Bundled Payment and Care of Acute Stroke
What Does it Take to Make it Work?

David Bruce Matchar, MD; Hai V. Nguyen, PhD; Yuan Tian, MSc

With nearly 800,000 strokes occurring a year, stroke remains the leading cause of disability and the fourth most common cause of death in the United States. Stroke also imposes an enormous economic burden, including long-term care costs and productivity losses. Total direct medical stroke-related costs to US economy are projected to triple from $71.6 billion in 2012 to $184.1 billion in 2030.

Although treatment for acute stroke is generally not vividly effective, the type and quality of stroke care can affect outcomes. Appropriate and prompt use of tissue-type plasminogen activator, reducing risk of acute medical complications, such as deep vein thrombosis, prophylaxis, and prevention of aspiration, secondary prevention, such as anticoagulation for atrial fibrillation, and early institution of aggressive rehabilitation can have substantial impacts on survival and disability. Moreover, given the high cost of disabling strokes, even care that is modestly effective in reducing functional loss can be highly cost-effective.

Evidence suggests we could treat patients with acute stroke more effectively and at lower cost. A review showed large variation in patient-level cost of strokes (between 2 and 4-fold difference) across hospitals that is not explained by improved process of care or clinical outcomes. Other studies found similar wide cost variation. Substantial variation also exists in clinical outcomes of stroke patients that is unexplained by patient and hospital characteristics. Programs such as Get-With-The Guidelines have documented that systematic improvement in stroke care are possible.

The high variation in costs of stroke and outcomes reflects not only the complex nature of the process of treating and managing stroke patients but also points to inefficiencies in the process of care. It has been argued that these inefficiencies are partly attributable to the current payment system, which is mostly based on volume of services rather than on quality of care (eg, as measured by conformance to recommended practices) and outcomes. Under the Patient Protection and Affordable Care Act (commonly referred to as the Affordable Care Act), several alternative models of value-based payment are promoted to mend the current dysfunctional reimbursement system. Under the rubric of bundled payment and Accountable Care Organization, these models are intended to incentivize providers to coordinate care and optimize on the basis of evidence-supported practice.

Under the bundled payment approach, a single payment is provided to multiple providers for a set of services related to an episode of care within a set time period. Bundled payment models are particularly suited for a well-defined episode with clear start and end points, with amount of care predictable and quantifiable based on standardized protocols and with the risk mostly under the control of providers.

As stroke is often characterized by a hyper acute care stage followed by an episode of inpatient care before transitioning into skilled nursing home or rehabilitation, it could be a suitable candidate for bundled payment. In this report, we consider the potential impact of bundled payment on the delivery of stroke care (including technological, clinical workflow, and administrative changes) and its cost implications. We approach this objective by (1) considering the theoretical impact of bundled payments in general and potentially for acute stroke and (2) reviewing the empirical evidence on the implementation of bundled payments and the impact of bundled payment on delivery of care, including cost. In the absence of evidence for stroke per se, we focus on arguably similar conditions. Similar conditions are defined as those that include an acute phase that needs prompt diagnosis and immediate treatment or surgery and a postacute phase that primarily requires secondary prevention or rehabilitation. We considered bundles that covered all hospital and physician services during the acute phase or postacute care.

Theoretical Impact of Bundled Payments

Bundled payments can be thought of as an extension of diagnosis-related groups (DRGs). In 1980s, Medicare started paying hospitals for episodes of care (eg, hip replacements) based on DRGs. Bundled payment goes beyond the DRG because the payer makes one payment for a package of services or care provided by multiple providers (eg, hospitals, physicians, posthospital services) for a defined episode of care within a defined time period. Bundled payment models set quality metrics for health providers to achieve (such as inpatient...
mortality, readmission rate, or conformance to guidelines) and allow them to share savings if cost targets are surpassed. As such, bundled payments offer health providers a financial incentive to choose the practices and redesign care that optimizes the provision of valued services and eliminates services that add costs without offering meaningful benefits.

Bundled payments may also offer adverse incentives. There is concern that health providers adopting bundled payment may select healthier, low-risk patients or reduce not only unnecessary but also appropriate care to generate larger savings. It is also possible that health providers increase the number of episodes eligible for bundled payments in the same way as they did in the conventional fee-for-service system.

Several authors have speculated on the potential of bundled payment to control costs through care redesign. In addition to the qualitative assessments of the potential of bundling, modeling has been used to project the likely impact of standardizing care delivery based on evidence-based clinical practice guidelines. One study predicted that bundled payments could lead to annual savings of $15 billion if it was applied to 245 episode types in Medicare and paid at the median of the current Medicare existing service fees. Another study estimated that under optimistic scenarios, bundled payment for 6 chronic conditions and 4 acute conditions or procedures requiring hospitalization could reduce national health care spending by 5.4% between 2010 and 2019. Interestingly, the authors also forecasted that bundling payments applied to hospital-based services only would reduce spending by just 0.1%. This is because Medicare already bundles hospital payments through the DRG mechanism, resulting in limited savings opportunities.

For stroke care, a recent review predicted that if the new payment models, including bundling methods, promote the use of innovative care delivery in stroke, the cost savings would be substantial. The authors of the review identified 4 main innovative care delivery methods for ischemic stroke care: (1) use of a team of nurses and certified nursing assistants to maximize use of preventative medications; (2) transition of the care for low-risk patients with transient ischemic attack from inpatient settings to outpatient clinics or observation units; (3) increases in access to and delivery of tissue-type plasminogen activator via tele-stroke systems and remote expert supervision to avoid potential delay in emergency care; and (4) strengthening of community programs to ensure smooth transition to home programs to reduce readmission for individuals at high risk. Their model forecasted that widespread adoption of these high value care delivery methods would lead to a reduction in direct healthcare spending for ischemic stroke care by 10% in 3 years.

Despite its conceptual appeal and prospects for cost savings, bundled payments remain largely at the demonstration phase. The Affordable Care Act-authorized Bundled Payments for Care Improvement (BPCI) initiative was launched to explore this innovative payment method in 2013. Under the BPCI, healthcare providers can choose from 48 episodes of care, including stroke, and enter into payment arrangements with Medicare with accountability for cost and performance. This is against a backdrop of relatively low and decreasing uptake of bundled payment in the private sector, that is, from 1.6% in 2013 to 0.1% in 2014.

Review of the Literature

Methods

The search criteria and strategies used for identifying the published literature relevant for review are detailed in Figure. We searched

![Figure. Review procedure.](http://stroke.ahajournals.org/)

by guest on August 31, 2017
MEDLINE, WEB OF SCIENCE, and ECONLIT for English language literature published between January 1996 and September 2014 using the term bundled payment or episode payment. For ECONLIT, we further combined them with the terms medicine or medical or health to restrict the records to be health-related. References in identified papers were examined for potential additional studies. Regarding applicability, we sought only studies related to stroke or similar conditions (ie, conditions that involve a period of acute care followed immediately by postacute care typically in a separate setting). We included all studies with empirical data regardless of study design. Given the lack of experimental studies with consistent outcome measures, the summarization below focuses on descriptions of the experiences with implementation of bundled payments and the purported impacts of bundled payments on care delivery and costs.

Results
Our first search yielded a total of 731 separate papers. Titles and abstracts of these articles were then screened by one author (Y. Tian) based on inclusion criteria, leaving 75 articles for full-text review by 2 authors (Y. Tian, H.V. Nguyen). After further excluding nonempirical studies (ie, opinion and commentary), studies focusing on traditional DRGs, and studies on bundling but not for stroke-like conditions (eg, renal dialysis and cancer), we were left with 12 papers which form our final sample.

These 12 identified studies assessed a total of 7 bundled payment demonstration projects. These demonstration projects are (1) Texas Institute Heart Cardiovascular Surgery (for heart surgery), (2) the Geisinger’s ProvenCare program (for coronary artery bypass graft [CABG] surgery), (3) the PROMETHEUS project (for chronic conditions, acute conditions, and surgical procedures), (4) the Integrated Health Association Demonstration (for orthopedic surgery), (5) the Medicare Participating Heart Bypass Demonstration (for CABG), (6) the Medicare Cataract Surgery Alternative Payment Demonstration (for cataract surgery), and (7) the Acute Care Episode (ACE) Demonstration (for cardiac and orthopedic procedures).

Except for the PROMETHEUS, none of these demonstrations involved stroke care (Table) and none involved randomization. Only one study (evaluating the Cataract Surgery Demonstration) included a concurrent control group. Notably, only 2 demonstrations (ie, the Geisinger’s ProvenCare program and the PROMETHEUS project) tested bundled payments that included posthospital care.

Evidence on Implementation
Among 4 demonstration projects in the private sector, 2 were implemented successfully, whereas the other 2 did not pass the implementation stage. The first successful bundled payment demonstration was conducted by the Texas Institute Heart Cardiovascular Surgery in 1984.23 Bundles in this demonstration included all services for 16 selected cardiovascular surgical procedures during hospitalization. The second successful demonstration is Geisinger Health System that implemented the ProvenCare (SM) program in 2006 to test bundled payment for CABG surgery.24,25 Geisinger Health System is an integrated health delivery system in Pennsylvania. It has 3 tertiary medical centers and a health insurance plan with 215,000 registered members. In this experiment that targeted members of the health plan requiring CABG surgery, the bundle was defined to include hospital and other facility costs, preoperative care, inpatient services, and postoperative care within 90 days.

The 2 recent bundled payment efforts in the private sector were not successful. The first is the PROMETHEUS project that covered 3 sites and began in 2008.26 In this experiment, 13 bundles were defined at the beginning of the experiment: 6 for chronic medical conditions, 4 for surgical procedures, and 3 for acute medical conditions (including stroke).27 For each bundle, the program assigned an evidence-based case reimbursement rate that covers all inpatient and outpatient care (including rehabilitation). The project has faced substantial implementation challenges, which resulted in longer-than-expected setup. These challenges include the complexity of the payment model (partly because it built on the existing fee-for-service payment system), difficulty in defining bundles, confusion around interpreting several terms that the PROMETHEUS used (such as typical costs, potentially avoidable complications, and evidence-informed case rates), failure to agree between payers and providers on acceptable division of financial risks, and allocation of payments, as well as the lack of engagement of frontline physicians, despite the support of physicians and management at pilot sites. As a result, none of the 3 pilot sites had executed contracts or made any bundled payments as of May 2011.

The second unsuccessful bundled payment effort was initiated by the Integrated Health Association (IHA) in California.28 The IHA collaborated with the RAND Corporation to implement bundled payment for orthopedic surgery targeting commercially insured Californians <65 years old. The role of IHA was to manage the planning and implementation process, including forming a technical committee consisting of specialist physicians and representatives of health plans and hospitals to define the bundled payment. The bundle for knee replacement and total hip replacement included facility, professional, and medical implement device charges for inpatient stay plus a 90 day postsurgical warranty to cover services related to complications and readmissions; other postacute care was excluded. Despite optimism and intensive efforts by the IHA, the study suffered several setbacks and experienced significant delay in implementation. In particular, parties could not agree on a bundle definition. Further, several plans and hospitals dropped out of the project, and ultimately, only 2 hospitals eventually signed contract with the health plans. The resulting low volume of orthopedic procedures subject to bundling (only 35 cases over 3 years) precluded an evaluation of the impact of the demonstration project on cost and quality for orthopedic procedures.

In the public sector, 3 major bundled payment projects have been tested by Medicare.29–34 The Medicare Participating Heart Bypass Demonstration29,30 was launched in 1988. In this demonstration, a single global price was paid to hospitals for all hospital and routine physician services provided during the patient’s CABG hospital stay. When reimbursing the physicians, hospitals introduced financial incentives (in the form of bonuses) if they exceed the quality goals. Under the Medicare Cataract Surgery Alternative Payment Demonstration,31 which ran from 1993 to 1996, participating provider sites were paid a single prospectively negotiated fee. This fee included...
Evidence on Changes in Care Delivery and Costs

In considering reports on the relationship between the bundled care and care delivery and cost, we focus here on the 5 programs that advanced to actual implementation (2 public and 3 private).

Although little data were provided on the quantitative impact of Texas Institute’s bundles for cardiovascular surgery on care delivery, qualitatively the effort was reported to lead to higher coordination of clinical care among specialists and between specialists and primary care physicians. More specific data were available for costs: in 1985, the flat fee for coronary artery bypass surgery at the Institute was $13800 compared with the average Medicare payment of $24588. This was largely attributable to reduction in length of stay, as well as administrative savings as a result of uncollected bills, and streamlined billing process. It is worth noting that although costs were reduced, the authors indicated that high quality of care was maintained throughout the study period.

Several factors were posited as contributing to the positive impact of the Texas Institute’s effort. First, the bundle applied to a large volume of homogeneous patients in need of organ-specific standardized procedures. The demonstration also benefitted from the presence of an extensive patient database, which allowed an accurate assessment of profiling the population to be covered in the bundle and tracking actual costs. Other factors include physician-lead efforts in cooperating with providers and payers and the involvement of physician specialists with an established history of working together to provide patient care.

Several care delivery changes were reported for the Geisinger experiment. Surgeons reviewed published guidelines and translated them into verifiable, actionable care processes with unequivocal definitions; 40 elements of care were identified and became the foundation for care process changes that were practical, measurable, and accountable to specific individuals. The experiment also led to better outcomes in hospital care utilization. Compared with the conventional care group of 137 patients, the treatment group of 117 patients under the ProvenCare program had a 16% reduction in total length of stay and a 5.2% decrease in hospital charges. Adherence to the full set of 40 care elements increased from 59% to 100%. However, no statistically significant improvement was observed in clinical outcomes, except that patients in the treatment group were significantly more likely to be discharged to home.

Bundled payments adopted in the Heart Bypass demonstration spurred several changes to care delivery. These include use of clinical nurse specialists as care coordinators to oversee the admission, development of an intensive care unit protocol for uncomplicated patients, and introduction of surgery on the day of admission. New cost-cutting strategies were also adopted, including a shift from generic to brand-name drugs, and surgeons’ and cardiologists’ consolidation of their equipment and supply purchases to obtain more favorable bulk prices.

For the Cataract Surgery demonstration, Medicare reported modest savings of between 2% and 5% relative to prior fee-for-service rates. There was no change in the clinical outcomes (visual acuity, complication rates, and changes in Snellen lines). Neither was there any reduction in use of specific services in the bundle.

Care redesign was also observed in the ACE demonstration, which has delivered a total of 12,501 episodes of care. Notable changes, primarily in the direction of better coordinating hospitals and physicians, include standardized operating procedures and materials, hiring of specialized patient navigators, and use of physician report cards for quality and cost metrics. In addition, the hospitals negotiated with vendors for reduced prices of surgical devices to control costs.

Under the ACE demonstration, Medicare saved $585 per episode on average from Medicare Part A and Part B expected payments. The greatest aggregate savings were from the orthopedic service line ($1.15 million) and smallest total savings from percutaneous coronary intervention ($303767). Per episode savings are highest for defibrillator placement ($1077) and smallest for percutaneous coronary intervention ($71). Though the ACE demonstration did not include postacute care in the bundle payment, the analysis of postacute care found some changes attributed to the ACE demonstration, such as lower costs of doctor visits for valve and percutaneous coronary intervention procedures. There was no evidence of decreased care quality, preference for having healthier and low-risk patients, substitution among the different types of postacute care (eg, skilled nursing facility instead of inpatient rehabilitation), or significant changes in volume and market share.

Implications of Bundled Payments for Acute Stroke

In addition to improving access to health services,16 a key goal of the Affordable Care Act is to enhance care quality and efficiency. The Act has breathed new life into efforts to reduce reliance on fee-for-service payment. For acute stroke care, the payment strategy most relevant is bundled payment for an episode of care, for example, from acute admission through rehabilitation. In anticipation of such payment revision, it is useful to consider the potential impacts and challenges of bundled payments for stroke care. In this report, we addressed this question by considering the theoretical implications of bundling and by evaluating the published literature on the impact of bundling on care of stroke or similar conditions, particularly on care process and costs. Although far from conclusive—indeed only 1 (unsuccessful) effort included bundled payment for stroke and none involved randomization—the 7 demonstrations described here provide some insights into the potential of bundling in the context of acute stroke care.

Two salient points emerge from the review of the existing empirical literature. First, use of bundled payment is still at
The IHA Bundled Payment Demonstration\textsuperscript{29}  

<table>
<thead>
<tr>
<th>Pilot</th>
<th>Payer</th>
<th>Number of Sites</th>
<th>Date</th>
<th>Bundles Targeted</th>
<th>Bundle Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas Heart Institute Cardiovascular Surgery\textsuperscript{23}</td>
<td>Self-insured corporations, prepaid health plans, union trusts, and Medicare.</td>
<td>1 Site</td>
<td>1984–1996</td>
<td>Cardiovascular surgery</td>
<td>All applicable charges (including physician and hospital charges) were bundled into a flat fee for Non-Medicare population. The approach was extended to Medicare patients later.</td>
</tr>
<tr>
<td>Geisinger ProvenCare\textsuperscript{24,25}</td>
<td>Geisinger Health Plan</td>
<td>3 Hospitals</td>
<td>2006</td>
<td>Elective CABGs</td>
<td>Bundled payment for preoperative, inpatient and postoperative care within 90 days.</td>
</tr>
<tr>
<td>PROMETHEUS Model\textsuperscript{23,27}</td>
<td>Health plans and self-insured employers and healthcare delivery organizations.</td>
<td>3 Pilot sites (Two of the sites chose to focus on chronic medical conditions, whereas the third focused on the procedures.)</td>
<td>2008–2011</td>
<td>4 for surgical procedure (hip and knee replacement, etc); 6 for chronic medical conditions (diabetes mellitus, etc); 3 for acute medical conditions (stroke, etc); 8 others have been developed subsequently.</td>
<td>Evidence-based development processes for bundles and case rates.</td>
</tr>
<tr>
<td>The IHA Bundled Payment Demonstration\textsuperscript{29}</td>
<td>Health Plans</td>
<td>8 hospitals</td>
<td>2010–2013</td>
<td>Orthopedic surgery</td>
<td>Bundled payment covering inpatient institutional and physician services for Medicare bypass patients discharged in DRGs 106 and 107.</td>
</tr>
<tr>
<td>Medicare Coronary Bypass Procedures\textsuperscript{23,33}</td>
<td>Medicare</td>
<td>7 demonstration sites</td>
<td>1991–1996</td>
<td>CABG</td>
<td>Bundled payment covering inpatient institutional and physician services for Medicare bypass patients discharged in DRGs 106 and 107.</td>
</tr>
<tr>
<td>Medicare Cataract Surgery Alternative Payment Demonstration\textsuperscript{31}</td>
<td>Medicare</td>
<td>4 demonstration sites</td>
<td>1991–1996</td>
<td>Cataract removal with an intraocular lens implant.</td>
<td>The bundle includes preoperative services before surgery, surgical services, and postoperative exams for 120 days.</td>
</tr>
<tr>
<td>Medicare Acute Care Episode (ACE) Demonstration\textsuperscript{20–24}</td>
<td>Medicare</td>
<td>5 ACE sites</td>
<td>2009–2013</td>
<td>Cardiac valve and other major thoracic or cardiovascular or neurosurgical procedures; CABG; cardiac pacemaker implant or revision; PCI; hip or knee replacement or revision</td>
<td>Bundle of Part A and Part B services provided to Medicare FFS beneficiaries during an inpatient stay for specific MS-DRGs. The unbundle PAC costs following the inpatient ACE episodes were analyzed for a 30-day postdischarge period.</td>
</tr>
</tbody>
</table>

ACE indicates Acute Care Episode; CABG, coronary artery bypass graft; ESRD, end-stage renal disease; FFS, fee-for-service; ICU, intensive care unit; IT, information technology; MS-DRGs, Medicare severity diagnosis-related groups; PAC, postacute care; PCI, percutaneous coronary intervention; and PPS, prospective payment system.
<table>
<thead>
<tr>
<th>Patient Volume</th>
<th>Risks/Gains Sharing Arrangement</th>
<th>Changes in Care Delivery</th>
<th>Experiences and Lessons Learned</th>
<th>Quality of Care and Cost Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>Patients with high hospital charges and longer length of stay (&gt;15 days) were not included in the bundled payment but were reimbursed on a per case basis. Evidence-based schedule of hospital charges were used.</td>
<td>The streamlined billing process facilitated both the physicians and the hospital to manage patients and to reduce overhead expenses and uncollected bills. Affordable high-quality medical care increased patient access. Identify the best practices to reduce complications of CABGs.</td>
<td>Extensive database, large volume of patients, physician-directed collaboration with hospital and payers, and cooperated team in care delivery were keys to the plan’s success. Electronic record-enabled integrated delivery system.</td>
<td>Length of stay reduced. The annual bill for CABG surgery could decrease by 15% ($192 million) if adopting the site’s price.</td>
</tr>
<tr>
<td>117</td>
<td>...</td>
<td>...</td>
<td>Develop risk-based pricing.</td>
<td>Increase in adherence to the evidence-based practice components to 100%. No statistically significant difference in clinical outcomes compared with the conventional care group.</td>
</tr>
<tr>
<td>...</td>
<td>The provider controlled the technical risk to reduce the potentially avoidable complications with adequate health systems, training and planning.</td>
<td>Building on existing FFS claim infrastructure.</td>
<td>Difficulties in defining the bundle. It was hard to build on the FFS system. Some challenges were from IT system and data sharing.</td>
<td>...</td>
</tr>
<tr>
<td>...</td>
<td>The provider controlled the technical risk to reduce the potentially avoidable complications with adequate health systems, training and planning.</td>
<td>...</td>
<td>Better coordination and early stages of planning for clinical redesign.</td>
<td>...</td>
</tr>
<tr>
<td>35</td>
<td>...</td>
<td>...</td>
<td>The implementation experienced significant delay. The volume was insufficient to test hypotheses about the impact of bundled payments on quality and costs.</td>
<td>...</td>
</tr>
<tr>
<td>Over 10 000</td>
<td>In 2 institutions, hospitals shared their saving with the physicians for efficient patient care, whereas in the other 2 medical centers, physicians were salaried with no cost-sharing.</td>
<td>Length of stay at ICU was reduced in most hospitals. Clinical Nurse Specialists were in charge of bypass patients’ stay. Same-day surgery was implemented, and brand drugs were substituted with their generic equivalents.</td>
<td>The implementation experienced considerable challenges, particularly, in the revenue sharing and coordination between physicians and hospitals.</td>
<td>Inpatient mortality rate declined to 5.4% in 1996. Aggregate Medicare spending on bypass patients (including the 90-day postdischarge period) decreased by 10%. A total saving to Medicare and its beneficiaries was $17.2 million within 3 y.</td>
</tr>
<tr>
<td>4565</td>
<td>2% to 5% discount was negotiated with providers compared with the payment under the FFS system.</td>
<td>No evidence available on redesigned care was directly attributable to the demonstration.</td>
<td>Difficulties in marketing to inform Medicare beneficiaries of their participation in the demonstration.</td>
<td>There were no changes in clinical outcomes which could be attributable to the demonstration. Surgical volume or specific services did not decrease. Providers at 3 out of 4 sites reported cost reduction.</td>
</tr>
<tr>
<td>12501</td>
<td>Each site negotiated the discount from Medicare’s usual payment. Hospitals and physicians could share savings if they could meet quality reporting and monitoring requirements. Physicians’ gain sharing was capped at 25% of the fee schedule payment.</td>
<td>Hospitals and physicians coordinated care, case by case, by adopting evidence-based standardized order sets and materials. Early involvement of physicians in design and implementation of program helped hospitals negotiate reduced price for devices identified to be high quality and cost-effective. Transparency in quality and cost data sharing was achieved through the use of monthly physician report card.</td>
<td>Standardized and evidence-based order sets developed through collaborative efforts: cost and quality data sharing with physicians; identified high quality and cost-effective medical devices; use of care navigator in coordination.</td>
<td>Medicare saved an average of $585 per episode from Medicare Part A and B (a total of $7.3 million across 12501 episodes). Increase in postacute care (PAC) cost, particular the PAC for PCI, offset the saving by ≈45%, resulting in per-episode saving of $319 (net saving of ≈$4 million).</td>
</tr>
</tbody>
</table>
the demonstration stage in the United States. Consequently, there are few studies that evaluate the use of bundled payment models and its impacts on care delivery. In particular, we were unable to identify any published studies or reports on the bundling of stroke care or care for similar situations with an acute event signaling an episode that persists into a posthospital phase (in particular, incorporating rehabilitation). Second, the private sector faced a substantial practical challenge in implementing bundled payment. The health delivery system in private sector is often fragmented, and it is difficult to align diverse interests of multiple payers and providers. A particularly successful effort seems to be Geisinger’s demonstration, in which a single entity served as both payer and provider of services and was able to implement bundling in the context of an existing culture of integration enabled by an electronic record system.

Bundled payment interventions initiated by Medicare have tended to be implemented successfully. Among the projects that went past the implementation stage, results are consistent with cost-savings and some positive changes in care process, such as explicit shifts to best practices, and the set-up and strengthening of information technology systems.

The failure of the PROMETHIUS and IHA projects seems to reflect the difficulty in bringing multiple partners with diverse interests together to agree on design aspects of bundled payments, such as types of services to be included, length of episode, as well as the nature and mechanism of risk sharing. Underlying this difficult negotiation are issues of trust and competing interests. Successful implementation of bundled payment seems to depend on the leadership of a large or dominant player who is able to move forward or bypass the negotiation process. Again, Geisinger is a notable case in which one administrative entity is both the health plan and the provider. In the same spirit, success of Medicare’s bundled payment experiments may reflect its status as a dominant payer.

Our review suggests other common features of bundled payment that may be conducive to successful implementation: (1) a strong electronic information system that can facilitate evidence-based practice, track costs, as well as follow and monitor clinical events and quality; (2) incentives aligned whereby physicians should not only be paid on the basis of compliance with meeting quality targets but also be given bonus if exceeding ambitious high-quality targets; (3) sufficiently high volume of patients (IHA failed because a low volume of patients was insufficient to justify required care process changes or modifications in benefit design to attract patients into the bundled payment model), and (4) an adequate mechanism for distributing risk between payers and providers (ie, bundles should incentivize providers based on their control of technical risks or performance risks, whereas insurance risks should be assumed by payers.)

Although some of these implementation issues are general, consideration should be given to the special challenges in establishing a successful bundled payment for stroke. For example, a distinguishing feature of stroke is heterogeneity, that is, stroke occurs to individuals with a wide range of pre-event disability and comorbidity, and its effects and management are similarly diverse. Patients with acute stroke typically have multiple comorbidities, in particular cardiovascular disease, and risks during the stroke episode are largely driven by these other comorbidities. Strategies for dealing with these issues include narrowing the case definition or transferring risk for outlier costs to the payer or a third party insurer. Another salient feature of stroke is that the opportunity for improving patient outcomes and care efficiency is normally not in the hospital phase (where length of stay has already been driven down and there is generally no high cost procedure to streamline), but in the postacute period. If bundled payment is to make a positive difference for stroke patients, it must include secondary prevention and rehabilitation. Here, coordination is especially crucial.

Though the empirical data available on bundled payment is currently limited, this situation should improve as results emerge from the ongoing CMS BPCI Initiative. Under the BPCI, 6256 organizations are participating in providing stroke care under bundled payments. Of these participants, 70% chose to be paid for postacute care only (so-called Model 3), whereas 29% enrolled in a bundled for acute care hospital stay plus postacute care (so-called Model 2). The majority of participants selected to include an episode of care definition extending 90 days from discharge (Model 2) or initiation of the postacute episode (Model 3).

Through better alignment of payment with goals of care, alternatives to fee-for-service care, such as bundled payments for episodes of care, offer promising tools for improving quality and efficiency in healthcare. However, much work remains to be done, not least for stroke care, to turn a conceptually attractive model into a successful reality.

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None.

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