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CMS Bundled Payments for Care Improvement Advanced Model: Third Evaluation Report

Final

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The Lewin Group, Inc. with our partners Abt Associates, GDIT, and Telligen

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Executive Summary

A. Introduction

The Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) launched the Bundled Payments for Care Improvement Advanced (BPCI Advanced) Model on October 1, 2018. BPCI Advanced is an Advanced Alternative Payment Model (Advanced APM) and tests whether linking Medicare payments for an episode of care can reduce Medicare expenditures while improving or maintaining quality of care. It builds upon the experience and results of the Bundled Payments for Care Improvement (BPCI) Initiative Models 2, 3, and 4, which were active from October 2013 through September 2018. The BPCI Advanced Model runs through December 2023.

BPCI Advanced is a voluntary model in which a participant enters into an agreement with CMS and is financially accountable for the cost and quality of health care services during episodes of care. A BPCI Advanced participant may be a hospital, physician group practice (PGP), or other eligible entity. Participants may be a convener participant (convener), which has at least one downstream hospital or PGP episode initiator (EI). A convener bears financial risk on behalf of its EIs and often provides services intended to help its EIs succeed in the model. Alternatively, a hospital or PGP may be a non-convener participant that bears financial risk only for itself. Participants could join the model in Model Year 1 (beginning October 2018), when they could choose among 32 clinical episodes (CEs), or Model Year 3 (beginning January 2020), when they could choose among 34 CEs.

A BPCI Advanced inpatient episode begins with a hospitalization in which the discharge is categorized in a Medicare Severity-Diagnosis Related Group (MS-DRG) that is included in one of the participant's selected CEs, and the episode extends for 90 days post discharge. An outpatient episode begins with a hospital outpatient procedure that is identified by a Healthcare Common Procedure Coding System (HCPCS) code that is included in one of the participant's selected CEs, and the episode extends for 90 days after the procedure. Episodes are attributed to an EI, which is either the hospital where the discharge or procedure occurred or the PGP for the attending or operating clinician.

At the end of each performance period, episode payments for each EI and their CEs are compared to a target price. If an EI's episode payments are above the applicable target price, then the participant may owe CMS a reconciliation payment. Conversely, if an EI's episode payments are below the target price, the participant may receive a reconciliation payment from CMS. Reconciliation payments are also adjusted by the EI's performance on quality measures. Target prices are calculated for each combination of EI, CE, and hospital where the episode was initiated. Target prices are based on historical episode payments for the hospital where the episode was initiated, updated based on spending levels and trends of the hospital's peers, and adjusted for patient mix. For PGP EIs, the target price incorporates adjustments for PGP-specific patient mix and differences between PGP and hospital historical payments. Target prices are discounted 3%, which is intended to be Medicare savings under the model.

In this annual report we provide an evaluation of the BPCI Advanced Model from its beginning on October 1, 2018. We estimate the impact of the model on total payments, utilization, quality, and

Medicare program savings in Model Years 1 and 2, where Model Year 1 consists of the last quarter of 2018, and Model Year 2 consists of the entirety of 2019. Impact analyses were performed at the episode level and used a difference-in-differences design to estimate the differential change in payment, utilization, and quality outcomes between a baseline and an intervention period for beneficiaries who received services from BPCI Advanced EIs relative to a selected comparison group. Medicare program savings calculations incorporated estimated changes in payments and reconciliation payments made to or paid by participants. We evaluated 13 hospital-initiated CEs and 18 PGP-initiated CEs that met minimum participation and sample size requirements for analysis. (See **Appendix C** for further details of our methodology, including minimum participation and sample size requirements.)

In this report we present results for,

- All CEs evaluated, by pooling episodes across the CEs evaluated (referred to as, "pooled CEs"),
- CEs grouped by medical and surgical, i.e.,
  - Medical CEs
  - Surgical CEs
- Medical and surgical CEs by EI type, i.e.,
  - Hospital medical CEs
  - PGP medical CEs
  - Hospital surgical CEs
  - PGP surgical CEs
- Individual CEs by EI type.

Results are grouped by medical and surgical CEs and by EI type because care redesign activities may vary by these categories, resulting in different impacts of the model.

This annual report builds on the evidence produced in the prior annual evaluation report by including impact estimates for episodes initiated by PGPs as well as hospitals and by analyzing an additional five months of intervention data. The report also provides early Model Year 3 descriptive statistics on changes in key outcomes for BPCI Advanced episodes during the onset of the COVID-19 public health emergency (PHE) (February through June 2020) and participant choices of amendments that allowed participants to retrospectively opt out of reconciliation or exclude episodes with a COVID-19 diagnosis from reconciliation in Model Year 3 (2020). Exhibit ES.1 below presents the model years evaluated for each analysis in this report.

Exhibit ES.1: Evaluation Report Components and Model Years Reflected in Report

Component	Model Years 1 & 2 (2018 – 2019)	Model Year 3 (2020)
Impact of the Model	•	
Medicare Program Savings	•	
COVID-19 Descriptive Analyses		•

CMS made substantive changes to the BPCI Advanced Model in Model Year 4 (2021), including adjustments to the calculation of target prices and adding additional risk-adjustment factors for the major joint replacement of the lower extremity CE. CMS also now requires participants to select clinical episode service line groups (CESLGs) rather than individual CEs and to participate in all CEs in the CESLG that meet minimum volume thresholds. Other changes made in Model Year 4 include adjustments to the episode overlap methodology, removal of the PGP offset, and the addition of new quality measures.[1] Changes implemented in Model Year 4 (2021) will be addressed in future evaluation reports.

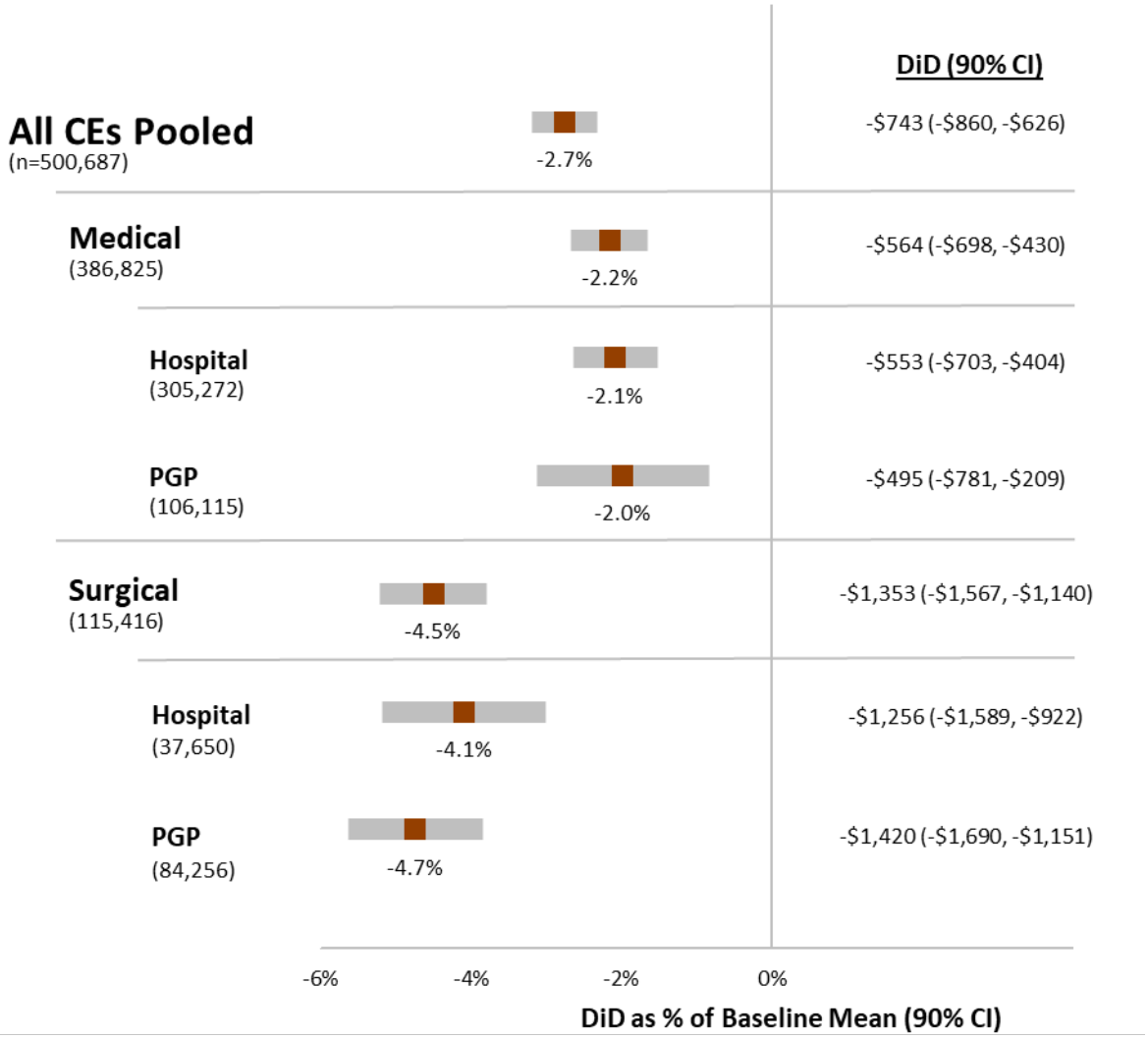
B. Results

1. What is the impact of BPCI Advanced on episode payments, utilization, and quality of care for Medicare beneficiaries?

In Model Years 1 and 2, for pooled CEs, the BPCI Advanced Model had a statistically significant reduction in average standardized episode payments of $743 per episode. This equates to a 2.7% decrease from the baseline mean. The average reduction in per-episode payments was over twice as large for surgical CEs ($1,353, or 4.5% of the baseline mean) than for medical CEs ($564, or 2.2% of the baseline mean). For medical CEs, hospitals and PGPs reduced episode payments by modest, but similar amounts. For surgical CEs, both hospitals and PGPs made larger reductions in episode payments with no statistically significant difference between them (see Exhibit ES.2). Reductions in total payments were primarily due to reductions in post-acute care (PAC) payments, particularly for skilled nursing facilities (SNF) and inpatient rehabilitation facilities.

[1] For additional details, see the BPCI Advanced Model Year 4 Fact Sheet, available at https://innovation.cms.gov/media/document/bcpi-model-overview-fact-sheet-my4

Exhibit ES.2: Impact of BPCI Advanced on Total Payments, Hospital and PGP EIs, October 1, 2018 – December 31, 2019 (Model Years 1 and 2)



Note: Total payments represent Part A and B FFS payments for the episode anchor stay or procedure and the 90-day PDP. The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent the relative change in dollars. Results are also presented as a percentage of the BPCI Advanced baseline mean total payments. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. This payment outcome is standardized to remove the effect of geographic and other payment adjustments. The number of episodes in each subgroup may not sum to the total, as episode-level weights were applied to each sample to account for overlapping episodes (see **Appendix C** for additional detail). CE = clinical episode; CI = confidence interval; EI = episode initiator; FFS = fee-for-service; PGP = physician group practice; PDP = post-discharge period.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Both hospitals and PGPs reduced institutional PAC use by discharging a smaller share of episodes to these settings, though reductions were smaller for hospitals. Hospitals also reduced the number of days in SNFs for both medical and surgical CEs, whereas reductions in SNF days for PGP EIs were concentrated in surgical CEs (see Exhibit ES.3). Hospitals may have substituted home health (HH) use for institutional PAC use, whereas PGPs substituted discharge to home without HH for

institutional PAC use, as HH payments increased for most hospital CEs and decreased for most PGP CEs.

Exhibit ES.3: Changes in Post-Acute Care Use by EI Type, October 1, 2018 – December 31, 2019 (Model Years 1 and 2)

Outcome	Hospital EIs	PGP EIs
Discharged to Institutional PAC	↓	↓
Days in SNF*	↓	↓§
HH Payments	↑	↓

Note: CE = clinical episode. EI = episode initiator; HH = home health; PGP = physician group practice; PAC = post-acute care; SNF = skilled nursing facility.

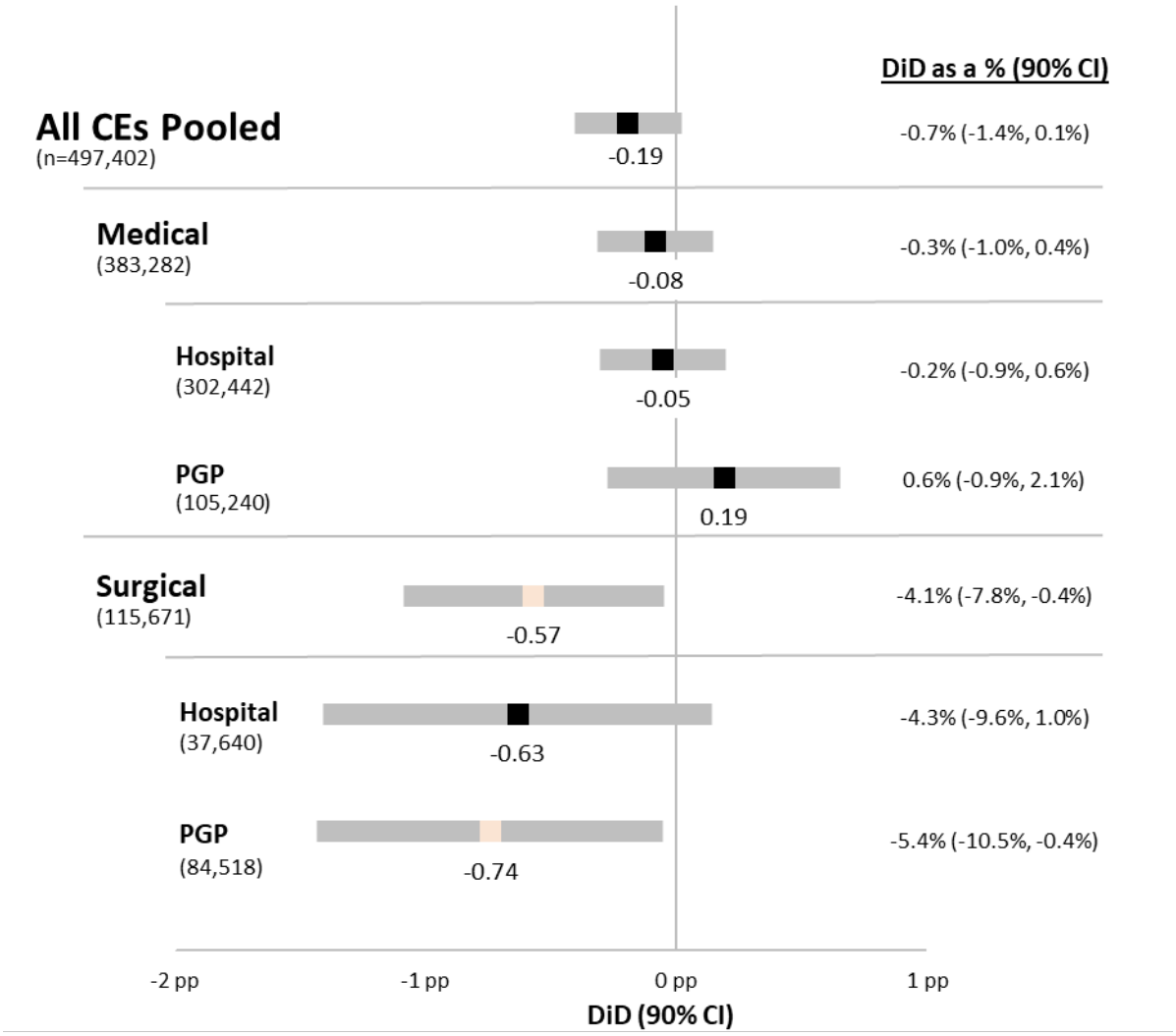
*Among episodes discharged to SNF.

§ Reductions concentrated in surgical CEs.

To assess the quality of care received by beneficiaries treated by BPCI Advanced EIs, we evaluated the impact of the model on two claims-based quality measures: the unplanned readmission rate and the mortality rate in the 90-day post-discharge period. BPCI Advanced reduced readmissions for surgical episodes during the 90 days following a discharge or procedure by 4.1% of the BPCI Advanced baseline mean. Estimates were similar by EI type (reductions of 4.3% and 5.4% for hospitals and PGPs, respectively), though only the PGP estimate was statistically significant. Neither EI type reduced readmissions for medical CEs (see Exhibit ES.4).

There were no changes in the mortality rate for episodes when pooled across all CEs evaluated, grouped by medical and surgical CEs, or grouped into medical and surgical CEs by EI type (see Exhibit ES.5). While there were some individual CEs with statistically significant changes in the mortality rate among hospital and PGP EIs, there was no consistent pattern. We will continue to monitor and report any changes in mortality rates or other indicators of quality of care.

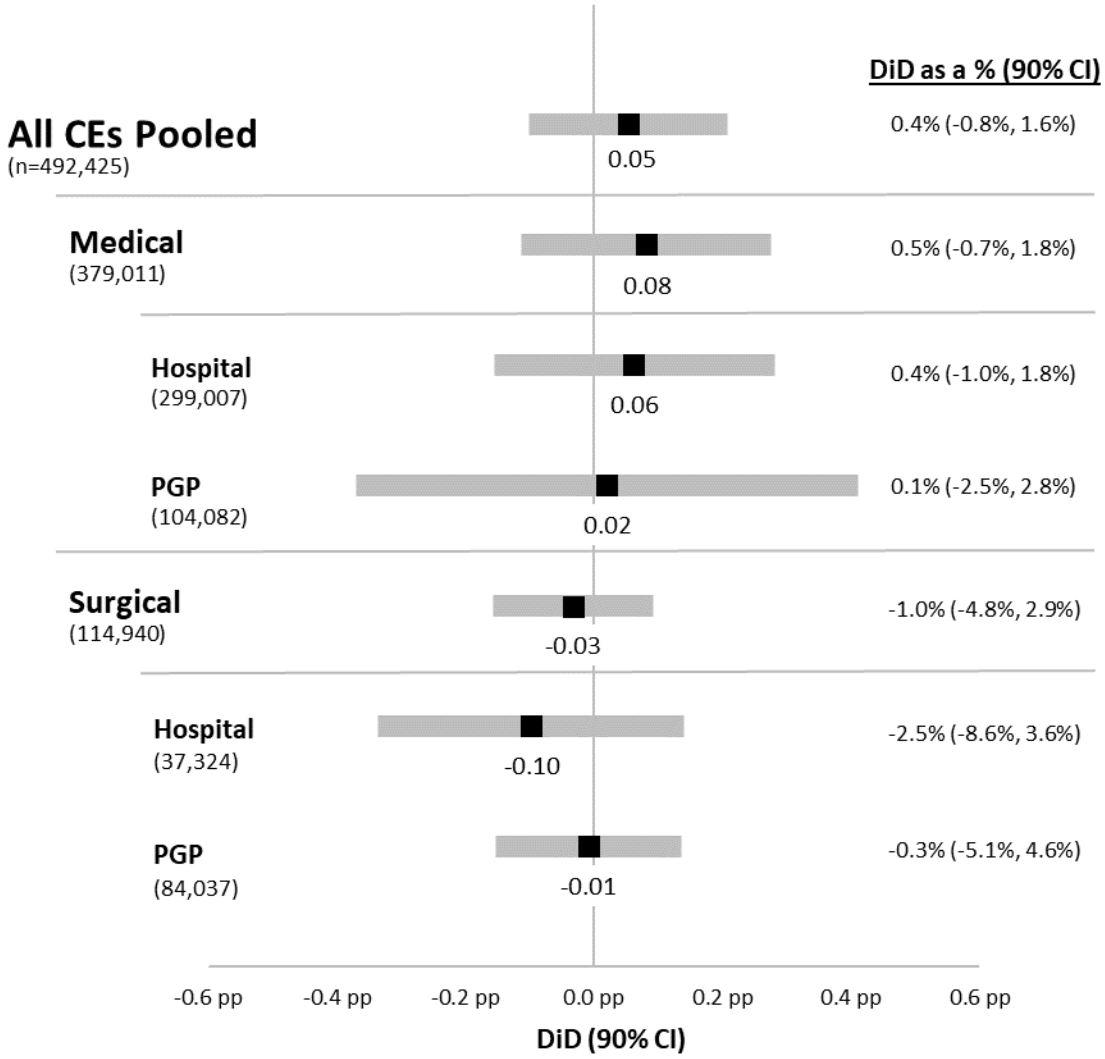
Exhibit ES.4: Impact of BPCI Advanced on Unplanned Readmission Rate in the 90-day PDP, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. CE = clinical episode; CI = confidence interval; PDP = post-discharge period; PGP = physician group practice; pp = percentage point(s).

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Exhibit ES.5: Impact of BPCI Advanced on Mortality in the 90-day PDP, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimate represents a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. CE = clinical episode; CI = confidence interval; PDP = post-discharge period; PGP = physician group practice; pp = percentage point(s).

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

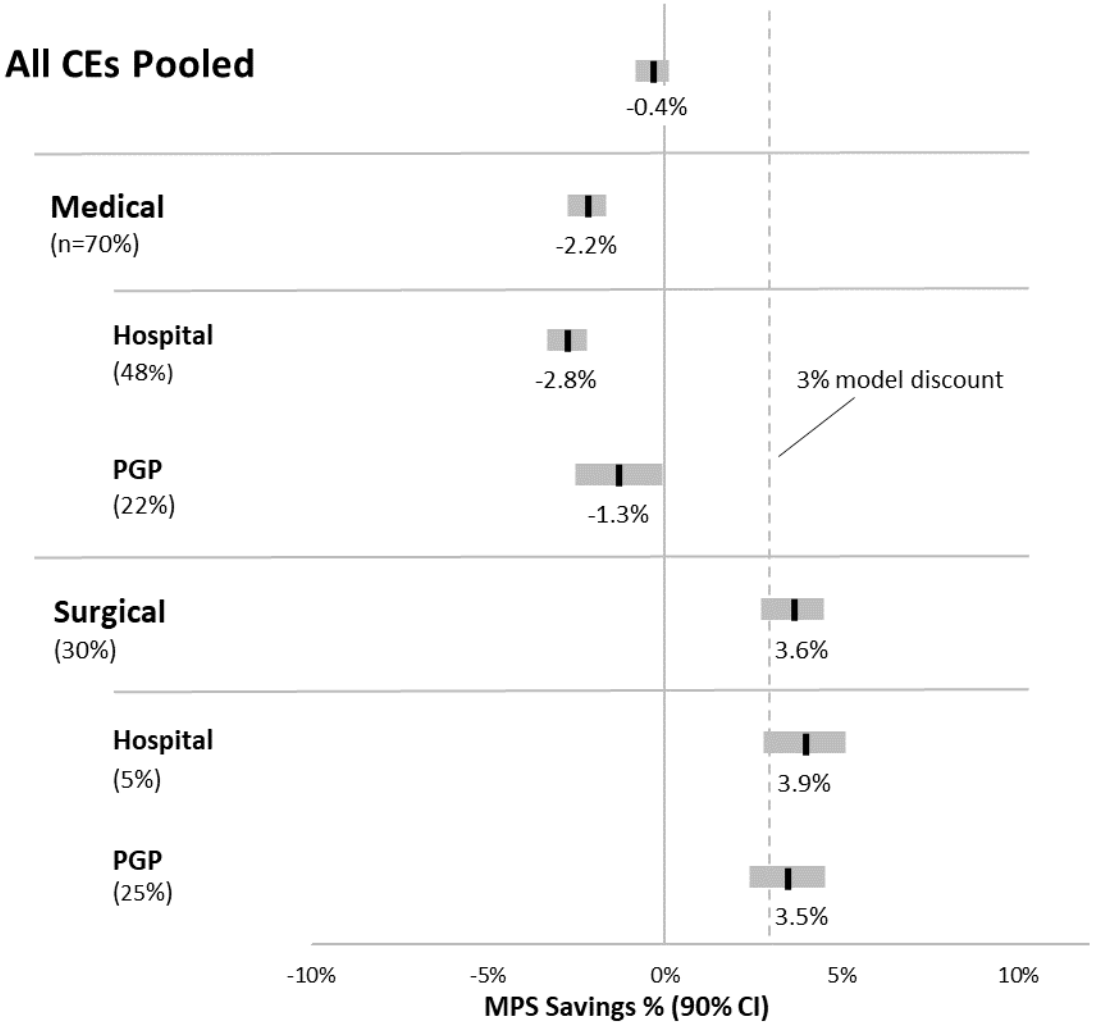
2. Did BPCI Advanced result in savings to Medicare in Model Years 1 and 2?

During Model Years 1 and 2, the BPCI Advanced Model resulted in a small estimated net loss to the Medicare program of $65.7 million, or 0.4% of what Medicare payments would have been absent the BPCI Advanced Model (see Exhibit ES.6). The range of the estimated change in net Medicare spending spanned from a loss of $152.0 million to a savings of $20.5 million (-0.8% to 0.1%).

The BPCI Advanced Model generally resulted in estimated net losses for medical CEs and estimated net savings for surgical CEs. For medical CEs, the model resulted in an estimated net loss of $275.0 million, or 2.2% of what payments would have been absent the model. When estimated by EI type, the model increased Medicare spending on hospital medical episodes by 2.8% and PGP medical episodes by 1.3%. For surgical CEs, the model resulted in an estimated net savings of $204.4 million, or 3.6% of what payments would have been absent the BPCI Advanced Model. When estimated by EI type, the model reduced Medicare spending on surgical clinical episodes by 3.9% for hospital EIs and 3.5% for PGP EIs.

Target prices in the BPCI Advanced Model were designed to achieve 3% net savings compared to what Medicare payments would have been absent the model. We compare our estimates of net savings to the Medicare program as a percentage of what payments would have been absent the BPCI Advanced Model to the 3% savings goal. For both hospital and PGP EIs, evidence suggests target prices were too high for most medical CEs but were more accurate for surgical CEs.

Exhibit ES.6: Medicare Savings Compared to the 3% Model Discount, October 1, 2018 – December 31, 2019



Note: The savings to Medicare is the difference between the change in non-standardized payments and reconciliation payments. The estimates are presented as a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. The grey bars indicate the 90% confidence interval. The confidence intervals associated with the estimates of Medicare program savings are based on the estimates of the change in non-standardized payments from the difference-in-differences models. The grey dashed line at the 3% mark indicates the 3% model discount. The sample size (n=) refers to the percentage of total episode volume used to calculate the reduction in non-standardized payments. CE = clinical episode; CI = confidence interval; PGP = physician group practice.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

3. How has COVID-19 affected BPCI Advanced participants in the model?

The COVID-19 PHE was declared on January 31, 2020. BPCI Advanced episode volume fell during the following months, reaching a low for surgical CEs in April—as hospitals halted elective or scheduled procedures—before partially rebounding by mid-year 2020. While medical CEs had

more moderate reductions in volume in April, the reductions persisted, and volume continued to decline through June (see Exhibit ES.7).

Exhibit ES.7: Percent Change in Volume Attributed to BPCI Advanced EIs From April 2019 to April 2020 and June 2019 to June 2020

	Medical CEs	Surgical CEs
April	-31% ↓	-73% ↓
June	-37% ↓	-15% ↓

Note: CE = clinical episode; EI = episode initiator.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures that began October 1, 2018 and ended on or before June 30, 2020 for BPCI Advanced EIs. The sample is restricted to episodes attributed to BPCI Advanced EIs participating in the clinical episode in Model Years 1, 2, and 3.

BPCI Advanced episodes with a COVID-19 diagnosis were concentrated in medical CEs. From February through June 2020, 95% of episodes with a COVID-19 diagnosis were in a medical CE, with a majority (over 70% of episodes with a COVID-19 diagnosis) occurring in either the simple pneumonia and respiratory infections or sepsis CEs.

In response to the COVID-19 PHE, Model Year 3 participants were given the option to alter or forgo the reconciliation process for episodes that occurred in 2020. Among BPCI Advanced participants that had not withdrawn from the model before June 28, 2020,

- 26% chose to forgo reconciliation,
- 57% choose to remove episodes with a COVID-19 diagnosis from reconciliation, and
- 16% of participants did not choose either option.

C. Discussion and Conclusion

The BPCI Advanced Model tests whether linking Medicare fee-for-service (FFS) payments for an episode of care can reduce Medicare expenditures while maintaining or improving quality of care. Through the first two model years (Model Years 1 and 2), there was relatively broad participation across the full range of CEs. Hospitals and PGPs participating in the BPCI Advanced Model reduced Medicare FFS payments without negative effects on quality of care (as measured by the unplanned readmission rate and the mortality rate). Moreover, for surgical CEs, there is evidence of an improvement in the unplanned readmissions rate. Reductions in FFS payments were driven primarily by reducing institutional PAC use. For pooled surgical CEs, BPCI Advanced achieved savings to Medicare (an estimated savings of $204.4 million, or 3.6% of what payments would have been absent the BPCI Advanced Model) and possibly improved quality of care, driven mostly by orthopedic procedures. Savings from surgical CEs, however, were fully offset by losses from medical CEs (an estimated net loss of $275 million, or 2.2% of what payments would have been absent the BPCI Advanced Model). Evidence indicates that, generally, target prices were too high for medical CEs but were more accurate for surgical CEs.

CMS implemented several changes in Model Year 4 (2021) to the target pricing methodology and required participants to select CESLGs rather than individual CEs. These changes are intended to improve opportunities for BPCI Advanced to achieve Medicare program savings, although the COVID-19 PHE may continue to complicate provider efforts to respond to BPCI Advanced incentives. Future evaluation reports will assess how these changes affect participation in the model and Medicare program savings, including participant perspectives on the changes implemented in Model Year 4 (2021), participant perspectives on how the PHE impacted their performance in the model, and beneficiary experiences.

LOOKING FOWARD TO FUTURE EVALUATION REPORTS

- Estimate episode-level impacts of the model and savings to Medicare in Model Year 3 (2020).
- Examine the impact of the changes to the BPCI Advanced Model implemented in Model Year 4 (2021) on:
  - Participation in the model and selection of clinical episode service line groups
  - Episode-level impacts of the model and savings to Medicare.
- Evaluate the model's impact on health equity and transformation of care.
- Assess participant and episode initiator experience and beneficiary experience and satisfaction.

I. Introduction

The Bundled Payments for Care Improvement Advanced (BPCI Advanced) Model is designed to test whether linking Medicare payments for an episode of care can reduce Medicare expenditures while improving or maintaining quality of care. The Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) launched BPCI Advanced, an Advanced Alternative Payment Model (Advanced APM), in October 2018 and the model will continue through December 2023.[2]

The Lewin Group, with our partners Abt Associates, Inc., GDIT, and Telligen, is under contract with CMS to conduct an independent evaluation of the impact of the BPCI Advanced Model. This third annual evaluation report explores the impact of the model on total payments, utilization, and quality of care for Medicare fee-for-service (FFS) beneficiaries; estimates Medicare program savings in Model Years 1 and 2 (2018 and 2019) for hospital and physician group practice (PGP) episode initiators (EIs); and provides descriptive statistics on the changes in the outcomes, patient mix, and volume of BPCI Advanced episodes during the early months of the Coronavirus 2019 public health emergency (COVID-19 PHE).

A. The BPCI Advanced Model

BPCI Advanced is a voluntary model in which participants enter into agreements with CMS to be held accountable for total Medicare FFS payments and quality of health care services for a beneficiary during an episode of care with a diagnosis within one of the BPCI Advanced clinical episodes (CEs). If total payments for a participant's chosen CE are below its target price, the participant may receive reconciliation payments from CMS. Conversely, if total payments for the CE are above its target price, the participant may owe reconciliation payments to CMS.[3] Reconciliation payments are also adjusted by the EI's performance on quality measures. Thus, participants have financial incentives to ensure efficient, coordinated care delivery throughout the entire episode, which begins with a triggering hospitalization or outpatient procedure and ends 90 days after discharge or completion of the procedure. Exhibit 1 highlights key components of the model.

BPCI Advanced is based on the Bundled Payments for Care Improvement (BPCI) Initiative, one of CMMI's previous bundled payment approaches, which was comprised of four models.[4] BPCI Advanced is similar to BPCI Model 2 and incorporates lessons learned.[5]

[2] See **Appendix A** for a glossary of terms and abbreviations used in this report.
[3] See the CMS BPCI Advanced website for additional information on the reconciliation specifications: https://innovation.cms.gov/media/document/bpciadvanced-my1-2-reconcilation-specs and https://innovation.cms.gov/media/document/bpciadvanced-my3-reconcilation-specs.
[4] BPCI Model 1 began in April 2013, with the final Awardee concluding its participation on December 31, 2016. BPCI Models 2, 3, and 4 began in October 2013 and the initiative ended on September 30, 2018.
[5] See the CMS BPCI website for additional information on the initiative and annual evaluation reports: https://innovation.cms.gov/innovation-models/bundled-payments.

Exhibit 1: Key Components of BPCI Advanced

Defining Characteristics of the Model

- Voluntary, Advanced Alternative Payment Model (APM)
- Reconciliation is calculated when CMS compares the aggregate Medicare FFS allowed amounts for episodes attributed to a participant against the target price for those episodes, which determines whether the participant receives a payment from CMS or makes a repayment to CMS
- Hospitals and PGPs can initiate episodes as EIs
- Includes 30 inpatient, 3 outpatient, and 1 multi-setting CEs (as of Model Year 3)
- Participants are required to participate in CESLGs rather than individual CEs beginning with Model Year 4

Target Prices

- Preliminary target prices were made available to applicants before they made participation decisions
- Hospital target prices are based on hospital historical payments, case mix, peer group historical payments, and a prospective peer group trend factor, and are discounted by 3%
- PGP target prices are hospital target prices adjusted for PGP-specific case mix and differences between PGP and hospital historical payments, and reflect that the hospital target prices are discounted by 3%
- Beginning in Model Year 4, final target prices reflect a realized peer group trend (capped at 10%), and PGP target prices are no longer adjusted for differences between PGP and hospital historical payments

Entry and Withdrawal Rules

- Participants and EIs could join the model at the start of Model Year 1 (October 1, 2018) or Model Year 3 (January 1, 2020)
- Model Year 3 was the last enrollment opportunity, but participants and EIs were required to select CESLGs at the start of Model Year 4 (January 1, 2021)
- Participants can terminate participation in the model with 90-days advance written notice
- CMS may terminate participants that do not meet the requirements of the participation agreement
- In response to the COVID-19 PHE, participants could retrospectively opt out of reconciliation or exclude episodes with a COVID-19 diagnosis from reconciliation in Model Year 3

Note: COVID-19 PHE = COVID-19 public health emergency.

Source: Centers for Medicare & Medicaid Services (2020, May 5). BPCI Advanced. Retrieved from https://innovation.cms.gov/initiatives/bpci-advanced; Centers for Medicare & Medicaid Services (2021, June). Model Overview Fact Sheet – Model Year 3 (MY3). Retrieved from https://innovation.cms.gov/files/fact-sheet/bpciadvanced-my3-modeloverviewfs.pdf; Centers for Medicare & Medicaid Services (2019, September 14). Bundled Payments for Care Improvement Advanced Amended and Restated Participation Agreement. Retrieved from https://innovation.cms.gov/files/x/bpciadvanced-my3-am-restated-participation-agmt.pdf

1. Participants and Episode Initiators

Each BPCI Advanced participant, which may be a hospital, PGP, or other eligible entity, enters into an agreement with CMS to be held accountable for performance on quality measures and episode payments relative to their target prices. Participants are expected to coordinate care across the providers involved in an episode to reduce utilization and payments and improve the quality of patient care.

Participants are either a convener participant (convener) or a non-convener participant. A convener has at least one downstream EI, which is a hospital or a PGP. A convener bears financial risk on

behalf of its downstream EIs and often provides services (e.g., data analysis, guidance on CE selection, or case management services) intended to help EIs succeed in the model. A non-convener participant is a hospital or PGP EI that bears financial risk only for itself. A convener may have multiple participation agreements with CMS for different downstream EIs, but as a single EI, non-convener participants can only have one agreement.

In Model Years 1 and 2 (2018 and 2019), there were 334 unique participants in BPCI Advanced, which increased to 694 in Model Year 3 (2020).[6] In Model Years 1 and 2, there were 715 hospital EIs and 580 PGP EIs after CMS allowed a one-time retroactive withdrawal from the model, and most (81%) participated as downstream EIs under a convener. In Model Year 3, participation grew to 1,010 hospital and 1,031 PGP EIs, with 70% of EIs participating as downstream EIs.

2. BPCI Advanced Episodes

A BPCI Advanced episode begins with a hospitalization or procedure at a participating hospital EI or when the attending or operating clinician for the hospitalization or procedure is a member of a participating PGP EI. Inpatient episodes start when a Medicare beneficiary is admitted to a hospital (anchor stay) and the resulting Medicare Severity-Diagnosis Related Group (MS-DRG) is in one of the participating EI's selected CEs. Outpatient episodes begin when a beneficiary has an outpatient procedure (anchor procedure) in a hospital outpatient setting that is identified by a Healthcare Common Procedure Coding System (HCPCS) code in the participating EI's selected CEs. All FFS Medicare-covered items and professional services, with certain exclusions, furnished during the anchor stay (or the anchor procedure) plus the 90 days after are included in the episode.

Over half (68%) of BPCI Advanced episodes initiated by EIs participating in Model Years 1 and 2 were in a medical CE (Exhibit 2). Most medical episodes were initiated by hospital EIs (68%), while PGP EIs initiated a larger share of the surgical episodes (72%). (See **Appendix B** for a list of CEs by CE type.)

Exhibit 2: BPCI Advanced Volume by CE Type, Model Years 1 and 2 (2018 and 2019)

Clinical Episode Type	Number of EIs	Number of Episodes	Percent of All Clinical Episodes
Medical Clinical Episodes	824	414,030	68%
Hospitals	645	280,036	46%
PGPs	179	133,994	22%
Surgical Clinical Episodes	857	194,448	32%
Hospitals	412	54,188	9%
PGPs	445	140,260	23%
All Clinical Episodes	1,213	608,478	100%

Note: CE = clinical episode; EI = episode initiator; PGP = physician group practice.

Source: CMS reconciliation data for BPCI Advanced hospitals and PGPs from Model Years 1 and 2. Second True-Up for Performance Period 1 and 2; First True-Up for Performance Period 3.

[6] "Unique participants" refers to unique entities which entered into participation agreements with CMS. For example, in Model Year 3, there were 1,707 participants (participation agreements) from 694 unique participants (unique entities).

In Model Year 3 (2020), there were changes to the CEs that were included in the model. Bariatric surgery, inflammatory bowel disease, and seizures CEs were added. The three individual spinal fusion CEs were combined into a single spinal procedures CE (cervical spinal fusion, combined anterior posterior spinal fusion, and spinal fusion (non-cervical)). A transcatheter aortic valve replacement CE was carved out of the original cardiac valve CE. Further, the major joint replacement of the lower extremity (MJRLE) CE was expanded to include total knee arthroplasty (TKA) procedures performed in the hospital outpatient department in addition to inpatient procedures. (See **Appendix B** for a list of the BPCI Advanced CEs and associated MS-DRGs and HCPCS codes.)

3. Target Prices and Reconciliation

CMS calculates a BPCI Advanced target price for each EI and CE combination. A hospital EI's target price reflects its historical Medicare FFS episode payments during the baseline period, adjusted for its patient mix and its payments relative to national historical payments, which are updated based on the spending trends of its hospital peers. A PGP EI's target price is based on the target price of the hospital where the hospitalization or procedure occurred, adjusted for PGP-specific patient mix and efficiency. Because a PGP may initiate episodes in different hospitals, it may have different target prices for the same CE, depending on where the episode was initiated. Target prices incorporate a 3% discount, which is intended to be Medicare savings under the model.

The target price calculation method was designed to support participation from a broad range of providers by accounting for variation in episode payments and factors that contribute to payment differences that are beyond providers' control. The use of hospital-specific historical payments, adjusted for peer group levels, peer group trends, and patient mix, is to encourage participation from a variety of providers, including those with historically high and those with historically low episode payments. The peer adjustments recognize that underlying costs and episode spending trends differ across types of hospitals in different circumstances.[7] The patient case-mix adjustment accounts for variations in payments due to differences in patient needs.

The BPCI Advanced Model is an Advanced APM, in part because participant performance on quality measures is factored into the determination of reconciliation payments. BPCI Advanced incorporates seven claims-based quality measures to calculate each EI's Composite Quality Score (CQS) (Exhibit 3).[8,9]

[7] Centers for Medicare & Medicaid Services (2018, June). Pricing Methodology for Clinicians and Administrators. Retrieved from https://innovation.cms.gov/Files/slides/bpciadvanced-wc-pricingmethodology-clinadmin.pdf.

[8] An additional set of 23 alternate quality measures, including claims-based and registry-based measures, was available for participants to select for CEs in Model Year 4.

[9] More information about BPCI Advanced quality measures is available at https://innovation.cms.gov/innovation-models/bpci-advanced/quality-measures-fact-sheets.

Exhibit 3: BPCI Advanced Quality Measures for Model Years 1 and 2

Measure	Applicable Clinical Episodes
All-Cause Hospital Readmission Measure	All CEs
Advance Care Plan	All CEs
CMS Patient Safety Indicators (CMS PSI 90)	All CEs
Hospital-Level Risk-Standardized Complication Rate (RSCR) Following Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA)	DJRLE, MJRLE
Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft Surgery (CABG)	CABG
Excess Days in Acute Care after Hospitalization for Acute Myocardial Infarction (AMI)	AMI
Perioperative Care: Selection of Prophylactic Antibiotic: First- or Second-Generation Cephalosporin	Back and Neck Except Spinal Fusion (inpatient and outpatient); Cervical Spinal Fusion; Combined Anterior Posterior Spinal Fusion; CABG; Cardiac Valve; DJRLE; Hip & Femur Procedures; Lower Extremity/Humerus Procedures; Major Bowel Procedure; MJRLE; MJRUE

Note: AMI = acute myocardial infarction; CE = clinical episode; CABG = coronary artery bypass graft; DJRLE = double joint replacement of the lower extremity; Hip & Femur Procedures = hip and femur procedures except major joint; Lower Extremity/Humerus Procedures = lower extremity and humerus procedures except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity.

Source: Centers for Medicare & Medicaid Services (n.d.). Quality Measures Correlation to Clinical Episodes Model Years 1 and 2. Retrieved from https://innovation.cms.gov/files/x/bpci-advanced-qualmsrcorrclinepi-modelyrs1-2.pdf

Under the model, providers and suppliers continue to receive Medicare FFS payments for providing Medicare-covered items and services. At the end of each performance period, CMS compares Medicare payments during the episode with the target price for each EI for each of its CEs. When the episode payments for a participant, aggregated across all of its EIs and CEs, are below its target amount, the participant will receive a Net Payment Reconciliation Amount (NPRA). When the aggregated episode payments are above the target amount, the participant will owe a repayment to CMS.[10] The NPRA or repayment includes adjustments for the EI's CQS and for the stop-loss or stop-gain limits of the BPCI Advanced Model.[11] Throughout the report, we refer to the NPRA or repayments collectively as "reconciliation payments."

4. Participation and Clinical Episode Selection

BPCI Advanced participants self-selected to participate in the model. To help inform their decision to participate, prospective participants received historical data and preliminary target prices to review and assess their potential success in the model within specific CEs. In Model Years 1, 2 and 3, EIs could select one or all CEs if the minimum episode threshold was met. CE selection was closely aligned with the ability to reduce episode costs and expected success in the model. As a result, there were differences between hospital and PGP EIs in the selection of medical and surgical CEs. Hospital EIs were more likely to select medical CEs, and PGP EIs were more likely to select surgical CEs.

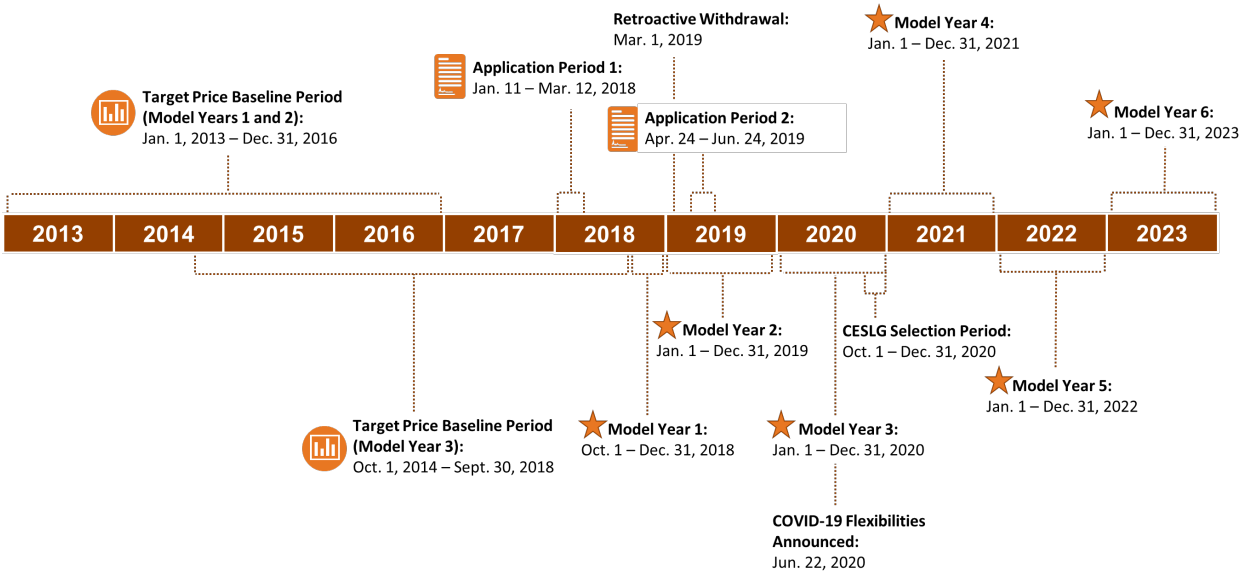
[10] The reconciliation amount has a 20% stop loss/gain applied at the EI level.
[11] The CQS adjustment amount cannot change the NPRA or repayment amount by more than 10%.

5. Model Timeline

The BPCI Advanced Model extends for more than five years: Model Year 1 began October 1, 2018, and Model Year 6 ends December 31, 2023 (Exhibit 4). Participants and EIs had two opportunities to join the model. The first cohort of participants began at the start of Model Year 1 (October 2018). The second cohort began at the start of Model Year 3 (January 2020). The target prices for Model Years 1 and 2 (2018 and 2019) were based on historical payments from January 2013 through December 2016 (target price baseline period). In Model Year 3 (2020), the target price baseline period was October 1, 2014 through September 30, 2018. The baseline period will continue to shift forward for future model years, and thus target prices will incorporate payments for episodes that occurred after the model began.

Beginning in Model Year 4 (2021), participants were required to choose to participate in clinical episode service line groups (CESLGs) rather than individual CEs. The previous 34 CEs were grouped into eight CESLGs—cardiac care, cardiac procedures, gastrointestinal surgery, gastrointestinal care, neurological care, medical & critical care, spinal procedures, and orthopedics. While CMS requires that participants select CESLGs, participants are not required to participate in CEs within selected CESLGs that do not meet the minimum volume threshold during the baseline period. Shifting to CESLGs is intended to encourage participants to broaden care redesign efforts to a wider range of conditions and limit their ability to participate only in CEs that are financially or clinically advantageous to them.

Exhibit 4: BPCI Advanced Timeline through Model Year 6



Note: CESLG = clinical episode service line group.

Source: Centers for Medicare & Medicaid Services (2018, April). BPCI Advanced Model T imeline. Retrieved from https://innovation.cms.gov/Files/x/bpci-advanced-timeline.pdf and Centers for Medicare & Medicaid Services. Pricing Methodology: Frequently Asked Questions (FAQ). Retrieved from https://innovation.cms.gov/Files/x/bpciadvanced-my3-pm-faqs.pdf.

B. Research Questions

This annual evaluation report provides an evaluation of the BPCI Advanced Model from its launch on October 1, 2018 through Model Years 1 and 2 (Model Year 2 ended on December 31, 2019). It also provides descriptive statistics on key outcomes during the onset of the COVID-19 PHE (first

six months of Model Year 3, 2020). Three major research questions provided the framework for our analytic approach.

Research Questions

- What is the impact of BPCI Advanced on episode payments, utilization, and quality of care for Medicare beneficiaries through Model Years 1 and 2?
- Did BPCI Advanced result in net savings to Medicare in Model Years 1 and 2?
- How has the COVID-19 public health emergency affected BPCI Advanced participants?

1. What is the impact of BPCI Advanced on episode payments, utilization, and quality of care for Medicare beneficiaries through Model Years 1 and 2 (October 1, 2018 through December 31, 2019)?

We estimated the impact of BPCI Advanced on episode payments, utilization of services, and quality of care for Medicare beneficiaries. Medicare claims and enrollment data were used to construct episodes for beneficiaries attributed to participating EIs (BPCI Advanced population) and to matched comparison providers.

2. Did BPCI Advanced result in savings to Medicare in Model Years 1 and 2 (October 1, 2018 through December 31, 2019)?

We evaluated net savings to Medicare due to BPCI Advanced for selected CEs based on the estimated impact of BPCI Advanced on Medicare FFS episode payments, adjusted by reconciliation payments made to or received from model participants. We calculated net Medicare savings (or losses) for each CE for which we conducted impact estimates. Net Medicare savings was defined as the change in non-standardized payments minus net reconciliation payments.

3. How has COVID-19 affected BPCI Advanced participants in the first six months of Model Year 3 (through June 30, 2020)?

We evaluated changes in outcomes, patient mix, and volume of BPCI Advanced episodes during the early months of the COVID-19 PHE (through June 30, 2020). We conducted descriptive analyses of the amendment choice made by BPCI Advanced participants and participant characteristics. We assessed changes in BPCI Advanced episode characteristics across time and different geographies categorized by COVID-19 incidence, including episode volume and proportion of episodes with COVID-19 diagnoses, as well as changes in 90-day post-anchor mortality, use of post-acute care (PAC) services, and average episode payments.

C. Data Sources and Outcomes

This evaluation relied on multiple secondary data sources to construct samples, determine outcomes, and supplement the quantitative results. We used provider-level data sources, including the CMS BPCI Advanced database, Provider of Services (POS) files, and Medicare Provider Enrollment, Chain, and Ownership System (PECOS) to identify and describe BPCI Advanced participant providers and select comparison providers. Medicare claims and enrollment data were used to construct episodes for beneficiaries at BPCI Advanced-

participating EIs and at matched comparison providers. We also used claims data to create outcome measures and beneficiary risk factors associated with the outcomes. See **Appendix C** for more information on our secondary data sources.

II. Results

This chapter presents results of the analyses of the evaluation sample, the impact of BPCI Advanced, Medicare program savings under the model, and descriptive analyses of BPCI Advanced during the COVID-19 PHE. Impact estimates and analyses of Medicare program savings were performed by pooling episodes across the CEs evaluated (referred to as, "pooled CEs"), for CEs grouped by medical and surgical (i.e., medical CEs and surgical CEs), for medical and surgical CEs separately by EI type (i.e., hospital medical CEs, PGP medical CEs, hospital surgical CEs, and PGP surgical CEs), and by individual CE by EI type. Results are grouped by medical and surgical CEs and by EI type because care redesign activities may vary by CE type and for hospital and PGP EIs, resulting in different outcomes. For hospital EIs, we constructed comparison groups for 13 CEs that had sufficient sample size for analysis. For PGP EIs, we constructed comparison groups for 18 CEs that met the sample size threshold. For the analysis of the impact of BPCI Advanced, we conducted sensitivity tests for key quality and payment outcomes. For further details of our methodology, data, and sensitivity tests see **Appendix C**.

A. Sample

Participants and EIs self-selected to participate in BPCI Advanced. In Model Years 1 and 2 (2018 and 2019), EIs could select one or more CEs if the minimum episode threshold was met. Our evaluation includes impact analyses for a subset of CEs with sufficient sample size for evaluation. The CEs evaluated represent 91.2% of total BPCI Advanced intervention volume, or, when grouped into medical and surgical CE types, 95.7% of episodes initiated under medical CEs and 82.4% of episodes initiated under surgical CEs. After matching BPCI Advanced EIs to comparison hospitals and PGPs, our evaluation sample included 73.5% of BPCI Advanced episodes initiated in the CEs evaluated, or, when grouped into medical and surgical CE types, 81.3% of episodes initiated in the evaluated medical CEs and 55.7% of episodes initiated in the evaluated surgical CEs. (See **Appendix C** for additional details on the sample and comparison group selection.)

There were differences between hospital and PGP EIs in the selection of CEs. Hospital EIs were more likely to select medical CEs, and PGP EIs were more likely to select surgical CEs. Hospital EIs selected five CEs, on average, with medical CEs accounting for four out of the five CEs. PGP EIs selected seven CEs, on average, with surgical CEs accounting for five out of the seven CEs. About 84% of hospital EI episodes were from medical CEs, whereas 49% of PGP EI episodes were from medical CEs. The resulting number of EIs and episodes included in our difference-in-differences (DiD) sample reflects this selection.

1. Hospital Episode Initiators

For hospital EIs, we evaluated 13 CEs for which we had sufficient sample size (Exhibit 5). Ten of the 13 CEs were medical CEs, and three were surgical CEs. The 13 CEs with sufficient sample size represented 90.3% of BPCI Advanced hospital EI episodes initiated during the intervention period (Model Years 1 and 2). When grouped into CE types, the CEs with sufficient sample size represented 97.1% of all BPCI Advanced episodes initiated in hospital medical CEs and 55.5% of episodes initiated in hospital surgical CEs. After matching BPCI Advanced hospitals with comparison hospitals, our evaluation sample included 85.3% of BPCI Advanced episodes initiated in the intervention period in the CEs evaluated. When grouped into medical and surgical CE types,

our evaluation sample represented 85.5% of episodes initiated in the hospital medical CEs evaluated and 83.9% of episodes initiated in the hospital surgical CEs evaluated. The number of matched hospital EIs for the medical CEs evaluated ranged from 122 to 320, and the number of BPCI Advanced episodes in the intervention period ranged from 10,773 to 76,995. The number of matched hospital EIs for the surgical CEs evaluated ranged from 51 to 128, and the number of BPCI Advanced episodes in the intervention period ranged from 7,643 to 20,707.

Exhibit 5: Matched BPCI Advanced Hospitals Included in the BPCI Advanced Impact Estimates, October 1, 2018 – December 31, 2019

Clinical Episode		BPCI Advanced Participating Hospitals	Matched BPCI Advanced Hospitals	Intervention Episodes for Matched BPCI Advanced Hospitals
Medical Clinical Episodes	AMI	227	205	14,211
	Cardiac Arrhythmia	287	256	24,309
	COPD, Bronchitis, Asthma	239	218	24,352
	CHF	368	320	58,051
	GI Hemorrhage	139	122	10,773
	Renal Failure	205	179	18,951
	Sepsis	316	267	76,995
	SPRI	274	248	38,481
	Stroke	230	225	27,078
	UTI	235	207	20,454
Surgical Clinical Episodes	Hip & Femur Procedures	145	123	9,318
	MJRLE	145	128	20,707
	PCI (Outpatient)	52	51	7,643

Note: The number of matched BPCI Advanced hospitals is limited to the BPCI Advanced hospitals that were used to calculate the difference-in-differences results in the remainder of this section. The number of matched intervention episodes is based on the sample used to evaluate the impact of the model on total allowed standardized payments. See **Appendix C** for information on the methods used to determine the sample. AMI = acute myocardial infarction; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; GI = gastrointestinal; Hip & Femur Procedures = hip and femur procedures except major joint; MJRLE = major joint replacement of the lower extremity; PCI = percutaneous coronary intervention; SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: CMS BPCI Advanced Database, as of March 1, 2021 and the BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stay or procedure end dates beginning October 1, 2018 and ending on or before December 31, 2019 for BPCI Advanced hospitals.

2. Physician Group Practice Episode Initiators

For PGP EIs, we evaluated 18 CEs for which we had sufficient sample size (Exhibit 6). Eleven of the 18 CEs were medical CEs, and seven were surgical CEs. The 18 CEs with sufficient sample size represented 92.2% of BPCI Advanced PGP EI episodes initiated during the intervention period (Model Years 1 and 2). When grouped into CE types, the CEs with sufficient sample size represented 92.7% of all BPCI Advanced episodes initiated in PGP medical CEs and 91.8% of episodes initiated in PGP surgical CEs. After matching BPCI Advanced PGPs with comparison PGPs, our evaluation sample included 60.1% of BPCI Advanced episodes initiated in the intervention period in the CEs evaluated. When grouped into medical and surgical CE types, our

evaluation sample represented 72.1% of episodes initiated in the PGP medical CEs evaluated and 49.7% of episodes initiated in the PGP surgical CEs evaluated. The number of matched PGP EIs for the medical CEs evaluated ranged from 45 to 74, and the number of BPCI Advanced episodes in the intervention period ranged from 3,339 to 19,056. The number of matched PGP EIs for the surgical CEs evaluated ranged from 31 to 197, and the number of BPCI Advanced episodes in the intervention period ranged from 1,418 to 50,136.

Exhibit 6: Matched BPCI Advanced PGPs Included in the BPCI Advanced Impact Estimates, October 1, 2018 – December 31, 2019

Clinical Episode		BPCI Advanced Participating PGPs	Matched BPCI Advanced PGPs	Intervention Episodes for Matched BPCI Advanced PGPs
Medical Clinical Episodes	AMI	66	60	5,769
	Cellulitis	47	45	4,294
	COPD, Bronchitis, Asthma	63	61	10,185
	CHF	81	74	16,857
	GI Hemorrhage	56	52	7,452
	GI Obstruction	50	46	3,339
	Renal Failure	63	53	8,197
	Sepsis	73	54	19,056
	SPRI	62	57	15,048
	Stroke	61	57	9,154
	UTI	67	64	9,683
Surgical Clinical Episodes	Cervical Spinal Fusion	32	31	1,418
	Hip & Femur Procedures	128	103	11,515
	LE & Humerus Procedures	47	39	2,114
	MJRLE	253	197	50,136
	MJRUE	102	88	8,576
	PCI (Inpatient)	41	39	5,611
	Spinal Fusion (NC)	85	82	4,960

Note: The number of matched BPCI Advanced PGPs is limited to the BPCI Advanced PGPs that were used to calculate the difference-in-differences results in the remainder of this section. The number of matched intervention episodes is based on the sample used to evaluate the impact of the model on total allowed standardized payments. See **Appendix C** for information on the methods used to determine the sample. AMI = acute myocardial infarction; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; GI = gastrointestinal; Hip & Femur Procedures = hip and femur procedures except major joint; LE & Humerus Procedures = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity; PCI = percutaneous coronary intervention; PGP = physician group practice; Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: CMS BPCI Advanced Database, as of March 1, 2021 and the BPCI Advanced evaluation team's analysis of and Medicare claims and enrollment data for episodes with anchor stay/procedure end dates beginning October 1, 2018 and ending on or before December 31, 2019 for BPCI Advanced PGPs.

B. Impact of BPCI Advanced

This section presents the changes in patient mix that occurred under BPCI Advanced and impact estimates on payments, utilization, and quality for episodes with anchor stays that ended on or before December 31, 2019. We evaluated whether BPCI Advanced patient mix changed during the intervention period to assess whether participants tried to generate NPRA by shifting to a less intensive mix of beneficiaries with lower episode spending. We examined claims-based patient characteristics that are associated with higher resource use for any indications of changes in patient mix. For each CE, we estimated the change in patient characteristics between the baseline and intervention period for BPCI Advanced beneficiaries relative to the change in the comparison group of beneficiaries for demographic characteristics (e.g., age 80 or older, dual eligibility disability status), count of hierarchical conditions categories (HCCs), HCC score,[12] and the utilization of institutional PAC use or home health (HH) service use during the six months prior to the anchor hospitalization or procedure.[13]

The episode-level impact analyses used a DiD design to estimate the differential change in outcomes between a baseline and an intervention period for beneficiaries who received services from BPCI Advanced EIs relative to a comparison group.[14] This approach controlled for health care service use before the hospitalization or procedure, beneficiary, market, and provider differences between BPCI Advanced and comparison episodes, and eliminated biases from time invariant differences between groups.

[12] The HCC score was constructed using the HCC score methodology based on a six-month lookback from the start of the episode, using v22 of CMS's 2019 Risk Score software, and 2016 (ICD-9) and 2019 (ICD-10) diagnosis to chronic condition mappings.

[13] This analysis is limited to patient characteristics available in claims data; there may be other patient characteristics that affect outcomes that we do not observe.

[14] The baseline period for the DiD analyses included episodes with anchor stays or procedures that began April 1, 2013 and ended on or before December 31, 2017, while the intervention period included episodes with anchor stays or procedures that began on October 1, 2018 and ended on or before December 31, 2019. The post-discharge period extends 89 days past the date of the end of the anchor stay (or past the date of the procedure). Thus some episodes with anchor stays that ended in 2019 (or procedures that occurred in 2019) extend into 2020.

1. Key Findings

Impact of BPCI Advanced

- In the first two model years (Model Years 1 and 2, 2018 and 2019), pooling all clinical episodes (CEs) analyzed, the BPCI Advanced Model had a statistically significant reduction in average standardized episode payments of $743 per episode. This equates to a 2.7% decrease from the baseline mean.
  - The reduction in per-episode payments was over twice as large for surgical CEs ($1,353; 4.5%) as for medical CEs ($564; 2.2%).
  - For medical CEs, hospital and physician group practice (PGP) episode initiators (EIs) reduced episode payments by modest, but similar amounts.
  - For surgical CEs, both hospital and PGP EIs made larger reductions in episode payments with no statistically significant difference between the two.
- For both hospital and PGP EIs, payment reductions were due to lower payments for institutional post-acute care (PAC) services, specifically skilled nursing facilities (SNF) and inpatient rehabilitation facilities (IRF).
  - Hospitals EIs reduced SNF and IRF payments in both medical and surgical CEs. Hospital EIs did not reduce home health (HH) payments.
  - PGP EIs reduced SNF payments for medical and surgical CEs, but statistically significant reductions in IRF and HH payments were concentrated in surgical CEs.
- PAC utilization findings suggest that hospital and PGP EIs reduced institutional PAC payments through different mechanisms.
  - Reductions in institutional PAC use were larger in magnitude and statistically significant in more CEs for PGP EIs compared to hospital EIs. For PGP EIs, statistically significant impacts were concentrated in surgical CEs.
  - Reductions in the number of SNF days during the post-discharge period were larger in magnitude for hospital EIs compared to PGP EIs, with statistically significant reductions in both medical and surgical CEs.
- BPCI Advanced had a limited to no impact on quality of care, though there is evidence of a reduction in the readmission rate for pooled surgical CEs.
- There were no indications of changes in patient mix that would contribute to the reduction in episode payments.

2. Patient Mix, Payment, Utilization, and Quality

a. Has BPCI Advanced affected patient mix?

BPCI Advanced is intended to reward EIs that lower episode payments through care redesign and care coordination. Episode payments could decline, however, if an EI's mix of patients under the intervention required fewer or less intensive services relative to the baseline. Alternatively, if an EI's mix of patients changed to one that required more services or more intensive services, episode payments may be higher. To account for the effect of patient mix on episode payments, the BPCI Advanced target pricing methodology and the evaluation incorporate risk adjustment. This may reduce incentives for participants to select healthier patients and may prevent EIs from being unfairly penalized for treating a more resource intensive patient mix.

For each of the measures we constructed, a negative value indicates a decline in the resource intensity of the BPCI Advanced beneficiaries during the intervention from the baseline period relative to the comparison group. Similarly, a positive value suggests a relative increase in patient resource intensity.[15]

Hospital Episode Initiators

The analysis of beneficiaries treated by hospital EIs did not reveal systematic changes in patient mix under BPCI Advanced based on the limited information available in claims-based data (Exhibit 7). None of the CEs we evaluated showed evidence of changes in patient mix in more than two of the seven characteristics we examined, and the number of statistically significant results is fewer than what we would expect due to coincidence at the 5% and 10% significance levels. Three CEs showed statistically significant changes in the share of patients aged 80 or above. For cardiac arrhythmia and hip and femur procedures except major joint CEs, the share of BPCI Advanced patients aged 80 or above decreased from baseline to intervention relative to the comparison group. The proportion of patients aged 80 or above increased for percutaneous coronary intervention (PCI). The proportion of beneficiaries with a disability, no end stage renal disease (ESRD), increased for acute myocardial infarction and cardiac arrythmia. Gastrointestinal hemorrhage (GI hemorrhage) showed a statistically significant increase in the average HCC score. These differences in patient mix are generally small, and the evaluation impact estimates and model target pricing account for changes in patient mix through risk adjustment.

[15] The impact estimates reported later in this section account for differences in patient mix. Thus the estimates measure the changes in outcomes due to the model and not changes due to differences in patient mix. The changes in patient mix presented here are not adjusted for any other factors.

Exhibit 7: Change in Patient Mix by CE, Hospitals, October 1, 2018 – December 31, 2019

Clinical Episode		Age: 80+ Years	Medicaid Eligibility	Disabled, No ESRD	Count of HCC Indicators*	HCC Score*	Home Health*	Institutional PAC Setting*
Medical Clinical Episodes	AMI	-0.70	0.59	1.32	-0.02	-0.01	-0.21	0.13
	Cardiac Arrhythmia	-1.18	-0.11	0.73	-0.02	-0.01	-0.51	-0.42
	COPD, Bronchitis, & Asthma	-0.84	0.66	1.09	-0.01	-0.01	-0.53	-0.18
	CHF	-0.43	0.53	0.04	-0.00	0.01	-0.37	-0.18
	GI Hemorrhage	0.83	1.01	0.43	0.07	0.06	0.02	0.65
	Renal Failure	-0.85	1.79	0.37	-0.06	-0.02	-0.13	-0.26
	Sepsis	-0.22	0.92	0.30	0.02	0.02	0.23	0.27
	SPRI	-0.48	-0.33	-0.17	-0.01	-0.01	0.31	0.13
	Stroke	0.01	-0.17	0.59	0.04	0.02	-0.10	-0.12
	UTI	-0.26	0.55	0.17	0.03	0.02	-0.74	0.33
Surgical Clinical Episodes	Hip & Femur Procedures	-1.51	0.17	-0.24	-0.05	-0.03	-0.50	0.14
	MJRLE	-0.17	-0.18	0.47	0.00	-0.01	-0.33	0.47
	PCI Outpatient	1.91	0.24	-1.57	-0.02	0.00	-0.40	-0.62

Note: Difference-in-differences estimates that are statistically significant at the 1%, 5% or 10% significance level are indicated by brown, medium orange, and light orange shaded cells, respectively. Categorization of resource intensity was based on statistically significant changes in patient characteristics associated with higher resource use as well as the direction and average magnitude of the estimates. AMI = acute myocardial infarction; CHF = congestive heart failure; CE = clinical episode; COPD = chronic obstructive pulmonary disease; ESRD = end stage renal disease; GI = gastrointestinal; HCC = hierarchical conditions categories; Hip & Femur Procedures = hip and femur procedures except major joint; MJRLE = major joint replacement of the lower extremity; PAC = post-acute care; PCI = percutaneous coronary intervention; SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

* These characteristics measure utilization of care in the six months prior to the anchor hospitalization. Count of HCCs and HCC score are based on the six months prior to the anchor hospitalization.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Physician Group Practice Episode Initiators

We did not find systematic changes in patient mix for beneficiaries treated by PGP EIs under BPCI Advanced based on the limited information available in claims-based data (Exhibit 8). None of the CEs we evaluated showed evidence of changes in patient mix in more than three of the characteristics we examined. For one measure, the share of beneficiaries who were disabled (no ESRD), three CEs had statistically significant differences; two were negative and one was positive. For hip and femur procedures except major joint and major joint replacement of the upper extremity (MJRUE), the share of BPCI Advanced beneficiaries who were disabled decreased from baseline to intervention relative to the comparison group, and for chronic obstructive pulmonary disease, bronchitis, and asthma the share of beneficiaries who were disabled increased relative to the comparison group. For HCC count and HCC score, 14 of the 18 CEs had a decline, and two were statistically significant, which may indicate changes in the BPCI Advanced patient mix relative to the comparison group. However, differences in patient mix are generally small, and the

evaluation impact estimates and model target pricing account for changes in patient mix through risk adjustment.

Exhibit 8: Change in Patient Mix by CE, PGPs, October 1, 2018 – December 31, 2019

Clinical Episode		Age: 80+ Years	Medicaid Eligibility	Disabled, No ESRD	Count of HCC Indicators*	HCC score*	Home Health*	Institutional PAC Setting*
Medical Clinical Episodes	AMI	-0.36	0.55	0.11	-0.01	-0.01	-0.98	1.78
	Cellulitis	-0.87	1.87	2.09	-0.00	-0.01	-0.32	0.34
	COPD, Bronchitis, & Asthma	-2.11	3.92	2.66	-0.03	-0.00	0.01	0.41
	CHF	-0.71	1.32	1.74	-0.03	-0.04	-0.40	-0.11
	GI Hemorrhage	0.34	-0.09	-1.45	0.04	-0.01	-0.58	1.46
	GI Obstruction	0.50	-0.45	1.76	0.04	0.04	-1.18	-1.48
	Renal Failure	-0.43	0.91	1.49	-0.09	-0.07	-1.59	-1.27
	Sepsis	-0.65	-1.08	2.22	-0.00	-0.04	-0.13	0.12
	SPRI	-0.46	1.52	0.75	-0.07	-0.06	-1.23	0.49
	Stroke	1.18	-0.93	-0.63	-0.03	-0.03	-1.05	-0.28
	UTI	-1.43	-0.68	0.74	-0.08	-0.04	-2.02	-0.74
Surgical Clinical Episodes	Cervical Spinal Fusion	2.57	3.44	-2.20	0.04	0.01	-0.99	0.07
	Hip & Femur Procedures	0.13	-1.10	-1.08	-0.05		0.44	-0.15
	LE & Humerus Procedures	0.14	0.50	-2.89	-0.03	0.02	-1.82	-2.30
	MJRLE	0.50	-0.40	-0.59	-0.05	-0.03	-0.03	0.44
	MJRUE	-0.99	-0.60	-2.04	-0.02	-0.01	0.25	0.84
	PCI (Inpatient)	0.39	0.43	0.39	0.01	0.01	-1.84	-1.87
	Spinal Fusion (NC)	0.37	0.36	0.79	-0.05	-0.03	-1.24	-0.48

Note: Difference-in-differences estimates that are statistically significant at the 1%, 5% or 10% significance level are indicated by brown, medium orange, and light orange shaded cells, respectively. Categorization of resource intensity was based on statistically significant changes in patient characteristics associated with higher resource use as well as the direction and average magnitude of the estimates. AMI = acute myocardial infarction; COPD = chronic obstructive pulmonary disease; CE = clinical episode; CHF = congestive heart failure; ESRD = end stage renal disease; GI = gastrointestinal; HCC = hierarchical conditions categories; Hip & Femur Procedures = hip and femur procedures except major joint; LE & Humerus Procedures = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity; PAC = post-acute care; PCI = percutaneous coronary intervention; PGP = physician group practice; Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

* These characteristics measure utilization of care in the six months prior to the anchor hospitalization. Count of HCCs and HCC score are based on the six months prior to the anchor hospitalization.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

b. How have average standardized episode payments changed under BPCI Advanced?

We measured the impact of BPCI Advanced on allowed standardized episode payments, which are Medicare Parts A and B payments that include beneficiary cost sharing and are standardized to remove geographic and other payment adjustments.

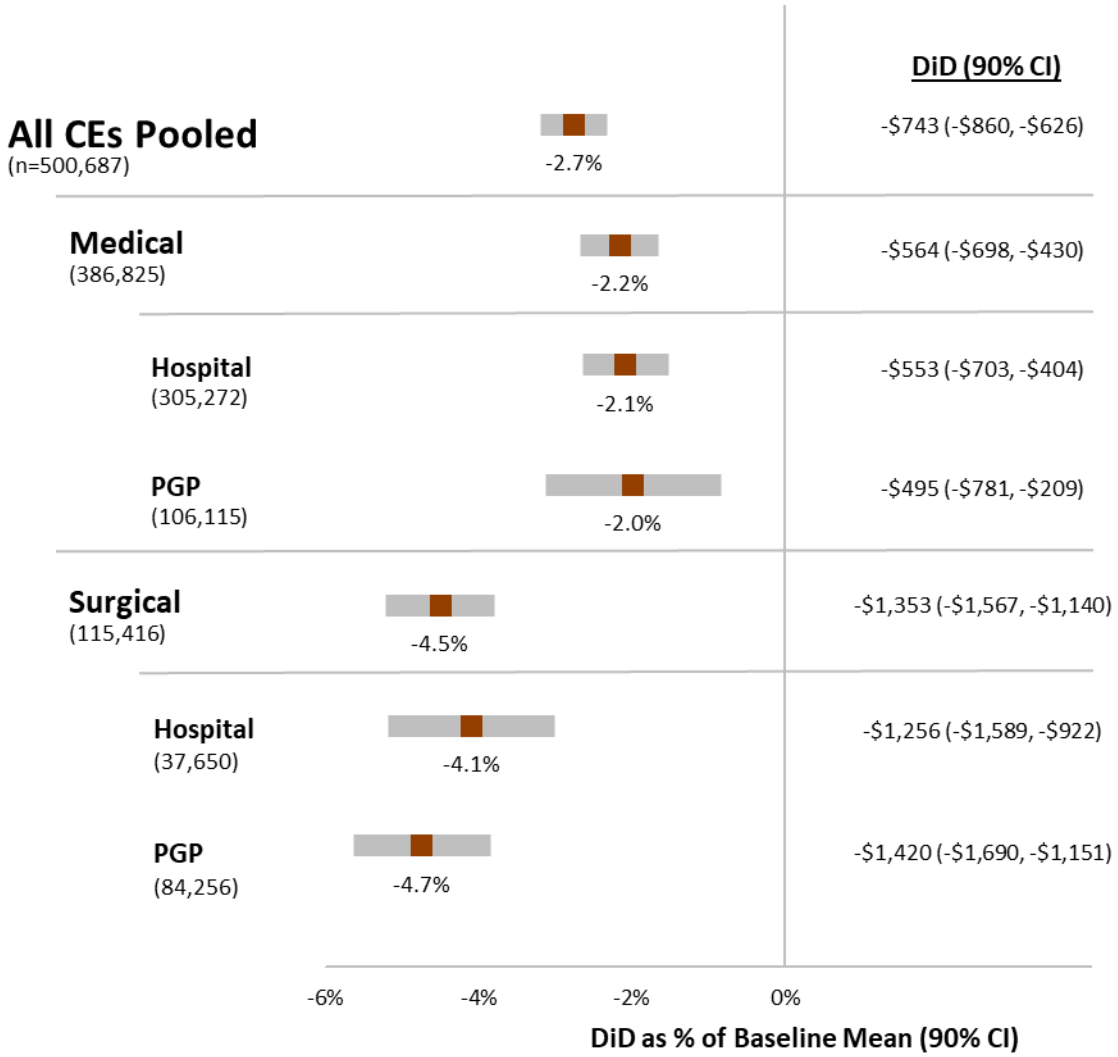
Pooled Clinical Episodes

During Model Years 1 and 2, the BPCI Advanced Model reduced episode payments by $743 per episode (90% confidence interval: -$860, -$626; p<0.00), or about 2.7% of the baseline mean (Exhibit 9). The reduction in per-episode payments was over twice as large for surgical CEs as it was for medical CEs. For medical CEs, episode payments were reduced by $564 per episode (90% confidence interval: -$698, -$430; p<0.00), or about 2.2% of the baseline mean. For surgical CEs, episode payments were reduced by $1,353 per episode (90% confidence interval: -$1,567, -$1,140; p<0.00), or about 4.5% of the baseline mean.

For medical CEs, hospital and PGP EIs reduced payments by similar amounts. Hospital medical CEs had a reduction in per-episode payments of $553 (90% confidence interval: -$703, -$404; p<0.00), or about 2.1% of the baseline mean. PGP medical CEs had a reduction in episode payments of $495 per episode (90% confidence interval: -$781, -$209; p<0.00), or about 2.0% of the baseline mean.

For surgical CEs, both hospital and PGP EIs made larger reductions in episode payments than for medical CEs. Hospital surgical CEs had a reduction in episode payments of $1,256 per episode (90% confidence interval: -$1,589, -$922; p<0.00), or about 4.1% of the baseline mean. PGP surgical CEs had a reduction in episode payments of $1,420 per episode (90% confidence interval: -$1,690, -$1,151; p<0.00), or about 4.7% of the baseline mean. The difference between hospitals and PGPs of $165 per episode, or about 0.6% of the baseline mean, was not statistically significant (p=0.52).

Exhibit 9: Impact of BPCI Advanced on Total Payments, Hospital and PGP EIs, October 1, 2018 – December 31, 2019



Note: Total payments represent Part A and B FFS payments for the episode anchor stay or procedure and the 90-day PDP. The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent the relative change in dollars. Results are also presented as a percentage of the BPCI Advanced baseline mean total payments. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. This payment outcome is standardized to remove the effect of geographic and other payment adjustments. CE = clinical episode; CI = confidence interval; EI = episode initiator; PGP = physician group practice; PDP = post-discharge period.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Individual Clinical Episodes by Episode Initiator Type

BPCI Advanced hospital EIs reduced episode payments from the baseline to the intervention period relative to the comparison group for all 10 medical CEs evaluated. The reduction was statistically significant for five medical CEs (Exhibit 10). Episode payment reductions ranged from $1,014, or 4.1% of the baseline mean, for urinary tract infection (UTI) episodes to $5, or 0.02% of

the baseline mean, for GI hemorrhage episodes. The largest reductions were for UTI, stroke, and sepsis. (Detailed results of BPCI Advanced impact estimates by CE are in **Appendix E**.)

BPCI Advanced PGP EIs reduced episode payments from the baseline to the intervention period relative to the comparison group for all 11 medical CEs evaluated, but none of the reductions were statistically significant (Exhibit 11). Episode payment reductions ranged from $770, or 2.4% of the baseline mean, for stroke episodes to $163, or 0.7% of the baseline mean, for renal failure episodes.

BPCI Advanced hospital EIs reduced episode payments from the baseline to the intervention period relative to the comparison group for the three surgical CEs evaluated (hip and femur procedures except major joint, MJRLE, and PCI outpatient). The reduction was statistically significant for two surgical CEs—hip and femur procedures except major joint and MJRLE (Exhibit 10). Episode payment reductions ranged from $2,269, or 4.9% of the baseline mean, for hip and femur procedures except major joint episodes to $264, or 1.6% of the baseline mean, for PCI (outpatient) episodes.

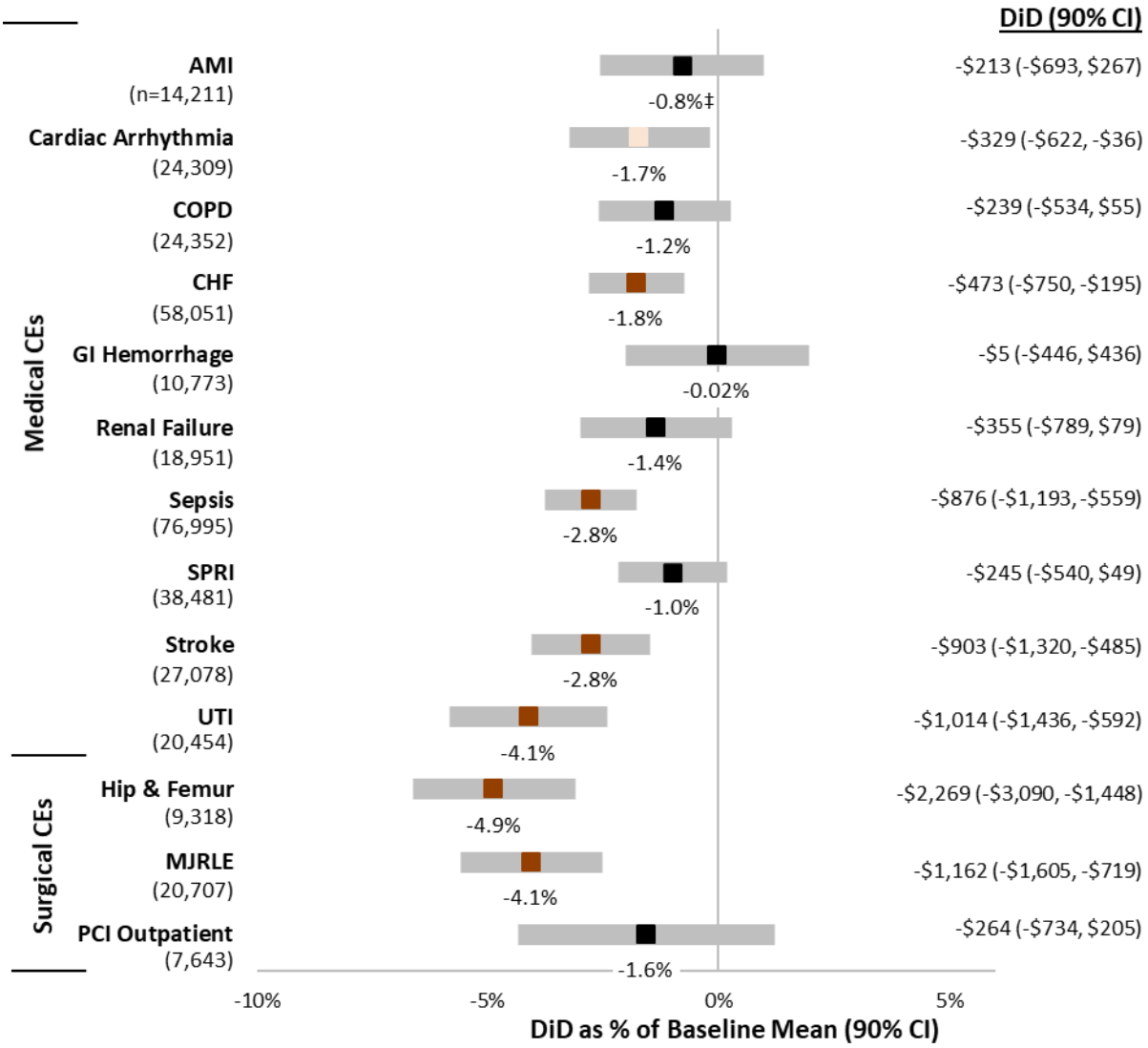
BPCI Advanced PGP EIs reduced episode payments from the baseline to the intervention period relative to the comparison group for all seven surgical CEs evaluated. The reduction was statistically significant for six of the seven surgical CEs (Exhibit 11). Episode payment reductions ranged from $2,463, or 5.4% of the baseline mean, for hip and femur procedures except major joint episodes to $701, or 2.5% of the baseline mean, for PCI (inpatient) episodes.

We estimate that hospital and PGP EIs had statistically significant reductions in episode payments for MJRLE, averaging $1,162 per episode, or 4.1% of the baseline mean, for hospitals and $1,373 per episode, or 5.2% of the baseline mean, for PGPs. These estimates are based on the MJRLE procedures occurring in the hospital inpatient setting, but beginning in January 2018, CMS allowed Medicare coverage of some MJRLE procedures, specifically TKA to be performed in the outpatient setting.[16] When the potential impact of the BPCI Advanced Model on the choice of setting (inpatient or outpatient) is considered, our estimates of the impact of BPCI Advanced on MJRLE episode payments may be biased, overstating the reductions in payments. This is because total episode payments for TKA procedures performed in the outpatient setting would be less costly, on average, but the BPCI Advanced Model, during Model Years 1 and 2, provides financial incentives to perform TKAs in the more expensive inpatient setting. TKA episodes performed in the outpatient setting would be less costly than in the inpatient setting due to lower payments for the procedure and because skilled nursing facility (SNF) stays generally are not covered by Medicare following an outpatient procedure. If comparison group providers utilize the outpatient setting for their less complex beneficiaries, while BPCI Advanced participants keep beneficiaries in the higher cost setting, the comparison group will appear to have relatively higher costs during the intervention period, leading to an overestimate of payment reductions from the model. Were BPCI Advanced participants to move their less costly patients to the outpatient setting, however, the remaining inpatient population would be costlier than the

[16] During Model Years 1 and 2 (2018 and 2019), the MJRLE CE included TKA performed in the inpatient setting only. It would not have been feasible to produce a prospective trend including outpatient TKA to calculate target prices because Medicare coverage extended only to inpatient TKA during the baseline period.

historical population used to calculate target prices (prior to Medicare coverage of outpatient TKA). Thus, participants that shift TKAs to the outpatient setting may find it more difficult to reduce their payments below their target price, thus lowering their reconciliation payments.[17] For BPCI Advanced Model Year 3 (2020), the MJRLE CE definition was expanded to include TKA procedures performed in both the hospital outpatient and inpatient settings. Our impact estimates for Model Year 3 (2020) will reflect this change.

Exhibit 10: Impact of BPCI Advanced on Total Payments by CE, Hospital EIs, October 1, 2018 – December 31, 2019



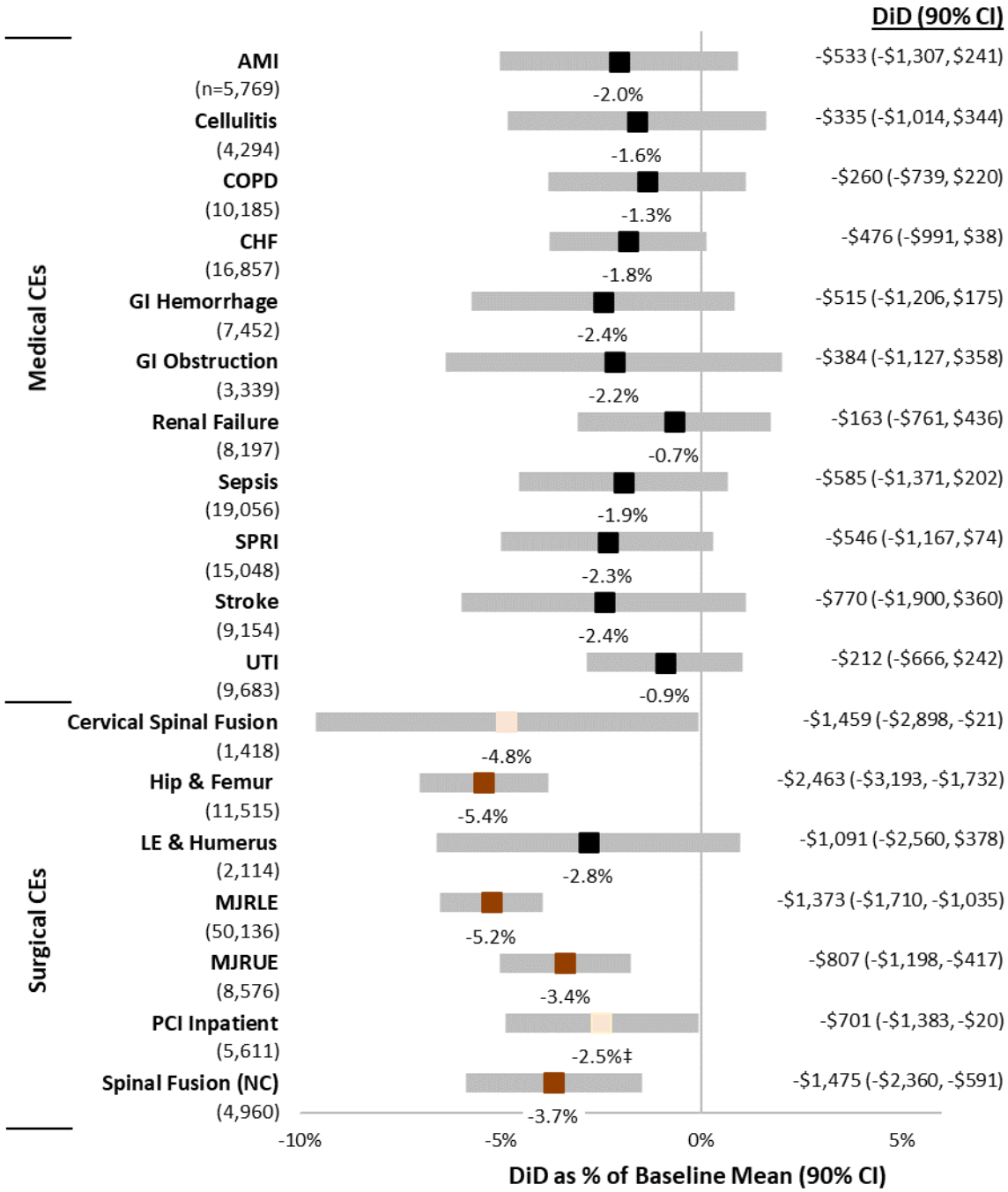
[17] In our evaluation of the mandatory Comprehensive Care for Joint Replacement (CJR) Model, an episode-based payment model focused solely on MJRLE with similar financial incentives, we estimated that 10% of TKAs performed in the inpatient setting by mandatory CJR-participating hospitals would have been performed in the outpatient setting in the absence of the CJR model. Since TKAs made up about 50% of all MJRLE episodes (total hip arthroplasty represented the other 50%), this resulted in an additional 5% of all MJRLE episodes to be performed in the more costly inpatient setting due to the CJR Model. For additional details, see the CMS Comprehensive Care for Joint Replacement Model: Performance Year 3 Evaluation Report, available for download at https://innovation.cms.gov/innovation-models/cjr.

Note: Total payments represent Part A and B FFS payments for the episode anchor stay or procedure and the 90-day PDP. The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent the relative change in dollars. Results are also presented as a percentage of the BPCI Advanced baseline mean total payments. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. This payment outcome is standardized to remove the effect of geographic and other payment adjustments. AMI = acute myocardial infarction; CE = clinical episode; CHF = congestive heart failure; CI = confidence interval; COPD = chronic obstructive pulmonary disease; EI = episode initiator; GI = gastrointestinal; Hip & Femur = hip and femur procedures except major joint; MJRLE = major joint replacement of the lower extremity; PCI = percutaneous coronary intervention; PDP = post-discharge period; SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

‡ We rejected the null hypothesis that BPCI Advanced and matched comparison providers had parallel trends for this outcome (with 90% confidence). See **Appendix F** for parallel trends test results.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Exhibit 11: Impact of BPCI Advanced on Total Payments by CE, PGP EIs, October 1, 2018 – December 31, 2019



Note: Total payments represent Part A and B FFS payments for the episode anchor stay or procedure and the 90-day PDP. The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent the relative change in dollars. Results are also presented as a percentage of the BPCI Advanced baseline mean total payments. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. This payment outcome is standardized to remove the effect of geographic and other payment adjustments. AMI = acute myocardial infarction; CE = clinical episode; CHF = congestive heart failure; CI = confidence interval; COPD = chronic obstructive pulmonary disease; EI = episode initiator; GI = gastrointestinal; Hip & Femur Procedures = hip and femur procedures except major joint; LE & Humerus Procedures = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity;

PCI = percutaneous coronary intervention; PGP = physician group practice; PDP = post-discharge period; Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

‡ We rejected the null hypothesis that BPCI Advanced and matched comparison providers had parallel trends for this outcome (with 90% confidence). See **Appendix F** for parallel trends test results.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

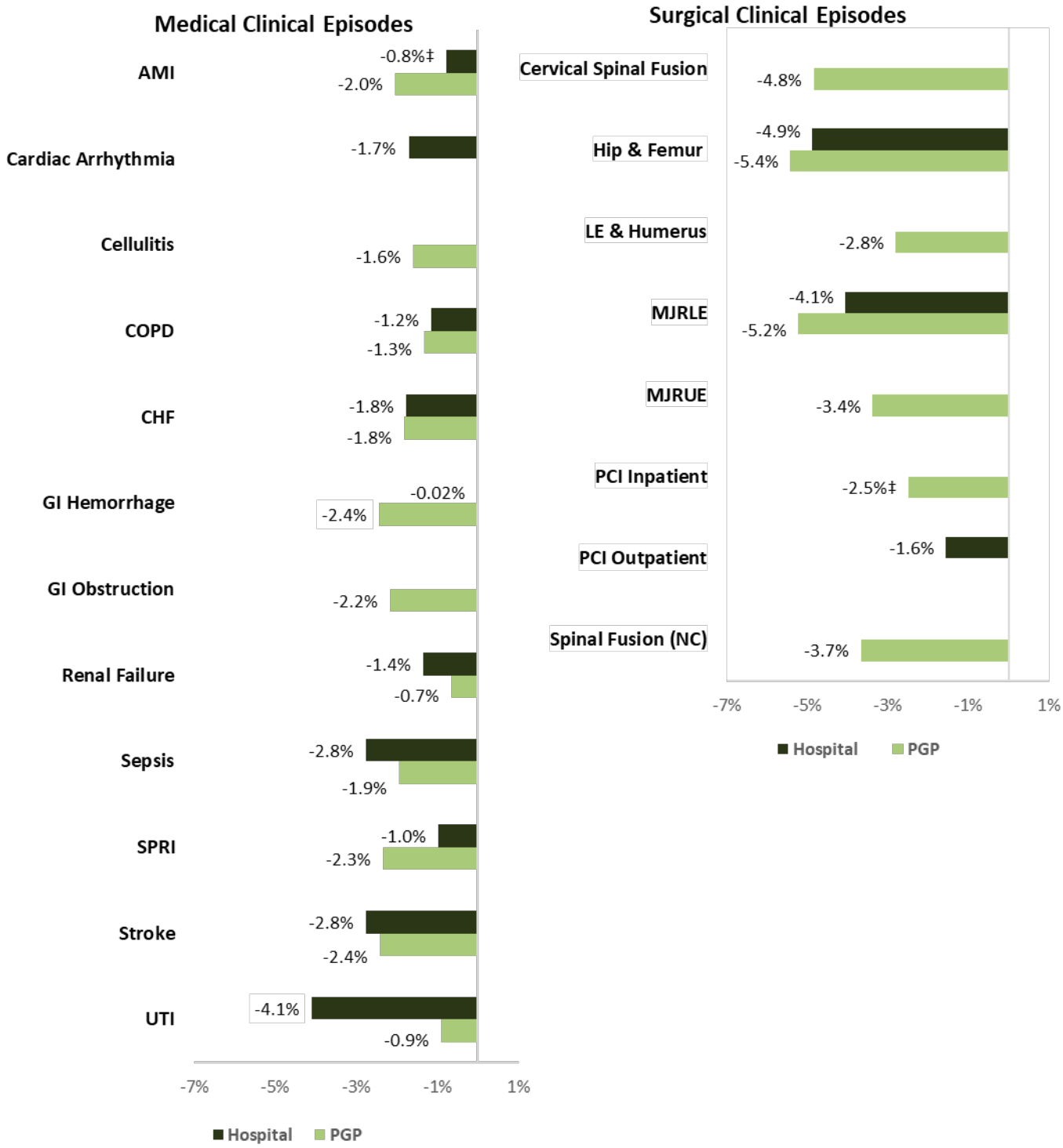
Conclusion

When pooling all CEs evaluated, the BPCI Advanced Model achieved statistically significant reductions in average standardized episode payments. The estimated reduction in per-episode payments was over twice as large for pooled surgical CEs as it was for medical CEs. For medical CEs, hospitals and PGPs reduced episode payments by small, but similar amounts when pooling across CEs. For surgical CEs, both hospitals and PGPs made larger reductions in episode payments than for medical CEs when pooling across CEs, with no statistically significant difference between the two.

In analyzing the individual medical CEs, we found that hospital EIs had statistically significant reductions in episode payments for a larger number of CEs than PGP EIs. Upon further inspection, however, it does not appear that these differences in statistically significant results between hospital and PGP EIs are meaningful. For the nine medical CEs that hospitals and PGPs have in common, four had larger estimated percent reductions for hospitals than for PGPs, and five had larger estimated percent reductions for PGPs than for hospitals (Exhibit 12). The difference in statistically significant results likely is because PGPs have larger confidence intervals than hospitals, which is consistent with PGPs' lower participation in medical CEs.

In analyzing the surgical CEs separately, we found that PGP EIs had statistically significant reductions in episode payments for a larger number of CEs than hospital EIs. Upon further inspection, however, it does not appear that these differences in statistically significant results between hospitals and PGPs are meaningful. For the two surgical CEs in common, both hospitals and PGPs had statistically significant reductions. The reductions were slightly larger for PGP EIs, but the differences between hospitals and PGPs were not statistically significant.

Exhibit 12: Impact of BPCI Advanced on Total Payments as a Percent of the BPCI Advanced Baseline Mean by CE and EI Type, October 1, 2018 – December 31, 2019



Note: Total payments represent Part A and B FFS payments for the episode anchor stay or procedure and the 90-day PDP. The estimates in this exhibit are the results of a difference-in-differences model. Results are expressed as percentage of the BPCI Advanced baseline mean total payment. This payment outcome is standardized to remove the effect of geographic and other payment adjustments. AMI = acute myocardial infarction; CE = clinical episode; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; EI = episode initiator; GI = gastrointestinal; Hip & Femur Procedures = hip and femur procedures except major joint; LE & Humerus Procedures = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity;

MJRUE = major joint replacement of the upper extremity; PCI = percutaneous coronary intervention; PGP = physician group practice; PDP = post-discharge period; Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

‡ We rejected the null hypothesis that BPCI Advanced and matched comparison providers had parallel trends for this outcome (with 90% confidence). See **Appendix F** for parallel trends test results.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays / procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

c. How have average post-acute care payments changed under BPCI Advanced?

Total episode payments can be reduced by reducing PAC use, such as shortening the length of stay (LOS) or by shifting PAC use from more to less intensive care settings which receive lower Medicare payments. To understand the contribution of PAC use to episode payment reductions, we measured the impact of BPCI Advanced on SNF, inpatient rehabilitation facility (IRF), and HH payments for the CEs evaluated that are performed in the inpatient setting.[18]

Hospital Episode Initiators

We assessed changes in SNF, IRF, and HH payments for the 12 inpatient hospital CEs evaluated to better understand the key drivers of reductions in total allowed payments.[19] BPCI Advanced hospital EIs reduced SNF payments in all 12 CEs, with statistically significant reductions in 11: nine medical CEs and both surgical CEs. IRF payments declined in nine of 12 CEs, with statistically significant reductions in five CEs, including the two surgical CEs. HH payments, on the other hand, increased in 11 of 12 CEs, and the increases were statistically significant in two CEs (see **Appendix E** for detailed results).

Among the five medical CEs and two surgical CEs with statistically significant reductions in total allowed episode payments, all had statistically significant reductions in SNF payments. Two of the medical CEs (sepsis and stroke) and the two surgical CEs (MJRLE and hip and femur procedures except major joint) also had statistically significant reductions in IRF payments (Exhibit 13). HH payments increased for all five medical CEs, one of which, congestive heart failure (CHF), was statistically significant. Among the two surgical CEs, one (hip and femur procedures except major joint) had an increase in HH payments, which was statistically significant, and one (MJRLE) had a decrease, though not statistically significant.

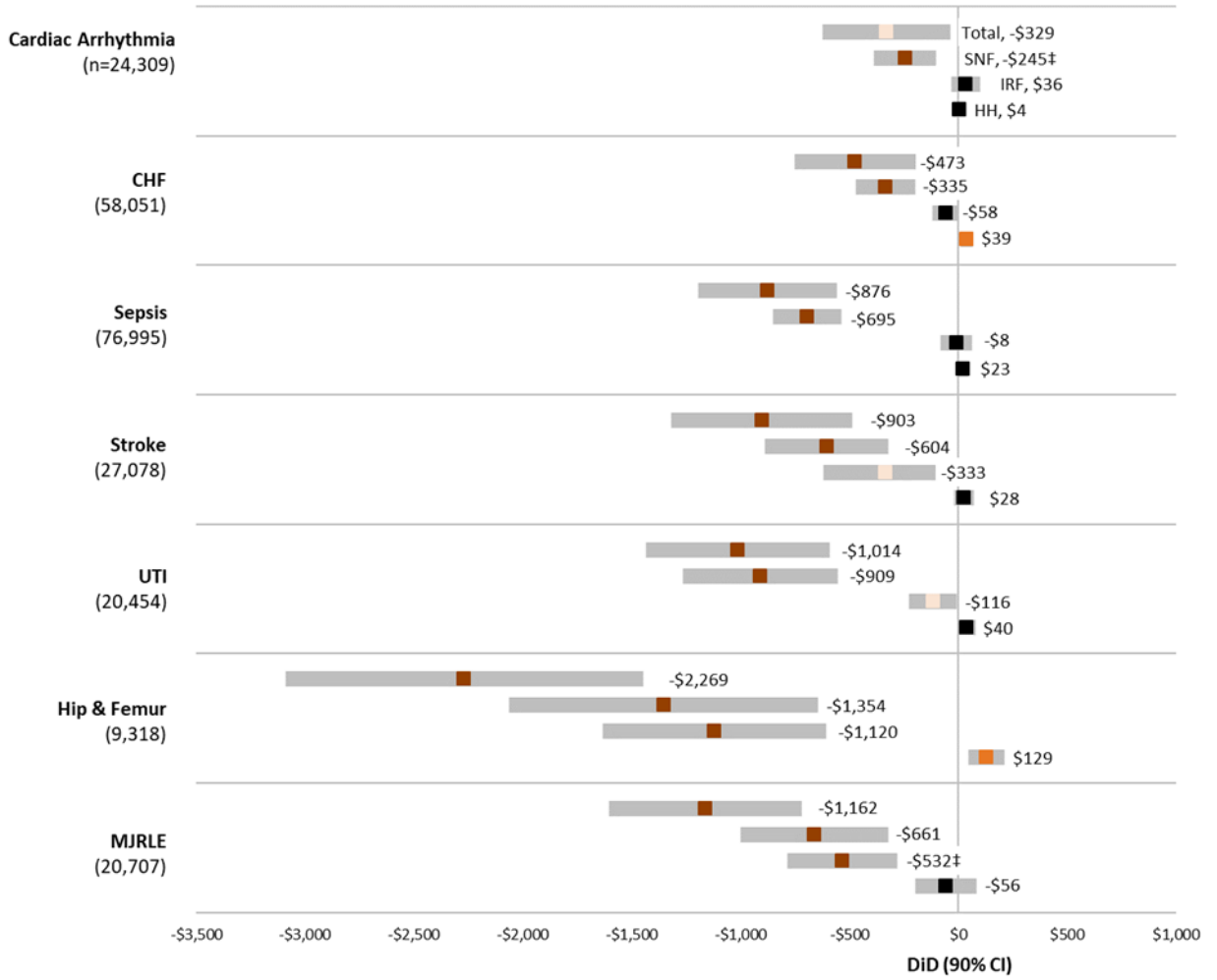
For hip and femur procedures except major joint episodes, which had the largest reduction in total payments, SNF payments declined by $1,354 ($p<0.01$, -7.5% of the baseline mean), IRF payments declined by $1,120 ($p<0.01$, -24.5%), and HH payments increased by $129 ($p<0.05$, 6.4%). Hospital EI MJLRE, stroke, and UTI episodes also had statistically significant reductions in both SNF and IRF payments. For cardiac arrhythmia, CHF, and sepsis, the primary contributor to the decline in total payments was the reduction in SNF payments. There were small,

[18] This analysis is limited to CEs performed in the inpatient setting because PAC use is lower following outpatient procedures. Patient needs are generally less acute, and Medicare generally does not cover SNF or IRF services following outpatient procedures.

[19] The PCI outpatient CE was excluded from this analysis as procedures are not performed in an inpatient setting.

statistically significant increases in HH payments for the hip and femur procedures except major joint and CHF episodes.

Exhibit 13: Impact of BPCI Advanced on SNF, IRF, and HH Payments in the 90-day PDP, CEs with Statistically Significant Reductions in Total Episode Payments, Hospital EIs, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. These payment outcomes were standardized to remove the effect of geographic and other payment adjustments. CE = clinical episode; CHF = congestive heart failure; CI = confidence interval; EI = episode initiator; HH = home health; Hip & Femur = hip and femur procedures except major joint; IRF = inpatient rehabilitation facility; MJRLE = major joint replacement of the lower extremity; PDP = post-discharge period; SNF = skilled nursing facility; UTI = urinary tract infection.

‡ We rejected the null hypothesis that BPCI Advanced and matched comparison providers had parallel trends for this outcome (with 90% confidence). See **Appendix F** for parallel trends test results.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Physician Group Practice Episode Initiators

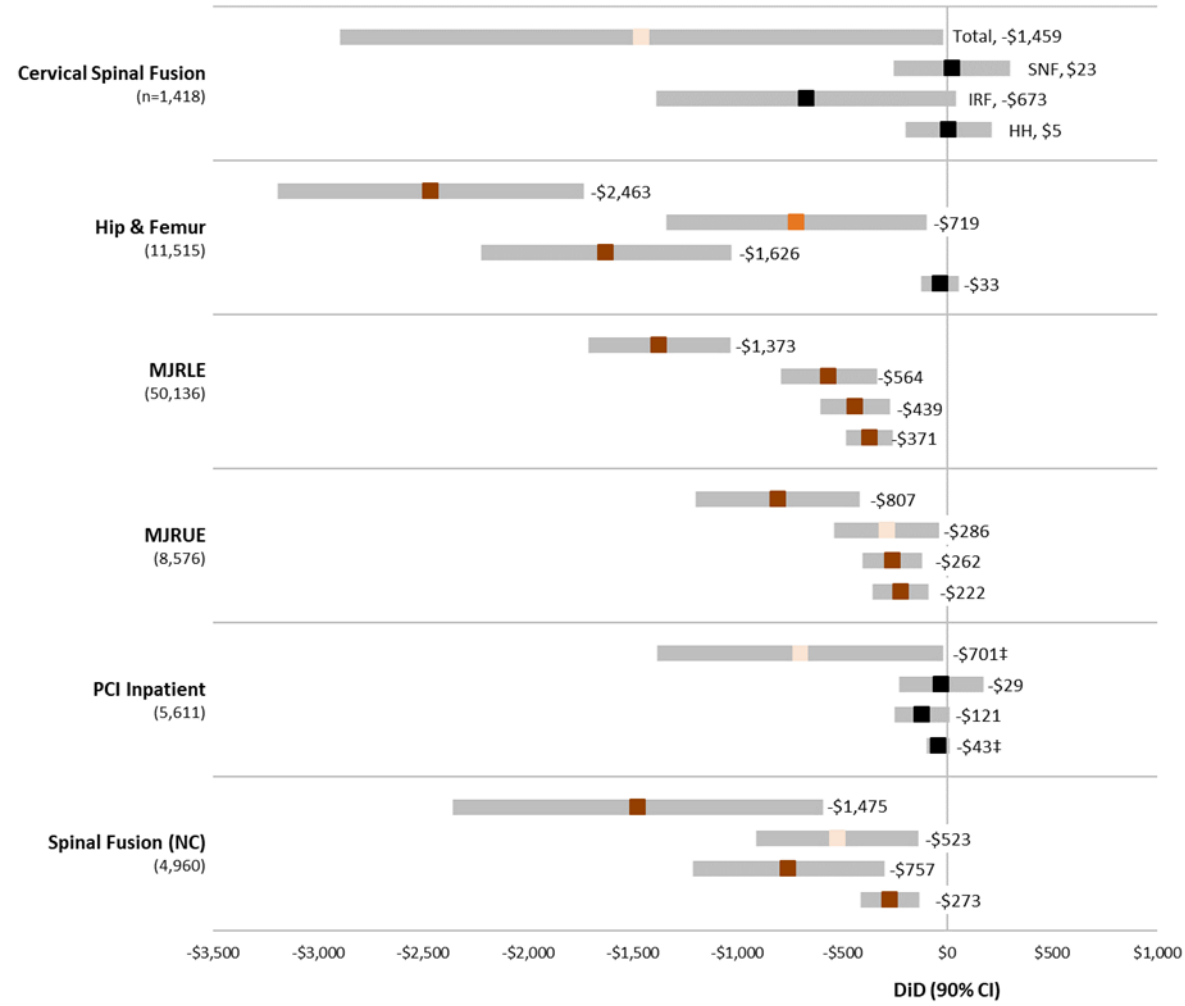
We assessed changes in SNF, IRF, and HH payments for the 18 inpatient PGP CEs evaluated to better understand the key drivers of reductions in total allowed payments. BPCI Advanced PGP EIs reduced SNF payments in 17 of 18 CEs, with statistically significant reductions in three medical CEs and four surgical CEs. Both IRF and HH payments declined in 15 CEs. For IRF payments, there were statistically significant reductions for one medical CE and five surgical CEs. Similarly, reductions in HH payments were statistically significant for one medical CE and three surgical CEs. Overall, most statistically significant reductions in PAC payments for PGP EIs were among surgical CEs (see **Appendix E** for detailed results).

There were six PGP CEs with statistically significant reductions in total allowed payments, and all of them were surgical CEs (Exhibit 14). For four of these CEs, reductions in total payments were driven by reductions in SNF, IRF, and HH payments. For hip and femur procedures except major joint episodes, reductions in IRF payments (-$1,626, p<0.01, -39.8% of the baseline mean) accounted for 66% of the reduction in total payments, and SNF payments (-$719, p<0.10, -4.0%) accounted for 29% of the reduction. There was no statistically significant change in HH payments for hip and femur procedures except major joint episodes. The key drivers of the reduction in total payments were similar for spinal fusion (non-cervical) episodes. IRF payments accounted for 51% (-$757, p<0.01, 36.4%) of the reduction in total episode payments, SNF payments accounted for 35% (-$523, p<0.05, 18.8%) of the reduction in total payments, and HH payments accounted for 18% (-$273, p<0.01, 21.9%). PGP EIs in MJRLE and MJRUE also had statistically significant reductions in SNF, IRF and HH payments.

For cervical spinal fusion and PCI inpatient episodes, there were no statistically significant changes in SNF, IRF or HH payments despite a statistically significant reduction in total episode payments (-$1,459, p=0.10, -4.8% for cervical spinal fusion and -$701, p=0.09, -2.5% for PCI inpatient, though the outcome did not pass the parallel trends test for this CE).[20] To assess the drivers of the reduction in total payments, we evaluated changes in other payment components. For cervical spinal fusion, there was a statistically significant reduction in total Part B payments (-$623, p=0.06, -7.5%), which accounted for 42.7% of the decline in total payments. The decline in Part B payments was driven by a statistically significant reduction in durable medical equipment payments (-$446, p=0.05, -38.2%), which accounted for 30.6% of the total decline. While not statistically significant, the decline in IRF payments (-$673, p=0.12, -33.6%) also represents a large portion (46.1%) of the decline in total payments. For PCI inpatient, we found that a majority (94.4%) of the change in total episode payments was due to a reduction in Part A payments (-$662, p=0.07, -3.1%), which was driven by declines in both Part A inpatient payments during the anchor hospital stay (-$183, p=0.36, -1.2%) and readmissions during the 90-day post-discharge period (PDP) (-$221, p=0.28, -6.0%).

[20] A key assumption required for an unbiased DiD estimate is that BPCI Advanced and the comparison group have the same trend in outcomes prior to the intervention. We tested the null hypothesis that selected BPCI Advanced and comparison providers had parallel trends in outcomes during the baseline period. More details on parallel trends tests are reported in **Appendix C**.

Exhibit 14: Impact of BPCI Advanced on SNF, IRF, and HH Payments in the 90-day PDP for CEs with Statistically Significant Reductions in Total Payments, PGP EIs, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. These payment outcomes were standardized to remove the effect of geographic and other payment adjustments. CE = clinical episode; CI = confidence interval; EI = episode initiator; HH = home health; Hip & Femur = hip and femur procedures except major joint; IRF = inpatient rehabilitation facility; MJRLE = major joint repla cement of the lower extremity; MJRUE = major joint replacement of the upper extremity; PCI = percutaneous coronary intervention; PDP = post-discharge period; PGP = physician group practice; SNF = skilled nursing facility; Spinal Fusion (NC) = spinal fusion (non-cervical).

‡ We rejected the null hypothesis that BPCI Advanced and matched comparison providers had parallel trends for this outcome (with 90% confidence). See **Appendix F** for parallel trends test results.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Conclusion

Hospital and PGP EIs both reduced PAC payments to drive reductions in total episode payments. Both hospitals and PGPs reduced SNF and IRF payments for medical and surgical CEs, while hospitals increased HH payments and PGPs tended to reduce them. (Not all results were statistically significant.) There were reductions in SNF payments for all hospital CEs and for all but one PGP CE, and there were reductions in IRF payments for three-quarters of hospital and PGP CEs (nine out of 12 hospital CEs and 15 out of 18 PGP CEs). Results for HH payments varied by EI type, with increases in HH payments for all but one hospital CE and decreases for all but three PGP CEs.

d. How has service use changed under BPCI Advanced?

To help understand the changes in PAC payments above, we measured the impact of BPCI Advanced on two utilization outcomes for inpatient CEs: the proportion of episodes with a first discharge to an institutional PAC setting and the number of SNF days in the 90-day PDP (among beneficiaries with at least one SNF stay in the PDP, which account for about 30% of intervention episodes).[21] These outcomes were chosen because evaluations of the BPCI Initiative demonstrated that participants reduced episode payments primarily through these two mechanisms: reducing the proportion of episodes discharged to an institutional PAC setting and reducing the number of days in SNF.

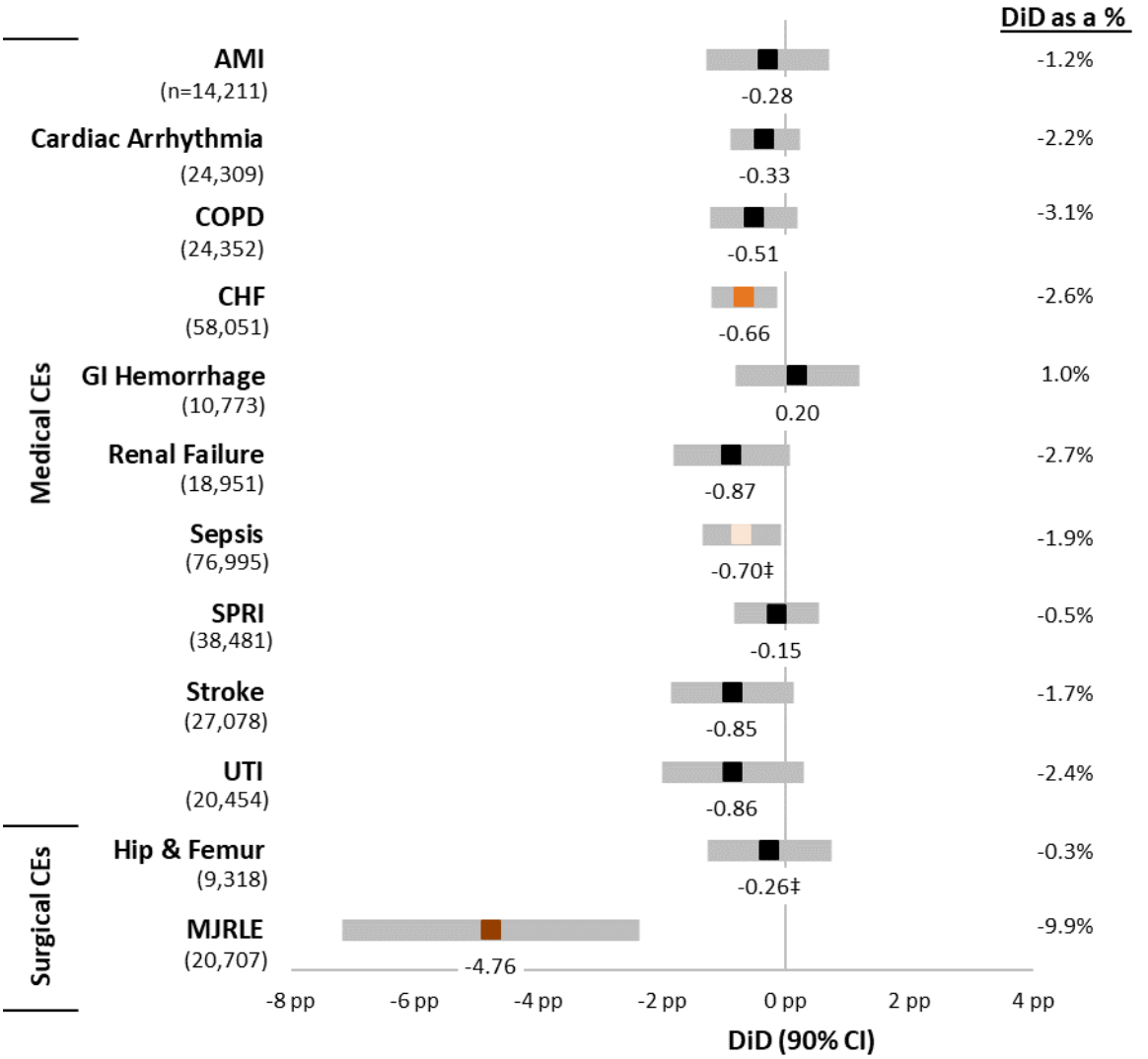
Hospital Episode Initiators

For hospital EIs, the proportion of beneficiaries first discharged from the hospital to institutional PAC settings declined in 11 of 12 CEs evaluated, and three of the declines were statistically significant, though one of them did not pass the test of parallel trends, an assumption required for an unbiased DiD estimate (Exhibit 15). The reductions were generally small. Among the two CEs with statistically significant declines that met the parallel trends assumption, the proportion of beneficiaries first discharged to institutional PAC settings declined for MJRLE episodes by 4.8 percentage points (pp) ($p<0.01$, -9.9% of the baseline mean) and for CHF episodes by 0.66 pp ($p<0.05$, -2.6%), relative to comparison episodes.[22]

[21] We examine the change in SNF days for SNF users because Medicare pays SNFs on a per diem basis, so a decline in SNF days reduces Medicare payments.

[22] These reductions were robust across multiple specifications. For sensitivity test results, see **Appendix G**.

Exhibit 15: Impact of BPCI Advanced on First Discharge to Institutional PAC Setting by CE, Hospital EIs, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. AMI = acute myocardial infarction; CE = clinical episode; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; CI = confidence interval; EI = episode initiator; GI = gastrointestinal; Hip & Femur = hip and femur procedures except major joint; MJRLE = major joint replacement of the lower extremity; PAC = post-acute care; pp = percentage point(s); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

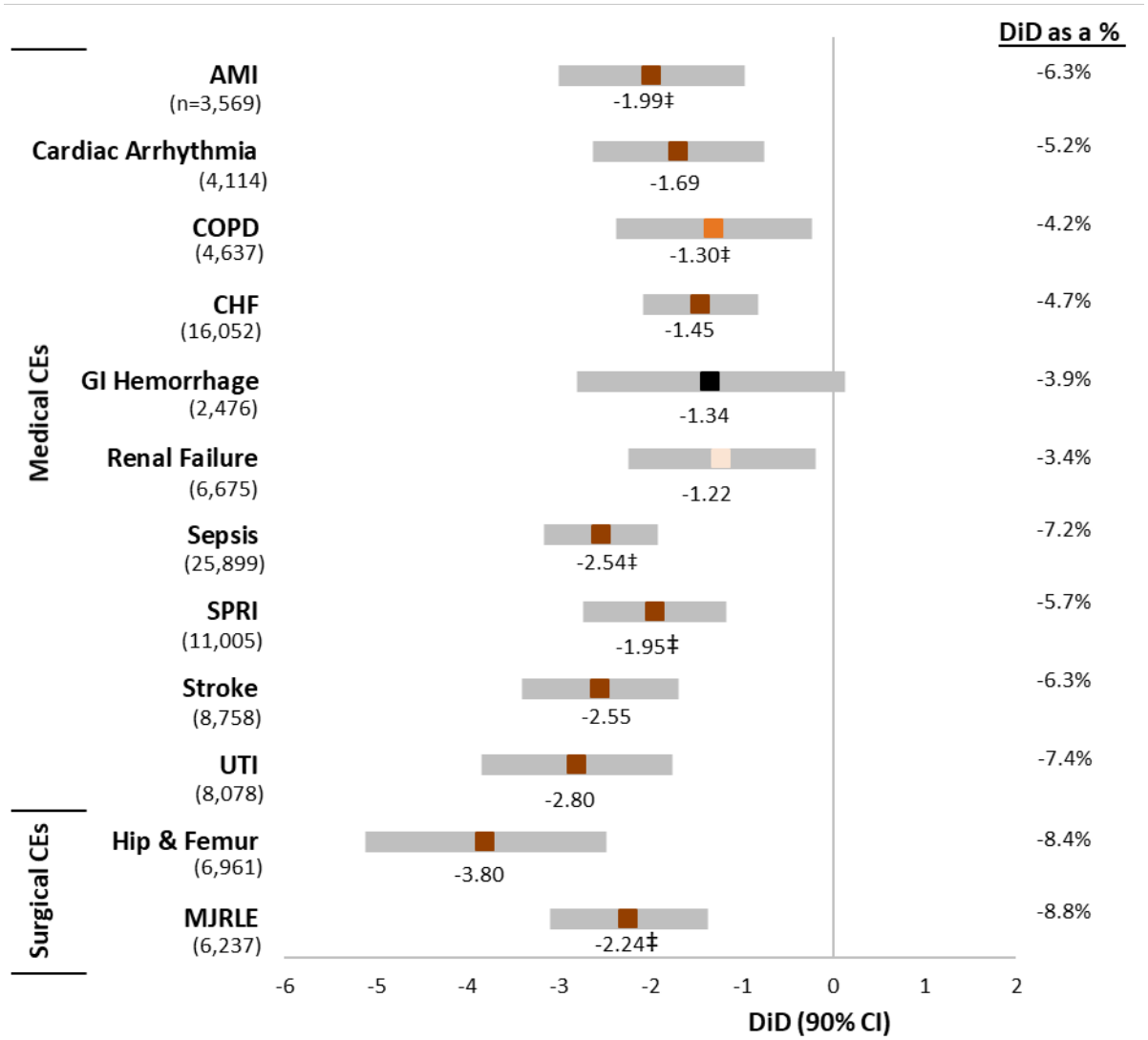
‡ We rejected the null hypothesis that BPCI Advanced and matched comparison providers had parallel trends for this outcome (with 90% confidence). See Appendix F for parallel trends test results.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

For episodes with at least one SNF day during the 90-day PDP, there was a relative decline in SNF days for all CEs evaluated, and the declines were statistically significant in all but one CE (Exhibit 16). The point estimates of the reduction in the number of days in SNF care ranged from 1.22 to

3.80 days, though not all CE pass the parallel trends test. Among the medical CEs, UTI had the largest reduction (-2.8 days, p<0.01, -7.4%), followed by cardiac arrhythmia (-1.69 days, p<0.01, -5.2%), CHF (-1.45 days, p<0.01, -4.7%), and renal failure (-1.22 days, p<0.10, -3.4%). The point estimates for the two surgical CEs (hip and femur procedures except major joint and MJRLE) are larger in magnitude and account for more than an 8% reduction from the baseline mean. SNF days declined by 3.8 days (p<0.01, -8.4%) for hip and femur procedures except major joint episodes, and by 2.2 days (p<0.01, -8.8%) for MJRLE episodes.

Exhibit 16: Impact of BPCI Advanced on Number of SNF Days for SNF Users in the 90-day PDP by CE, Hospital EIs, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. Results are presented as the relative change in days and expressed as a percentage of the BPCI Advanced baseline mean number of SNF days. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. AMI = acute myocardial infarction; CE = clinical episode; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; CI = confidence interval; EI = episode initiator; GI = gastrointestinal; Hip & Femur = hip and femur procedures except major joint; MJRLE = major joint replacement of the lower extremity; PDP = post-discharge period; SNF = skilled nursing facility; SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

‡ We rejected the null hypothesis that BPCI Advanced and matched comparison providers had parallel trends for this outcome (with 90% confidence). See Appendix F for parallel trends test results.

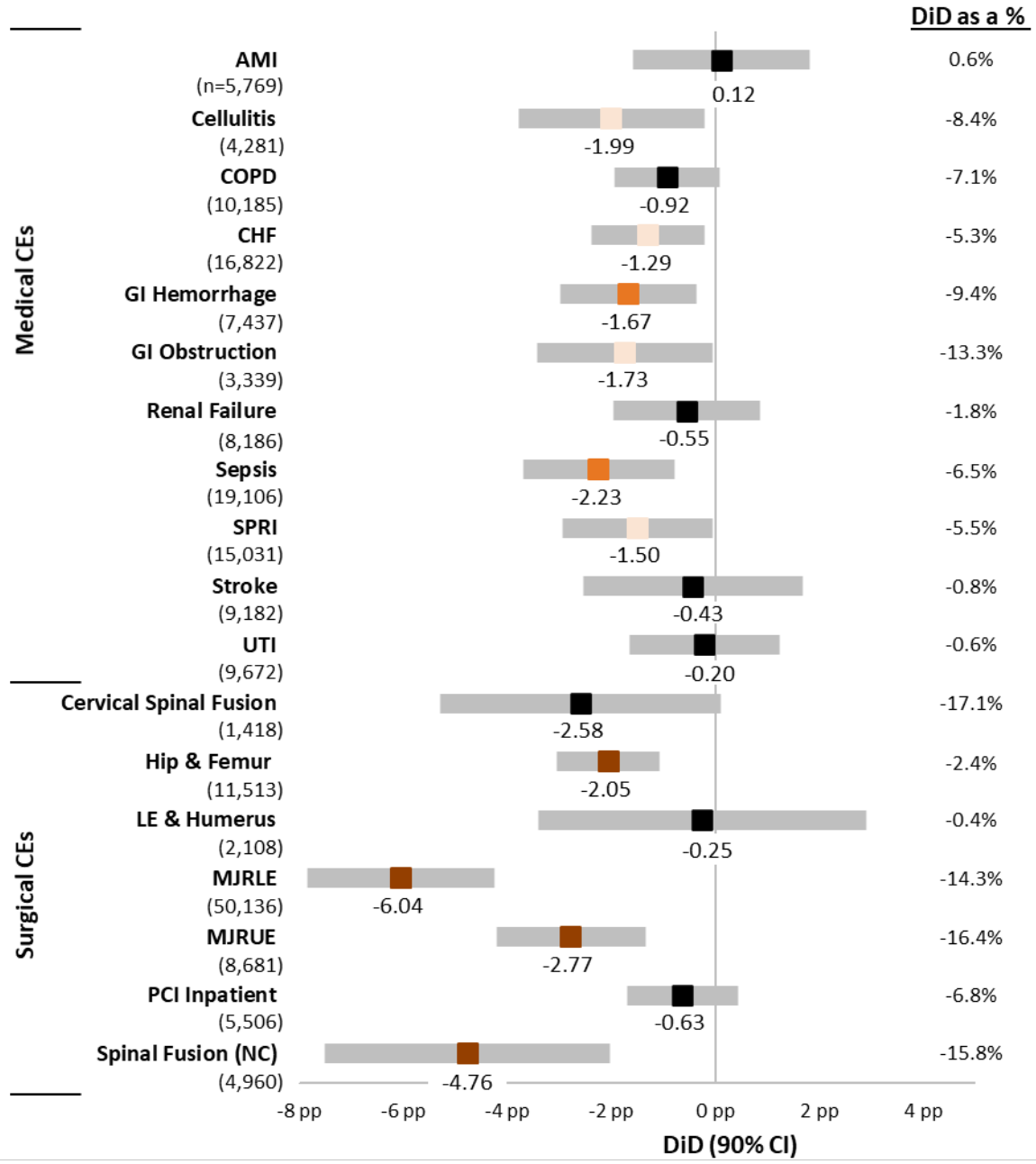
Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Physician Group Practice Episode Initiators

For PGP EIs, there was a relative decline in the proportion of beneficiaries first discharged from the hospital to institutional PAC settings for 17 CEs evaluated, with statistically significant declines in 10 CEs (Exhibit 17). The reductions were modest, with the largest relative reductions for surgical CEs. For MJRLE episodes, the proportion first discharged to institutional PAC settings decreased by 6.0 pp ($p<0.01$, -14.3% of the baseline mean), spinal fusion (non-cervical) decreased by 4.8 pp ($p<0.01$, -15.8%), and MJRUE decreased by 2.7 pp ($p<0.01$, -16.4%). There were also statistically significant relative reductions for cellulitis, CHF, GI hemorrhage, gastrointestinal obstruction (GI obstruction), sepsis, simple pneumonia and respiratory infections (SPRI), and hip and femur procedures except major joint episodes.[23]

[23] These reductions were robust across multiple specifications. For sensitivity test results see **Appendix G**.

Exhibit 17: Impact of BPCI Advanced on First Discharge to Institutional PAC Setting by CE, PGP EIs, October 1, 2018 – December 31, 2019



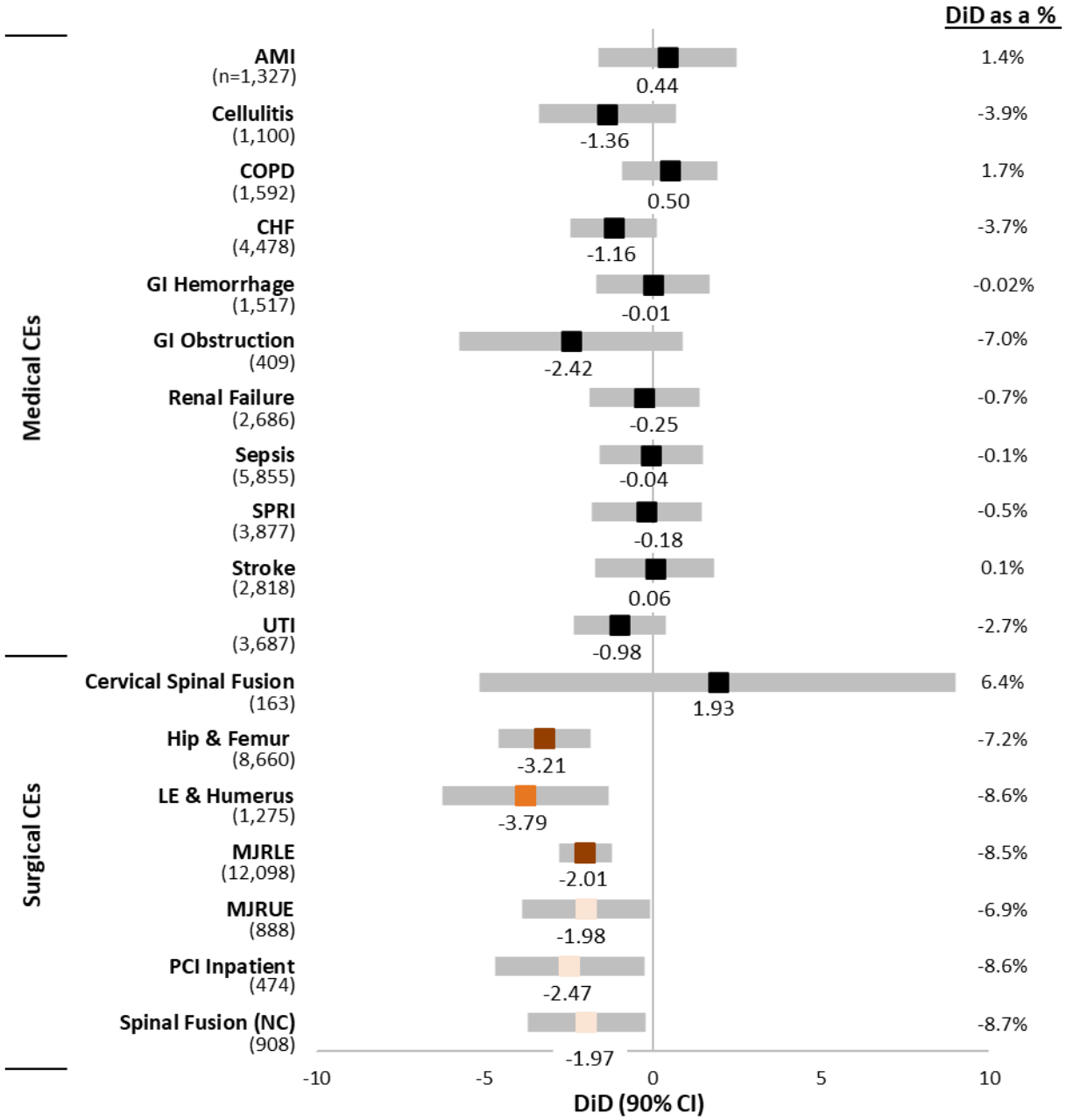
Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. AMI = acute myocardial infarction; CE = clinical episode; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; CI = confidence interval; EI = episode initiator; GI = gastrointestinal; Hip & Femur = hip and femur procedures except major joint; LE & Humerus = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity; PAC = post-acute care; PCI = percutaneous coronary intervention; PGP = physician group practice; pp = percentage point(s); Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/

procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

For episodes with at least one SNF day during the 90-day PDP, there was a statistically significant relative decline in SNF days for six surgical CEs (Exhibit 18). The largest reduction was for lower extremity and humerus procedures except hip, foot, femur episodes (-3.8 days, $p<0.05$, -8.6%). This was followed by hip and femur procedures except major joint (-3.21 days, $p<0.01$, -7.2%), PCI (-2.47 days, $p<0.10$, -8.6%), MJRLE (-2.01 days, $p<0.01$, -8.5%), MJRUE (-1.98 days, $p<0.10$, -6.9%) and spinal fusion (non-cervical) (-1.97 days, $p<0.10$, -8.7%). There were declines in SNF days for eight of the 11 PGP medical CEs, but none of the changes were statistically significant.

Exhibit 18: Impact of BPCI Advanced on Number of SNF Days for SNF Users in the 90-day PDP by CE, PGP EIs, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent the relative change in SNF days. Results are also presented as a percentage of the BPCI Advanced baseline average number of SNF days. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. AMI = acute myocardial infarction; CE = clinical episode; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; CI = confidence interval; EI = episode initiator; GI = gastrointestinal; Hip & Femur = hip and femur procedures except major joint; LE & Humerus = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity; PAC = post-acute care; PCI = percutaneous coronary intervention; PDP = post-discharge period; PGP = physician group practice; SNF = skilled nursing facility; Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/

procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Conclusion

As described above, both hospital and PGP EIs reduced total payments through reductions in SNF and IRF payments, but changes in PAC use varied. Hospital EIs reduced the number of SNF days among those with at least one SNF stay in both medical and surgical CEs, and while there were declines in the proportion of hospital episodes first discharged to an institutional PAC facility, the declines were small and were only statistically significant for three CEs. Conversely, reductions in the share of episodes first discharged to an institutional PAC facility were larger for PGP CEs, and more than half were statistically significant. Reductions in SNF days were concentrated among surgical PGP CEs, with generally smaller or no reductions for medical PGP CEs.

These results, along with the changes in PAC payments, demonstrate that methods for care redesign may vary by EI and CE type. Hospitals may have more control over inpatient care protocols, which impact recovery and the type and duration of PAC use. PGPs may have an ability to create a more targeted post-discharge plan than hospitals. Flexible models allow participants to reduce episode payments using the levers available to them.

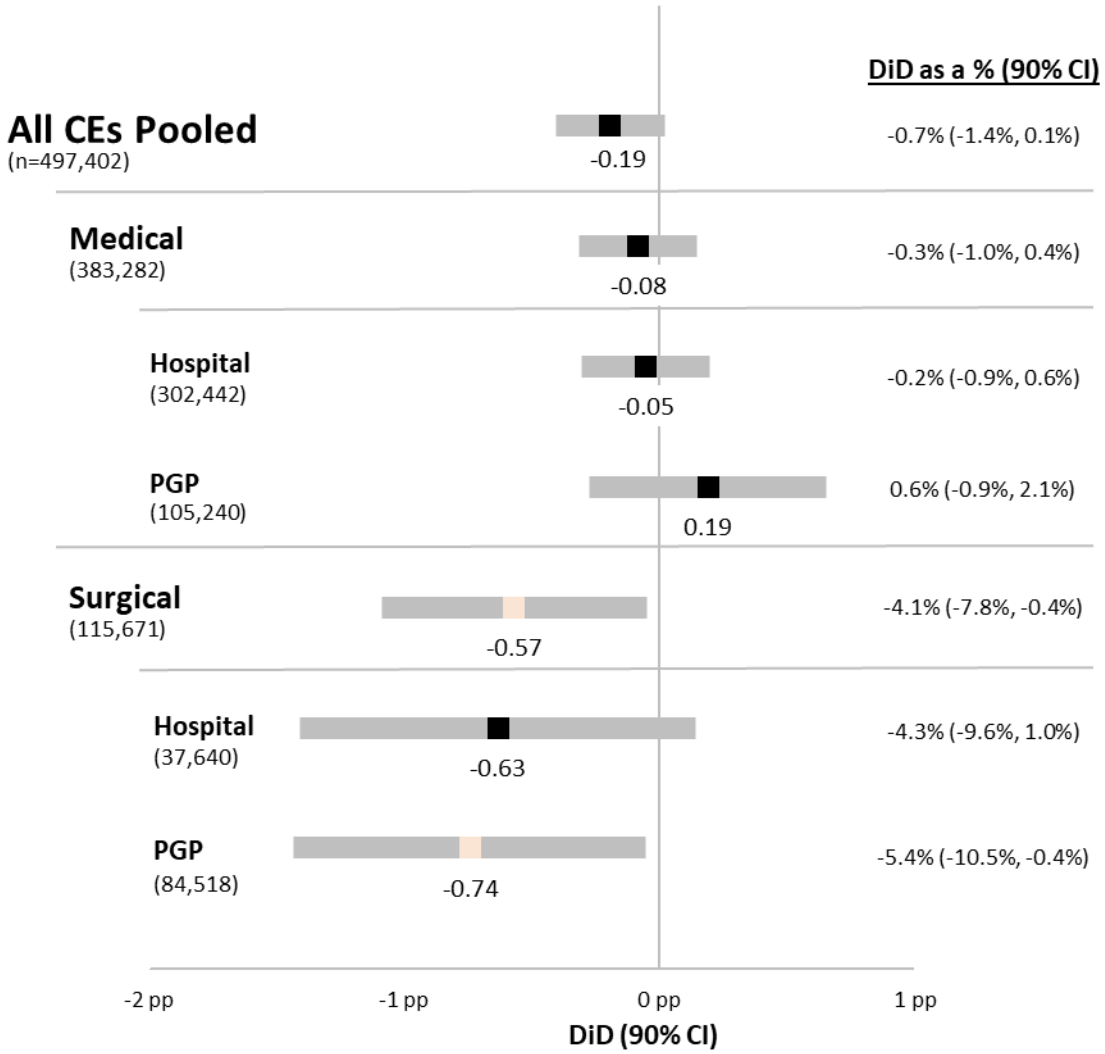
e. How has quality of care changed under BPCI Advanced?

To assess the quality of care received by beneficiaries treated by BPCI Advanced participants, we evaluated the impact of the model on two claims-based quality measures: the unplanned readmission rate and the mortality rate in the 90-day PDP.

Unplanned Readmission Rate

During Model Years 1 and 2, the BPCI Advanced Model did not have an impact on the unplanned readmission rate pooled across the CEs evaluated or across the medical CEs evaluated, but there was a reduction of 0.57 pp for surgical CEs (90% confidence interval: -1.09, -0.05; $p<0.08$), or about 4.1% of the BPCI Advanced baseline unplanned readmission rate (Exhibit 19). For medical CEs, there was a small relative decline in the unplanned readmission rate for hospital EIs and a small relative increase for PGP EIs, and neither estimate was statistically significant. For surgical CEs, there were relative declines in the unplanned readmission rate for both hospitals and PGPs, though only the PGP estimate was statistically significant. For PGP surgical CEs, the unplanned readmission rate declined 0.74 pp (90% confidence interval: -1.43, -0.05; $p<0.08$), or about 5.4% of the baseline mean.

Exhibit 19: Impact of BPCI Advanced on Unplanned Readmission Rate in the 90-day PDP, October 1, 2018 – December 31, 2019

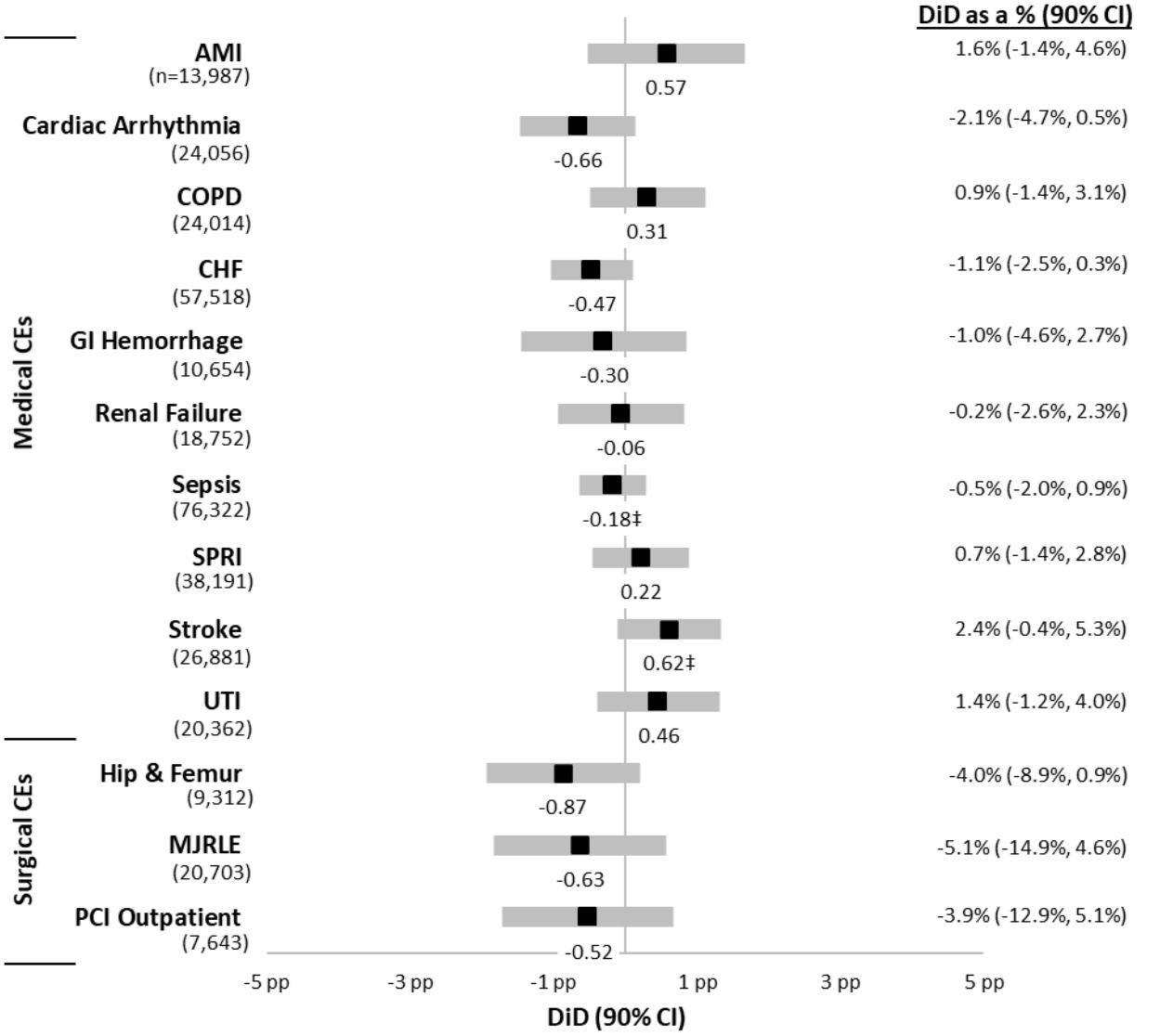


Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. CE = clinical episode; CI = confidence interval; PDP = post-discharge period; PGP = physician group practice; pp = percentage point(s).

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Half of the hospital medical CEs analyzed had an increase in the unplanned readmission rate, and half had a decrease, relative to the comparison group, and none of the estimates were statistically significant (Exhibit 20). The unplanned readmission rate declined for BPCI Advanced hospitals for all three of the surgical CEs analyzed, though none of the estimates were statistically significant.

Exhibit 20: Impact of BPCI Advanced on Unplanned Readmission Rate in the 90-day PDP by CE, Hospital EIs, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. AMI = acute myocardial infarction; CE = clinical episode; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; CI = confidence interval; EI = episode initiator; GI = gastrointestinal; Hip & Femur = hip and femur procedures except major joint; MJRLE = major joint replacement of the lower extremity; PCI = percutaneous coronary intervention; PDP = post-discharge period; pp = percentage point(s); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

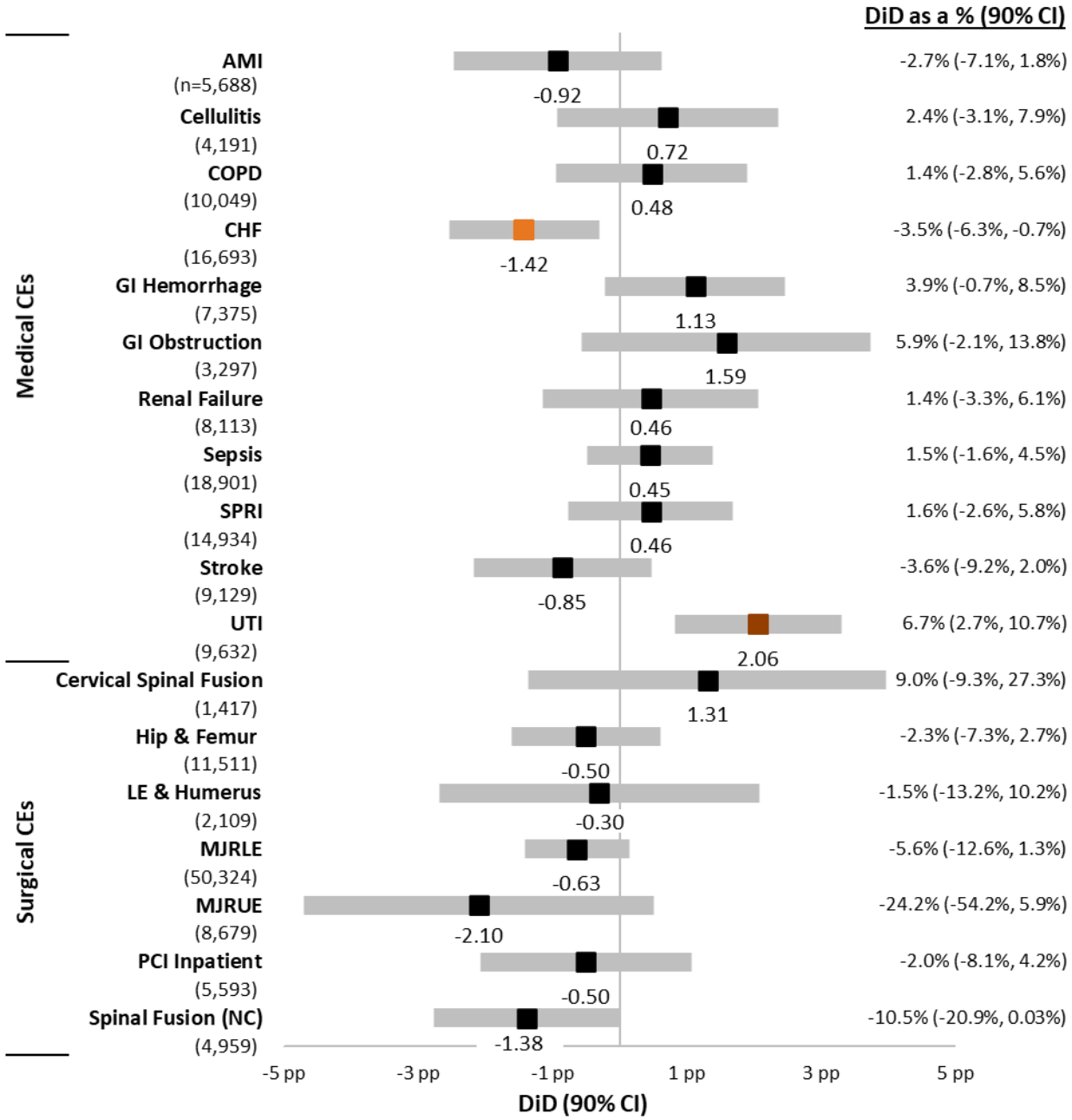
‡ We rejected the null hypothesis that BPCI Advanced and matched comparison hospitals had parallel trends for this outcome (with 90% confidence). See Appendix F for parallel trends test results.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

The unplanned readmission rate increased for BPCI Advanced PGPs relative to the comparison group for eight of the 11 medical CEs analyzed, and one estimate was statistically significant.

There was a relative increase in the unplanned readmission rate for UTI episodes (2.1 pp, p<0.01, 6.7%) (Exhibit 21). The unplanned readmission rate declined for CHF episodes by 1.4 pp (p<0.05, -3.5%), relative to comparison episodes. The unplanned readmission rate decreased for BPCI Advanced PGPs relative to the comparison group for six of the seven surgical CEs analyzed, but none of the estimates were statistically significant.

Exhibit 21: Impact of BPCI Advanced on Unplanned Readmission Rate in the 90-day PDP by CE, PGP EIs, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimates represent a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. AMI = acute myocardial infarction; CE = clinical

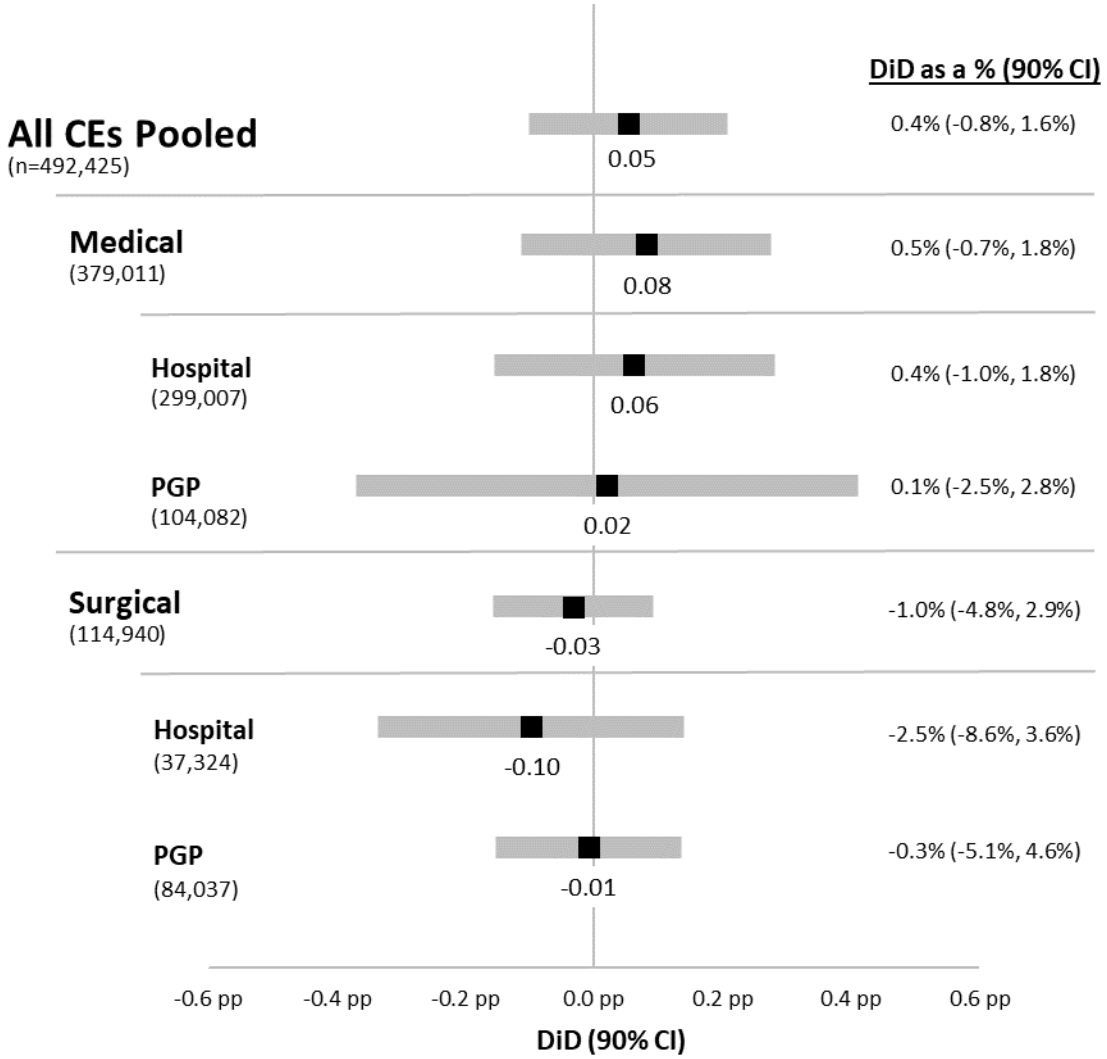
episode; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; CI = confidence interval; EI = episode initiator; GI = gastrointestinal; Hip & Femur = hip and femur procedures except major joint; LE & Humerus = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity; PCI = percutaneous coronary intervention; PDP = post-discharge period; PGP = physician group practice; pp = percentage point(s); Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Mortality Rate

During Model Years 1 and 2, the BPCI Advanced Model did not have an impact on the mortality rate for episodes pooled across the CEs evaluated, for episodes pooled across medical or surgical CEs, or for hospital- or PGP-initiated episodes pooled by surgical and medical CE (Exhibit 22).

Exhibit 22: Impact of BPCI Advanced on Mortality in the 90-day PDP, October 1, 2018 – December 31, 2019



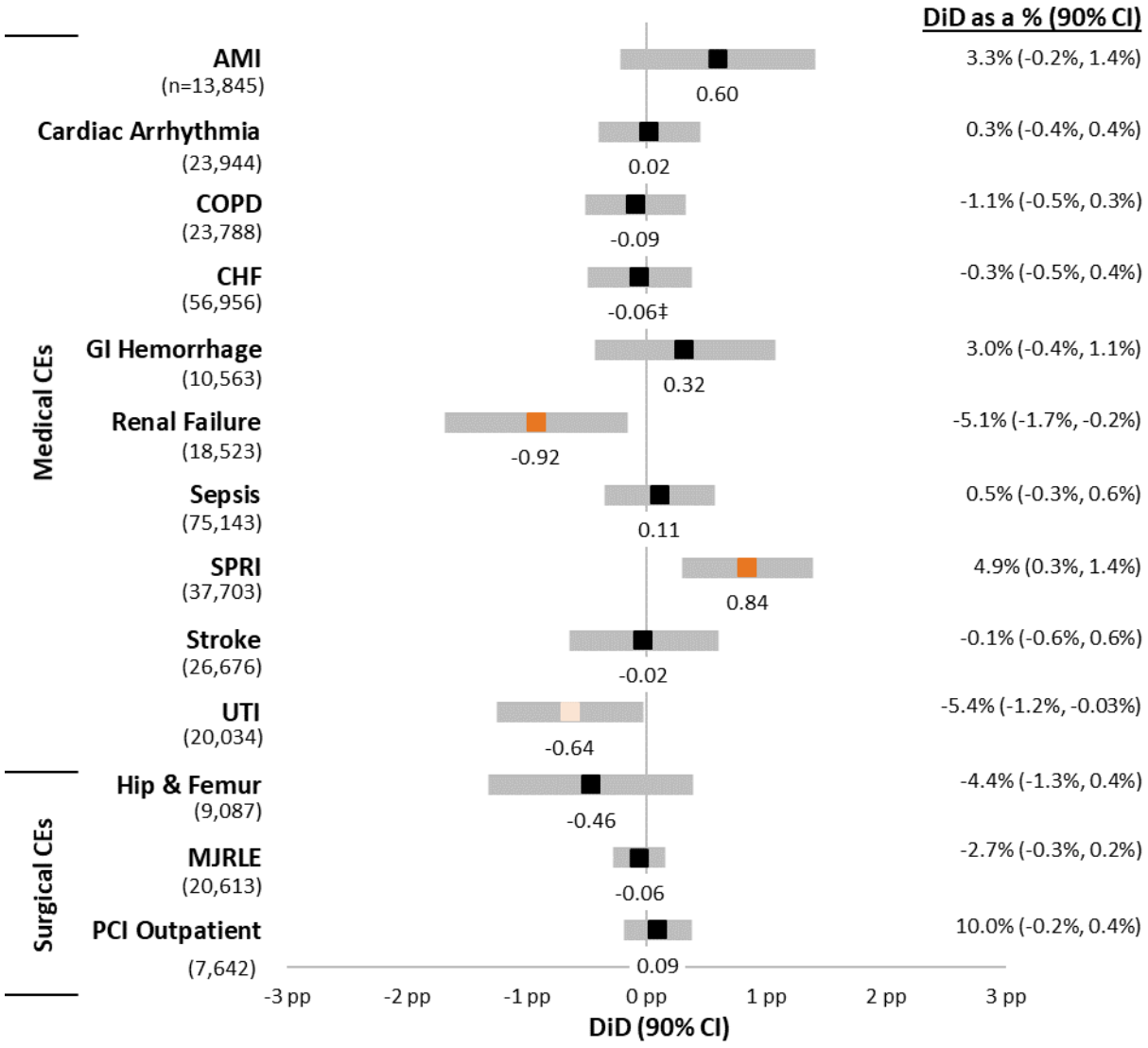
Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimate represents a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The

grey bars indicate the 90% confidence interval of the DiD estimate. CE = clinical episode; CI = confidence interval; PDP = post-discharge period; PGP = physician group practice; pp = percentage point(s).

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

While there were no changes in the mortality rate during the 90-day PDP pooled across episodes, there were statistically significant changes for three hospital CEs. The mortality rate declined by 0.92 pp ($p<0.05$, -5.1% of the baseline mean) for renal failure and 0.64 pp ($p<0.10$, -5.4%) for UTI episodes relative to the comparison group (Exhibit 23).[24] The mortality rate for SPRI episodes increased by 0.84 pp ($p<0.05$, 4.9%) relative to the comparison group.

Exhibit 23: Impact of BPCI Advanced on 90-day Mortality by CE, Hospital EIs, October 1, 2018 – December 31, 2019



[24] These reductions were robust across multiple specifications. For sensitivity test results see **Appendix G**.

Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimate represents a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. AMI = acute myocardial infarction; CE = clinical episode; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; CI = confidence interval; EI = episode initiator; GI = gastrointestinal; Hip & Femur = hip and femur procedures except major joint; MJRLE = major joint replacement of the lower extremity; PCI = percutaneous coronary intervention; pp = percentage point(s); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

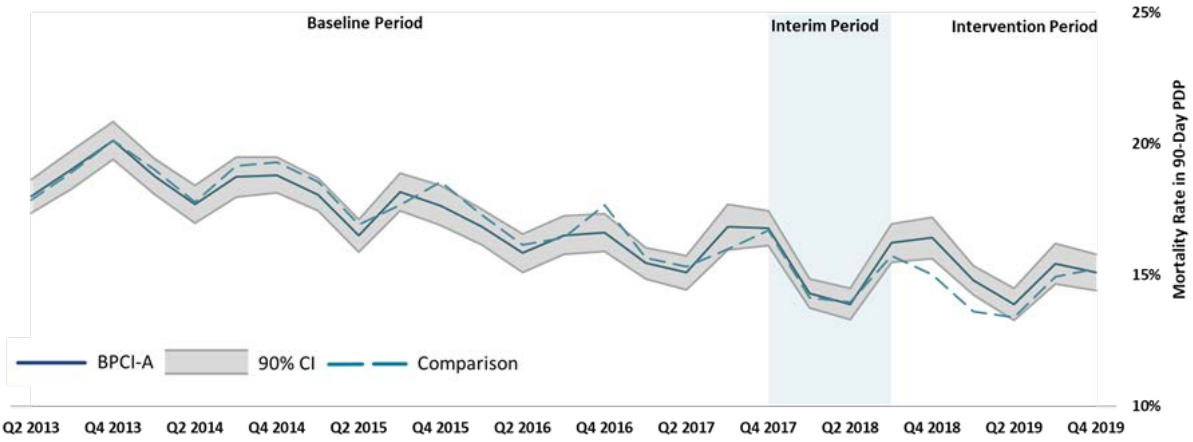
‡ We rejected the null hypothesis that BPCI Advanced and matched comparison providers had parallel trends for this outcome (with 90% confidence). See **Appendix F** for parallel trends test results.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

To understand what may have been associated with the relative increase in the mortality rate for SPRI, we explored changes in care patterns among BPCI Advanced hospitals relative to comparison hospitals, and we conducted additional sensitivity analyses. As reported above, there was no change in the share of SPRI beneficiaries discharged to institutional PAC facilities (the impact estimate was small and not statistically significant), and although we did estimate a statistically significant decline in the number of days in SNF among SNF users (-1.95 days), the BPCI Advanced and matched comparison providers did not pass parallel trends for this outcome, and so our estimate may be biased. We explored two additional outcomes for SPRI: anchor stay LOS and hospice use. There was no change in LOS for BPCI Advanced SPRI hospital episodes relative to the comparison group. However, there were differential rates of hospice use between the BPCI Advanced and comparison episodes. BPCI Advanced hospital EIs had a 0.98 pp ($p<0.01$, 6.8%) larger proportion of episodes with hospice use in the 90-day PDP relative to comparison episodes (see results in **Appendix E**). This may be an indication that BPCI Advanced hospital EIs shifted care patterns under the model to discharge patients to hospice sooner or in greater shares, avoiding beneficiary deaths in the hospital, which could be viewed as an improvement in the quality of care. Under the BPCI Advanced model rules, beneficiaries that die during the hospital stay are not eligible to trigger episodes in the model. Thus, an increase in hospice use for patients directly discharged from the hospital could contribute to a higher mortality rate as measured during the 90-day PDP. Taken together, these findings on changes in care patterns do not support a hypothesis of care stinting. In addition, the relative increase in the mortality rate for SPRI was not due to changes in patient mix as measured in claims, relative changes in MS-DRG volume shares, or extreme values in a few hospitals.[25] Finally, we found that the regression adjusted trend of the mortality rate shows an attenuation of the effect beginning in the second quarter of 2019 through the end of Model Year 2 (2019) (Exhibit 24).

[25] These outcomes are for episodes with anchor stays or procedures on or before August 3, 2019, prior to the public health emergency due to COVID-19.

Exhibit 24: Risk-Adjusted Trend for Mortality, SPRI Episodes, Hospital EIs



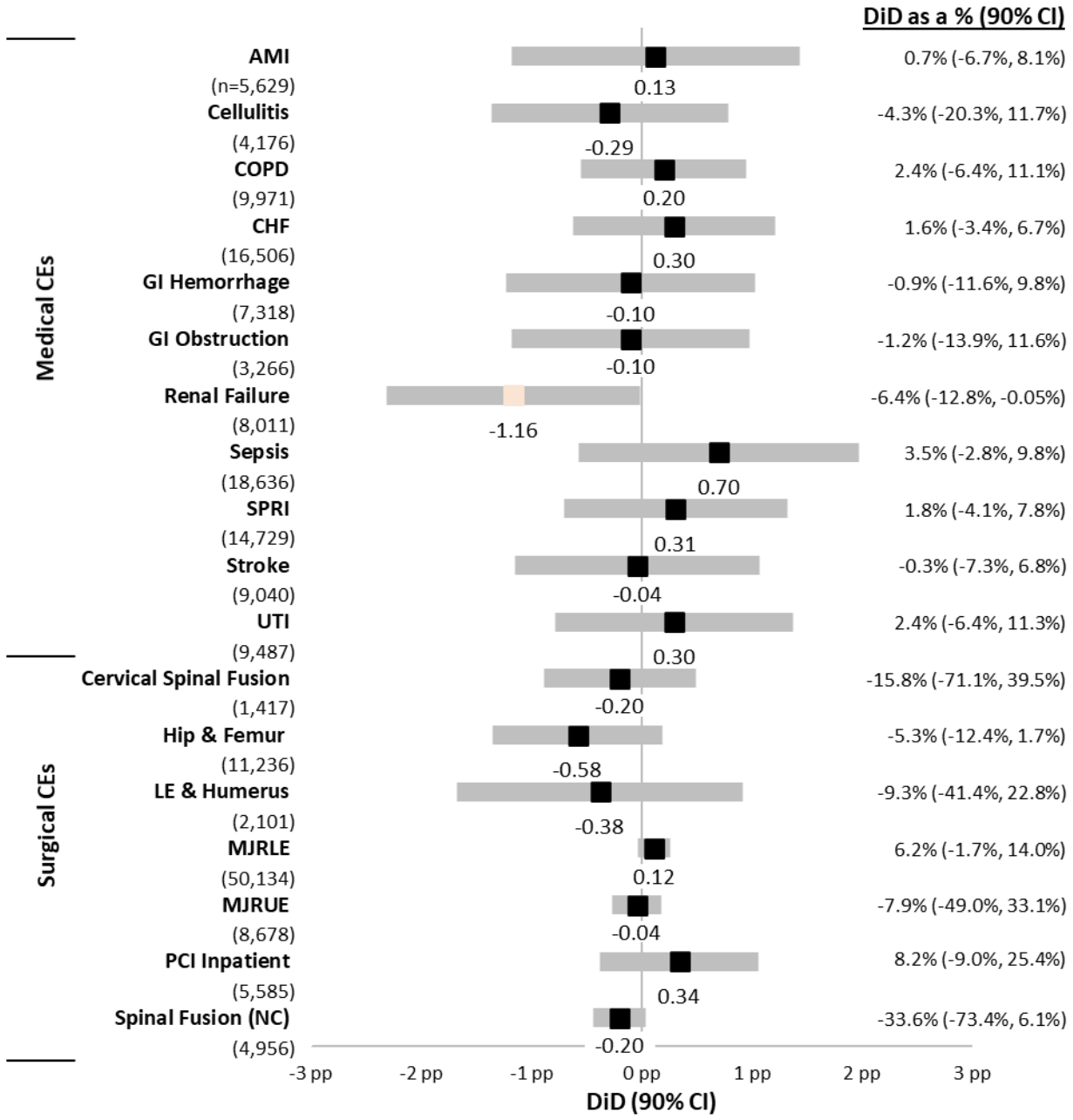
Note: EI = episode initiator; PDP = post-discharge period; SPRI = simple pneumonia and respiratory infections.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Among PGPs, there was a statistically significant reduction in the mortality rate for one medical CE; the mortality rate for renal failure declined by 1.16 pp ($p<0.10$, -6.4%) relative to the comparison group (Exhibit 25). There were no statistically significant changes in the mortality rate for any other CEs.[26]

[26] These findings were robust across multiple specifications. For sensitivity test results see **Appendix G**.

Exhibit 25: Impact of BPCI Advanced on 90-day Mortality by CE, PGP EIs, October 1, 2018 – December 31, 2019



Note: The estimates in this exhibit are the results of a difference-in-differences (DiD) model. The DiD estimate represents a percentage point change. Results are also presented as a percentage of the BPCI Advanced baseline average rate. DiD estimates that are statistically significant at the 1%, 5%, or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval of the DiD estimate. AMI = acute myocardial infarction; CE = clinical episode; COPD = chronic obstructive pulmonary disease; CHF = congestive heart failure; CI = confidence interval; EI = episode initiator; GI = gastrointestinal; Hip & Femur = hip and femur procedures except major joint; LE & Humerus = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity; PCI = percutaneous coronary intervention; PGP = physician group practice; pp = percentage point(s); Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays/

procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Conclusion

BPCI Advanced was associated with a reduction in the unplanned readmission rate for pooled surgical CEs. There were similar declines for both hospital and PGP surgical CEs, but only the PGP estimate was statistically significant. BPCI Advanced did not have an impact on the unplanned readmission rate for pooled medical CEs. Likewise, the unplanned readmission rates by CE are generally negative for the surgical CEs but not the medical CEs.

There were no changes in the mortality rate for episodes pooled across CEs, grouped by medical and surgical, or grouped separately for medical and surgical by hospital and PGP EIs. While there were some individual CEs with statistically significant changes in the mortality rate among hospital and PGP EIs, there was no consistent pattern. We will continue to monitor and report on any changes in mortality rates and other indicators of quality of care.

The analyses of the unplanned readmission rate and mortality rate suggest that BPCI Advanced did not reduce the quality of care received by beneficiaries. While these findings are encouraging, it is important to note that these two claims-based measures may not be able to capture all aspects of quality of care.

C. Medicare Program Savings

This section presents estimates of Medicare program savings for Model Years 1 and 2 (2018 and 2019) of the BPCI Advanced Model. We calculated net Medicare savings (or losses) for pooled CEs, medical CEs, surgical CEs, hospital medical CEs, PGP medical CEs, hospital surgical CEs, PGP surgical CEs, and for each CE and EI type for which we evaluated impact estimates.[27] Medicare savings estimates differ from our Medicare payment impact estimates because they account not only for Medicare FFS payments to providers but also for reconciliation payments made to (or received from) participants.

Net Medicare savings due to the BPCI Advanced Model equals the reduction in non-standardized episode payments minus reconciliation payments paid to (or received from) participants. We calculated the reduction in non-standardized payments by converting the DiD impact estimates based on standardized Medicare paid amounts to non-standardized payments.[28] Total reconciliation payments for relevant episodes during the period were then subtracted to obtain net savings expressed in dollars. To calculate per-episode savings, we divided net savings, expressed in dollars, by the count of BPCI Advanced episodes in the intervention used in the DiD impact estimates.

The evaluation count of BPCI Advanced intervention episodes is larger than the reconciliation count of BPCI Advanced intervention episodes, because when faced with overlapping models or overlapping episodes, the reconciliation methodology drops episodes in order to avoid paying

[27] This includes 13 out of 32 CEs for hospital EIs and 18 out of 32 CEs for PGP EIs.

[28] Non-standardized Medicare paid amounts reflect actual Medicare payments, as they include adjustments for wages, practice expenses, and other initiatives (e.g., medical education). They also exclude beneficiary cost sharing. See **Appendix C** for more details.

out the same savings to participants of multiple models. In the evaluation, however, we retain episodes that overlap and calculate the incremental impact of the BPCI Advanced Model over and above other models' impacts, or in the case of overlapping BPCI Advanced episodes, we prorate the episode across multiple participants and CEs. This results in a count of BPCI Advanced intervention episodes in the evaluation that is about 24% larger than the count of BPCI Advanced intervention episodes used to calculate reconciliation payments. In this way, the evaluation captures the impact of the model on a broader set of episodes than the set of episodes considered in reconciliation.

Finally, the BPCI Advanced Model was designed to save the Medicare program 3% of what payments would have been absent the BPCI Advanced Model, also referred to as the counterfactual. To assess how well the model achieved its goals, we express Medicare program savings estimates and the components of savings (reduction in non-standardized payments and reconciliation payments) as a percentage of the evaluation's estimate of the counterfactual, which is calculated as the average BPCI Advanced episode payment in the baseline plus the change in the average episode payment for the comparison group from baseline to intervention. See **Appendix C** for additional details on the definitions and calculations of savings.

1. Key Findings

Medicare Program Savings

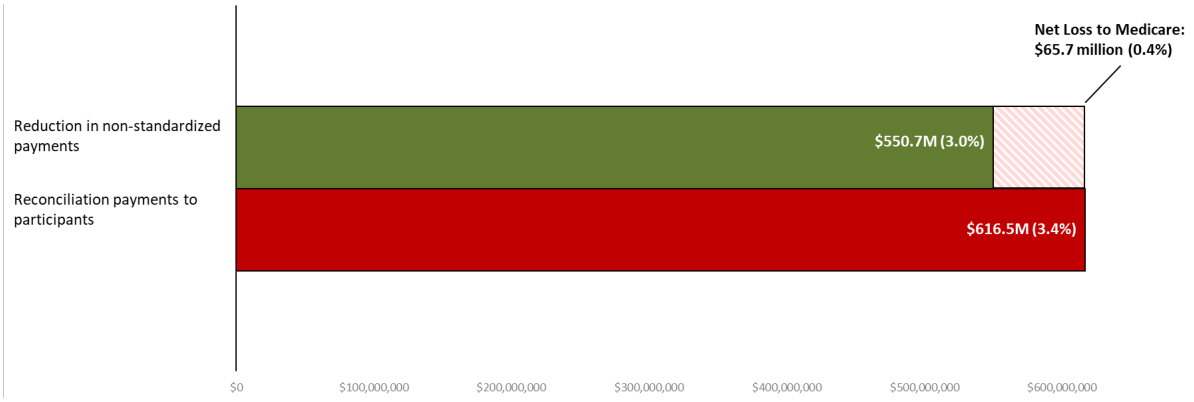
- During Model Years 1 and 2 (2018 and 2019), the BPCI Advanced Model resulted in an estimated net loss to the Medicare program of $65.7 million, or 0.4% of what Medicare payments would have been absent the BPCI Advanced Model, ranging from a loss of $152.0 million to a savings of $20.5 million (loss of 0.8% to savings of 0.1%).
- Overall, for both hospital and physician group practice (PGP) episode initiators, the BPCI Advanced Model generally resulted in estimated net losses for medical clinical episodes (CEs) and estimated net savings for surgical CEs.
- For medical CEs, the model resulted in an estimated net loss of $275.0 million, or 2.2% of what payments would have been absent the BPCI Advanced Model.
- For surgical CEs, the model resulted in an estimated net savings of $204.4 million, or 3.6% of what payments would have been absent the BPCI Advanced Model.
- For both hospitals and PGPs, the evidence suggests that target prices may have been too high for medical CEs but were generally more appropriate for surgical CEs.

2. Results

a. Pooled Clinical Episodes

During Model Years 1 and 2, the BPCI Advanced Model reduced non-standardized episode payments by an estimated $550.7 million, or about 3.0% of what payments would have been absent the model (Exhibit 26). After accounting for $616.5 million in reconciliation payments, or 3.4% of what payments would have been absent the BPCI Advanced Model, the model resulted in an estimated net loss of $65.7 million to Medicare, or 0.4% of what payments would have been absent the BPCI Advanced Model. That is, Medicare spending increased by an estimated $65.7 million due to the BPCI Advanced Model, equivalent to an increase of $96 per episode. When considering the confidence interval of our DiD impact estimate, net savings ranged from a loss of $152.0 million, or 0.8% of what payments would have been absent the BPCI Advanced Model, to savings of $20.5 million, or 0.1% of what payments would have been absent the model. See **Appendix H** for detailed results of the Medicare savings analysis.

Exhibit 26: Medicare Savings due to BPCI Advanced, October 1, 2018 – December 31, 2019



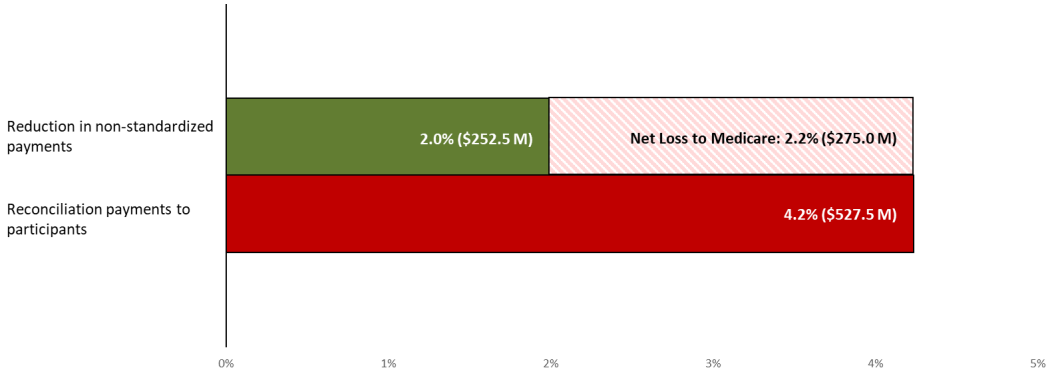
Note: The estimated reduction in non-standardized payments is based on difference-in-differences models of standardized Medicare paid amounts for evaluated CEs, which account for 90% of all episodes initiated by hospital EIs and 92% of all episodes initiated by PGP EIs. Net loss to Medicare is the estimated reduction in non-standardized payments minus reconciliation payments. The estimates are also presented as a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. See **Appendix H** for detailed results of net Medicare savings. CE = clinical episode; EI = episode initiator; PGP = physician group practice.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

For medical CEs, the BPCI Advanced Model reduced non-standardized episode payments by an estimated $252.5 million, or about 2.0% of what payments would have been absent the model (Exhibit 27). After accounting for $527.5 million in reconciliation payments, or 4.2% of what payments would have been absent the BPCI Advanced Model, the model resulted in an estimated net loss of $275.0 million, or 2.2% of what payments would have been absent the model, for medical CEs. That is, Medicare spending on medical CEs increased by an estimated $275.0 million due to the BPCI Advanced Model, equivalent to an increase of $575 per episode. When considering the confidence interval of our DiD impact estimate, net savings for medical CEs ranged from a loss of $343.0 million, or 2.8% of what payments would have been absent the BPCI

Advanced Model, to a loss of $207.1 million, or 1.7% of what payments would have been absent the model.

Exhibit 27: Medicare Savings due to BPCI Advanced, Medical CEs, October 1, 2018 – December 31, 2019

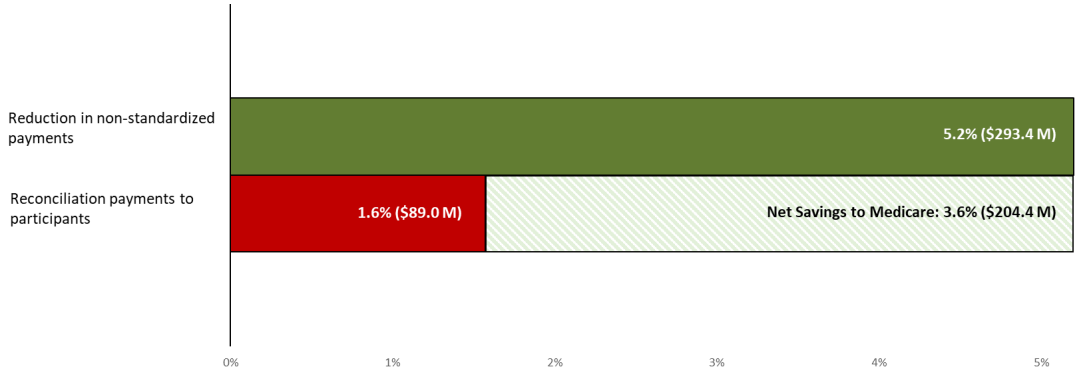


Note: The estimated reduction in non-standardized payments is based on difference-in-differences models of standardized Medicare paid amounts for evaluated clinical episodes. Net loss to Medicare is the estimated reduction in non-standardized payments minus reconciliation payments. The estimates are also presented as a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. See **Appendix H** for detailed results of net Medicare savings. The sum of the estimates of Medicare savings from the subgroups may not sum to the estimate of Medicare savings from the pooled CEs due to being calculated from separate weighted regressions. For example, the Medicare savings estimate for surgical CEs plus the Medicare savings estimate for medical CEs does not exactly equal the Medicare savings estimate for pooled CEs. See **Appendix C** for more details. CE = clinical episode.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

For surgical CEs, the BPCI Advanced Model reduced non-standardized episode payments by an estimated $293.4 million, or about 5.2% of what payments would have been absent the BPCI Advanced Model (Exhibit 28). After accounting for $89.0 million in reconciliation payments, or 1.6% of what payments would have been absent the BPCI Advanced Model, the model for surgical CEs resulted in an estimated net savings of $204.4 million, or 3.6% of what payments would have been absent the model. That is, Medicare spending on surgical CEs decreased by an estimated $204.4 million due to the BPCI Advanced Model, which is equivalent to a decrease of $976 per episode. When considering the confidence interval of our DiD impact estimate, net savings for surgical CEs ranged from a savings of $153.9 million, or 2.7% of what payments would have been absent the BPCI Advanced Model, to a savings of $254.9 million, or 4.5% of what payments would have been absent the model.

Exhibit 28: Medicare Savings due to BPCI Advanced, Surgical CEs, October 1, 2018 – December 31, 2019



Note: The estimated reduction in non-standardized payments is based on difference-in-differences models of standardized Medicare paid amounts for evaluated clinical episodes. Net savings to Medicare is the estimated reduction in non-standardized payments minus reconciliation payments. The percentage estimates are a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. See **Appendix H** for detailed results of net Medicare savings. The sum of the estimates of Medicare savings from the subgroups may not sum to the estimate of Medicare savings from the pooled CEs due to being calculated from separate weighted regressions. For example, the Medicare savings estimate for surgical CEs plus the Medicare savings estimate for medical CEs does not exactly equal the Medicare savings estimate for pooled CEs. See **Appendix C** for more details. CE = clinical episode.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

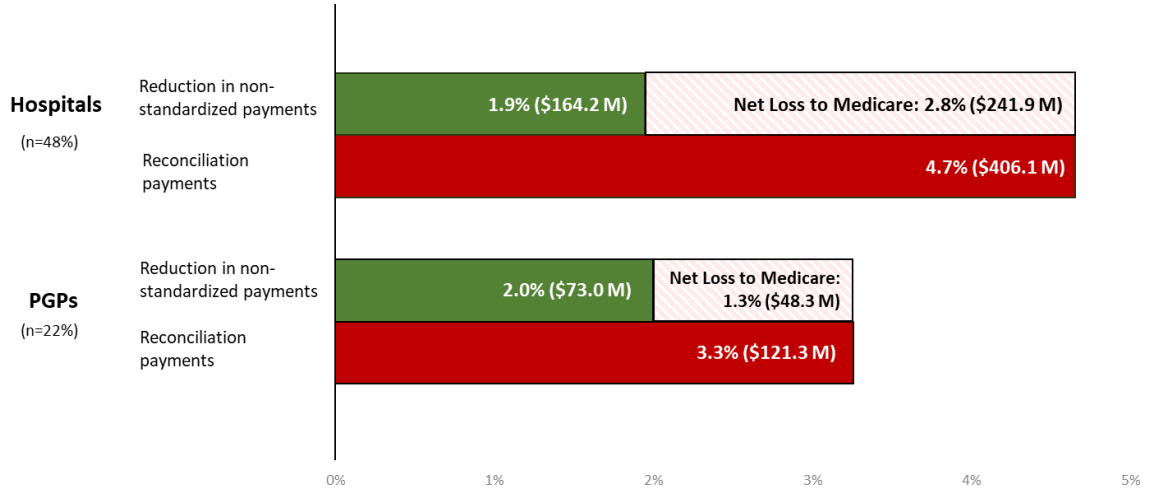
b. Medical Clinical Episodes for Hospitals and Physician Group Practices

For hospital medical CEs, the BPCI Advanced Model reduced non-standardized episode payments by an estimated $164.2 million, or about 1.9% of what payments would have been absent the BPCI Advanced Model (Exhibit 29). After accounting for $406.1 million in reconciliation payments, or 4.7% of what payments would have been absent the BPCI Advanced Model, the model resulted in an estimated net loss of $241.9 million, or 2.8% of what payments would have been absent the model, for hospital medical CEs. That is, Medicare spending on hospital medical CEs increased by an estimated $241.9 million due to the BPCI Advanced Model, which is equivalent to an increase of $732 per episode. When considering the confidence interval of our DiD impact estimate, net savings for hospital medical CEs ranged from a loss of $291.6 million, or 3.3% of what payments would have been absent the BPCI Advanced Model, to a loss of $192.2 million, or 2.2% of what payments would have been absent the model.

For PGP medical CEs, the BPCI Advanced Model reduced non-standardized episode payments by an estimated $73.0 million, or about 2.0% of what payments would have been absent the BPCI Advanced Model (Exhibit 29). After accounting for $121.3 million in reconciliation payments, or 3.3% of what payments would have been absent the BPCI Advanced Model, the model resulted in an estimated net loss of $48.3 million, or 1.3% of what payments would have been absent the model, for PGP medical CEs. That is, Medicare spending on PGP medical CEs increased by an estimated $48.3 million due to the BPCI Advanced Model, which is equivalent to an increase of $324 per episode. When considering the confidence intervals of our DiD impact estimate, net savings for PGP medical CEs ranged from a loss of $93.9 million, or 2.5% of what payments

would have been absent the BPCI Advanced Model, to a loss of $2.8 million, or 0.1% of what payments would have been absent the model.

Exhibit 29: Medicare Savings due to BPCI Advanced, Medical CEs for Hospital and PGP EIs, October 1, 2018 – December 31, 2019



Note: The estimated reduction in non-standardized payments is based on difference-in-differences models of standardized Medicare paid amounts for evaluated clinical episodes. Net loss to Medicare is the estimated reduction in non-standardized payments minus reconciliation payments. The percentage estimates are a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. The sample size (n=) refers to the percentage of total episode volume used to calculate the reduction in non-standardized payments. See **Appendix C** for additional details about episode methodology. See **Appendix H** for detailed results of net Medicare savings. CE = clinical episode; EI = episode initiator; PGP = physician practice group.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

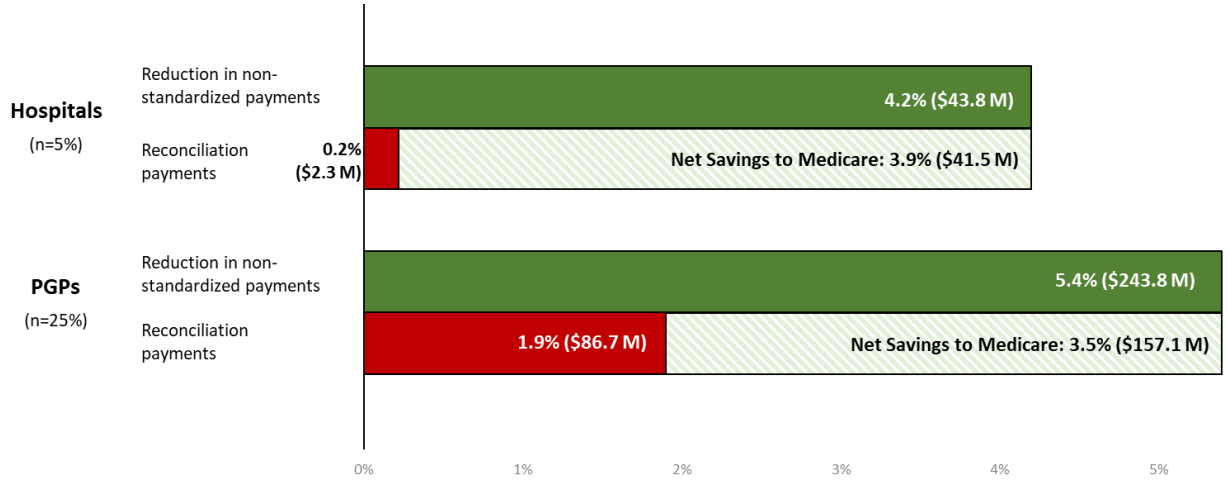
c. Surgical Clinical Episodes for Hospitals and Physician Group Practices

For hospital surgical CEs, the BPCI Advanced Model reduced non-standardized episode payments by an estimated $43.8 million, or about 4.2% of what payments would have been absent the BPCI Advanced Model (Exhibit 30). After accounting for $2.3 million in reconciliation payments, or 0.2% of what payments would have been absent the BPCI Advanced Model, the model resulted in an estimated net savings of $41.5 million, or 3.9% of what payments would have been absent the model, for hospital surgical CEs. That is, Medicare spending on hospital surgical CEs decreased by an estimated $41.5 million due to the BPCI Advanced Model, which is equivalent to a decrease of $1,132 per episode. When considering the confidence interval of our DiD impact estimate, net savings for hospital surgical CEs ranged from a savings of $29.4 million, or 2.8% of what payments would have been absent the BPCI Advanced Model, to a savings of $53.6 million, or 5.1% of what payments would have been absent the model.

For PGP surgical CEs, the BPCI Advanced Model reduced non-standardized episode payments by an estimated $243.8 million, or about 5.4% of what payments would have been absent the BPCI Advanced Model (Exhibit 30). After accounting for $86.7 million in reconciliation payments, or 1.9% of what payments would have been absent the BPCI Advanced Model, the model resulted in an estimated net savings of $157.1 million, or 3.5% of what payments would have been absent the

model, for PGP surgical CEs. That is, Medicare spending on PGP surgical CEs decreased by an estimated $157.1 million due to the BPCI Advanced Model, which is equivalent to a decrease of $907 per episode. When considering the confidence interval of our DiD impact estimate, net savings for PGP surgical CEs ranged from a savings of $109.2 million, or 2.4% of what payments would have been absent the BPCI Advanced Model, to a savings of $205.0 million, or 4.5% of what payments would have been absent the model.

Exhibit 30: Medicare Savings due to BPCI Advanced, Surgical CEs for Hospital and PGP EIs, October 1, 2018 – December 31, 2019



Note: The estimated reduction in non-standardized payments is based on difference-in-differences models of standardized Medicare paid amounts for evaluated clinical episodes. Net savings to Medicare is the estimated reduction in non-standardized payments minus reconciliation payments. The percentage estimates are a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. The sample size (n=) refers to the percentage of total episode volume used to calculate the reduction in non-standardized payments. See **Appendix C** for additional details about episode methodology. See **Appendix H** for detailed results of net Medicare savings. CE = clinical episode; EI = episode initiator; PGP = physician group practice.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

d. Individual Clinical Episodes by Episode Initiator Type

For hospital EIs, nine out of the 10 medical CEs evaluated resulted in estimated net losses to Medicare, and eight of the nine estimates were statistically significant (Exhibit 31). Net savings for those nine CEs ranged from a loss of $89.4 million, or 5.7% of what payments would have been absent the BPCI Advanced Model, for CHF episodes to a loss of $1.5 million, or 0.6% of what payments would have been absent the model, for GI hemorrhage episodes. UTI was the only medical CE for hospital EIs that resulted in net savings to Medicare. For hospital UTI episodes, the BPCI Advanced Model achieved statistically significant savings of $10.2 million, or 2.0% of what payments would have been absent the model.

For PGP EIs, eight out of the 11 medical CEs evaluated resulted in estimated net losses to Medicare, but only one (CHF) was statistically significant (Exhibit 32). Three out of the 11 medical CEs evaluated resulted in estimated net savings to Medicare, but none were statistically significant. Net savings for PGP medical episodes ranged from a loss of $32.3 million, or 5.6% of

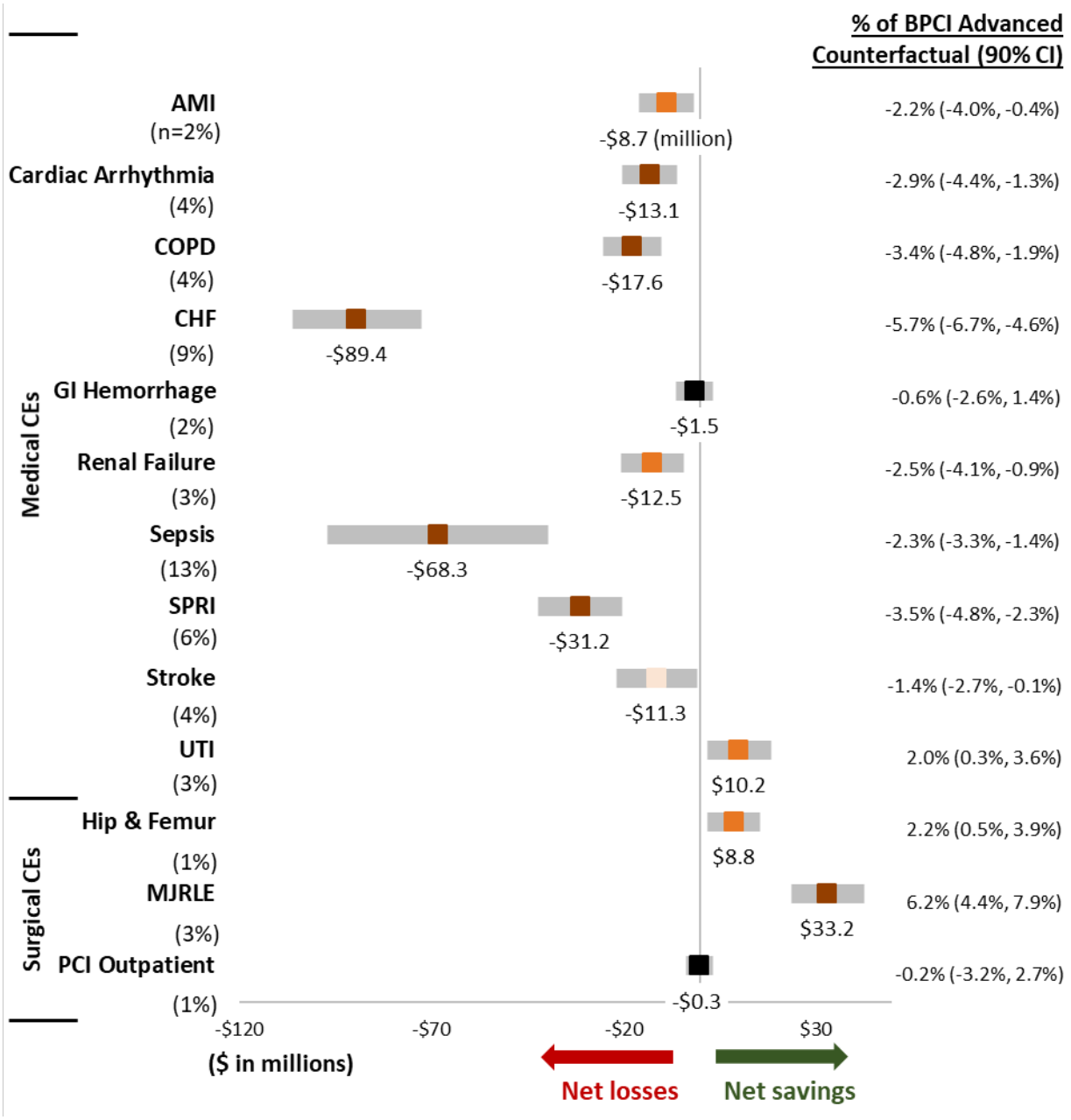
what payments would have been absent the BPCI Advanced Model, for CHF to savings of $4.1 million, or 2.1% of what payments would have been absent the model, for GI hemorrhage episodes.

For hospital EIs, two out of the three surgical CEs evaluated (hip and femur procedures except major joint and MJRLE) resulted in estimated net savings to Medicare, and both are statistically significant. One out of the three surgical CEs evaluated (PCI outpatient) resulted in estimated net losses to Medicare, but the estimate is small and not statistically significant. Net savings for hospital surgical CEs ranged from a loss of $0.3 million, or 0.2% of what payments would have been absent the BPCI Advanced Model, for PCI (outpatient) to savings of $33.2 million, or 6.2% of what payments would have been absent the model, for MJRLE.

For PGP EIs, five out of the seven surgical CEs evaluated resulted in estimated net savings to Medicare, and three of the five are statistically significant. Two out of the seven surgical CEs evaluated resulted in estimated net losses to Medicare, but the estimates were small and not statistically significant. Net savings for PGP surgical CEs ranged from a loss of $2.0 million, or 0.8% of what payments would have been absent the BPCI Advanced Model, for spinal fusion (non-cervical) to savings of $134.8 million, or 4.8% of what payments would have been absent the model, for MJRLE.

Among the CEs in common between hospitals and PGPs, the estimates of net savings and losses were similar for most CEs. While PGPs generally had smaller estimated net losses than hospitals for the nine medical CEs in common, and hospitals had larger estimates of net savings for the two surgical CEs in common, the differences between hospitals and PGPs were generally small (Exhibit 33).

Exhibit 31: Medicare Savings by CE, Hospital EIs, October 1, 2018 – December 31, 2019

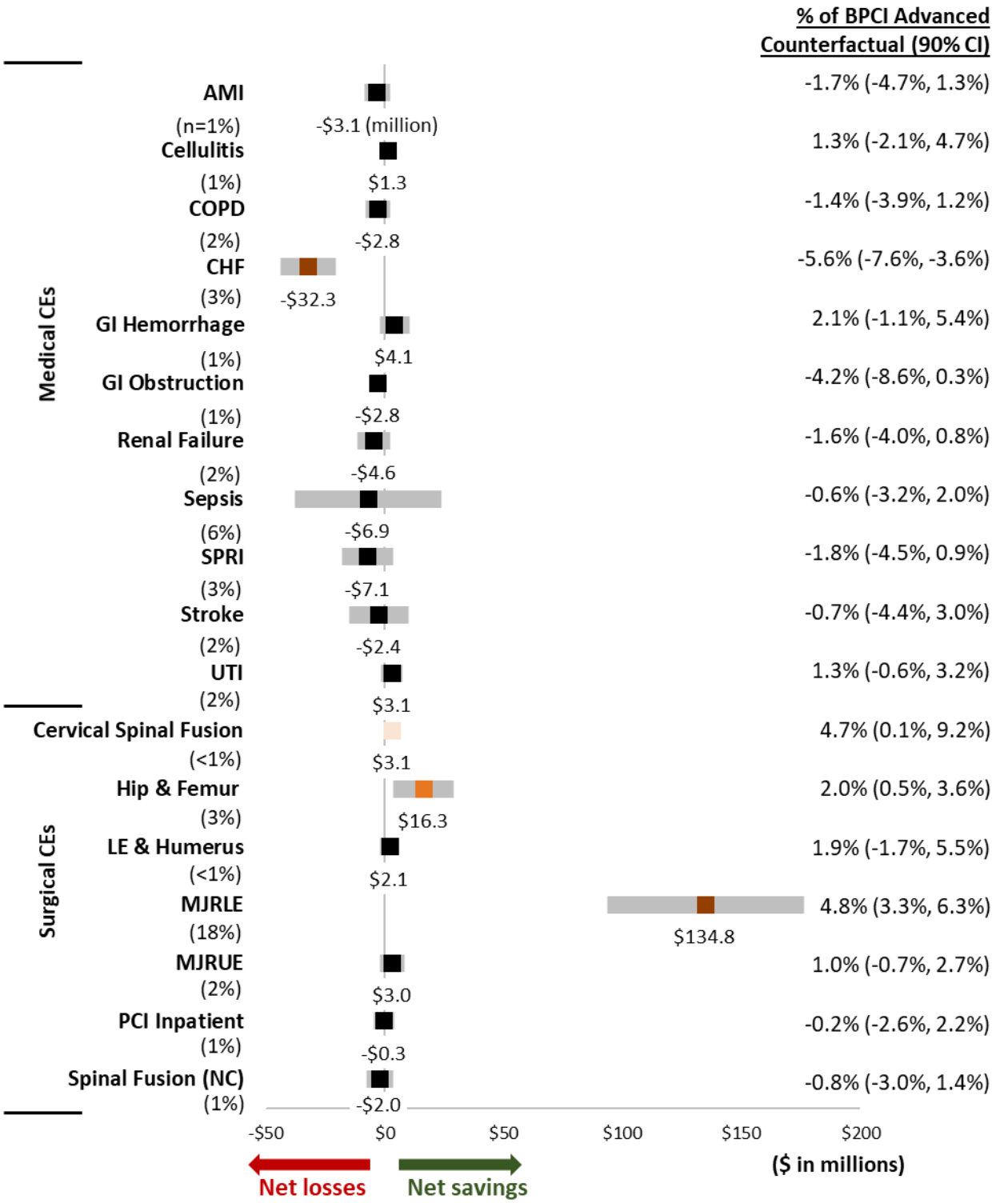


Note: For a given CE, net savings to Medicare is the difference between the reduction in non-standardized payments and reconciliation payments. Estimates that are statistically significant at the 1%, 5% or 10% significance level are indicated by brown, medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval. The confidence intervals associated with the estimates of net Medicare program savings are based on the estimates of the reduction in non-standardized payments from the difference-in-differences models. The percentage of BPCI Advanced counterfactual estimates are a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. The sample size (n=) refers to the percentage of total episode volume used to calculate the reduction in non-standardized payments. AMI = acute myocardial infarction; CE = clinical episode; CHF = congestive heart failure; CI = confidence interval; COPD = chronic obstructive pulmonary disease; EI = episode initiator; GI = gastrointestinal; Hip & Femur Procedures = hip and femur procedures except major joint; MJRLE = major joint replacement of the lower extremity; PCI = percutaneous coronary intervention; SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period) and episodes with anchor stays /

procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers.

Exhibit 32: Medicare Savings by CE, PGP EIs, October 1, 2018 – December 31, 2019

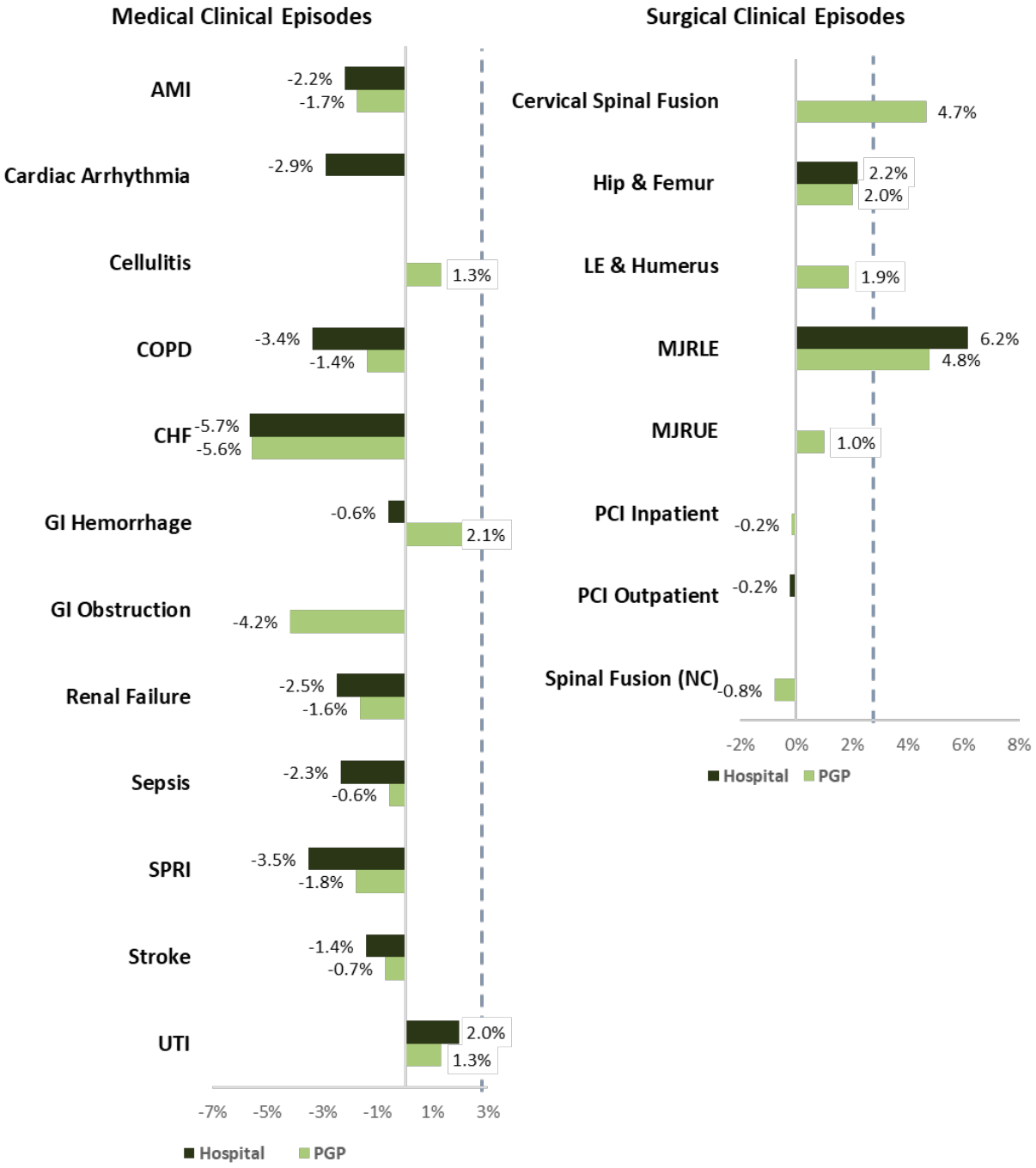


Note: For a given CE, net savings to Medicare is the difference between the reduction in non-standardized payments and reconciliation payments. Estimates that are statistically significant at the 1%, 5% or 10% significance level are indicated by brown,

medium orange, and light orange squares, respectively. The grey bars indicate the 90% confidence interval. The confidence intervals associated with the estimates of net Medicare program savings are based on the estimates of the reduction in non-standardized payments from the difference-in-differences models. The percentage of BPCI Advanced counterfactual estimates are a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. The sample size (n=) refers to the percentage of total episode volume used to calculate the reduction in non-standardized payments. AMI = acute myocardial infarction; CE = clinical episode; CHF = congestive heart failure; CI = confidence interval; COPD = chronic obstructive pulmonary disease; EI = episode initiator; GI = gastrointestinal; Hip & Femur Procedures = hip and femur procedures except major joint; LE & Humerus Procedures = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity; PCI = percutaneous coronary intervention; PGP = physician group practice; Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

Exhibit 33: Medicare Savings as a Percent by CE and EI Type, October 1, 2018 – December 31, 2019



Note: For a given CE, net savings to Medicare is the difference between the reduction in non-standardized payments and reconciliation payments, calculated as a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. AMI = acute myocardial infarction; CHF = congestive heart failure; CE = clinical episode; COPD = chronic obstructive pulmonary disease; EI = episode initiator; GI = gastrointestinal; Hip & Femur Procedures = hip and femur procedures except major joint; LE & Humerus Procedures = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity; PCI = percutaneous coronary intervention; PGP = physician group practice; Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

e. Were Target Prices in the BPCI Advanced Model appropriate?

Target prices in the BPCI Advanced Model were constructed such that the Medicare program would save 3% of what payments would have been absent the model. However, as explained by a former CMMI Director in a 2021 letter to the *New England Journal of Medicine*, constructing accurate target prices can be difficult because it requires projecting future costs for the episodes, and costs can change over time and vary across geographic regions.[29] For example, changes in coding guidelines can lead to cost changes. In fiscal year 2017, there were changes to the guidelines for coding CHF and SPRI, two of the highest-volume CEs in the BPCI Advanced model. The change resulted in an increase in the share of patients classified as having more serious CHF and SPRI diagnoses in the performance period than in the baseline period. According to CMMI's analysis, "Because target prices are appropriately based on the seriousness of a patient's diagnosis, target prices increased in the BPCI Advanced model, which resulted in excess payments to participants." It is also more challenging to construct accurate target prices *prospectively*—using data from the baseline period to forecast future peer group trends which can be disrupted by unforeseen practice or policy changes—rather than *retrospectively*—using realized peer group trends which account for changes during the performance period. To improve target pricing accuracy, CMS made changes to the target price construction beginning in Model Year 4 (2021), including a change from prospective target prices in Model Years 1 through 3 (2018 through 2020) to retrospective target prices in Model Year 4.

Exhibit 34 displays estimates of net savings to the Medicare program as a percentage of what payments would have been absent the BPCI Advanced Model and compares those estimates to the 3% savings goal. If 3% falls within the 90% confidence intervals of the net savings estimates, then we conclude there is evidence that the target prices were appropriate. If the 90% confidence intervals fall below 3%, then the evidence suggests target prices may have been too high. If the 90% confidence intervals fall above 3%, then the evidence suggests target prices may have been too low.

The evidence suggests that target prices may have been too high for episodes pooled across all CEs evaluated, pooled medical CEs, hospital medical CEs, and PGP medical CEs, because the BPCI Advanced Model resulted in estimated losses with 90% confidence intervals that fall below the 3% savings goal.

The evidence suggests that target prices may have been reasonably accurate for pooled surgical CEs, hospital surgical CEs, and PGP surgical CEs. We estimate that the BPCI Advanced Model resulted in savings greater than 3% for these groupings, but the 90% confidence intervals around those estimates include 3%.

For the individual medical CEs, the evidence suggests that target prices may have been too high for most hospital and PGP CEs (Exhibits 35 and 36). Target prices may have been too high for

[29] Smith, Brad (2021). CMS Innovation Center at 10 Years — Progress and Lessons Learned. *New England Journal of Medicine*, 384(8), 759–764.

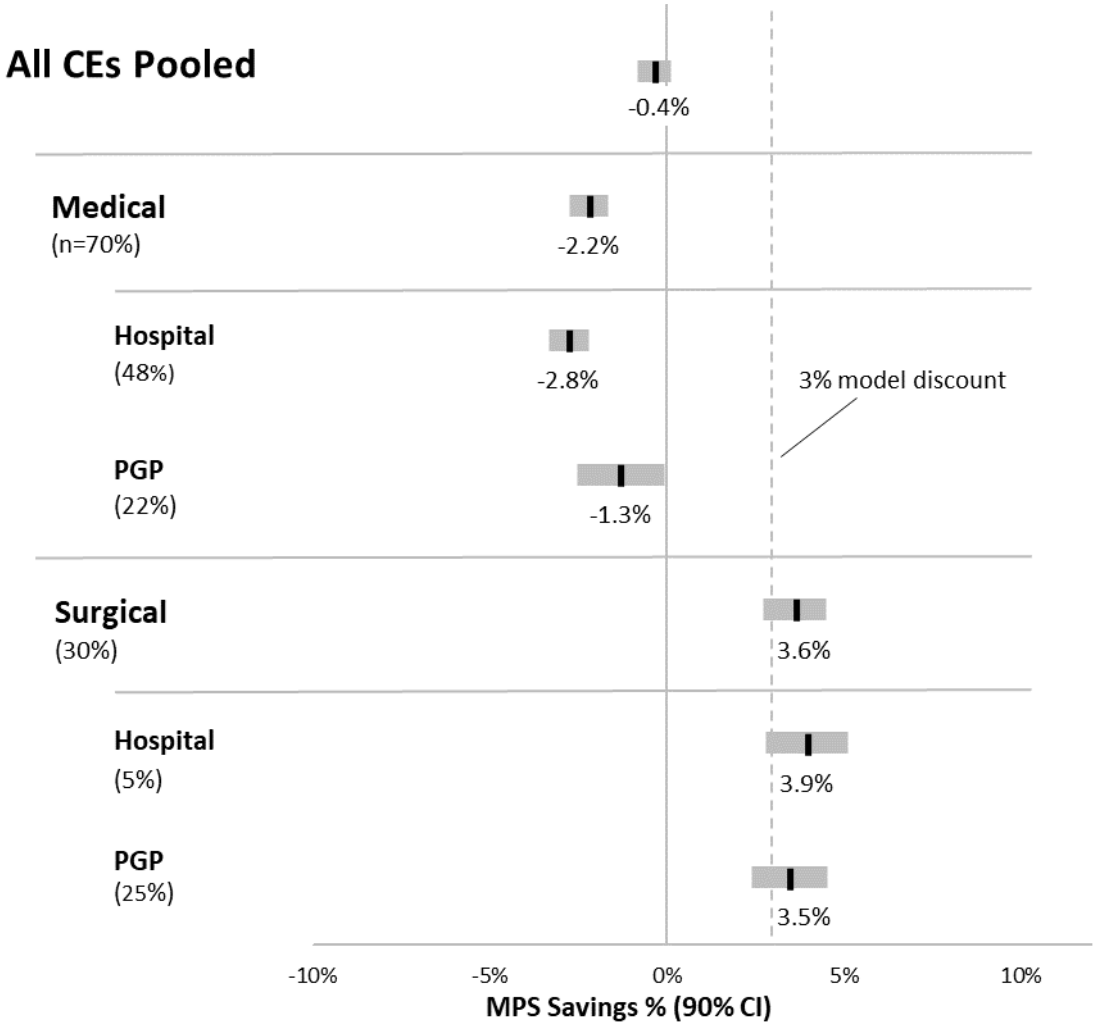
all 10 hospital medical CEs except UTI. Net savings for UTI is estimated at 2.0%, with a 90% confidence interval that includes 3% (0.3%, 3.6%). Since the 90% confidence interval includes 3%, the evidence suggests that target prices were reasonably accurate.

Target prices may have been too high for seven of the 11 PGP medical CEs. For four PGP medical CEs (cellulitis, GI hemorrhage, stroke, and UTI) the 90% confidence intervals include 3%, suggesting that target prices were reasonably accurate.

The evidence is mixed for individual surgical CEs. Across the three individual surgical CEs for hospital EIs, the evidence suggests that the target prices may have been appropriate for hip and femur procedures except major joint because the 90% confidence interval for that CE includes 3%. For MJRLE, net savings is estimated to be 6.2% of what payments would have been absent the BPCI Advanced model with a 90% confidence interval of 4.4% to 7.9%. The 90% confidence interval falls above 3%, indicating that the target price may have been too low. However, the estimate of net savings and associated 90% confidence interval may be biased and overstate savings to Medicare from the MJRLE CE, since the estimates did not account for the interaction of the BPCI Advanced Model with the change in Medicare policy that removed knee replacements from the inpatient only list as described above. Target prices may have been too high for PCI (outpatient) because the 90% confidence interval falls below 3%. Across the seven individual surgical CEs for PGP EIs, the 90% confidence intervals for three CEs include 3%, suggesting that the target prices were accurate (cervical spinal fusion; hip and femur procedures except major joint; and lower extremity and humerus procedures except hip, foot, femur). While the 90% confidence interval for MJRUE (-0.7%, 2.7%) falls below 3%, the 95% confidence interval (-1.0%, 3.0%) includes 3%, providing evidence that the target prices were not too high for MJRUE (see **Appendix H** for detailed results).[30] For MJRLE, net savings is estimated to be 4.8% of what payments would have been absent the BPCI Advanced Model, with a 90% confidence interval of 3.3% to 6.3%. The 90% confidence interval falls above 3%, suggesting that the target prices may have been too low. However, the estimate of net savings and associated 90% confidence interval may be biased and overstate savings to Medicare from the MJRLE CE, since the estimates did not account for the interaction of the BPCI Advanced Model with the change in Medicare policy that removed knee replacements from the inpatient only list. Finally, the evidence suggests that the target prices for PCI (inpatient) and spinal fusion (non-cervical) may have been too high since their 90% confidence intervals fall below 3%.

[30] While the BPCI Advanced evaluation generally uses a 10% level of significance, in the case of MJRUE, we present results at both the 5% and 10% level of significance because the conclusions differ, and we do not want to suggest that target prices were inaccurate when they may have been reasonably accurate.

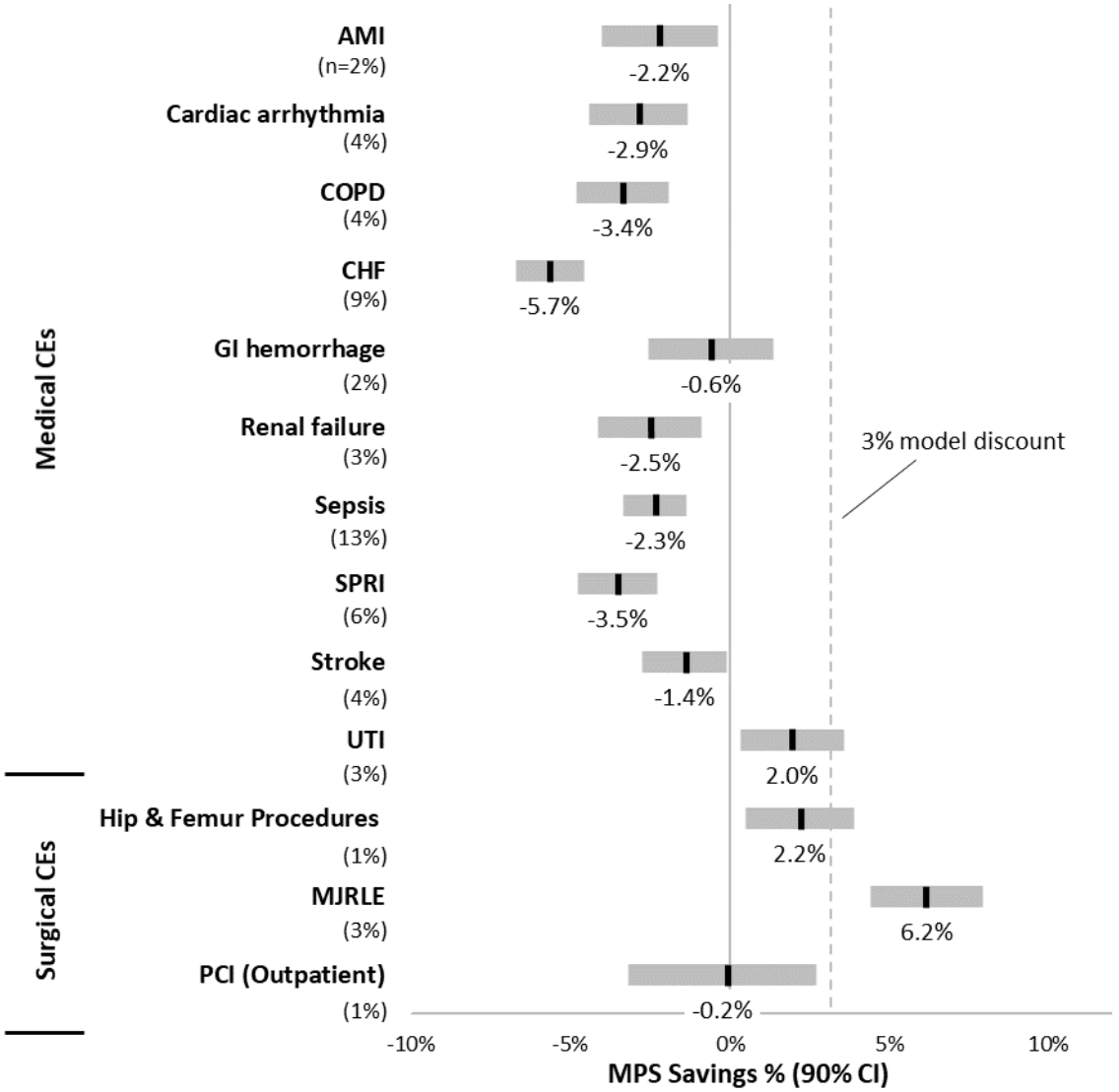
Exhibit 34: Medicare Savings Compared to the 3% Model Discount, October 1, 2018 – December 31, 2019



Note: The net savings to Medicare is the difference between the change in non-standardized payments and reconciliation payments. The estimates are presented as a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. The grey bars indicate the 90% confidence interval. The confidence intervals associated with the estimates of net Medicare program savings are based on the estimates of the change in non-standardized payments from the difference-in-differences models. The grey dashed line at the 3% mark indicates the 3% model discount. The sample size (n=) refers to the percentage of total episode volume used to calculate the reduction in non-standardized payments. CE = clinical episode; CI = confidence interval; EI = episode initiator; MPS = Medicare program savings; PGP = physician group practice.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

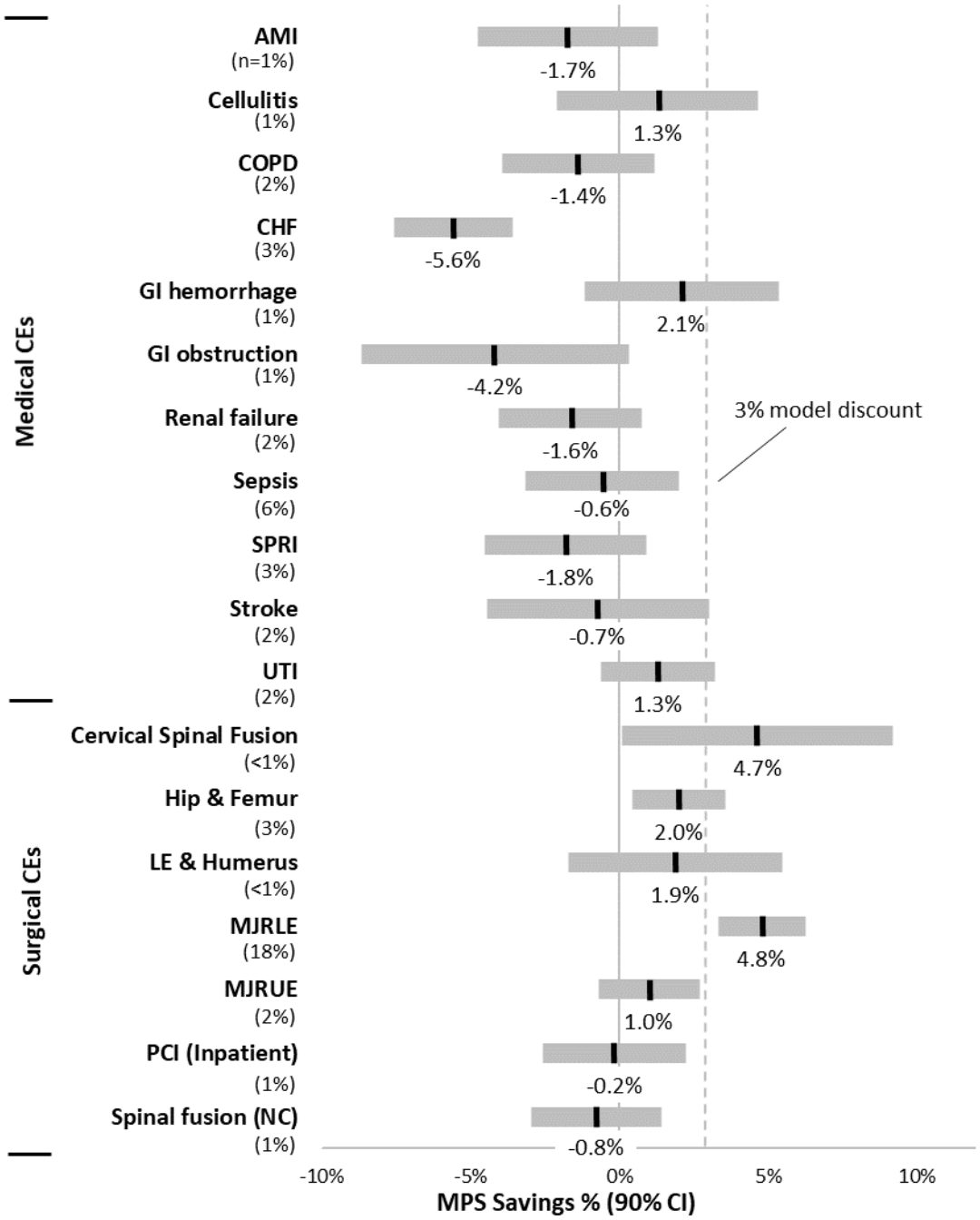
Exhibit 35: Medicare Savings by CE Compared to the 3% Model Discount, Hospital EIs, October 1, 2018 – December 31, 2019



Note: The net savings to Medicare is the difference between the change in non-standardized payments and reconciliation payments. The estimates are presented as a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. The grey bars indicate the 90% confidence interval. The confidence intervals associated with the estimates of net Medicare program savings are based on the estimates of the change in non-standardized payments from the difference-in-differences models. The grey dashed line at the 3% mark indicates the 3% model discount. The sample size (n=) refers to the percentage of total episode volume used to calculate the reduction in non-standardized payments. AMI = acute myocardial infarction; CE = clinical episode; CI = confidence interval; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; EI = episode initiator; GI = gastrointestinal; Hip & Femur Procedures = hip and femur procedures except major joint; MJRLE = major joint replacement of the lower extremity; MPS = Medicare program savings; PCI = percutaneous coronary intervention; SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/ procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

Exhibit 36: Medicare Savings by CE Compared to the 3% Model Discount, PGP EIs, October 1, 2018 – December 31, 2019



Note: For a given CE, the net savings to Medicare is the difference between the change in non-standardized payments and reconciliation payments. The estimates are presented as a percentage of what payments would have been absent BPCI Advanced, which is estimated as the average BPCI Advanced baseline payment amount plus the average change in the episode payment amount for the comparison group from baseline to intervention. The grey bars indicate the 90% confidence interval. The confidence intervals associated with the estimates of net Medicare program savings are based on the estimates of the change in non-standardized payments from the difference-in-differences models. The grey dashed line at the 3% mark indicates the 3% model discount. The sample size (n=) refers to the percentage of total episode volume used to calculate the reduction in non-standardized payments. AMI = acute myocardial infarction; CE = clinical episode; CI = confidence interval; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; EI = episode initiator; GI = gastrointestinal; Hip & Femur Procedures = hip and femur procedures except major joint; LE & Humerus Procedures = lower extremity and humerus procedure except hip, foot, femur; MJRLE = major

joint replacement of the lower extremity; MJRUE = major joint replacement of the upper extremity; MPS = Medicare program savings; PCI = percutaneous coronary intervention; PGP = physician group practice; Spinal Fusion (NC) = spinal fusion (non-cervical); SPRI = simple pneumonia and respiratory infections; UTI = urinary tract infection.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning April 1, 2013 and ending on or before December 31, 2017 (baseline period), and episodes with anchor stays/procedures beginning October 1, 2018 and ending on or before December 31, 2019 (intervention period) for BPCI Advanced EIs and matched comparison providers and CMS reconciliation data from the same period.

f. Conclusion

During Model Years 1 and 2, the BPCI Advanced Model generally resulted in estimated net losses for medical CEs and net savings for surgical CEs, with an overall estimated net loss to the Medicare program of $65.7 million, or 0.4% of what Medicare payments would have been absent the BPCI Advanced Model. For episodes pooled across medical CEs, the model resulted in an estimated net loss of $275.0 million, or 2.2% of what payments would have been absent the BPCI Advanced Model. For pooled surgical CEs, the model resulted in an estimated net savings of $204.4 million, or 3.6% of what payments would have been absent the BPCI Advanced Model. With few exceptions, the evidence suggests that target prices may have been too high for medical CEs for both hospital and PGP EIs. For surgical CEs, the evidence suggests that target prices were generally appropriate. Setting aside MJRLE for the reasons discussed above, the evidence suggests that one hospital surgical CE and two PGP surgical CEs may have had target prices that were too high. For the remaining CEs, the evidence suggests that the target prices were reasonably accurate.

D. Descriptive Analyses of BPCI Advanced During the COVID-19 Public Health Emergency

The COVID-19 PHE, which began in January 2020 (Model Year 3 of the BPCI Advanced Model), has affected all aspects of health care delivery. To better understand changes that occurred during the early months of the PHE among BPCI Advanced episodes, we performed a set of descriptive analyses.[31] We summarized participant choices of COVID-19 Amendments that allowed participants to alter their risk in the model, assessed differences in COVID-19 county-level incidence patterns between episodes attributed to BPCI Advanced EIs and episodes attributed to non-participating hospitals and PGPs, documented changes in BPCI Advanced episode volume, and examined differences in outcomes for BPCI Advanced episodes relative to the same months in the prior year. We include episodes in our analyses regardless of COVID-19 diagnoses or amendments chosen unless otherwise noted.[32] For additional information on the methods used in this section, please see **Appendix C**. The relationship between the COVID-19 PHE and BPCI Advanced will be explored further in the next evaluation report.

[31] Due to the availability of Medicare claims at the time of this report, claims-based analyses only include episodes up to those with anchor stays or procedures ending by June 30, 2020.

[32] We considered an episode to have a COVID-19 diagnosis if there was a COVID-19 ICD-10 code reported on a claim for the beneficiary at any point during the episode. The COVID-19 ICD-10 codes used were B97.29 (between January 27, 2020 and March 31, 2020) and U07.1 (on or after April 1, 2020). This differs from the definition used for reconciliation, as CMS revised the definition of a COVID-19 diagnosis to include B97.29 from January 27 and beyond due to continued use of the B97.29 code on Medicare claims after March 31, 2020. In the next report, we will align our COVID-19 definition with the reconciliation definition.

1. Key Findings

COVID-19 Public Health Emergency

- When given the option to remove, limit, or maintain financial risk in the model for episodes beginning and ending in 2020, a majority of BPCI Advanced participants chose to limit risk by removing episodes with a COVID-19 diagnosis from reconciliation.
- Changes in BPCI Advanced episode volume after the onset of the public health emergency differed by clinical episode (CE) type:
  - For surgical CEs, volume fell sharply, reaching a low point in April 2020, when volume was 72.5% lower than it was in April 2019. Volume began to rebound and was only 14.8% lower in June 2020 compared to June 2019.
  - For medical CEs, volume declined compared to the previous year, but it did not fall as sharply as surgical CEs. Volume did not rebound and was lower in June 2020 (down 36.5% compared to 2019) than in April 2020 (down 31.2% compared to 2019).
- 95.2% of episodes with COVID-19 diagnosis occured in medical CEs, with sepsis and simple pneumonia and respiratory infections accouting for more than 70% of COVID-19 episode volume between February and June 2020.
- Total allowed payments declined in 15 of 21 CEs in June 2020 compared to June 2019. Reductions in total payments were likely driven by reductions in post-acute care use.
- In June 2020, the share of episodes discharged to skilled nursing facilities declined in all 21 CEs analyzed.
- Mortality in the 90-day post-discharge period was higher compared to the prior year for 18 CEs in April 2020 (11 were statistically significant) and for 14 CEs in June 2020 (5 were statistically significant). Most statistically significant increases in mortality persisted regardless of whether COVID-19 cases were included or excluded from the analysis.

2. Results

a. Which 2020 amendment option for the Model Year 3 Participation Agreement did BPCI Advanced participants choose?

In response to the COVID-19 PHE, CMS allowed BPCI Advanced participants to alter their financial risk for episodes beginning on or after January 1, 2020 and ending by December 31, 2020.[33] Any participant that had not withdrawn from the model before June 28, 2020 could select one of two amendments.[34] Amendment 1 allowed the participant to forgo reconciliation for all episodes, such that the participant would not earn or owe reconciliation payments, but they could continue participation. Amendment 2 allowed the participant to exclude episodes with a COVID-19 diagnosis from reconciliation. Episodes from participants that did not elect either amendment were subject to the usual reconciliation process of the BPCI Advanced Model.

About a quarter (26.1%) of participants selected Amendment 1, to opt out of reconciliation entirely. More than half of participants (57.4%) chose Amendment 2, to exclude episodes in 2020 with a COVID-19 diagnosis from reconciliation (Exhibit 37). The remainder (16.5%) did not select either amendment. Excluding episodes with COVID-19 from reconciliation was the most popular option regardless of when the participant joined the model, participant type, or geographic location (see **Appendix I** for geographic results at the EI level).

Exhibit 37: BPCI Advanced Participant COVID-19 Amendment Selection

		Amendment 1: Withdraw from Reconciliation	Amendment 2: Exclude Episodes with a COVID-19 Diagnosis	No Amendment Selected
All Participants (N = 1,689)		26.1%	57.4%	16.5%
Participant Model Start Year	First Cohort (N = 1,211)	30.4%	60.0%	9.6%
	Second Cohort (N = 478)	15.3%	50.8%	33.9%
Participant Type	Other Convener (N = 1,002)	31.4%	56.2%	12.4%
	Hospital (N = 194)	31.7%	57.1%	11.2%
	PGP* (N = 493)	12.6%	58.6%	28.8%

Note: Sample includes BPCI Advanced Model Year 3 participants that had not withdrawn from the model prior to June 28, 2020. An episode had a COVID-19 diagnosis if the beneficiary had an ICD-10 diagnosis code for COVID-19 at any time during the episode.

*Includes physician group practices (PGPs) with no episode volume. Of the 493 PGPs, there were 221 with at least one episode attributed to the PGP with an anchor start and end date between January 1, 2013 and June 30, 2020. Of PGPs with any volume, 27.6% chose Amendment 1, 70.1% chose Amendment 2, and only 2.3% did not elect either amendment. First Cohort = participants that joined the model in Model Year 1 (2018); Second Cohort = participants that joined the model in Model Year 3 (2020); Hospital = hospital participants (convener and non-convener); Other Convener = convener participants that are not hospitals or PGPs; PGP = physician group practice participants (convener and non-convener).

Source: The BPCI Advanced evaluation team's analysis of BPCI Advanced programmatic data and amendment selection data, and Medicare claims data for episodes with anchor stays/procedures beginning January 1, 2013 and ending on or before June 30, 2020.

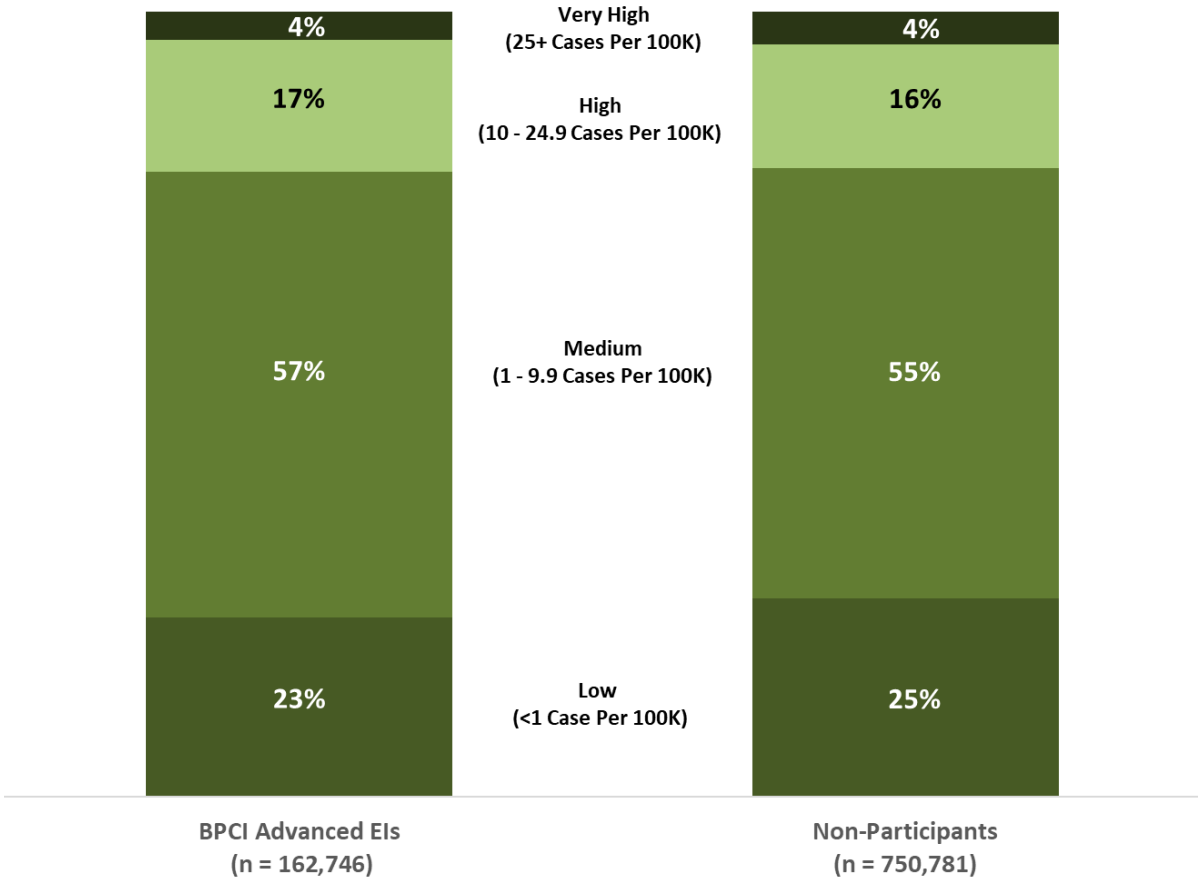
[33] CMS later issued an amendment that all episodes with a COVID-19 diagnosis that were initiated in 2020 and reconciled in performance period 5 (ending June 30, 2021) would be excluded from reconciliation for all participants, including those that chose Amendment 1 and those that did not elect either amendment. Since then, CMS has determined that episodes with a COVID-19 diagnosis will be excluded from reconciliation for the remainder of the model.

[34] That is, only participants that had not withdrawn from the model 90 or more days before the submission due date for the amendments (September 25, 2020) were eligible.

b. How did COVID-19 incidence and BPCI Advanced participation vary during the early months of the public health emergency?

The incidence of COVID-19 has had temporal and geographic differences, with waves peaking and falling in different areas at different times. To explore whether patterns varied for BPCI Advanced EIs, we calculated the proportion of episodes attributed to BPCI Advanced EIs and the proportion of episodes attributed to non-participating hospitals and PGPs in counties with varying levels of COVID-19 incidence. We conducted the analysis by month and in the aggregate for March 2020 through June 2020. Though there was some monthly variation, when aggregated, the share in each county-level incidence category did not differ by more than two percentage points for episodes attributed to BPCI Advanced EIs and episodes attributed to non-participating hospitals and PGPs (Exhibit 38). Detailed findings by month and CE are presented in **Appendix I**.

Exhibit 38: Proportion of BPCI Advanced and Non-Participant Episodes by County-level Average COVID-19 Incidence, March 1, 2020 – June 30, 2020



Note: "BPCI Advanced EIs" indicates episodes attributed to a BPCI Advanced hospital or PGP EI. "Non-Participants" indicates episodes attributed to a non-participating hospital or PGP. The monthly average of daily county-level COVID-19 incidence was calculated using county populations and daily county-level confirmed case counts from USA Facts and were linked to the location of hospitals where the episode was initiated using the 2020 CMS Provider of Service Files. Categories for county-level COVID-19 incidence were adapted from the Testing, Tracing, and Supported Isolation Technical Handbook for States and Municipalities (https://ethics.harvard.edu/ttsi-technical-handbook). Percentages may not add to 100 due to rounding.

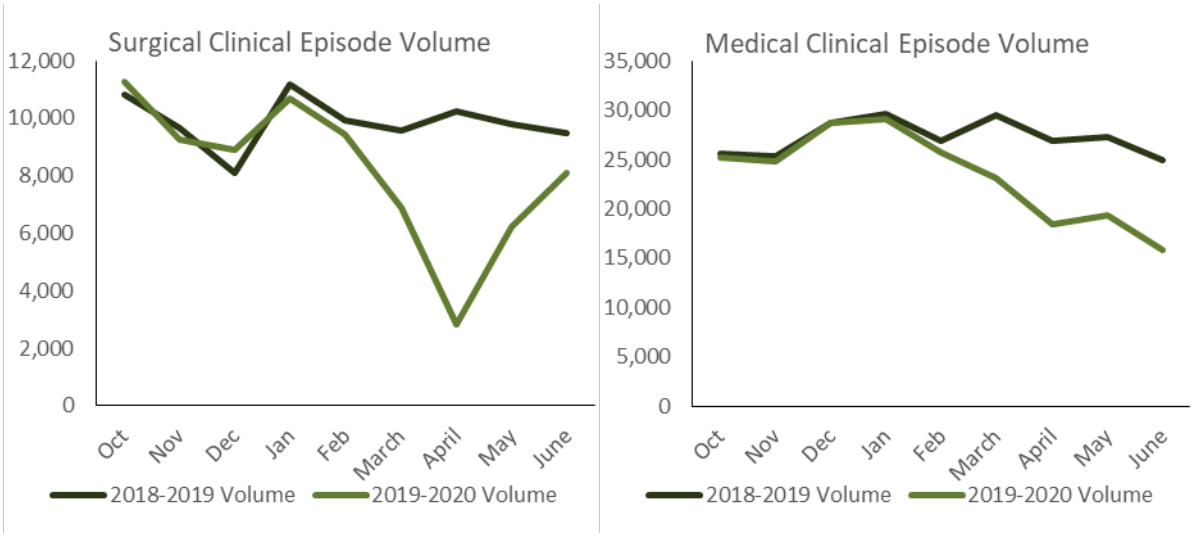
Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures that began on or after March 1, 2020 and ended by June 30, 2020 for BPCI Advanced and eligible, non-attributed episodes, county-level COVID-19 case numbers and 2019 county populations from USA Facts, and the 2020 CMS Provider of Services files.

c. How did BPCI Advanced episode volume and beneficiary characteristics change during the early months of the COVID-19 public health emergency?

We compared episode volume for the periods October 2018 through June 2019 and October 2019 through June 2020 for the group of BPCI Advanced EIs that participated in the same CEs in Model Years 1 through 3 (2018 through 2020) (Exhibit 39).[35] We found that changes in volume after the onset of the COVID-19 PHE differed between medical and surgical CEs. For surgical CEs, volume fell sharply, reaching a low point in April 2020, when the volume was 72.5% lower than it was in April 2019. Surgical CE volume began to rebound in May, and by June, the volume of surgical CE episodes was only 14.8% lower than in June of the prior year.

While Medical CE volume also decreased, it did not decline as sharply as surgical CE volume, and it did not rebound by June. In April 2020, medical CE volume was 31.2% lower than in April 2019, and in June 2020, it was 36.5% lower than in June 2019. See **Appendix I** for detailed results.

Exhibit 39: Volume Attributed to BPCI Advanced EIs, October 2018 – June 2020



Note: EI = episode initiator.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/ procedures that began October 1, 2018 and ended on or before June 30, 2020 for BPCI Advanced EIs. The sample is restricted to episodes attributed to BPCI Advanced EIs participating in the clinical episode in Model Years 1, 2, and 3.

Medical CEs were more likely to include a COVID-19 diagnosis than surgical CEs. In April 2020, 29.8% of medical episodes had a COVID-19 diagnosis, compared to 4.5% of surgical episodes. By June, the proportion of episodes with a COVID-19 diagnosis had fallen for both medical and surgical CEs, but the prevalence was still higher among medical episodes (14.5% compared to 2.4% of surgical episodes). The vast majority (95.2%) of episodes with a COVID-19 diagnosis from February through June 2020 were in medical CEs, with over 70% of episodes with a COVID-19 diagnoses occurring in SPRI and sepsis.

[35] We restricted EIs to those that participated in the same CEs for both Model Years 1 and 2 (2018 and 2019) and Model Year 3 (2020) to retain the same EIs in both periods included in the analysis.

Given the overall reductions in volume and other changes and challenges during the PHE, it is possible that beneficiary characteristics during early 2020 were different than in the years prior. We investigated changes in beneficiary characteristics for BPCI Advanced episodes by calculating the change in claims-based beneficiary characteristics for April 2020 compared to April 2019 and for June 2020 compared to June 2019. Most CEs had few statistically significant changes in beneficiary characteristics.

However, three CEs, MJRLE, SPRI, and sepsis, displayed changes across several beneficiary characteristics (Exhibit 40). In April 2020, MRJLE beneficiaries on average were older, had higher HCC scores, were more likely to be eligible for Medicaid, and were more likely to be female compared to April 2019. These changes may be due to the increase in the share of beneficiaries with hip fractures. The pattern of changes in MJRLE largely reversed by June, as the share of hip fractures declined.

The pattern of changes varied by month for sepsis, though the average HCC score was lower in 2020 in both April and June, and the share of beneficiaries who were Black or African American was higher in both months. For SPRI, the pattern of changes in beneficiary characteristics in April persisted into June. SPRI beneficiaries were younger, with lower HCC scores and a larger share of beneficiaries who were dually eligible for Medicaid, Black or African American, or Hispanic compared to the prior year. SPRI and sepsis had the highest shares of COVID-19 episodes (65.0% of SPRI episodes and 34.1% of sepsis episodes in April, respectively), which may have contributed to the observed changes in beneficiary characteristics. For example, after excluding COVID-19 episodes from SPRI, there were no statistically significant changes in the proportion of beneficiaries who were dually eligible for Medicaid, Black or African American, or Hispanic in April or June compared to the prior year, and the HCC score was statistically significantly higher for beneficiaries in April 2020 compared to 2019. **Appendix I** reports average beneficiary characteristics for episodes by CEs for the months included in the analysis, both including and excluding COVID-19 diagnoses.

Exhibit 40: Change in Average Beneficiary Characteristics in MJRLE, Sepsis, and SPRI, April 2020 vs. April 2019 and June 2020 vs. June 2019

Clinical Episode		Age	HCC Score	Medicaid Eligibility	Male	Black or African American	Hispanic
Difference in Average Beneficiary Characteristics: April 2020 vs. April 2019	MJRLE	5.90	0.47	5.06	-6.12	-1.31	-0.29
	Sepsis	0.06	-0.07	4.77	0.70	5.33	-0.50
	SPRI	-1.56	-0.18	12.52	1.09	10.89	1.75
Difference in Average Beneficiary Characteristics: June 2020 vs. June 2019	MJRLE	-0.12	-0.05	-1.78	3.54	-0.79	-0.12
	Sepsis	-0.40	-0.13	0.82	0.06	1.10	0.41
	SPRI	-1.34	-0.37	9.86	0.91	3.67	3.00

Note: Differences in the means that are statistically significant at the 1%, 5% or 10% significance level are indicated by dark, medium, and light orange shaded cells, respectively. Differences represent percentage point changes for categorical variables. Statistical significance was tested using a two-sample t-test for continuous outcomes (e.g., age) and a two-sample test of proportions for binary variables (e.g., Medicaid eligibility). HCC = hierarchical conditions categories; MJRLE = major joint replacement of the lower extremity; SPRI = simple pneumonia and respiratory infections.

Source: The BPCI Advanced evaluation team's analysis of Medicare claims and enrollment data for episodes with anchor stays/procedures beginning in April 2019, April 2020, June 2019, or June 2020 and ending by June 30, 2020 for BPCI Advanced EIs that participated in MRJLE, sepsis, and SPRI during Model Years 1, 2, and 3.

d. How did average outcomes differ between 2019 and 2020 for BPCI Advanced episodes?

We assessed changes in outcomes to explore the potential impact of the COVID-19 PHE on BPCI Advanced episodes. For each outcome, we compared episode-level averages in April and June 2020 to the same months in 2019. Episode payments increased for 15 of 21 CEs in April 2020 compared to April 2019, and 8 of the increases were statistically significant.[36] In June, average episode payments declined in 15 of 21 CEs, and 6 of the declines were statistically significant. Only SPRI had a statistically significant increase in total episode payments in June 2020 compared to June 2019. Reductions in payments in June were likely related to reduced PAC use, as discharges with any PAC services (SNF, IRF, long-term care hospital, HH) declined for a majority of CEs. Reductions in PAC use were driven largely by a reduction in discharges to SNFs, which declined in all CEs.

We also assessed changes in two claims-based quality outcomes. Unplanned readmissions declined in 15 of 21 CEs in June, though the reductions were only statistically significant in four CEs. The mortality rate during the 90-day PDP increased in 2020 compared to 2019 for many of the CEs evaluated. In April 2020, mortality increased in 18 of 21 CEs, with statistically significant increases in 11 CEs. Three of the largest percentage point increases in mortality were in the three CEs with the greatest number of changes in beneficiary characteristics overall: MJRLE, sepsis, and SPRI. In June, mortality increased in 14 of 21 CEs compared to the previous year, and five of the increases were statistically significant. All CEs with statistically significant increases in mortality in June were medical CEs. For most CEs, statistically significant increases in mortality remained both when including and excluding episodes with a COVID-19 diagnosis. Detailed results are available in **Appendix I**.

e. Conclusion

When given the option, most participants chose to exclude Model Year 3 (2020) episodes with a COVID-19 diagnosis, rather than forgo the reconciliation process entirely or be subject to the usual reconciliation process regardless of the presence of a COVID-19 diagnosis.

We assessed changes in BPCI Advanced episode volume, outcomes, and patient characteristics during the early months of the PHE. The volume of BPCI Advanced episodes fell for both surgical and medical CEs, though volume in surgical CEs partially rebounded by mid-year 2020, while medical volume continued to decline slightly. Similar to episodes attributed to non-participating hospitals and PGPs, a majority of BPCI Advanced episodes occurred in counties with a monthly average COVID-19 incidence of 1 – 9.9 daily cases per 100,000 residents during the time period of March through June 2020.

Most COVID-19 diagnoses occurred in medical CEs. The CEs with the highest share of episodes with a COVID-19 diagnoses (SPRI and sepsis) consistently exhibited shifts in beneficiary characteristics. Average episode payments increased for most CEs in April 2020. By June, the

[36] Similar to the volume analysis, we added the restriction that the EIs must have participated in the CE for both Model Years 1 and 2 and Model Year 3 to retain the same EIs in both periods included in the analysis. For both the beneficiary characteristics and outcomes analyses, we also excluded CEs that did not have at least 60 episodes without a COVID-19 diagnosis in each month of the analysis. Thus 21 CEs overall were included in the beneficiary characteristics and outcomes analyses. For more details, see **Appendix I**.

pattern had reversed, and a majority of CEs experienced lower total episode payments on average, with only the CE with the highest share of COVID-19 diagnoses, SPRI, exhibiting a statistically significant increase in total episode payments. The widespread reductions in total episode payments likely reflected declines in PAC use, most notably a reduction in discharges to SNF. We will continue to assess and monitor the relationship between the PHE and BPCI Advanced in future evaluation reports.

III. Discussion and Conclusion

A. Discussion

The BPCI Advanced Model tests whether linking Medicare payments for an episode of care can reduce Medicare expenditures while maintaining or improving quality of care. BPCI Advanced builds on the lessons learned from earlier bundled payment models, primarily the BPCI Initiative Model 2. Its refined payment approach is intended to expand provider participation as well as increase the likelihood that the Medicare program will achieve savings. In addition, performance on select quality metrics adjusts reconciliation payments, so that BPCI Advanced qualifies as an Advanced APM. This may further boost participation since physicians who achieve threshold levels of payments or patients through Advanced APMs may be eligible for the 5% APM incentive payment and may be excluded from the MIPS reporting requirements and payment adjustment. The quality adjustment is also intended to reinforce the quality aims of the model.

There was widespread participation in BPCI Advanced, with 1,295 hospital and PGP EIs in Model Years 1 and 2 (2018 and 2019), which almost doubled to 2,041 EIs in Model Year 3 (2020). Potential participants were provided preliminary target prices and data on their historical episode payments, which allowed them to evaluate their opportunities for achieving payment and quality goals prior to joining BPCI Advanced and selecting CEs. EIs selected CEs for which they expected to perform well. Hospitals were more likely to participate in medical CEs, while PGPs were more likely to participate in surgical CEs. Hospitals selected five CEs, on average, with medical CEs accounting for four of them and representing about 84% of their episodes. PGPs selected seven CEs, on average, with surgical CEs accounting for five of them and representing about 51% of their episodes.

Overall, for the CEs evaluated, the BPCI Advanced Model achieved statistically significant reductions in average standardized episode payments. The reduction in per-episode payments was over twice as large for surgical CEs pooled as it was for medical CEs pooled. For medical CEs, hospital and PGP EIs reduced episode payments by modest, but similar amounts. For surgical CEs, both hospital and PGP EIs made larger reductions in episode payments with no statistically significant difference between the two.

Consistent with earlier analyses and other episode-based payment approaches, payment reductions were primarily due to lower payments for more intensive PAC settings, particularly for SNF and IRF. This was true for both hospital and PGP EIs, although they differed in how they achieved these reductions. The proportion of patients first discharged to an institutional PAC setting declined marginally or not at all for most hospital CEs. Rather, hospital EIs reduced the number of SNF days for SNF users in most CEs. By contrast, PGP EIs reduced the proportion of episodes first discharged to an institutional PAC setting for medical and surgical CEs by larger amounts. For beneficiaries with at least one SNF day in the 90-day PDP, PGP EIs showed a statistically significant reduction in the number of SNF days for all but one surgical CE, with little to no reductions for medical PGP CEs. Changes in HH payments under the model differed for hospital and PGP EIs. HH payments increased for hospital EIs, indicating hospitals may have substituted more intensive PAC services for less intensive PAC services, while HH payments decreased for PGP EIs. This may reflect the different nature of physicians' relationships with beneficiaries and their ability to plan for the post-acute or post-procedure period differently than hospitals. These

differences may provide insights into the levers available to hospitals and physicians to affect health care utilization and spending.

As in previous years, BPCI Advanced did not negatively affect quality of care, even though PAC use declined, as measured by two claims-based quality outcomes, and on the contrary, there is evidence of an improvement in the unplanned readmission rate for surgical CEs.[37] While there was no impact on the unplanned readmissions rate during the 90-day PDP for hospital and PGP EI episodes pooled across the CEs evaluated, there was a decline in the unplanned readmissions rate for surgical CEs, which was seen in both hospital and PGP surgical CEs, though the hospital surgical result was not statistically significant. The mortality rate during the 90-day PDP did not change for episodes pooled across CEs, but there were declines for renal failure and UTI episodes, as well as an increase for SPRI episodes. We investigated several potential causes for the adverse result for SPRI episodes and did not find an explanation. In addition, the higher relative mortality rate for SPRI episodes appears to be attenuating beginning in the second quarter of 2019. We will continue to monitor and report on any changes in mortality rates and other indicators of quality of care.

Although BPCI Advanced extended participation and achieved lower episode payments across multiple CEs, it was only partly successful in reducing Medicare spending. During Model Years 1 and 2, for both hospital and PGP EIs, after considering reconciliation payments, the BPCI Advanced Model generally resulted in estimated net losses for medical episodes and resulted in estimated net savings for surgical episodes, with an overall estimated net loss to the Medicare program of $65.7 million, or 0.4% of what Medicare program payments would have been absent the BPCI Advanced Model.

For medical CEs, the model resulted in an estimated net loss of $275.0 million, or 2.2% of what payments would have been absent the BPCI Advanced Model. For surgical CEs, the model resulted in an estimated net savings of $204.4 million, or 3.6% of what payments would have been absent the BPCI Advanced Model.

With few exceptions, the evidence suggests that target prices were too high for medical CEs for both hospital and PGP EIs. For surgical CEs, the evidence generally suggests target prices were reasonably accurate.

Future evaluation reports will extend the evaluation of the BPCI Advanced Model in the context of several important changes. The COVID-19 PHE may affect providers' ability to implement care redesign strategies developed as part of BPCI Advanced participation. We intend to further assess these implications in future reports by expanding upon our COVID-19 analysis in this report. Effective in Model Year 4 (2021), participants will need to choose CESLGs rather than individual CEs, which will limit selection decisions, and there will be additional flexibility to report quality measures. The CESLGs, in particular, may bolster participant efforts to reduce payments across a broader range of CEs, which may mitigate the impact of self-selection on estimates of net savings

[37] The BPCI Advanced Second Evaluation Report includes quality measures from a beneficiary survey. Beneficiary survey results suggest that, in aggregate, self-reported change in functional status, experience and satisfaction from before to after the episode did not differ between BPCI Advanced and comparison respondents for hospital- or PGP-attributed episodes. Prior annual evaluation reports are available on the CMS BPCI Advanced website: https://innovation.cms.gov/innovation-models/bundled-payments.

to Medicare. In addition, effective in Model Year 4, target prices will be set retrospectively (using a realized peer group trend) rather than prospectively (using forecasted peer group trends) as was done in Model Years 1 through 3. We will assess whether the prospective target prices are accurate, i.e., whether net Medicare program savings equal to the model discount is achieved.

B. Limitations

We estimate the impact of the model using a DiD design, which is dependent on a matched comparison group that is similar to BPCI Advanced providers on key factors expected to influence their decision to participate in the model. To identify matched providers that were balanced with BPCI Advanced providers across various characteristics, a subset of BPCI Advanced EIs had to be excluded from our impact estimates. Across the CEs evaluated, 84.5% to 98.1% of BPCI Advanced hospitals EIs were included in the analysis, and 74.0% to 96.9% of PGP EIs were included. To estimate net savings to Medicare, we extrapolate these analyses to all EIs that initiated episodes in the CEs we evaluate. Sensitivity testing that included all EIs showed that our findings were robust to alternative samples.

These statistics about the share of BPCI Advanced episodes in the evaluation sample illustrate the challenges of evaluating the BPCI Advanced Model. The primary difficulty is finding a group of comparison providers that are similar to BPCI Advanced hospital and PGP EIs. The BPCI Advanced Model has broad participation. We excluded providers from the potential comparison pool if they were contaminated by the BPCI Advanced Model because they were located in a market with high BPCI Advanced penetration or because they had a high share of their baseline episodes initiated by other BPCI Advanced EIs. For example, a non-participating hospital may have BPCI Advanced PGPs practicing at the hospital, and non-participating PGPs may be practicing at BPCI Advanced hospitals. Moreover, CMS provided applicants with a large amount of data and information, allowing providers to determine if they would benefit financially from the model. Those who would benefit financially chose to participate, leaving few candidates for the comparison group that were similar to BPCI Advanced participants.

Constructing comparison samples for PGP EIs was more challenging than constructing comparisons for hospital EIs. PGPs may form new tax identification numbers (TINs), which is how PGPs are identified, with new clinician members, ownership status, or tax status. PGP EIs were also able to form new TINs specifically to participate in BPCI Advanced. As a result, there was no baseline claims data to use for matching purposes for many PGP EIs. To preserve as many PGP EIs in our sample, we linked new PGP EIs to baseline data based on overlapping physician billing, and ownership structure. There were 41 PGP EIs newly created to participate in BPCI Advanced that we were unable to identify baseline information for and were excluded from the analyses. These EIs made up approximately 4% of episode volume.

We assess the impact of BPCI Advanced for a subset of CEs due to limited sample size or difficulty identifying a suitable matched comparison sample of providers. We evaluated 13 CEs for hospital EIs, which account for 90% of episodes, and 18 CEs for PGP EIs, which account for 93% of episodes. In future reports we will expand the number of CEs for which we conduct impact estimates when sample size permits.

A key assumption of our DiD design is parallel trends for a given outcome. We evaluated parallel trends in the baseline for each EI type, CE, and outcome measure. We rejected the null hypothesis that there were parallel trends at the 10% level of significance for 17 of 100 (or 17%) estimates for hospital EIs, and 7 of 144 (or 5%) estimates for PGP EIs. These estimated outcomes that did not pass parallel trends may be biased and are so noted in the report.

The analysis of beneficiaries treated by hospital and PGP EIs did not reveal systematic changes in patient mix under BPCI Advanced. This finding is based on the limited information available in claims-based data, but at this time, there is not a better source of data available to measure changes in patient mix for the BPCI Advanced evaluation. For example, clinical records that would provide more detailed information on patient mix in the form of electronic health records are not widely available for the Medicare population or for the evaluation of large models such as BPCI Advanced. In addition, patient assessments available in the Minimum Data Set (MDS), Outcome and Assessment Information Set (OASIS), and Inpatient Rehabilitation Facility Patient Assessment (IRF-PAI) are only available for beneficiaries that received services from SNFs, HH agencies, and IRFs, respectively, and only for a subset of beneficiaries for which clinicians were able to complete the assessments. Furthermore, given that PAC use declined due to BPCI Advanced, it would not be appropriate to use these data to measure changes in patient mix that occurred due to the model.

Our conclusion that BPCI Advanced resulted in net losses to Medicare in the first two model years is based on several assumptions. First, we extrapolate our DiD estimates to EIs not included in our sample due to limitations identifying suitable matched comparison EIs. Reconciliation amounts that we used do not account for several model adjustments that are applied at the EI and convener level (i.e., the stop-loss/stop-gain provision, the CQS adjustment, BPCI Advanced recoupment amount, and the post-episode spending penalty amount). Finally, we only estimate net savings to Medicare for the 13 hospital CEs and 18 PGP CEs evaluated.

C. Conclusion

In Model Years 1 and 2, for the CEs analyzed, the BPCI Advanced Model has been successful in reducing total episode payments without compromising the quality of care and may have improved unplanned readmission rates for surgical CEs. Payment reductions were over twice as large for surgical CEs as for medical CEs. For medical CEs, hospital and PGP EIs reduced episode payments by modest, but similar amounts. For surgical CEs, both hospitals and PGPs made larger reductions in episode payments with no statistically significant difference between the two. The model accrued net Medicare losses for medical CEs and net Medicare savings for surgical CEs, resulting in small net Medicare losses overall. Changes to the target pricing methodology and CE groupings that CMS implemented in Model Year 4 (2021) are intended to bolster the model's ability to achieve Medicare savings. Achieving savings is important because the Secretary of Health and Human Services has the authority to expand models that reduce federal spending while maintaining or improving quality for beneficiaries. Future evaluation reports will assess how these changes impacted participation in the model and Medicare program savings. Future evaluation reports will also incorporate participant perspectives of the changes implemented in Model Year 4 (2021) and the levers that are used to reduce episode payments. We will also report on beneficiary experience and patient reported outcomes in the model. The next report will also explore the effect of the COVID-19 PHE on providers and their ability to respond to the incentives of the model.