

Bundled-Payment Models Around the World: How They Work and What Their Impact Has Been

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ABSTRACT

ISSUE: Understanding the impact of bundled-payment models on value in health care requires a better understanding of how design choices and implementation strategies affect cost and quality.

GOAL: To describe the key design elements of bundled-payment models and evaluate empirical evidence about their impact on quality of care and medical spending.

METHODS: Scan of the scientific and grey literature.

FINDINGS AND CONCLUSIONS: We identified 23 initiatives in eight countries that have implemented bundled-payment models, focusing on procedures such as total joint replacements and cardiac surgery, as well as chronic conditions like diabetes and breast cancer. Of the 35 studies retrieved, 32 reported effects on quality of care and 32 reported effects on medical spending. Twenty of 32 studies reported modest savings or a modest reduction in spending growth, while two studies (both based on the same initiative) demonstrated increased spending in the early years of the bundled-payment model's implementation. Eighteen of 32 studies reported quality improvements for most evaluated measures, while other studies showed no difference in measured quality. Our study provides evidence that bundled-payment models have the potential to reduce medical spending growth while having either a positive impact or no impact on quality of care.

TOPLINES

- ▶ An eight-country study reports predominantly positive impacts — irrespective of country, medical procedure, or condition — of bundled-payment models that aim to impact both spending and quality of care.
- ▶ Privacy laws that affect information-sharing and the difficulty of defining quality criteria are among the operational challenges of implementing bundled-payment models around the world.



BACKGROUND

Public and private payers around the globe are increasingly shifting away from fee-for-service (FFS) payment models in favor of alternative payment models (APMs) that give providers incentives to improve value. The rationale is that providers and organizations are in the best position to identify ways to reduce waste and overuse, coordinate care across settings, steer patients to the most appropriate, high-quality providers, and provide needed care.

APMs vary in design. Some, such as accountable care organizations and *Gesundes Kinzigtal*, target total population spending, while others focus on creating incentives for providers to limit spending during episodes, or bundles, of care.¹ These later models go by many names — including episode-based payment, episode payment, episode-of-care payment, case rate, evidence-based case rate, and global bundled payment. What they have in common is a shift of financial and clinical risk from payers to providers.

Bundled-payment models capitalize on the provider entity's need to manage a budget and ensure quality. The entity receiving the bundled payment earns a higher margin if a patient utilizes less care, but also must cover the cost of unexpected utilization and complications. Public and private payers in many countries are implementing APMs on the theory that giving care providers a financial stake in driving value might be more effective than asking patients to assume financial risk through deductibles, co-payments, and out-of-pocket payments.²

To gain a better understanding of the impact of design choices and implementation strategies, this study aimed to: 1) provide an overview of current bundled-payment models in high-income countries; and 2) describe the key design elements of bundled-payment models and estimate their effects on quality of care and medical spending.

HOW DO BUNDLED-PAYMENT MODELS WORK IN PRACTICE?

We systematically analyzed bundled-payment model initiatives by describing the general characteristics of the initiative — including country, year of implementation, what condition (or conditions) it covers, and whether the model was a pilot or fully implemented — and the key design elements of the bundled payment, such as target population, included care components, and payment methodology. We assessed payment methodology using an adaptation of the HCP-LAN framework by De Vries and colleagues that looks at receiving entity, time period, risk-adjustment methods, distribution among participating providers, and link with quality.³

General Characteristics

We identified 23 bundled-payment initiatives across eight high-income countries (Exhibit 1). Most of the initiatives were introduced in the United States (n=15), but we also studied programs in Taiwan, England (n=2), the Netherlands, Portugal, Denmark, New Zealand, and Sweden. The earliest initiative was implemented in Taiwan in 2001, followed by several in European countries in 2007 (the Netherlands and Denmark) and 2008 (Portugal). Substantial uptake of bundled-payment models occurred in the U.S. after the introduction of the Affordable Care Act.

Most initiatives focus on one condition, procedure, or treatment. Most payment models in this study started with only one chronic condition, procedure, or treatment, such as diabetes (the Netherlands and Denmark), maternity care (U.S. and England), end-stage renal disease (Portugal and U.S.), breast cancer (Taiwan and U.S.), or total joint replacement (U.S. and Sweden). Some of the bundles target a range of related conditions, such as the U.S. oncology bundles that include multiple forms of cancer. Four other initiatives include multiple conditions or procedures in their bundled-payment model. The Bundled Payment for Care Improvement (BPCI), a U.S. pilot, includes the broadest range, with 48 chronic conditions or episodes.

Exhibit 1. Overview of Initiatives Implementing Bundled-Payment Models

	Initiative	Country/State	Condition, Procedure, or Treatment	Year Begun
United States				
1	Provider Payment Reform for Outcomes, Margins, Evidence, Transparency, Hassle-reduction, Excellence, Understandability, and Sustainability (PROMETHEUS)	U.S.	21 defined clinical episodes, such as hip replacement and diabetes	2008
2	Acute Care Episode (ACE) Payment model	U.S.	37 inpatient cardiac and orthopedic procedures which include cardiac valve and other major cardiothoracic valve, cardiac defibrillator implant, Coronary artery bypass grafting (CABG), cardiac pacemaker implant or revision, percutaneous coronary intervention, and hip or knee replacement or revision	2009
3	UnitedHealthcare Episode Payment model for oncology care	U.S.	Breast, colon, head, neck, and lung cancer (19 defined episodes)	2009; 2014 for head and neck
4	IHA Bundled Episode Payment and Gainsharing Demonstration	U.S.	Total hip replacement and total knee replacement	2010
5	Minnesota Birth Centers BirthBundle (MBCBB)	U.S. (Minnesota)	Maternity care	2012
6	Horizon HealthCare division (Blue Cross Blue Shield)	U.S.	Total joint arthroplasty	2012
7	Hoag bundled payment	U.S.	Total joint arthroplasty	2012
8	Providence Health & Services The Pregnancy Care Package (PHSPCP)	U.S. (Oregon)	Maternity care	2013
9	Bundled Payment for Care Improvement (BPCI)	U.S. (253 hospitals and 152 physician group practices)	48 conditions (e.g., acute myocardial infarction, hip/knee replacements, CABG)	2013
10	Bundled Payment for Care Improvement (BPCI) Advanced	U.S.	29 inpatient clinical episodes and three outpatient clinical episodes	2018
11	Horizon Blue Cross Blue Shield of New Jersey (Horizon HealthCare Division)	U.S. (New Jersey)	Multiple	2013
12	Comprehensive Care for Joint Replacement (CJR) Payment model	U.S. (67 metropolitan statistical areas)	Total hip replacement, total knee replacement, lower extremity joint replacement	2016
13	Arkansas Payment Improvement Initiative	U.S. (Arkansas)	2012: Five episodes were launched: upper respiratory infections (URIs), attention deficit/hyperactivity disorder (ADHD), hip and knee replacement, perinatal (pregnancy), and congestive heart failure 2013: Three more—colonoscopy, cholecystectomy, and tonsillectomy 2014: CABG and asthma 2015: Oppositional defiant disorder (ODD), percutaneous coronary intervention, chronic obstructive pulmonary disease, and ADHD/ODD comorbidity	2012-2015

	Initiative	Country/State	Condition, Procedure, or Treatment	Year Begun
14	HealthChoice Select	U.S. (Oklahoma)	43 categories of bundled services, including (among others) arthroscopies, cataract removal, lithotripsy, mastectomy, and cardiology; facilities could choose to participate in one or more category	2016
15	Humana/Century Oncology case rate	U.S. (20 states)	12 common oncology conditions	2013
Other countries				
16	Bundled payment for breast cancer	Taiwan	Breast cancer	2001
17	Bundled payment for diabetes care (BPDC)	Denmark	Diabetes mellitus	2007
18	Bundled payment for diabetes care, chronic obstructive pulmonary disease (COPD) care, and vascular risk management	Netherlands	Three conditions: diabetes mellitus, COPD, and vascular risk management	2007 as BPDC pilot; 2010 permanent
19	Leading Maternity Carer	New Zealand	Maternity care	2007
20	Bundled payment model for end-stage renal disease (ESRD)	Portugal	ESRD	2008
21	OrthoChoice	Sweden	Total hip replacement and total knee replacement	2009
22	Long-term care bundled payment, crossing health and social care	England	Not condition-specific	2012
23	Maternity Pathway Bundled Payment	England	Maternity care	2013 (with 2012 as a shadow year)

Finally, one initiative (England's long-term care model) does not focus on a specific condition or treatment but integrates the payment models of services from different domains, such as long-term care and social care. The payment applies to the whole population, irrespective of disease, condition, or procedure. This payment model could be characterized as partial global payment instead of a bundled payment, which we define as an episode of care for a medical condition or treatment including services of multiple providers.

Most bundled-payment models started as pilots but have been permanently implemented. All initiatives started with pilot programs and evolved toward permanent

implementation. Some of the experimental bundled-payment models had a formal end date but lived on in newly launched bundled-payment models with new names. For instance, the Acute Care Episode payment model formally ended but contributed to the creation of the BPCI.

All bundled-payment models were voluntary with the exception of England's Maternity Pathway Bundled Payment model and the Arkansas Payment Improvement Initiative. The U.S. Comprehensive Care for Joint Replacement Payment model was initially designed to be mandatory but was implemented as a voluntary program so that more input could be collected.⁴

Key Design Elements

Exhibit 2 summarizes design features of bundled-payment models. (For specific features of each of the 23 initiatives, see [Appendix](#).)

Included care services were quite comparable within specific conditions. Across the initiatives using a bundled-payment model for the same condition, the included care services were similar, irrespective of country. For instance, maternity care initiatives from the U.S. (Horizon Blue Cross, Arkansas Payment Improvement Initiative), New Zealand (Leading Maternity Carer), and England (Maternity Pathway Bundled Payment) all included prenatal, natal, and postnatal services. The same holds for initiatives focused on total joint arthroplasty (TJA).

All the TJA initiatives included the surgery itself, the prosthesis, and postdischarge care services including

readmissions and complications. In Sweden, Orthochoice also included a presurgical visit, which was not the case in the other TJA models. In addition, included care services for most bundles were limited to a single care sector, with the exception of England's long-term care bundled-payment model, which included both health care and social care. In general, no preventive services were included in the bundles.

Definition of episode differed among conditions. Bundled-payment models focusing on a chronic condition generally defined a care episode as a calendar time period. For example, in both diabetes care bundles (Netherlands and Denmark), a care episode is 365 days. Bundles that cover a procedure or treatment such as a total joint replacement (TJR) defined their episode of care as the period of illness or care cycle. In the TJR

Exhibit 2. Examples of Key Design Elements of Bundled-Payment Models

Design Element	Examples
Covered services	<p><i>Surgical care:</i> Presurgical visit, surgery, inpatient stay, follow-up care</p> <p><i>Cancer care:</i> Services for intake, diagnosis, and staging (imaging, biopsy, pathology), treatment (surgery, chemotherapy, radiation), and follow-up</p> <p><i>Chronic care (diabetes):</i> Diabetes services provided in primary care setting; regular checkups including annual consultation and subsequent consultations related to diabetes (e.g., dietary counseling, eye exam, foot exam)</p>
Payment methodology	Prospective; retrospective; mix of both
Accountable entity	Typically provider-led entity, such as hospital or independent practice
Episode of care definition	Length of time (e.g., one year); breadth of services (e.g., preoperative visit through follow-up visit)
Risk sharing	Savings shared 50/50 between providers and insurers; providers bear 100% of risk; provider risk increases gradually
Risk adjustment	Severity-adjusted budget per episode; risk-stratified by diagnosis and major comorbidities
Distribution of payments among participating providers	Incentive payments weighted for resource management, clinical performance, and patient satisfaction
Linkage of payment to quality outcomes	Quality standards must be met to participate in shared savings

bundles, this episode included a preoperative period, an inpatient period, and a postdischarge period, with the length of these periods varying. TJA bundles vary widely in how they quantify episodes: In the BPCI model, the postdischarge period is maximized at 180 days; in the Swedish model this period was two years with an extension to five years if a complication occurred within the first two years.

Both retrospective and prospective bundled-payment models were applied. Payers and providers choose from two main strategies for payment flow, namely 1) a prospectively established price that is paid as one payment to the accountable entity; or 2) upfront FFS payments to individual providers within the episode with a retrospective reconciliation period. Among the bundled-payment initiatives studied, 10 initiatives used a retrospective bundled-payment model, while 12 chose a prospective bundled-payment model. One initiative (BPCI) included both retrospective and prospective payment models.

Risk-sharing properties, risk-adjustment methods, distribution, and link with quality were not well-described in many initiatives. Among the research papers and reports on bundled-payment initiatives, the risk-sharing properties, risk adjustment methods, and distribution of pay for the included care services were not described or only briefly described.

WHAT DOES EMPIRICAL EVIDENCE SHOW ABOUT THE IMPACT OF BUNDLED-PAYMENT MODELS?

About half of the bundled-payment initiatives were empirically evaluated. In total, we retrieved 35 papers evaluating 11 bundled-payment initiatives. To our knowledge, the 12 additional initiatives in our study have not generated publicly available empirical evidence on their impact on quality of care and medical spending. Most studies were on the U.S. bundled-payment models, of which the BPCI was most commonly evaluated. All studies had an observational design and the most commonly applied methodologies were pre- and post-measurement without a control group, or difference-in-

difference approach (that is, pre- and post-measurement with a control group). Of the 35 retrieved papers, 32 reported effects of the bundled-payment model on quality of care; 32 reported the effects of the bundled-payment model on medical spending; and no papers reported the effects of the payment model on accessibility.

Most studies reported positive (cost-saving) effects of bundled-payment models on medical spending. Twenty of the 32 studies that evaluated the effects of the bundled-payment model on medical spending reported lower medical spending and/or spending growth as compared to their control group. The effect varied widely between studies. For example, Sweden's bundled-payment model for total hip and total knee replacements yielded a decrease of 34 percent in total average medical spending, while a U.S. initiative targeting chronic obstructive pulmonary disease in Medicare patients reported a 4.3 percent cost savings compared with BPCI target prices.⁵ The only initiative in which an increase in medical spending was observed was the Dutch bundled-payment model for diabetes care. Within this model, total medical spending increased in the first two years.⁶ Evaluations on long-term effects of the Dutch diabetes bundled-payment model are not available.

Eighteen studies reported positive effects on quality of care, while two studies reported negative effects. Among the 32 papers that reported on the effect of the initiative on quality of care, 18 reported overall (small) positive effects on the quality of care measures, while in 12 studies no (significant) quality improvements were demonstrated. Some of these 12 studies had mixed results: Some quality measures were slightly positive while others were unchanged. Two of the studies reported negative effects on the quality of care delivered.

Both process and outcome measures were included in all studies. Many of the process measures were focused on guideline adherence, like the percentage of patients receiving necessary checkups. No differences were found in the effect on process or outcome measures. If positive effects were reported, it was mostly observed in both process and outcome measures.

Patient experiences were not regularly evaluated within the obtained studies. Patient experiences were rarely measured in the 35 studies. One study reported a higher likelihood to recommend the surgeon within the bundled-payment group (94.4%) as compared to the overall average percentage (76.0%).⁷

Exhibit 3 presents selected findings from the studies showing how bundled-payment models affected quality of care and cost. (For additional findings of each of the 23 initiatives, see [Appendix](#).)

Exhibit 3. Selected Evidence on Quality-of-Care and Cost Outcomes

About 60 percent of the studies reported improved quality of care, while the other studies showed no difference in measured quality of care. Similarly, about 60 percent reported lower medical spending and/or spending growth. Below are selected examples of the effects of bundled-payment reform on quality of care and health care spending.

Bundled-Payment Initiative	Quality of Care Results	Medical Spending Results
Acute Care Episode (ACE) Payment model (cardiac)	Quality of care levels maintained Reduction in the use of internal mammary artery grafts in patients undergoing coronary artery bypass graft surgery	Savings of \$319 per episode Total of \$4 million in net savings for 12,501 episodes of care
UnitedHealthcare episode payment model (oncology)	No differences between the groups on multiple quality measures	34% reduction of predicted total medical cost (Study used two interventions — financial incentives and data-sharing — to change behavior; relative effect of each incentive could not be determined)
Horizon Health Care division (Blue Cross Blue Shield) (orthopedic)	Total knee arthroscopy (TKA) length of stay decreased from 3.3 days to 1.9 days Total hip arthroscopy (THA) length of stay decreased from 2.9 days to 1.8 days Discharge to inpatient rehabilitation significantly decreased from 66.3% in 2011 to 33.17% in 2013–2014. In-hospital complication rate increased from 6.4% to 8.67%, but a review of this data revealed a significant increase in hospital coding for clinically insignificant complications Transfusion rate decreased from 23.2% to 4.45% 30-day readmission rates decreased from 3.2% to 2.7%	Average device cost decreased from \$6,301 per patient to \$4,972 per patient with the last six months averaging \$4,585 per patient Average episode budget was \$25,365 for TKA and \$23,580 for THA Under budget for 65 of 78 TKA episodes and under budget for 27 of 38 THA episodes Total savings relative to budget for all Horizon patients over this two-year period exceeded \$524,000, resulting in a savings of \$262,445 during this time or an average of \$2,262 per patient
Bundled Payment for Care Improvement (BPCI) (total joint arthroplasty)	18% reduction in length of stay Shift from home health and skilled nursing facility discharge to home self-care (54.1% to 63.7%)	No significant differences in implant cost Improvements resulted in 6% reduction in average total allowed claims per case
Bundled Payment, Netherlands (diabetes)	Decrease in specialist care Increase in regular checkups Increase in foot exams Increase in kidney exams Decrease in eye exams	Increase in total medical spending of 388 euro compared to control group No increase in medical spending for diabetes specialist care

DISCUSSION

Bundled payments have had a predominantly positive effect on medical spending and quality of care. Bundled-payment models have had predominantly positive impacts on both spending and quality of care, irrespective of country, medical procedure, or condition and applied research methodology. Twenty out of 32 studies reported lower medical spending or spending growth, and 18 studies reported quality of care improvements. Remarkably, just two (6%) studies produced negative outcomes.

Moreover, the *a priori* assumed effects of bundled-payment models were supported by multiple evaluation studies, although most of the studies had design weaknesses that limited causal inference. Bundled-payment models have led to closer collaboration among providers, better coordination of care, reduction of low-value care services and overuse of care, and greater use of preventive services.

Voluntary bundled-payment initiatives might have led to selection. Because the majority of initiatives introduced bundled payments on a voluntary basis, selection bias may have affected the results. For instance, providers and organizations who choose to implement bundled payments may be more able to implement and more likely to benefit from this payment model.⁸ Providers and organizations that expect not to benefit may be more reluctant to switch to the bundled-payment model. In addition, in most cases there were no penalties for dropping out of the initiatives. Within the U.S. BPCI model, a substantial share of providers and organizations dropped out of the program.⁹ In studies from other countries, this phenomenon of dropouts was not mentioned.

Should bundled payments be retrospective or prospective? One of the most discussed issues of bundled-payment models focuses on the timing of the

payment flow: Should bundles be paid prospectively or retrospectively? The studies suggest that the difference between retrospective and prospective payments is not significant in practice, particularly because retrospective payments are often based on up-front negotiated benchmarks.¹⁰

In addition, “loss aversion” acts as an incentive to include downside risk in retrospective bundled payments, as a way of mimicking the incentives created by prospective bundled payments. Research suggests that the natural aversion to loss is why an upfront negotiated benchmark will never adequately mimic the incentives from a prospective payment. Furthermore, assuming downside risk in a retrospective payment arrangement results in physicians behaving differently than if they had assumed full financial accountability for managing a prospective bundled payment.¹¹ More research should be done to better understand the effects of payment timing on provider behavior.

Cross-national learning will be crucial for the implementation of bundled payments. The challenge of implementing bundled-payment models is a recurring theme in the scientific literature.¹² Some operational hurdles are relatively well-known, such as privacy laws that affect information-sharing, the difficulty of defining quality criteria, and “gaming.”¹³ Other challenges are less well-described, such as difficulties identifying which patients are included in the bundle, income loss for some care professionals, and potential limits on patients’ freedom of choice.¹⁴ These challenges point to a need for more insight into barriers to implementation. The various ways that bundled-payment models have been operationalized — and the difficulties both payers and providers have experienced so far — make clear that shifting from FFS toward bundled payments is not a simple or straightforward process. As bundled-payment models continue to take root in multiple countries, learning from their successes and failures will be critical.

NOTES

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