IRF episode initiators.

Exhibit 93: Number of HHA Providers, Q4 2013 – Q1 2014: CBSA Level



Source: Lewin analysis of Salesforce data for all Q4 2013 and Q1 2014 BPCI participating HHA episode initiators.

Exhibit 94: Number of LTCH Providers, Q4 2013 – Q1 2014: CBSA Level



Source: Lewin analysis of Salesforce data for all Q4 2013 and Q1 2014 BPCI participating LTCH episode initiators.

As shown in Exhibit 95, the median market penetration rate for BPCI SNFs was 7.5%, meaning that BPCI-participating SNFs had 7.5 % of the SNF beds in their area. This was considerably higher than for the markets without BPCI SNFs, which include rural areas. Market competition for SNFs within BPCI markets was high (with an average Herfindahl index value of 0.08); significantly higher than in non-BPCI markets (0.32). Participants are located in more densely populated areas (averaging about 2.7M residents) compared with non-BPCI providers (averaging about 252,000). On average, BPCI markets had a higher median household income (just under $51,000 vs. approximately $44,000) than other markets, as well as more primary care physicians, specialists, and nurse practitioners per 10,000 residents.

Exhibit 95: Comparison of Model 3 BPCI Markets and Non-BPCI Markets

Market Characteristics – Model 3	BPCI Markets N=22; 2.3% of Markets				Non-BPCI Markets N=920; 97.7% of Markets			
	Mean	Median	25th	75th	Mean	Median	25th	75th
BPCI Market Penetration - Hospital	8.1%	0.0%	0.0%	10.0%	2.2%	0.0%	0.0%	0.0%
Herfindahl Index - ACH	0.24	0.17	0.06	0.37	0.67	0.87	0.38	1.00
BPCI Market Penetration - SNF	10.0%	7.5%	0.0%	16.0%	0.0%	0.0%	0.0%	0.0%
Herfindahl Index - SNF	0.08	0.04	0.01	0.10	0.32	0.27	0.14	0.40
BPCI Market Penetration - HH	19.5%	0.0%	0.0%	38.0%	0.0%	0.0%	0.0%	0.0%

Market Characteristics – Model 3	BPCI Markets N=22; 2.3% of Markets				Non-BPCI Markets N=920; 97.7% of Markets			
	Mean	Median	25th	75th	Mean	Median	25th	75th
Herfindahl Index - HH	0.19	0.16	0.08	0.24	0.53	0.51	0.21	1.00
BPCI Market Penetration - IRF	4.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Herfindahl Index - IRF	0.44	0.41	0.00	1.00	0.12	0.00	0.00	0.00
Medicare Advantage Penetration	23.4%	22.3%	13.2%	27.2%	18.1%	15.2%	8.5%	24.2%
Population	2,741,674	1,118,877	347,962	3,318,486	252,007	72,307	39,575	162,677
Median Household Income	$50,666	$49,997	$44,989	$56,524	$44,053	$43,028	$38,445	$48,366
% Age 65+	14%	13%	12%	15%	15%	15%	13%	17%
PCP Per 10,000	8.1	8.3	6.8	9.0	6.4	6.2	4.7	7.6
Specialist Per 10,000	12.0	11.2	8.4	13.6	5.4	4.4	2.6	6.7
PA/NPs Per 10,000	7.6	7.2	5.4	8.3	6.1	5.6	3.9	7.6
SNF Beds Per 10,000	48.7	45.4	33.7	58.8	71.1	65.1	43.9	90.8
LTCH Beds Per 10,000	1.1	0.9	0.5	1.2	0.5	0.0	0.0	0.0
IP Rehab Bed Per 10,000	0.4	0.3	0.0	0.7	0.4	0.0	0.0	0.0
CAH Beds Per 10,000	0.2	0.0	0.0	0.1	1.8	0.0	0.0	1.3

Source: Lewin analysis of 2013 Medicare claims and 2011 Area Health Resource File (AHRF). Variable definitions are included in **Appendix I**.

3. Model Incentive Structure Characteristics

a. Model 3 - Model, episode, and length selection

Twenty of the 94 Awardees that began participating in Q4 2013 or Q1 2014 participated in Model 3, representing 84 of the 211 EIs (1 PGP, 1 LTCH, 1 IRF, 18 HHA, and 63 SNFs). According to our interviews with Awardees, the decisions about the Model and episodes under BPCI were made by the organizations' administrative leadership. Interviewees also mentioned the importance of making decisions by tapping into the expertise of leadership across their organizations (e.g., financial, physician, and nursing).

All Model 3 Awardees active in Q4 2013 chose the surgical orthopedic excluding spine clinical episode group. With the influx of an additional 75 EIs in Q1 2014, the range of clinical episodes expanded so that EIs chose episodes in all of the clinical episode groups. In fact, nearly half of all Q1 2014 EIs participated in 35 of the 48 clinical episodes. Exhibit 96 summarizes the count of EIs participating in each of the 48 clinical episodes.

Exhibit 96: EIs that Participated in a Given Clinical Episode[47] in Model 3, by BPCI Intervention Quarter

Clinical Episode	Q4 2013 Episode Initiators (N=8)		Q1 2014 Episode Initiators (N=84)	
	N	%	N	%
Non-surgical and surgical: GI				
Esophagitis, gastroenteritis and other digestive disorders	0	0%	38	45%
Gastrointestinal hemorrhage	0	0%	38	45%
Gastrointestinal obstruction	0	0%	38	45%
Major bowel procedure	0	0%	38	45%
Total	**0**	**0%**	**38**	**45%**
Non-surgical: Cardiovascular				
Acute myocardial infarction	0	0%	54	64%
Atherosclerosis	0	0%	37	44%
Cardiac arrhythmia	0	0%	53	63%
Chest pain	0	0%	53	63%
Congestive heart failure	3	38%	79	94%
Medical peripheral vascular disorders	0	0%	53	63%
Syncope & collapse	0	0%	38	45%
Total	**3**	**38%**	**79**	**94%**
Non-surgical: Neurovascular				
Stroke	0	0%	53	63%
Transient ischemia	0	0%	38	45%
Total	**0**	**0%**	**53**	**63%**
Non-surgical: Orthopedic				
Fractures of the femur and hip or pelvis	2	25%	47	56%
Medical non-infectious orthopedic	0	0%	41	49%
Total	**2**	**25%**	**47**	**56%**
Non-surgical: Other medical				
Cellulitis	0	0%	43	51%
Diabetes	0	0%	38	45%
Nutritional and metabolic disorders	0	0%	38	45%
Red blood cell disorders	0	0%	38	45%
Renal failure	0	0%	38	45%
Sepsis	0	0%	46	55%
Urinary tract infection	0	0%	63	75%
Total	**0**	**0%**	**66**	**79%**
Non-surgical: Respiratory				
Chronic obstructive pulmonary disease, bronchitis, asthma	0	0%	66	79%
Other respiratory	0	0%	61	73%
Simple pneumonia and respiratory infections	0	0%	65	77%
Total	**0**	**0%**	**66**	**79%**

[47] Total number of EIs represents the number of EIs that participated in a given clinical episode and had at least one patient episode in Q4 2013. There was one SNF EI that participated in Q4 2013 but did not have any patient episodes.

Clinical Episode	Q4 2013 Episode Initiators (N=8)		Q1 2014 Episode Initiators (N=84)	
	N	%	N	%
Surgical: Cardiovascular				
AICD generator or lead	0	0%	0	0%
Cardiac defibrillator	0	0%	53	63%
Cardiac valve	0	0%	53	63%
Coronary artery bypass graft	0	0%	53	63%
Major cardiovascular procedure	0	0%	15	18%
Other vascular surgery	0	0%	53	63%
Pacemaker	0	0%	43	51%
Pacemaker device replacement or revision	0	0%	38	45%
Percutaneous coronary intervention	0	0%	53	63%
Total	**0**	**0%**	**58**	**69%**
Surgical: Orthopedic excluding spine				
Amputation	0	0%	5	6%
Double joint replacement of the lower extremity	1	13%	5	6%
Hip & femur procedures except major joint	4	50%	12	14%
Lower extremity and humerus procedure except hip, foot, femur	0	0%	5	6%
Major joint replacement of the lower extremity	8	100%	25	30%
Major joint replacement of the upper extremity	0	0%	38	45%
Other knee procedures	0	0%	43	51%
Removal of orthopedic devices	0	0%	42	50%
Revision of the hip or knee	3	38%	9	11%
Total	**8**	**100%**	**63**	**75%**
Surgical: Spinal				
Back & neck except spinal fusion	0	0%	0	0%
Cervical spinal fusion	0	0%	0	0%
Combined anterior posterior spinal fusion	0	0%	0	0%
Complex non-cervical spinal fusion	0	0%	38	45%
Spinal fusion (non-cervical)	0	0%	5	6%
Total	**0**	**0%**	**43**	**51%**

Source: February, 2014 BPCI Master list of episodes from CMS.

The Awardees we interviewed mentioned a few recurring themes about their decision-making processes. They stated that they chose episodes that offer opportunities to learn about best practices; have high volume and are therefore big cost drivers; and may have the best opportunity to improve care and reduce readmissions. One interviewee also noted that they selected joint replacements because care is "cleaner," or more specific, relative to other clinical episodes.

> *"And I think some of the stuff that we're doing for the smaller set of DRGs…particularly even sepsis, if we get the readmits, the length of stay, down for that difficult one, then adding additional DRGs would be quite possible. And once you tackle the tough ones and beat those, then it would open the door to expand."* – Model 3 Awardee

In Q4 2013, Model 3 participants chose 60- or 90-day episodes. Four EIs chose the 60-day length and five EIs selected the 90-day length across all clinical episodes. In Q1 2014, 13 EIs chose the 60-

day episode length and 71 EIs chose the 90-day for all clinical episodes. Some of the Model 3 Awardees interviewed noted that the 90-day period was strongly recommended by CMS when sites were applying to participate in BPCI. Furthermore, interviewees reported they had the impression that the application process for BPCI was competitive and they therefore wanted to put forward the strongest application possible. Awardees also indicated that they selected 90 days because they felt that was the appropriate length of time to study their population and allow for their care redesign system to function as intended.

b. Partners

In interviews, five Model 3 Awardees described seeking partnerships with other PAC facilities, including four that reached out to downstream PAC providers to discuss quality. Model 3 Awardees indicated that they may partner with other PAC facilities to maintain quality in patient care after discharge. During one case study, for example, an EI described their desire to educate or coordinate with HHAs that receive their patients, since the care received from HHAs can affect patient outcomes.

Some Model 3 Awardees have contracted with third-party administrators to assist with tasks such as data management, BPCI program administration, and gainsharing calculation and distribution. Four Model 3 interviewees reported formally partnering with a company that provides data analysis or IT support. These Awardees reported that such partners assisted with decision-making or program design at the time of entry to the BPCI initiative. Several Awardees also described partnerships with physicians, which included education and outreach, collaboration about the BPCI model, and participation in gainsharing.

Model 3 Awardees described several specific benefits of partnerships. For two Awardees, partnerships bring a sense of community, improve education, and foster unity. Other reported benefits include planning for challenges arising under the BPCI program and increasing the geographic reach of the initiative. Still, Awardees noted challenges associated with partners, including difficulty working with many physicians from different provider organizations, streamlining data exchange across a variety of data systems, and data lags.

c. Waiver use

Based on a review of Awardee Implementation Protocols, all Awardees active in Q4 2013 use one or both waivers available to Model 3 participants: beneficiary incentives and gainsharing. Seven Awardees that started in Q1 2014 do not intend to use either waiver.[48]

[48] For a description of the waivers, see section I.A BPCI Initiative.

Exhibit 97: Model 3 EIs Choosing BPCI initiative waivers, Q4 2013 and Q1 2014

Model 3 Initiator Waiver Selection	Number of Q4 2013 EIs (N=9)[a]	Number of Q1 2014 EIs (N=84)[b]
Beneficiary Incentives	5	25
Gainsharing	2	67

a. The nine EIs in Q4 2013 are distributed among six Awardees.

b. The 84 EIs in Q1 2014 are distributed among 21 Awardees.

Source: Lewin analysis of Awardee Implementation Protocols for the nine Awardees participating in the BPCI initiative during Q4 2013.

Beneficiary incentives

The beneficiary incentive waiver allows the EI to offer a service or product to a beneficiary that is related to the episode but is not typically covered by Medicare. Five of the Q4 2013 and 25 of the Q1 2014 EIs offered beneficiary incentives ranging in value from $20.33 to $400. The five EIs offering beneficiary incentives in Q4 2013 are participating under the same AC. The services and products offered by this AC include telehealth and a personal response system (PERS). These incentives were chosen to provide additional support and education to the patient and are intended to reduce the need for higher levels of care in the future. In Q4 2013, five beneficiaries received these incentives, one telehealth and four PERS. See Exhibit 98 for a full description of beneficiary incentives offered in Q4 2013.

> *"You're always trying to distinguish yourself from your competitors… [G]ainsharing enabled us…to have strategic conversations in the C-suite at some major hospitals… [and] they were more than happy to be partners with us with no risk and only upside in doing the right thing and improving the quality of care."* – Model 3 Awardee

Exhibit 98: Beneficiary incentive waivers offered by Model 3 Awardees, Q4 2013

Service offered	Value	Purpose of incentive as described by Awardee
Telehealth	$150 enrollment fee and $86 per month	This is available for patients with congestive heart failure or lower joint replacement episodes of care. It is intended to provide real-time intervention and education to beneficiaries to encourage engagement in self-health management and to reduce demand for higher levels of care.
Personal response system (PERS)	$29 per month (analog phone line) or $37 per month (cellular)	This is available for patients with congestive heart failure or lower joint replacement episodes of care. Should a beneficiary fall in their home, this service provides real-time intervention to avoid further complications.

Source: Lewin analysis of Awardee Implementation Protocols for the nine Awardees participating in the BPCI initiative during Q4 2013.

We also discussed the use of beneficiary incentives during our case studies. One Q1 2014 EI, that offers a weight scale and a blood pressure cuff to beneficiaries at the time of discharge, noted that these resources have already been used by congestive heart failure patients to help manage their care from home. The provider also incorporated these monitoring tools into their patient education classes so beneficiaries can learn how to check their weight and vital signs.

Gainsharing

Gainsharing enables Awardees to share any savings generated under BPCI with its gainsharing partners. According to the Awardee IPs, two of the Q4 2013 EIs (under one AC) and 67 of the Q1 2014 EIs are intending to gainshare. Based on quarterly interview data, these Awardees view gainsharing as an opportunity for financial gain and aligning incentives.

> *"I think we've got enough of a challenge of figuring out how to share gains and losses amongst members… [W]e felt that given the scope of our project that might not be something that we would really be able to tackle and to do effectively"* – Model 3 Awardee

The Awardees that do not participate in gainsharing cite financial risk as one of the primary deterrents. In the Awardee quarterly interviews, some Awardees voiced concerns that gainsharing would over-complicate program implementation and chose to focus on care redesign and coordination among immediate practitioners. Other Awardees attribute their gainsharing policy decision to their AC. None of these Awardees indicated that they would consider gainsharing in the future.

The results of the eight Model 3 quarterly interviews as related to gainsharing are summarized in Exhibit 99.

Exhibit 99: Rationale behind gainsharing decisions, Awardee Interviews for Q4 2013 and Q1 2014 Starters

Considerations in gainsharing decision	Number of Quarterly Awardee Interviews (N=8)
Gainsharing (reasons cited):	**3**
Financial opportunity	3
Incentive alignment	2
Improve patient experience	1
Not gainsharing (reasons cited):	**5**
Financial risk	5
Awardee structure	2
Open to gainsharing in the future	**0**

Source: Lewin interviews with eight Model 3 Awardees joining BPCI in Q4 2013 or Q1 2014, conducted from March through June 2014.

*Note: Awardees often cited multiple reasons for their decisions, so the numbers in this column do not sum to eight.

The two Q4 2013 EIs that participate in gainsharing are under the same AC and have the same gainsharing methodology. There are two other EIs under this AC that do not participate in gainsharing. The gainsharing EIs have selected Option 3 for the BPCI savings pool, meaning each EI has its own savings pool where both internal savings and distributed savings are deposited. See **Appendix O** for a discussion of the gainsharing methodologies.

4. Care redesign and cost saving strategy characteristics

In addition to the various waivers, all of the Q4 2013 and Q1 2014 Model 3 EI have interventions in each of the five major care redesign categories: redesign of care pathways; enhancements in

care delivery; patient activation, engagement, and risk management; care coordination; and system changes to support care. Within each care redesign category, EIs have various implementation methods.

Some of the care redesign interventions were in place prior to entering Phase II of BPCI while others are new interventions. According to the Implementation Protocols, participants active in Q4 2013 and Q1 2014 have undertaken several new interventions including patient and caregiver coaching; utilizing care managers, case managers, or patient navigators; conducting patient risk screening; and discharge destination planning.

During one case study interview, an EI described developing clinical pathways and care maps for specific disease categories. According to an administrator, prior to joining BPCI this PAC provider did not focus on specific types of patients, and now it has adopted numerous care redesign strategies to improve quality of care and efficiency. Several notable initiatives include care maps, episode-specific protocols, and hiring additional medical specialists.

During the site visits, Awardees described employing outside consultants to assist in implementing BPCI. This is an added cost, but Awardees indicated that the additional help contributes to operating the initiative effectively and ultimately results in savings. One Awardee described a contract with a third-party administrator for additional oversight of its gainsharing practices. This Awardee has entered into gainsharing arrangements with several neighboring hospitals but has determined that it will be too difficult to track the attainment of facility and physician quality metrics themselves. Although quality reporting is not yet required, the EI is using quality measures to benchmark success and determine areas in need of improvement and the third-party administrator audits the measures for accuracy.

5. Patient population characteristics

Exhibit 100 provides information on Model 3 Q4 2013 BPCI patients. The BPCI patients are compared with all Medicare beneficiaries who had an inpatient admission in one of the six active Model 3 clinical episodes and received PAC care during Q4 2013. Patients cared for by BPCI participants in Q4 2013 exhibit a relatively similar age and gender distribution to that of all Medicare beneficiaries who were admitted with one of the same MS-DRGs and received PAC care. Model 3 BPCI patients are less likely to be dual eligible (10% vs. 17%) but more likely to have a disability (14% vs. 10%) relative to the broader Medicare population.

Exhibit 100: Characteristics of Model 3 BPCI Patients and All Medicare Beneficiaries with an Inpatient Admission within one of the 5 Clinical Episodes for which Model 3 Beneficiaries were admitted and subsequent PAC use, Q4 2013

Characteristics	Model 3 BPCI Patients (N=275)		All Medicare Beneficiaries with same MS-DRG admission and discharged to HH, SNF, IRF, or LTCH (N=201,783)	
	N	%	N	%
Age				
20-64	26	9.5%	16,578	8.2%
65-79	142	51.6%	98,863	49.0%

Characteristics	Model 3 BPCI Patients (N=275)		All Medicare Beneficiaries with same MS-DRG admission and discharged to HH, SNF, IRF, or LTCH (N=201,783)	
	N	%	N	%
80+	107	38.9%	86,340	42.8%
Gender				
Female	193	70.2%	132,237	65.5%
Male	82	29.8%	69,546	34.5%
Percent Eligible for Medicaid	27	9.8%	34,233	17.0%
Percent Disability, no ESRD	39	14.2%	19,574	9.75

Source: Lewin analysis of 2013 Medicare claims.

Exhibit 101 compares Model 3 Q4 2013 BPCI SNF patients to all Medicare beneficiaries who had an inpatient admission in one of the five active Model 3 clinical episodes and received SNF care during Q4 2013. There are several notable differences between the two populations. A lower proportion of BPCI SNF patients were over the age of 80 than the comparable Medicare population (37% vs. 54%). The patients seen by BPCI SNF providers are also more likely to be disabled (13% vs. 7%). The most notable difference between the two populations is the difference in Medicaid eligibility. Non-BPCI SNF Medicare patients in the six active clinical episodes are twice as likely to be eligible for Medicaid as patients of BPCI SNF providers (19% vs. 9%).

Exhibit 101: Characteristics of Model 3 SNF BPCI Patients and All Medicare Beneficiaries with an Inpatient Admission with a Surgical Orthopedic Clinical Episodes for which Model 3 Beneficiaries were Admitted and Subsequent SNF, Q4 2013

Characteristics	Model 3 SNF Patients (N=200)		All Medicare Beneficiaries with same MS-DRG admission and discharged to SNF (N=108,774)	
	N	%	N	%
Age				
20-64	17	8.5%	6,597	6.1%
65-79	109	54.5%	43,419	39.9%
80+	74	37.0%	58,758	54.0%
Gender				
Female	150	75.0%	76,089	70.0%
Male	50	25.0%	32,685	30.1%
Percent Eligible for Medicaid	18	9.0%	20,344	18.7%
Percent Disability, no ESRD	27	13.5%	7,860	7.2%

Source: Lewin analysis of 2013 Medicare claims.

B. Impact of BPCI

For Model 3, we performed the quantitative analysis separately for each type of EI (SNF, IRF, and HHA) because the patients and, as a result, the patterns of care, differ across the three settings. There was one Model 3 IRF participant active in Q4 2013 with only 44 patient episodes during the intervention quarter across two surgical clinical episodes. Similarly, there was only one Model 3

HHA participant active in Q4 2013 with 31 patient episodes across two clinical episodes. Given the extremely small number of patient episodes for a single BPCI participant, we do not present the results for the IRF and HHA participants. **Appendix D**: Model 3 PM/RC Report includes the results for these two BPCI participants relative to their comparison groups.

This section presents the risk-adjusted health care utilization, payments, and quality of care, as well as descriptive measures of unintended consequences for the Model 3 SNF BPCI participants relative to SNF comparison providers. There were eight SNF participants active in Q4 2013 across six clinical episodes, with a total of 209 patient episodes in Q4 2013. Given that 200 of the 209 episodes were in the surgical orthopedic without spine clinical group, we limited our analysis to surgical orthopedic without spine clinical episodes. Although the outcomes for the Model 3 SNF initiated BPCI patients are risk-adjusted, we make no inference about the impact of BPCI because there is only three months of experience under BPCI. See **Appendix D** for the full results.

1. *Characteristics of Model 3 BPCI SNF Patients Compared with SNF Patients treated by Comparison Group SNF Providers*

Exhibit 102 illustrates that the characteristics and prior health care utilization of Model 3 BPCI SNF surgical orthopedic without spine episode patients are generally similar to those of the comparison group patients during Q4 2013. Both patient samples had a similar gender distribution. A larger share of the BPCI patients than comparison patients, however, was in the youngest age category. The two patient populations had comparable use of medical services in the six months prior to the qualifying hospital stay. In both samples, a similar proportion of patients were eligible for Medicaid. The most notable difference between BPCI and comparison group patients is that the proportion of patients who qualified for Medicare due to a disability was higher among Model 3 BPCI SNF patients (13.5% vs. 6.3%).

Exhibit 102: Characteristics of Model 3 BPCI *Surgical Orthopedic Excluding Spine* SNF Patients and Comparison Group Patients, Episodes Initiated Q4 2013

Characteristics	Model 3 BPCI SNF Patients (N=200)		Model 3 Comparison Group Patients (N=239)	
	N	%	N	%
Age				
20-64	17	8.5%	12	5.0%
65-79	109	54.5%	119	49.8%
80+	74	37.0%	108	45.2%
Gender				
Female	150	75.0%	183	76.6%
Male	50	25.0%	56	23.4%

Characteristics	Model 3 BPCI SNF Patients (N=200)		Model 3 Comparison Group Patients (N=239)	
	N	%	N	%
Eligible for Medicaid	18	9.0%	23	9.6%
Disabled, no ESRD	27	13.5%	15	6.3%
Inpatient hospitalization in the six months prior to anchor hospitalization	29	14.5%	43	18.0%
No institutional use in the six months prior to anchor hospitalization	168	84.0%	194	81.2%
	Mean	SD	Mean	SD
Average HCC case mix index	0.564	0.705	0.690	0.809
Average number of ED visits in the six months prior to anchor hospitalization	0.18	0.61	0.16	0.52
Average number of inpatient hospitalizations in the six months prior to anchor hospitalization	0.18	0.49	0.28	0.66

Source: Lewin analysis of 2013 Medicare claims.

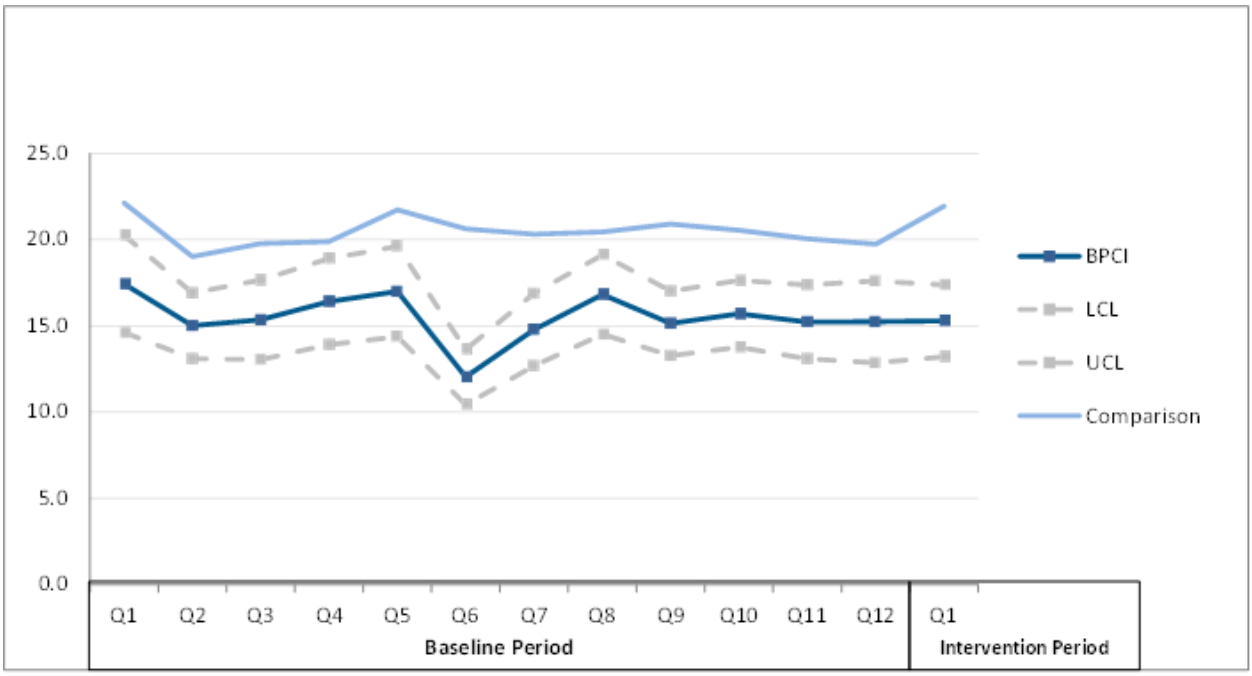
2. Utilization - Number of days

This section presents the results for the utilization measures for Model 3 BPCI SNF patients treated by BPCI providers relative to patients treated by comparison group providers. Due to limited sample size, our analysis is restricted to the surgical orthopedic excluding spine episodes initiated during Q4 2013. Utilization measures include total number of days in an institutional setting during the 90 days after the qualifying inpatient hospitalization discharge, as well as the number of days of SNF care for patients with any SNF use and number of days of HHA use for patients with any HHA use during the same measurement period.[49] The measurement period is truncated at 90 days for the purposes of this analysis. See Section III.A.5 for detailed outcome definitions.

Exhibits 103 and 104 display the average risk-adjusted number of days in an institutional setting during the 90 days after discharge from the qualifying inpatient hospitalization for Model 3 SNF initiated surgical orthopedic excluding spine patients. The risk-adjusted number of days in an institutional setting was significantly lower for patients treated by BPCI providers than patients treated by comparison providers across all quarters of baseline and the intervention period. During the first eight quarters of the baseline period, the risk-adjusted number of days of institutional PAC care was 16 days for patients treated by BPCI providers and 21 days for patients treated by comparison group providers. A similar trend was observed during the last four quarters of the baseline period (15 vs. 20). This relationship continued during the intervention period for BPCI patients, with the difference actually increasing because the average number of days for comparison patients went up two days.

[49] We analyzed the number of days in each type of PAC setting (HH, SNF, IRF, and LTCH) for Model 3 episodes that began in a SNF. Therefore, if a patient in a Model 3 SNF initiated episode had any days of HH care during the 90 days post qualifying stay discharge, we look at the average number of days among BPCI patients relative to comparison patient. There was insufficient sample size to examine average qualifying stay length of stay and the number of days during 90-day post qualifying stay discharge in LTCH and IRF settings.

Exhibit 103: Average Risk-adjusted Number of Days Receiving Institutional PAC Services during the 90-day Post-qualifying Inpatient Stay Discharge Period, Model 3 SNF Initiated *Surgical Orthopedic Excluding* Spine



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 104: Average Unadjusted and Risk-adjusted Number of Days Receiving Institutional PAC Services during the 90-day Post-qualifying Inpatient Stay Discharge Period, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	1,054	582	192	2,032	897	230
Unadjusted	15.3	15.0	17.9	25.0	25.1	27.7
Risk-adjusted	15.6	15.3	15.3	20.5	20.3	21.9

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 105 presents the DiD estimate for this measure. While the number of days of institutional PAC use declined for BPCI patients and increased in the comparison group, the difference was not statistically significant.

Exhibit 105: Average Unadjusted and Risk-Adjusted Number of Days Receiving Institutional PAC Services during the 90-day Post-qualifying Inpatient Stay Discharge Period, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

BPCI Episodes Q4 2013(N)	Comparison Episodes Q4 2013(N)	Unadjusted DiD	Risk-adjusted DiD
192	230	0.02	-1.7

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 106 presents the unadjusted number of days of care by PAC setting during the 90-day post-qualifying inpatient hospitalization for Model 3 SNF BPCI patients with surgical orthopedic excluding spine episodes. Given the limited sample size, our analysis is restricted to SNF and HHA use among Model 3 SNF BPCI patients with surgical orthopedic excluding spine episodes. For the purposes of this analysis, the number of days of PAC use is limited to the patients who had at least one day of use during the measurement period.

Exhibit 106: Average Unadjusted Number of Days during the 90-day Post-qualifying Inpatient Hospitalization, by PAC Setting, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

PAC Setting	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
Stays including SNF	N	1,054	582	192	2,037	897	231
	Unadjusted	14.4	14.1	16.5	23.7	23.9	26.2
Stays including HHA	N	645	334	126	1,189	489	130
	Unadjusted	30.5	29.9	31.5	30.3	28.9	28.2

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 107 presents the unadjusted and risk-adjusted DiD estimate for average number of days of care in a SNF and HHA separately, during the 90-day post-qualifying inpatient hospitalization. Due to sample size restrictions, results are presented for stays in SNF and HHA among Model 3 SNF BPCI patients with surgical orthopedic excluding spine episodes who had at least one day of use during the measurement period. The average risk-adjusted number of SNF days decreased for BPCI patients relative to comparison group patients. In contrast, the average number of risk-adjusted HHA days increased for BPCI patients relative to comparison group patients. These findings were not statistically significant.

Exhibit 107: Average Unadjusted and Risk-adjusted Number of Days during the 90-day Post-qualifying Inpatient Hospitalization, by PAC Setting, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

PAC Setting	BPCI Episodes Q4 2013(N)	Comparison Episodes Q4 2013(N)	Unadjusted DiD	Risk-adjusted DiD
Stays including SNF	192	230	-0.23	-1.9
Stays including HHA	126	129	2.86	1.0

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

3. Payment

We calculated the Medicare standardized allowed payment amount for multiple service types during various measurement periods (e.g., within bundle and 90 days post qualifying stay discharge). In this section, we present the total payments (Part A and B combined) for patients with 60-day episodes in the surgical orthopedic excluding spine group, which accounted for the largest share of patients in Model 3. Part A and B payments were calculated by service category for the 90 day post qualifying stay discharge period. The results for all outcomes are in **Appendix D.**

a. Average Total Medicare Standardized Allowed Amount

Exhibits 108 and 109 display the unadjusted average total Medicare standardized allowed amount for 60-day SNF episodes for BPCI and comparison group patients with surgical orthopedic excluding spine episodes. The average total amount was lower during the baseline period for BPCI patients than for comparison group patients ($11,311 vs. $16,896). The average total amount increased from baseline to intervention for both groups and the total amount remained higher for comparison group patients. These results are most likely driven by the shorter length of SNF stays for BPCI patients. The Medicare standardized allowed amount for BPCI providers averaged $13,154 in the intervention period for services included in the bundle, compared with $17,008 for comparison group providers. The amount for services excluded from the bundle averaged $179 for BPCI patients, compared with $193 for the comparison group. These differences were not statistically significant. The results for the 90-day SNF episodes were similar (See **Appendix D**).

Exhibit 108: Trends: Unadjusted Average Total Medicare Standardized Allowed Amount ($2014) included and not included in the Bundle Definition, 60-day episodes, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

Measure		BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
Total amount included in bundle definition	**N**	764	459	158	1,638	686	172
	Unadjusted	$11,436	$10,299	$13,154	$16,919	$16,277	$17,008
Total amount not included in bundle definition	**N**	764	459	158	1,638	686	172
	Unadjusted	$271	$221	$179	$215	$142	$193

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 109: DiD: Unadjusted Average Total Medicare Standardized Allowed Amount ($2014) included and not included in the Bundle Definition, 60-day episodes *with* PAC use, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

Measure	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD
Total amount included in bundle definition	158	172	$1,958
Total amount not included in bundle definition	158	172	-$82

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

b. Average Medicare Part A Standardized Allowed Amount

Exhibit 110 displays the unadjusted and risk-adjusted average Part A standardized allowed amount for the qualifying hospital stay, SNF care and HHA care during the 90-day post-discharge period for surgical orthopedic excluding spine patients treated by BPCI and comparison group SNF providers. Average Part A payments for the three settings combined were higher for patients treated by comparison group providers than for BPCI patients during all quarters of the baseline period and intervention period. The average Part A standardized allowed amount during the baseline period was $22,891 for BPCI patients and $26,923 for comparison group patients. The average during the intervention period, Q4 2013, was $22,768 for BPCI patients and $27,114 for comparison group patients. Average Part A payments for BPCI providers decreased by $1,154 from the first eight quarters of the baseline period ($23,276) to the last four quarters ($22,122). Similarly, for comparison group providers, average aggregated Part A payments decreased by $1,390 from the first eight quarters ($27,386) to the last four quarters ($25,996) of the baseline period.

Average risk adjusted Part A SNF payments were significantly higher for patients treated by comparison group providers ($11,739 for baseline and $12,082 for intervention) than for patients treated by BPCI providers ($7,590 for baseline and $7,465 for intervention) across all quarters. These findings reflect the longer length of stay in SNFs for patients treated by comparison group providers than by BPCI providers. For patients treated by BPCI providers, average Part A payments for SNF care decreased from the baseline period ($7,590) to the intervention period ($7,465). Part A payments increased from the baseline period ($11,739) to the intervention period ($12,082) for patients treated by comparison group providers.

HHA payments for patients in surgical orthopedic excluding spine episodes were higher for patients treated by BPCI providers than by comparison group providers for all quarters, except one during the baseline period. For patients treated by BPCI providers, average Part A HHA payments remained relatively stable across the entire period, but payments declined from the baseline to the intervention period for patients of the comparison providers.

Exhibit 110: Trends: Average Risk-Adjusted Part A Standardized Allowed Amount ($2014) for BPCI and Non-BPCI Beneficiaries, Qualifying Inpatient Stay and PAC Settings, 90-day PDP, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

Measure	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
Qualifying Inpatient Stay	N	1057	584	194	2,045	897	232
	Unadjusted	$12,893	$12,881	$13,685	$13,268	$13,183	$13,568
	Risk-adjusted	$13,021	$12,876	$12,977	$13,208	$13,034	$13,434
Skilled Nursing Facility	N	1,055	583	193	2,036	897	231
	Unadjusted	$7,720	$6,928	$8,726	$13,530	$12,613	$14,007
	Risk-adjusted	$7,843	$7,085	$7,465	$12,047	$11,121	$12,082
Home Health Agency	N	1,055	583	193	2,036	897	231
	Unadjusted	$2,389	$2,151	$2,470	$2,210	$1,952	$1,739
	Risk-adjusted	$2,411	$2,161	$2,327	$2,131	$1,841	$1,598

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 111 presents the DiD estimate for changes from the baseline to intervention period for BPCI providers relative to comparison group providers. Average Part A risk adjusted HHA payments increased significantly more from baseline to intervention for BPCI providers than for comparison group providers. (See **Appendix D** for complete results).

Exhibit 111: DiD: Average Risk-Adjusted Part A Standardized Allowed Amount ($2014) for BPCI and Non-BPCI Beneficiaries, Qualifying Inpatient Stay and PAC settings, 90-day PDP, Model 3 SNF Initiated: *Surgical Orthopedic Excluding Spine*

Measure for 90-day PDP	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
Qualifying Inpatient Stay	194	232	$501*	-$281
Skilled Nursing Facility	193	231	$607	-$462
Home Health Agency	193	231	$578*	$495*

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

c. *Average Medicare Part B Standardized Allowed Amount*

Exhibit 112 displays the unadjusted average Part B standardized allowed amount for six mutually exclusive service categories[50] during the 90-day post-discharge period for BPCI and comparison group patients with surgical orthopedic excluding spine episodes. BPCI patients had higher Part

[50] For purposes of aggregate Part B payment discussion, the six service categories refer to outpatient therapy, imaging and lab, procedures, E&M, all other non-institutional, and all other institutional.

B payments than comparison group patients in all but four quarters of the baseline period, averaging $3,310 for BPCI patients and $2,781 for comparison patients over the entire baseline period. From the baseline to the intervention period, average Part B payments declined for both groups. During the intervention period, Part B payments were still higher for BPCI providers than comparison group providers, but the difference between the groups was smaller than during the baseline period. Average Part B payments increased from the first eight quarters to the last four quarters of the baseline period for both BPCI providers and comparison group providers.

Average unadjusted Part B payments during the baseline period were higher for comparison group patients than for BPCI patients for all service categories except outpatient therapy and procedures. During the intervention period, however, average Part B payments were higher for patients treated by BPCI providers than by comparison group providers for all service categories.

Average Part B payments decreased from the first eight quarters of the baseline period to the last four quarters in three of the six service categories for both BPCI and comparison group patients. For both groups, these three categories included procedures and all other non-institutional services. In addition, from baseline to intervention, average Part B payments increased for comparison group patients for only E&M and all other non-institutional services. For BPCI patients, however, Part B payments increased for these two categories as well as imaging and lab and all other institutional services.

Exhibit 112: Trends: Unadjusted Average Part B Medicare Standardized Allowed Amount ($2014), Service Categories, 90-day post-discharge period, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

Measure	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
Part B standardized allowed amount after qualifying stay:							
Outpatient therapy	N	1,054	584	193	2,040	896	232
	Unadjusted	$801	$788	$640	$437	$452	$404
Imaging and lab	N	1,054	584	193	2,040	896	232
	Unadjusted	$307	$310	$355	$341	$314	$324
Procedures	N	1,054	584	193	2,040	896	232
	Unadjusted	$271	$264	$237	$237	$224	$146
E&M	N	1,054	584	193	2,040	896	232
	Unadjusted	$897	$1,102	$1,310	$1,068	$1,157	$1,257
All other non-institutional	N	1,054	584	193	2,040	896	232
	Unadjusted	$334	$330	$483	$391	$373	$417
All other institutional	N	1,054	584	193	2,040	896	232
	Unadjusted	$190	$200	$284	$244	$247	$235

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

Exhibit 113 presents the DiD estimate for changes from the baseline to intervention period in Part B payments for BPCI patients relative to comparison group patients. For all service categories except outpatient therapy, the average unadjusted Part B payment increased more for BPCI patients from baseline to intervention than for comparison group. This difference was only statistically significant for all other non-institutional services. See **Appendix D** for 60- and 90-day episode results.

Exhibit 113: DiD: Average Part B Standardized Allowed Amount ($2014) for BPCI and Non-BPCI Providers, Anchor Stay and Service Categories, 90-day post-discharge period, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

Measure	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	Unadjusted DiD
Part B standardized allowed amount after qualifying stay:			
Outpatient therapy	193	232	-$121
Imaging and lab	193	232	$56
Procedures	193	232	$56
E&M	193	232	$174
All other non-institutional	193	232	$121*
All other institutional	193	232	$102

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

4. Quality outcomes, including quality-related utilization measures

This section describes claims-based quality of care measures for the Model 3 SNF BPCI providers and comparison SNF providers among the SNF initiated Model 3 episodes in the surgical orthopedic excluding spine clinical episode group. Quality of care measures include readmission rates (30 days post-SNF discharge), emergency department (ED) use without hospitalization (30 days post-SNF discharge), and mortality rate within 90 days of the episode start date. See Section III.A.5 for detailed outcome definitions.

a. All-cause mortality - Surgical orthopedic excluding spine

Mortality rates within 90 days of the episode start date were low among patients in the surgical orthopedic excluding spine clinical episode group treated by SNF BPCI providers during the baseline and intervention periods. The change in risk adjusted mortality rate was not significantly different between the BPCI patients and comparison group patients.

b. Unplanned readmissions - Surgical orthopedic excluding spine

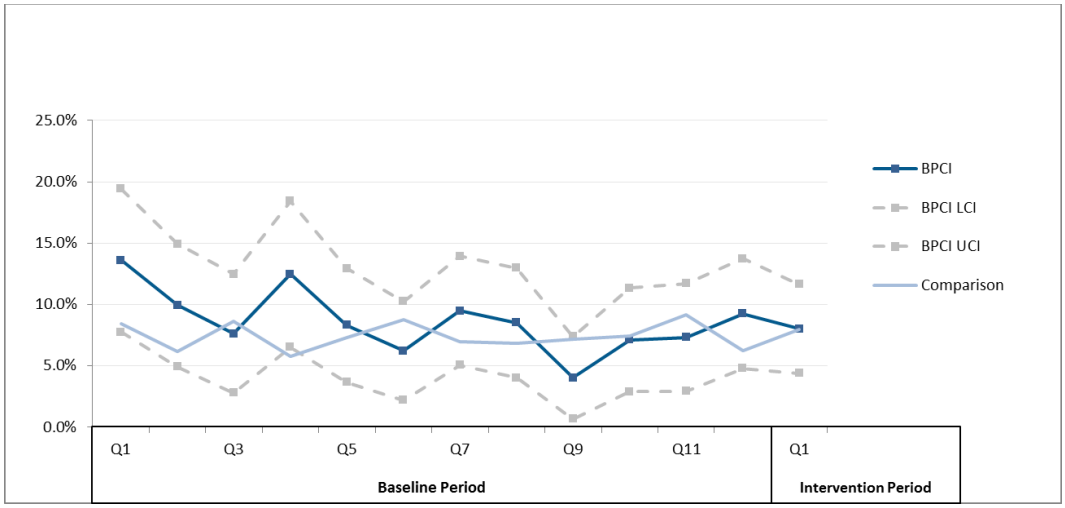
Exhibits 114 and 115 present the unadjusted and risk-adjusted trends for 30-day unplanned readmissions among BPCI patients relative to comparison group patients for SNF-initiated episodes in the surgical orthopedic excluding spine clinical episode group. The risk-adjusted unplanned readmission rate was higher for BPCI patients than comparison group patients during the first eight quarters of the baseline period (9.5% vs. 7.4%). In the intervention period, the risk-adjusted readmission rate was 8.0% for both BPCI and comparison group patients.

Exhibit 114: Trends: 30-day Unplanned Readmission Rate, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine* Episodes, Unadjusted and Risk-Adjusted

Statistic	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
N	1,053	580	194	2,029	892	227
Unadjusted	9.2%	7.0%	9.8%	11.3%	11.9%	13.6%
Risk adjusted	9.5%	6.9%	8.0%	7.4%	7.5%	8.0%

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 115: Trends: 30-day Unplanned Readmission Rate, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine* Episodes, Risk-Adjusted



Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 116 presents the DiD estimate for the unadjusted and risk-adjusted unplanned readmission rates for SNF-initiated episodes in the surgical orthopedic excluding spine clinical episode group. From the baseline to the intervention period, the risk-adjusted readmission rate 30 days post-SNF discharge declined 1.7 percentage points more for BPCI patients relative to the comparison group patients. However, this decrease was not statistically significant.

Exhibit 116: DiD: Unplanned Readmission Rate, post discharge period, Q4 2013 relative to baseline (Q4 2010 through Q3 2013), Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine*

Unplanned readmission rate	BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
30-day post-SNF discharge	194	227	-0.73%	-1.7%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

c. Emergency department use without hospitalization - Surgical orthopedic excluding spine

Exhibit 117 presents the unadjusted and risk-adjusted trends for ED use without hospitalization during the 30-day post discharge period for BPCI patients relative to comparison group patients for SNF-initiated episodes in the surgical orthopedic excluding spine clinical episode group. The proportion of BPCI patients with an ED visit not resulting in a hospitalization increased between the baseline to intervention period for both groups of patients.

Exhibit 117: Trends: Unadjusted and Risk-Adjusted Emergency Department Use Rate, 30 day Post-SNF discharge Period, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine* Episodes

Post-discharge Period	Statistic	BPCI		Comparison Group	
		Baseline Period (Q4 2010 – Q3 2013)	Intervention Period (Q4 2013)	Baseline Period (Q4 2010 – Q3 2013)	Intervention Period (Q4 2013)
ED Use, 30-day post-SNF discharge	N	1,635	194	2,926	227
	Unadjusted	6.2%	8.8%	5.8%	6.6%
	Risk adjusted	6.5%	9.5%	5.5%	7.1%

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

Exhibit 118 presents unadjusted and risk-adjusted DiD results for ED use among BPCI patients relative to comparison group patients with surgical orthopedic excluding spine episodes. The risk-adjusted emergency department use increased 1.3 percentage points more for BPCI patients relative to the comparison group patients. However, this increase was not statistically significant.

Exhibit 118: DiD: Risk-Adjusted Emergency Department Use, Intervention Period (Q4 2013) Relative to Baseline (Q4 2010 through Q3 2013), 30 day Post-qualifying stay discharge Period, Model 3 SNF Initiated *Surgical Orthopedic Excluding Spine* Episodes

Post-discharge period	BPCI SNF Episodes Q4 2013 (N)	Comparison SNF Episodes Q4 2013 (N)	Unadjusted DiD	Risk-adjusted DiD
30-day PDP	194	227	1.7%	1.3%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

5. Other unintended consequences

Unintended consequences of BPCI could include providers reducing their costs or increasing their Medicare payments through patient shifting, up-coding, cherry-picking, or lemon-dropping instead of care redesign to improve efficiency and quality. We examined various measures for indications of these unintended consequences, but results could also indicate other phenomena such as attracting more patients due to the popularity of a successful program.

Potential unintended consequences were examined at the provider-clinical episode level by examining changes in patient mix for each setting. Results are unadjusted and should be

interpreted with caution. In this section, results are presented for major joint replacement of lower extremity clinical episodes for SNF-initiated episodes in Model 3which had sufficient sample size in Q4 2013 for analysis.

If providers were selecting less severe patients who require fewer resources to treat, we would expect to see changes in the post-acute care case-mix measures for the BPCI patients, but not for the comparison patients. BPCI patients using PAC would be in lower intensity case-mix groups, fewer BPCI patients would need PAC because the patients were less severe in the anchor stay, fewer BPCI patients would need the most intensive PAC, or some combination of these changes.

See **Appendix D** for results across the four clinical episode groups with episodes in Q4 2013 and Section III.A.5 for detailed outcome definitions.

Exhibit 119: Change in Average Case Weights for Qualifying Inpatient Stay preceding SNF Stay and Average Case Weights of Resource Use Groups IV, Model 3 SNF Initiated *Major Joint Replacement of the Lower Extremity* Episodes, Q4 2013

Measure	BPCI Episodes Q4 2013 (N)	Comparison Episodes Q4 2013 (N)	BPCI Q4 2010-Q3 2013 Average	BPCI Q4 2013 Average	Comparison Q4 2010-Q3 2013 Average	Comparison Q4 2013 Average	DiD
Anchor admission MS-DRG case weight	158	356	2.19	2.20	2.19	2.24	-0.03
SNF Resource Use Groups IV average case weight	158	356	1.31	1.15	1.44	1.26	0.02

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

VI. Model 4 Results

This section presents a summary of Model 4 results, organized by research question, based on quantitative analyses of the one Model 4 BPCI participant in Q4 2013 and qualitative analyses of Model 4 BPCI participants in Q4 2013 and Q1 2014. The claims-based outcomes are not risk-adjusted in this report due to insufficient sample size. The qualitative data were collected from three unique Model 4 Awardees through three quarterly Awardee interviews and one episode initiator case study. The quantitative results summarized in this section, as well as additional results, are located in **Appendix E**: Model 4 PMRC Q4 2013 Report.

A. Characteristics of the Program and Participants

1. Participants

There was one Model 4 Awardee in Phase II of the BPCI initiative in Q4 2013. As shown in Exhibit 120, it was a non-episode initiating AC with one EI, which was the only active EI in the quarter. In Q1 2014 there were 13 Awardees (with 20 EIs) in Model 4. This includes nine Single Awardees and four ACs. As noted in the introduction, this report primarily discusses the characteristics of the participants that joined the initiative in Q4 2013. Participants that joined the initiative after Q4 2013 will be discussed in greater detail in subsequent annual reports.

Exhibit 120: Model 4 Participants by BPCI Role, Q4 2013 and Q1 2014

BPCI Role	Q4 2013 (N)	Q1 2014 (N)
Single Awardee	**0**	**9**
Awardee Convener	**1**	**4**
Episode Initiating Bundled Payments Provider Org.	1	11
Facilitator Convener	**0**	**0**
Designated Awardee	0	0
Designated Awardee Convener	0	0
Episode Initiating Bundled Payments Provider Org.	0	0
Total number of Episode Initiators	**1**	**20**
Hospitals	1	20

Source: Lewin analysis of Salesforce data for all Awardees participating in the BPCI initiative during Q4 2013 and Q1 2014.

As displayed in Exhibit 121, hospitals participating in Model 4 of BPCI in Q4 2013 and Q1 2014 were more like to be located in an urban area than non-participants. The Q4 2013 Model 4 EI and all of the Q1 2014 Model 4 EIs were located in urban areas, compared with 71% of non-participants. Participating hospitals were also more likely to be located in the West than non-participants. The sole Q4 2013 EI was located in the South, but the majority (60%) of the Q1 2014 EIs was located in the West. In comparison, 18% of non-participants were located in the West.

Participating hospitals were similar to non-participants in terms of ownership. While the only Q4 2013 EI was a for-profit entity, the majority (65%) of Q1 2014 participating hospitals were non-profit hospitals, as were 60% of non-participants. Participating hospitals were also more likely to be large in size than non-participants. The Q4 2013 participant and 70% of the Q1 2014 participants had more than 250 beds, compared with 25% of non-participants. Participating

hospitals had a higher average occupancy rate (51% in Q4 2013 and 62% in Q1 2014) than non-participating hospitals (49%) and a lower average percent of inpatient days attributable to Medicare patients (37% in Q4 2013 and 29% in Q1 2014 vs. 41%).

Exhibit 121: Characteristics of Model 4 Hospital Episode Initiators relative to Non-BPCI Hospitals, Q4 2013 and Q1 2014

	Q4 2013 BPCI Initiating Hospital (N=1)		BPCI Q1 2014 Initiating Hospitals (N=20)		Non-BPCI Hospitals (N=3,000)	
Variables	**N**	**%**	**N**	**%**	**N**	**%**
Ownership						
For Profit	1	100%	6	30%	662	22%
Government	0	0%	1	5%	547	18%
Non-Profit	0	0%	13	65%	1,791	60%
Urban/Rural						
Rural	0	0%	0	0%	865	29%
Urban	1	100%	20	100%	2,135	71%
Region						
Midwest	0	0%	4	20%	722	24%
Northeast	0	0%	2	10%	462	15%
South	1	100%	2	10%	1,268	42%
West	0	0%	12	60%	548	18%
Bed Count						
0 - 99	0	0%	0	0%	1,122	37%
100-249	0	0%	6	30%	1,130	38%
250+	1	100%	14	70%	748	25%
Occupancy Rate						
Mean	51%	--	62%	--	49%	--
Percent Medicare Days						
Mean	37%	--	29%	--	41%	--

Source: Lewin analysis of 2013 Provider of Service (POS) files and 2013 Medicare claims. Non-Participant hospitals are all hospitals other than the BPCI EIs in Q4 2013.

During the quarterly Awardee interviews and EI case studies we asked about reasons for participating in BPCI. Responses fell into one of four categories: (1) financial opportunities, (2) quality improvement, (3) leadership and innovation, and (4) participation in other initiatives. Exhibit 122 displays the portion of Awardees that shared specific reasons for entry.

Exhibit 122: Awardee rationale for joining the BPCI initiative, Q4 2013 – Q1 2014

Reasons for Participation	Number of Awardees Interviewed (N=3)*
Saw potential financial opportunities	3
Ability to align incentives through gainsharing	2
Opportunity to improve quality of care	2
Provider engagement	2

Source: Lewin interviews with Model 4 Awardees participating in BPCI in Q4 2013 or Q1 2014, conducted from March through June 2014.

*Note: Awardees could cite multiple reasons, so the numbers in this column do not sum to 3.

a. Financial opportunities

The three Model 4 Awardees that participated in a quarterly interview said that they joined the initiative because they saw potential financial opportunities and identified areas to lower costs, such as reducing length of stay or implant costs. Two Awardees said that the ability to align incentives through gainsharing made participating in the initiative attractive. One of these Awardees elaborated, noting that the opportunity to align incentives through gainsharing is particularly appealing because the Awardee's state essentially prohibits hospitals from employing physicians.

> *"Oh, absolutely the opportunity to participate in, in my bazillion years in healthcare, what may be the very first opportunity to participate in a program that actually aligned incentives." – Model 4 Awardee*

b. Quality improvement

Two Awardees said they joined the initiative because they saw BPCI as an opportunity to improve the quality of care, and added that they could do so in a "cost-effective manner."

c. Leadership and innovation

Awardees also attributed the decision to enter to a commitment to innovation at both the executive and physician levels. Two Awardees noted that physicians were engaged in the decision to participate. One of these Awardees said that they also viewed the initiative as an opportunity to re-engage other providers. A case study with a Model 4 hospital also confirmed the importance of provider engagement. That EI largely attributed the successful implementation of the BPCI initiative to a physician champion within the organization, and indicated that other physicians bought into the program once the lead physician appeared receptive to change.

> *"at [my hospital] they, the system really is very innovative and looking for new, innovative ways for delivery of healthcare services […] We just felt that the bundled payments project specifically was a natural fit" – Model 4 Awardee*

d. Other initiatives

None of the Model 4 Awardees on the quarterly interviews are participating in other initiatives like ACOs, medical homes, or commercial bundles.

2. Market characteristics

The Model 2 result section above includes a comparison of the BPCI markets to Non-BPCI markets based on the Model 2 and 4 BPCI participants. See Section IV.A.A2 for a summary of the results.

3. Model incentive structure characteristics

a. Model 4 - Model and episode selection

According to the three Model 4 Awardees we interviewed, the decisions about Model and episodes were made primarily by the hospitals' administrative leadership, with guidance from their physician leaders. (Model 4 only allows 30-day episodes.)Two of the Awardees interviewed selected Model 4 because it was the least risky option for their organization. One noted that they were apprehensive about needing to rely on PAC partners (had they chosen Model 2). Their intention was to begin with Model 4, build relationships with PACs, and then transition to Model 2 at a later time. The third Awardee specifically selected Model 4 because it allows for prospective payments, which they are using to set a financial target for a given episode and then manage care toward that goal.

As to episode selection, the Model 4 Awardees we interviewed indicated similar rationales in their decision-making process (although they each selected different clinical episodes). All three Awardees selected episodes based on the opportunity to improve quality and reduce costs. Another factor noted by all three Awardees was the presence of highly engaged physician champions who support the implementation of BPCI for these episodes. Two of the Awardees selected episodes that are part of key service lines in their organization. The one Model 4 Awardee that began BPCI in Q4 2013 initiated the lower joint replacement episode. By Q1 2014, 14 Model 4 Awardees participated in this episode and three other episodes in that clinical episode group. Awardees also participated in three additional clinical episode groups as well. The count of EIs participating in each of the 48 clinical episodes during Q4 2013 and Q1 2014 is shown in Exhibit 123.

> *"Much of the advantage we saw…is that we did have that direct line to the primary surgeon who is participating in bundled payment."*
> *– Model 4 Awardee*

Exhibit 123: Number of Episode Initiators that participated in a given clinical episode in Model 4, Q4 2013 and Q1 2014

Clinical Episode	Q4 2013 Episode Initiators (N=1)		Q1 2014 Episode Initiators (N=20)	
	N	%	N	%
Non-surgical and surgical: GI				
Esophagitis, gastroenteritis and other digestive disorders	0	0%	0	0%
Gastrointestinal hemorrhage	0	0%	0	0%
Gastrointestinal obstruction	0	0%	0	0%
Major bowel procedure	0	0%	0	0%
Total	**0**	**0%**	**0**	**0%**
Non-surgical: Cardiovascular				
Acute myocardial infarction	0	0%	0	0%
Atherosclerosis	0	0%	0	0%
Cardiac arrhythmia	0	0%	0	0%

Clinical Episode	Q4 2013 Episode Initiators (N=1)		Q1 2014 Episode Initiators (N=20)	
	N	%	N	%
Chest pain	0	0%	0	0%
Congestive heart failure	0	0%	1	5%
Medical peripheral vascular disorders	0	0%	0	0%
Syncope & collapse	0	0%	0	0%
Total	**0**	**0%**	**1**	**5%**
Non-surgical: Neurovascular				
Stroke	0	0%	0	0%
Transient ischemia	0	0%	0	0%
Total	**0**	**0%**	**0**	**0%**
Non-surgical: Orthopedic				
Fractures of the femur and hip or pelvis	0	0%	0	0%
Medical non-infectious orthopedic	0	0%	0	0%
Total	**0**	**0%**	**0**	**0%**
Non-surgical: Other medical				
Cellulitis	0	0%	0	0%
Diabetes	0	0%	0	0%
Nutritional and metabolic disorders	0	0%	0	0%
Red blood cell disorders	0	0%	0	0%
Renal failure	0	0%	0	0%
Sepsis	0	0%	0	0%
Urinary tract infection	0	0%	0	0%
Total	**0**	**0%**	**0**	**0%**
Non-surgical: Respiratory				
Chronic obstructive pulmonary disease, bronchitis, asthma	0	0%	0	0%
Other respiratory	0	0%	0	0%
Simple pneumonia and respiratory infections	0	0%	0	0%
Total	**0**	**0%**	**0**	**0%**
Surgical: Cardiovascular				
AICD generator or lead	0	0%	1	5%
Cardiac defibrillator	0	0%	7	35%
Cardiac valve	0	0%	6	30%
Coronary artery bypass graft	0	0%	9	45%
Major cardiovascular procedure	0	0%	0	0%
Other vascular surgery	0	0%	0	0%
Pacemaker	0	0%	7	35%
Pacemaker device replacement or revision	0	0%	6	30%
Percutaneous coronary intervention	0	0%	7	35%
Total	**0**	**0%**	**10**	**50%**

Clinical Episode	Q4 2013 Episode Initiators (N=1)		Q1 2014 Episode Initiators (N=20)	
	N	%	N	%
Surgical: Orthopedic excluding spine				
Amputation	0	0%	0	0%
Double joint replacement of the lower extremity	0	0%	9	45%
Hip & femur procedures except major joint	0	0%	0	0%
Lower extremity and humerus procedure except hip, foot, femur	0	0%	0	0%
Major joint replacement of the lower extremity	1	100%	14	70%
Major joint replacement of the upper extremity	0	0%	0	0%
Other knee procedures	0	0%	1	5%
Removal of orthopedic devices	0	0%	0	0%
Revision of the hip or knee	0	0%	3	15%
Total	**1**	100%	**14**	**70%**
Surgical: Spinal				
Back & neck except spinal fusion	0	0%	4	20%
Cervical spinal fusion	0	0%	4	20%
Combined anterior posterior spinal fusion	0	0%	2	10%
Complex non-cervical spinal fusion	0	0%	2	0%
Spinal fusion (non-cervical)	0	0%	4	20%
Total	**0**	**0%**	**4**	**20%**

Source: February, 2014 BPCI Master list of Episodes from CMS.

b. Partners

During quarterly interviews, Model 4 Awardees reported partnering informally with PAC providers as part of their efforts under the BPCI program. All three Model 4 Awardees that we interviewed and the EI interviewed during the case study reported identifying commonly used PAC providers and evaluating their quality. Several Awardees noted that they were doing so partly in preparation for possible expansion into Model 2.

Two Awardees reported having a partner organization complete data analysis at the time of entry into the initiative to help with decision-making or program design. The EI in our case study also noted the importance to their approach of its contract with a third-party administrator to oversee gainsharing, data, and overall program management. Awardees also described partnering with physicians as champions of the BPCI initiative, gainsharing partners, and collaborators in program decision-making.

Awardees described several benefits of partnerships, such as improved patient recovery and patient tracking, coordination of efforts and accountability under BPCI, and alignment of incentives with physicians. There were also challenges associated with partnerships, including coordination with individual physicians located across the region.

c. Waiver use

Based on a review of Awardee IPs, all EIs in Q4 2013 and Q1 2014 intend to participate in gainsharing. None of the EIs are offering beneficiary incentives. One Model 4 Awardee plans to

participate in the three-day qualifying stay for SNF coverage waiver.[51] For the Q4 2013 and Q1 2014 Awardees, if the Awardee was participating in a waiver, all EIs participated as well. 2013 is gainsharing. (See Exhibit 124.)

Exhibit 124: Number of Model 4 EIs participating in BPCI initiative waivers, Q4 2013 and Q1 2014

Model 4 initiator waiver selection	Number of Q4 2013 EIs (N=1)	Number of Q1 2014 EIs (N=20)[a]
Beneficiary Incentives	0	0
Gainsharing	1	20

[a] The 20 EIs in Q1 2014 are distributed among 13 Awardees.

Source: Lewin analysis of Awardee Implementation Protocols for the Awardee active in the BPCI initiative in Q4 2013.

Gainsharing

> *"[Gainsharing is] going to help facilitate deeper communication between all the providers."*
> *– Model 4 Awardee*

Based on a review of the Awardee IPs, all Q4 2013 and Q1 2014 EIs indicate an intention to participate in gainsharing. The Model 4 Q4 2013 participant is gainsharing with physicians. According to two Q1 2014 Awardees we interviewed, gainsharing is a financial opportunity that will align incentives and foster engagement among providers. The results of the three Model 4 quarterly interviews as related to gainsharing are summarized in Exhibit 125.

Exhibit 125: Rationale behind gainsharing decisions, Q4 2013 to Q1 2014

Considerations in gainsharing participation	Number of Quarterly Awardee Interviews (N=3)
Gainsharing (Reasons cited):	3
Financial opportunity	3
Incentive alignment	3
Provider engagement	3

Source: Lewin interviews with Model 4 Awardees participating in BPCI in Q4 2013 or Q1 2014, conducted from March through June 2014.

*Note: Awardees often cited multiple reasons for their decisions, so the numbers in this column do not sum to three.

> *"If you didn't have a [third party administrator], this would be very, very arduous, very difficult to monitor for a hospital because we're not used to being the payer."*
> *- Model 4 Awardee*

Model 4 Awardees that participate in gainsharing have fewer savings pool options than Awardees in Models 2 and 3 because their payments are prospective. For example, Model 4 Awardees are limited to savings pool Options 1 and 2, which are simpler in structure. Further, since they are paid prospectively, they do not receive any NPRA and thus may only gainshare realized internal cost savings. Nevertheless, like Awardees in Models 2 and 3, Model 4 Awardees may choose to

[51] For a description of the waivers, see Section A.I BPCI Initiative.

gainshare with individual physicians or with organizations and determine when and how savings are calculated and distributed.

The Q4 2013 Awardee has selected Option 1 for its BPCI savings pool. This participant reported that it realized Internal Cost Savings in Q4 2013. Per its IP, the Awardee calculates ICS on a monthly basis. After adjusting for readmission-related expenses, half of the ICS will be contributed to the savings pool for gainsharing. Incentive Payments will also be made on a monthly basis, but with a 45-60 day lag period. No gainsharing payments were made during the period of time examined in this report.

4. Care redesign and cost saving strategy characteristics

All of the Q4 2013 and Q1 2014 Model 4 EIs have undertaken care redesign in each of the five major categories: redesign of care pathways; enhancements in care delivery; patient activation, engagement, and risk management; care coordination, and system changes to support care.

Some of the care redesign interventions were already in place prior to entering BPCI and other care redesign activities are new interventions. Some Awardees began developing and initiating new interventions prior to Phase II with the plan to further develop it throughout the initiative and other initiatives began with the start of Phase II. New interventions include: discharge destination planning; formalizing and continually refining care pathways; and onboarding new care managers, case managers, or patient navigators.

"[Providers] are much more efficient. People are held accountable. And it's just so much easier. It's a more creative environment."

The case study of the Awardee active in Q4 2013 Awardee participated in the ACE demonstration and gained experience and had relative success with bundling payments for joint replacements. This success and experience influenced the Awardee's decision to participate in BPCI. This Awardee spoke of several successful endeavors, most notably the use of transitional case managers to reduce readmissions. Generally speaking, the Awardee found that care redesign fostered coordination among physicians and inpatient hospital groups, who no longer viewed their interventions in isolation. The Awardee also noted that as their orthopedics practice becomes more efficient, the behavior changes inspired by the BPCI initiative have a spillover effect on other lines of service.

This Awardee is entirely responsible for financing the aforementioned care redesign initiatives. As such, their plan is to recover their administrative costs (50% of internal cost savings) prior to distributing incentive payments from the BPCI savings pool.

As revealed in our quarterly interview, the Awardee found that an "impartial" third party administrator would dispel suspicions of "impropriety" in gainsharing calculations. In terms of costs, the EI remarked that although the third-party administrator presented an added cost, this partnership has been instrumental in their success.

The other two quarterly interviews indicated that these Awardees also enlisted the help of external administrators. Both Awardees spoke to the instrumental role that the third-party administrator serves in ensuring the integrity of gainsharing calculations and facilitating data management.

5. Patient population characteristics

Patients cared for by BPCI participants in Q4 2013 differ from other Medicare beneficiaries who were admitted for the same type of procedure, but did not receive care from a BPCI participant. Exhibit 126 compares Model 4 BPCI patients to all Medicare beneficiaries who had an inpatient admission for major joint replacement of the lower extremity, the only clinical episode active in Q4 2013. For patients with a major joint replacement of the lower extremity, the populations differ slightly in terms of age and gender composition, with BPCI patients more likely to be younger and female. The BPCI population has a higher proportion of patients aged 65-79 (76.6% vs. 67.8%), and a smaller proportion of patients in the 80+ age group (13.8% vs. 23.0%). The populations have comparable proportions of patients who are disabled. The most notable difference between the two populations is the proportion of patients who are eligible for Medicaid. Among the Model 4 BPCI patients, 40% are eligible for Medicaid, compared to 11% of all Medicare beneficiaries who had an inpatient admission within the same clinical episode. The high proportion of patients eligible for Medicaid is not surprising as the Model 4 provider described themselves as a safety net provider during their site visit.

Exhibit 126: Characteristics of Model 4 BPCI Patients and All Medicare Beneficiaries with an Inpatient Admission in the Same Clinical Episode[52] for which Model 4 Beneficiaries were Admitted, Q4 2013

Characteristics	Model 4 BPCI Patients (N=94)		All Medicare Beneficiaries with same MS-DRG admission (N=125,523)	
	N	%	N	%
Age				
20-64	9	9.6%	11,610	9.3%
65-79	72	76.6%	85,069	67.8%
80+	13	13.8%	28,843	23.0%
Gender				
Female	72	76.6%	77,737	61.9%
Male	22	23.4%	47,786	38.1%
Percent Eligible for Medicaid	38	40.4%	13,750	11.0%
Percent Disability, no ESRD	11	11.7%	14,077	11.2%

Source: Lewin analysis of 2013 Medicare claims.

B. Impact of BPCI

This section compares the characteristics of Model 4 BPCI patients with those of patients treated by comparison group providers and then describes health care utilization, payments, quality of care, and indicators of potential unintended consequences. It is important to keep in mind that there was only one Model 4 BPCI participant. The Model 4 participant had 94 patients in the major joint replacement of the lower extremity episode in Q4 2013. We could not risk adjust the outcomes. Additionally, this Awardee participated in the ACE demonstration between June 2009 and May 2012 and gained experience with bundled payments for joint replacements and cardiovascular

[52] Major joint replacement of the lower extremity was the only active episode in Q42103.

procedures. Therefore, the majority of their baseline period (Oct 2010 through Sept 2013) for the analysis presented in this section was when they were participating in ACE. See **Appendix E**: Model 4 PM/RC Report for the full results.

1. *Characteristics of Model 4 BPCI Patients Compared with Patients treated by Comparison Group Providers*

Exhibit 127 compares characteristics and prior health care utilization across Model 4 BPCI patients and comparison group patients during Q4 2013. As mentioned in Section VI.A.5 above, the Model 4 BPCI participant indicated that the hospital was a safety net provider. Therefore, it is not surprising that the most notable difference between BPCI and comparison group patients is that a higher proportion of Model 4 BPCI patients were eligible for Medicaid (40% vs. 18%).A larger share of the BPCI patients are in the younger age categories, a higher proportion are female, and they are healthier, as indicated by a lower average HCC index than the comparison group patients. In future quarters, when sample size permits, our risk-adjusted models will control for these characteristics to account for differences between the BPCI and comparison group patients.

Exhibit 127: Characteristics of Model 4 BPCI Patients and Comparison Group Patients, *Major Joint Replacement of the Lower Extremity*, Q4 2013

Characteristics	Model 4 BPCI Patients (N=94)		Model 4 Comparison Group Patients (N=994)	
	N	%	N	%
Age				
20-64	9	9.6%	91	9.2%
65-79	72	76.6%	627	63.1%
80+	13	13.8%	276	27.8%
Gender				
Female	72	76.6%	680	68.4%
Male	22	23.4%	314	31.6%
Eligible for Medicaid	38	40.4%	176	17.7%
Disabled, no ESRD	11	11.7%	105	10.6%
Inpatient hospitalization in the six months prior to anchor hospitalization	15	16.0%	143	14.4%
No institutional use in the six months prior to anchor hospitalization	79	84.0%	837	84.2%
	Mean	SD	Mean	SD
Average HCC index	0.495	0.412	0.766	0.735
Average number of ED visits in the six months prior to anchor hospitalization	0.14	0.48	0.28	0.83
Average number of inpatient hospitalizations in the six months prior to anchor hospitalization	0.17	0.41	0.19	0.52

Source: Lewin analysis of 2013 Medicare claims.

2. Utilization

This section describes claims-based utilization measures for the one Model 4 BPCI participant and 33 comparison providers. These measures are average hospital LOS, number of days during the 90 days post-hospitalization in various PAC settings, and use of PAC following the anchor hospitalization. See Section III.A.5 for detailed outcome definitions.

During the baseline period, the hospital LOS for BPCI patients was 5.5 days, compared with 5.4 days for patients of the comparison group. During the intervention quarter, unadjusted LOS declined to 4.3 days for BPCI patients with a major joint replacement of the lower extremity compared with 5.2 days for patients of the comparison providers. Average institutional number of days, which includes days in hospital readmissions and institutional PAC stays during the 90-day post-anchor hospitalization period, was lower for BPCI patients than comparison group patients during the baseline period (22.4 days vs. 25.9 days) and intervention period (18.1 days vs. 26.1 days).

The proportion of BPCI patients discharged to, SNF, HHA, IRF, LTCH or home (without HHA services) following the anchor hospitalization for major joint replacement of a lower extremity varied across the baseline and intervention quarters. The BPCI provider discharged a higher proportion of its patients with a major joint replacement of a lower extremity to PAC than did the comparison group.

Exhibit 128: Unadjusted Distribution of Patients by Discharge Setting Following Anchor Hospitalization for Model 4 BPCI Patients and Model 4 Comparison Group Patients, *Major Joint Replacement of the Lower Extremity*, Q4 2013

PAC setting	BPCI			Comparison		
	Baseline Period		Intervention Period	Baseline Period		Intervention Period
	Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
SNF	29.6%	28.3%	31.0%	38.6%	42.4%	41.4%
HHA	48.3%	37.1%	28.7%	34.3%	31.5%	31.4%
LTCH	0.4%	0%	0%	0.5%	0.5%	0.6%
IRF	19.9%	31.2%	40.2%	18.3%	16.7%	13.9%
Home without HH	1.9%	3.4%	0%	8.3%	8.9%	12.7%
Total (N)	458	226	87	8,331	3,882	945

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

3. Payment

This section describes unadjusted Medicare standardized allowed payment amounts for Model 4 major joint replacement of the lower extremity episodes. By definition, the bundle includes Part A and B services occurring during the initial hospital stay and Part A and B services occurring during non-excluded hospital readmissions during the 30-day episode period. Part A and B services not occurring during a hospitalization, such as for a SNF or HHA PAC provider, are not included in the bundle. This analysis separately reports aggregated Part A payments included in the bundle definition, Part B payments during the anchor stay (but not for included readmissions), Part A payments not included in the bundle during the 30 day period, and Part A payments for

readmissions that are excluded from the bundle. We also examined Part A payments by service category during the 90-day post-discharge period and Part B payments by service category during the 90-day post-discharge period. These results are shown in **Appendix E.**

Exhibit 129 displays unadjusted Medicare standardized allowed amounts for services included and not included in the bundle definition for BPCI and comparison group patients. None of the results were significantly different between BPCI and comparison group patients. Although not significantly different, there was a potentially interesting observation in unadjusted other Part A payments not included in the bundle definition. For BPCI patients there was an increase between the baseline and the period of performance (increase from $9,995 vs. $10,794) while the comparison group patients experienced a decline in these expenses during this same period (decline from $9,818 vs. $8,974). These results are shown in **Appendix E.**

Exhibit 129: Trends: Unadjusted Average Total Medicare Standardized Allowed Amount ($2014) included and not included in the Bundle Definition, *Major Joint Replacement of the Lower Extremity* episodes, Model 4

Measure	Statistic	BPCI			Comparison		
		Baseline Period		Intervention Period	Baseline Period		Intervention Period
		Q1-8	Q9-12	Q1	Q1-8	Q9-12	Q1
Part A amount included in bundle definition	N	450	223	83	8,321	3,865	900
	Unadjusted	$13,470	$13,361	$13,161	$13,850	$13,536	$13,081
Part B included in anchor stay	N	457	223	83	8,323	3,866	900
	Unadjusted	$2,275	$2,368	$2,264	$2,526	$2,510	$2,428
Part A readmissions excluded from bundle definition	N	450	223	83	8,343	3,868	900
	Unadjusted	$2,275	$2,368	$2,264	$2,526	$2,510	$2,428
Other Part A not included in bundle definition	N	450	223	83	8,323	3,866	900
	Unadjusted	$9,974	$10,037	$10,794	$9,908	$9,636	$8,974

The unadjusted average Part A standardized allowed amount for the inpatient anchor stay and by setting during the 90-day post discharge period[53] and the average Part B standardized allowed amounts by service category[54]were volatile across time for the one BPCI provider, probably because of the small number of episodes (see **Appendix E** for complete results). With that in mind, there were two outcomes that increased significantly for the BPCI provider from baseline to intervention period relative to the comparison group. The average Part A amount for IRFs increased $2,905 more from the baseline period to the intervention period for the BPCI patients than for comparison patients. However, given the relatively few patients with IRF care, this could be due to just one or two more patients receiving IRF care post discharge. The average Part B

[53] This includes payments during the post-discharge period for readmissions, SNFs, IRFs, LTCHs, HHAs, and hospice.

[54] The service categories are outpatient therapy, imaging and lab, procedures, E&M, all other non-institutional, and all other institutional.

amount for procedures during the 90-day post-discharge period increased $196 more from the baseline period to the intervention period for the BPCI patients than for comparison patients.

4. Quality outcomes, including quality-related utilization measures

This section describes claims-based quality of care measures for episodes initiated in Q4 2013 for the one Model 4 BPCI participant and 33 comparison providers. For the purposes of this analysis, quality of care measures include readmission rates (30, 60, and 90 days post-discharge from the anchor hospitalization), ED use without hospitalization, and mortality rates (inpatient and 30 days post-discharge). See Section III.A.5 for detailed outcome definitions.

The 30-day unplanned readmission rate was not significantly different between patients of the BPCI participant and patients treated by the comparison group during any quarter of the baseline period or the intervention period. Exhibit 130 presents the DiD estimates for the unadjusted readmission rates.

Exhibit 130: DiD: 30 day Unadjusted, Unplanned Readmission Rate, Intervention Period (Q4 2013) Relative to Baseline (Q4 2010 through Q3 2013), *Major Joint Replacement of the Lower Extremity* episodes *with* PAC use, Model 4

Unplanned, readmission rate	BPCI Episodes Q4 2013(N)	Comparison Episodes Q4 2013(N)	DiD	Confidence Interval	
				LL	UL
30-day readmission rate	87	945	-1.9%	-8.2%	4.5%

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 standardized Medicare payment outcomes and enrollment data for BPCI participants and comparison group.

During the majority of the baseline and intervention quarters, the rate of ED use without hospitalization following the anchor stay was statistically significantly lower for BPCI patients relative to comparison group patients. This trend was observed across the 30-, 60-, and 90-day post-discharge periods. Though ED use declined for both BPCI and comparison group patients from baseline to intervention for each measurement period, the decrease was more pronounced among BPCI patients. For example, the average rate of ED use without hospitalization during the 30 days post-discharge was 4.3% for BPCI patients compared to 7.7% for comparison group patients during baseline and 1.1% vs. 7.2% during the intervention period. However, these relative declines in ED use were not statistically significantly different between the BPCI patients and the comparison group patients.

On average, the mortality rates were similar among BPCI and comparison group patients during the baseline and intervention periods. DiD estimates were not statistically significant for the change in inpatient and 30-day post-discharge mortality rates for the BPCI provider relative to the comparison group.

5. Other unintended consequences

This section describes measures of patient mix that could indicate unintended consequences such as patient shifting, up-coding, cherry-picking, or lemon-dropping. The measures included here

may be indicators of unintended consequences, but results could also indicate other phenomena such as attracting more patients due to the popularity of a successful program. Results are calculated at the clinical episode level, unadjusted, and should be interpreted with caution

In Q4 2013, the Model 4 BPCI participant only participated in the major joint replacement of the lower extremity clinical episode. As shown in Exhibit 131, the change in the geometric mean of the anchor stay MS-DRG weights from baseline to intervention for the BPCI participant was not significant relative to the comparison group. Similarly, the rate of outpatient APCs and the proportion of MS-DRGs similar to major joint replacement of the lower extremity for the BPCI participant did not have a significant change from baseline to intervention relative to the comparison group. See Section III.A.5 for detailed outcome definitions.

Exhibit 131: Inpatient Case-Mix Index of Anchor Admissions for Model 4 Episodes, *Major Joint Replacement of the Lower Extremity*, Q4 2013

Clinical Episode	BPCI episodes Q4 2013 (N)	Comparison episodes Q4 2013 (N)	BPCI Q4 2010-Q3 2013 Average	BPCI Q4 2013 Average	Comparison Q4 2010-Q3 2013 Average	Comparison Q4 2013 Average	Diff-in-Diff
Major joint replacement of the lower extremity	94	994	2.14	2.17	2.17	2.21	-0.01

* Denotes statistical significance at the 5% level.

Source: Lewin analysis of Q4 2010 – Q4 2013 Medicare claims and enrollment data for BPCI participants and comparison group.

VII. Discussion

This Annual Report provides a summative evaluation of the BPCI initiative based on quantitative analyses of Phase 2 participants in the first quarter of the initiative (Q4 2013) and qualitative analyses of participants in the first and second (Q1 2014) quarters of the initiative. It includes data on the characteristics of the program and participants at baseline and how they changed during the initial months of the initiative and the preliminary impact of the BPCI initiative on the costs of episodes, the Medicare program, and the quality of care for Medicare beneficiaries.

Results are based on the 15 Awardees across the three Models that were active in the first quarter and their 98 unique combinations of active EIs and clinical episodes and the 93 Awardees that were active in the second quarter with 2,415 unique combinations of active EIs and clinical episodes. Because of the significant differences in provider incentives across the three Models and the range of patient needs across episode types, our analyses must account for Model and clinical episode, resulting in small sample sizes for many of the outcomes contained in this report. Further, participants have been under the initiative for a limited amount of time, which signals the need for caution in interpreting any results. BPCI is expected to grow significantly in the next year so that the profile of BPCI participants will be quite different. Consequently, the results in this Annual Report may not be indicative of the actual impact of BPCI. Drawing any conclusions about the initiative at this time is premature.

Even with strong caveats about small sample sizes and limited experience under BPCI, our preliminary results, taken together, show that BPCI appears to have affected provider performance.

Most participants and episodes were under Model 2 during the first two quarters of the initiative. The EIs were primarily hospitals that are larger, urban providers in areas with more affluent populations than the universe of Medicare-participating hospitals. This may indicate that they have more resources to engage in care redesign than other hospitals. They are also in markets with more hospital competitors, so bundled payments may be a way for them to stand out and gain market share.

Several Model 2 Awardees indicated during site visits or interviews that they had been preparing for bundled payments for some time. Participants examined utilization data, discussed strategies among their leaders and with potential provider partners, and hired consultants and specialized staff to perform critical roles such as data analytics in preparation for BPCI. Some Awardees said they hired care coordinators or managers to oversee process changes consistent with the incentives under BPCI. Many early BPCI entrants considered themselves leaders in health care delivery and wanted to be at the forefront of this new payment model. Nevertheless, they were cautious about the initiative, in that most first quarter entrants initiated only surgical orthopedic excluding spine episodes. These are predominantly hip or knee replacements, which are typically elective, scheduled surgeries performed on healthier patients. Awardees indicated that because these episodes are more predictable than other hospitalizations, they are more conducive to care redesign to reduce costs while maintaining or improving outcomes. Awardees expanded their range of episodes in the second quarter and have until October 2015 to move additional episodes from Phase 1 to Phase 2.

Episode initiators under Model 2 reported that they focused on services provided during the post-acute period to reduce costs and improve quality. They believed there were opportunities to control the use of PAC. They reached out to PAC providers to discuss expectations and ways to improve care and encouraged their patients to use higher quality PAC providers. Across all Model 2 episodes, the share of BPCI patients discharged to SNF was 5 percentage points lower in the first intervention quarter than in the baseline period and the share of BPCI patients discharged to home health care, which is typically a lower cost provider, increased.

There were also changes in the anchor hospitalization. The inpatient hospital LOS for BPCI patients declined relative to the LOS for comparison patients. In most instances, this would not affect total Medicare spending for the episode, although shorter LOS would probably reduce a hospital's internal costs; however, hospitals have always had the incentive to reduce their internal costs under the IPPS. For a subset of episodes, the Medicare allowed amount for the anchor hospitalization declined during the intervention period, probably because short stay transfers to PAC, which can result in lower hospital payments, increased substantially.

We saw changes in some claims-based quality measures. Within the first 30 days after discharge from the anchor hospitalization, readmissions declined 2.5 % more for BPCI participants than for the comparison providers. Readmissions rates were higher for BPCI providers during the baseline period, but declined more so that by the intervention quarter, BPCI rates were lower than the comparison group readmission rates. For surgical orthopedic excluding spine episodes, ED use for BPCI patients went up, which raises questions about quality of care, particularly in light of shorter anchor stays. We will examine changes in observation stays for indications that BPCI providers are treating patients who come to the ED on an outpatient basis, rather than readmitting them.

There is little to discuss about the Model 3 or Model 4 results. For Model 3, a small number of EIs participated across few episode types and the results must distinguish by provider type. We only present claims-based results for the seven SNF EIs; there was one HHA and one IRF EI in the first quarter. The SNF EIs are very different than the universe of Medicare-participating SNFs, in that they are non-profit and urban whereas almost 70% of SNFs are for-profit and one quarter are in rural areas. Further, they had considerably shorter lengths of PAC stays. There was only one hospital participating under Model 4 in the first intervention quarter, precluding any conclusions.

We will monitor quality measures and patient functional status, as well as patient satisfaction, for indications that this or any other changes in patterns of care affect quality or other outcomes. In the coming year, we will continue to monitor and assess shifts in post-acute care. With a larger sample and additional data, we can better determine if there are pertinent differences in the characteristics of patients discharged to home health versus SNF. We will also monitor whether the share of patients discharged home without home health care remains steady and consistent across BPCI and comparison patients, as it did through the first quarter of the initiative. The patient survey will also be an important source of information about quality of care outcomes across the sites and patient perceptions of their care.

Reaching conclusions about the impact of BPCI will involve careful analysis of multiple sources of data, including functional status information, patient survey data, and primary data received from the Awardees, which were not available for this report, as well as the experience of more providers over more episodes that will come with time.

VIII. BPCI Model Growth

This annual report reflects quantitative analyses of Phase 2 participants in the first quarter under the initiative (Q4 2013) and qualitative analyses of participants in their first and second quarters (Q4 2013 and Q1 2014). Though there were a limited number of participants in the initiative during this time, BPCI participation is expected to increase substantially, particularly between April and October 2015. In this section, we present what is expected over the coming two years.

A. Size of BPCI Initiative, Jan – June 2014

The initial group of Phase 1 Awardees, those that had joined the initiative as of October 2013, had the choice to enter the risk bearing phase ("Phase 2") on either October 1, 2013 or January 1, 2014. This initial group was required to enter at least one episode in at least one EI by Q1 2014. After this point, Awardees may transition episodes or EIs that have remained in Phase 1 to Phase 2 on a quarterly basis. This quarterly 'roll-out' of BPCI results in a great increase in the number of Awardees, EIs, and clinical episodes in January 2014.

Exhibit 132 presents the number of Awardees, EIs, and clinical episodes for each of the first three quarters of BPCI separately by model. From Q4 2013 to Q1 2014, the total number of Awardees grew from 15 to 93. There was also more than a tenfold increase in the number of episode initiators, from 19 to 211. As expected, the number of clinical episodes under BPCI also grew substantially, increasing from 98 to 2,415. In addition, there were slight increases during the third quarter of the BPCI initiative (Q2 2014). We anticipate that current Phase 2 participants may continue to add new episode-initiating sites or episodes because in quarterly interviews and case studies, Awardees indicated their intent to expand their initiatives and said they are currently exploring options to do so.

Exhibit 132: Estimated Counts of Awardees, EIs and Episodes by Quarter, Model 2

Model	BPCI Quarter	Number of Awardees	Number of Episode Initiators	Number of Clinical Episodes[55]
Model 2	Q1: Oct - Dec, 2013	8	9	67
	Q2: Jan - Mar, 2014	60	107	546
	Q3: Apr - Jun, 2014	60	111	580
Model 3	Q1: Oct - Dec, 2013	6	9	30
	Q2: Jan - Mar, 2014	20	84	1782
	Q3: Apr - Jun, 2014	20	94	1817
Model 4	Q1: Oct - Dec, 2013	1	1	1
	Q2: Jan - Mar, 2014	13	20	87
	Q3: Apr - Jun, 2014	13	21	88
All Models	**Q1: Oct - Dec, 2013**	**15**	**19**	**98**
	Q2: Jan - Mar, 2014	**93**	**211**	**2415**
	Q3: Apr - Jun, 2014	**93**	**226**	**2485**

Source: Count of Awardees based on Lewin analysis of Salesforce data, August 2014. The counts of episode initiators and clinical episodes are based on the final monthly reports from CMS, January through June, 2014. For the counts of episode initiators and clinical episodes for a given quarter, we present the highest monthly count for the three months during the quarter.

In addition to the growth of the initiative, some Awardees changed models and changed roles (from Single Awardee to Awardee Convener) during Q1 2014 and Q2 2014. There were also Awardees that withdrew from the BPCI initiative during Q2 2014. Our future evaluation activities will account for this type of movement in and out of the initiative as further explained in Section IX. Future Evaluation Activities.

B. BPCI Initiative Growth: November and Winter Open Period Enrollment

As discussed in the Introduction, CMS anticipates that participation in the initiative will continue to expand through October 2015 based on the interest from current BPCI participants and new entrants in the 2013 and 2014 Open Periods. As of October 2014, approximately 6,788 participants were in Phase 1.

Beginning in January 2015, new Awardees and Episode Initiators may enter Phase 2 by transitioning at least one clinical episode to Phase 2. All Awardees and each Episode Initiator must enter at least one BPCI clinical episode into Phase 2 by April 2015. Awardees and EIs may transition additional clinical episodes from Phase 1 to Phase 2 in July 2015 and October 2015. Phase 1 will end in October 2015, so all episodes for all EIs must be transitioned to Phase 2 by that time.

Given the timeline outlined above and the high level of interest expressed by potential participants during the 2013 and 2014 Winter Open Periods, we expect the initiative will expand significantly by October 2015. As a result, subsequent quarterly and annual reports will incorporate analyses based on a much larger sample of participants and episodes across all three

[55] The number of clinical episodes for which the episode initiators were participating in BPCI during the intervention quarter. Although an episode initiator is participating in a clinical episode, it does not guarantee that any patient-episodes will occur in a given quarter.

models. This growth in the initiative will have implications on our methodology, reporting, and ability to draw meaningful conclusions. Because sample sizes will be much larger and more diverse, we will have the capability to create results across more levels of stratification and calculate more statistically powerful results. We will, however, also have to revisit our methodology each quarter to ensure we are able to account for growing sample sizes, movement in and out of the initiative, and increased variability in the types of episodes and providers.

IX. Future Evaluation Activities

This report presents an early assessment of the BPCI program based on data from the first quarter of the initiative. As such, the analysis is limited in scope and findings are not representative of BPCI participants and episodes that enter the program after this quarter. The first quarter cohort includes only 19 out of the 92 Awardees that are currently enrolled in the program. Because there were a small number of participants in the first quarter, the analysis of determinants of BPCI participation was limited. Also, to account for lags in claims submissions, the analysis is restricted to episodes that started in Q4 2013 and the last day of the measurement period was set to March 31, 2014. As a result, sample sizes were small and many comparisons - especially for Model 3 and 4- were inconclusive. Further, sample sizes were not large enough to support a separate analysis for all clinical episode groups or provider types that were active in the first quarter. Outcomes extending over 90 days after the start of the post-acute period were not included in this report since the claims data were not considered complete. Finally, assessment-based outcomes were not included in this report because MDS and OASIS were incomplete for the relevant measurement period.

For next year's Annual Report, we will evaluate all Awardees that participate in BPCI at any time from Q4 2013 to Q4 2014 and we will conduct impact analysis for the first five quarters of the initiative. With an increased number of BPCI participants and larger sample sizes, we will address many of the data driven limitations described above. For example, we will be able to conduct separate analysis for a larger number of clinical episode groups.

In addition, we will expand the qualitative and quantitative analysis in the following dimensions:

- **Primary Data Collection:** We will collect and analyze two additional sources of primary data, conduct 20 case studies, and hold approximately 90 quarterly Awardee interviews.

  We will be collecting data directly from the Awardees on a quarterly basis using our online reporting platform. The data to be collected include: gainsharing activity; beneficiary incentives offered; participant characteristics, including patient mix, electronic health record use, and health information exchange capabilities; status of care redesign interventions; medication reconciliation activity; and other quality monitoring measures. With these data we will measure waiver adherence, document additional participant characteristics and care redesign activities, and measure quality of care. Awardee data will also be used to investigate what program, provider, beneficiary, and environmental factors contributed to the various results of the BPCI initiative.

  By the next Annual Report, we will have conducted and analyzed data from one wave of the beneficiary survey to obtain information not available on claims data or assessment data. The patient survey will be used to answer question's related to beneficiaries' experiences with care (i.e., care coordination, communication, patient preference), quality (i.e., functional status, mobility, care transition), and access to care. Some of these topics are also being examined with secondary data (e.g., PAC patient assessment instruments will be used to examine functional status for those patients receiving PAC services). The beneficiary survey data will augment other data by examining factors that are not available from other data sources (e.g., return to previous levels of social engagement, access to services) or not available for all patients (e.g., self-reported functional status for all patients, not only those receiving PAC services).

- **Determinants of BPCI participation and Refinements to Comparison Group:** With a larger number of BPCI participants in the expanded scope we will be able to conduct a comprehensive analysis on market trends and BPCI participants to understand what factors have contributed to their participation in the program. We will use information on BPCI providers' trends in costs, outcomes, and patient case-mix during the quarters leading to participation to refine the selection of the comparison group.
- **Additional Outcomes**: During the next year we will be updating claims and assessment data to construct additional outcomes that were not included in this report because data were not complete. These include post-bundle outcomes (i.e., average standardized Medicare allowed charges 30 days post-bundle, 60 days post-bundle, and cost shifting before and after the episode) and assessment-based outcomes (i.e., Mobility ADLs, Self-care ADL improvement). Next year's report will also include outcomes based on beneficiary survey data (i.e., transitions/coordination between hospitalization, PAC facility, and/or HHA; patient preferences of services post discharge from hospital, PAC facility). Finally, this year's report only included outcomes that are reported in the quarterly PMRC reports. Next year's Annual Report will include additional outcomes that will be analyzed annually (i.e., use of outpatient therapy, use of specialists vs. generalist during anchor hospitalization, 14-day post-discharge follow up).
- **Analysis of exploratory factors related to program success or failure:** We will perform a synthesis of qualitative and quantitative findings that allow us to identify participant characteristics associated with positive or negative outcomes of the initiative (research question C). In particular, we will analyze differential impacts by: 1) Characteristics of the model, 2) Characteristics of the participating Awardees' approaches to their chosen model, 3) Characteristics of the participating providers' specific features and ability to carry out their proposed interventions, 4) Characteristics of the market; and 5) Patient population and case-mix characteristics. We will also examine participants' roles in other CMMI initiatives, such as ACOs and other shared savings initiatives, to isolate the impact of BPCI from these other initiatives.
- **Analysis of Market Spillover:** In addition to identifying whether BPCI participation has an incremental effect on beneficiary outcomes, we will also examine whether BPCI participation may have spillover effects within the market. Spillover effects from the BPCI program occur when the changes in practices of BPCI providers influence the activities of other providers or outcomes of non-BPCI beneficiaries in the market. The comparison group used in the market spillover analysis will be limited to non-BPCI providers and their patients in BPCI clinical episode MS-DRGs that are located in the same markets as BPCI providers.

  We will conduct analyses on a number of market-level spillover measures including referral network concentration indices, physician volume ratio, and increased volume of profitable BPCI beneficiaries referred between inpatient and PAC partners. In general, these measures identify changes in the volume of BPCI and non-BPCI episodes, concentration of services among providers in the market, acute/post-acute provider referral patterns of BPCI providers, and case-mix (e.g. HCC scores, RUGs, HHRGs) of Medicare beneficiaries receiving care from providers in the market.

  We will examine trends in the volume and concentration of services among providers in the market as well as the referral patterns and case-mix for BPCI-participating providers.

We will not capture spillover measures for markets without BPCI providers. As such, there are no comparison markets for spillover analyses and we are not able to control for changes common across all markets. Therefore, the trend analysis is descriptive rather than causal. However, a national comparison sample for the claims analysis can inform trends in case-mix and, perhaps, volume in a general health care market.

- **Analysis of BPCI Attrition.** We will characterize the trajectory of successful participants (Do stayers have better outcomes relative to drop outs when they join? Do stayers have average outcomes at the beginning but improve faster relative to those that leave the program?). We would run a restricted DiD analysis on the subset of participants that remained in the program for a given number of quarters (i.e., four quarters for the first Annual Report [Q1 2014 through Q4 2014]). We would be able to assess how successful participants improve as they spend more time in the program by comparing estimates for different tenure levels because the sample composition in the restricted DiD would remain constant over time. Also, by comparing DiD estimates from the restricted and the full samples, we would be able to assess when and how stayers differ from the average participant.

X. References

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