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Bundled Payment Methods: An Alternative Payment Method to Contain Healthcare Costs in Georgia

Evidence synthesis

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Abbreviations

AHPSR	Alliance for Health Policy and Systems Research
CABG	Coronary Artery Bypass Graft
CJR	Comprehensive Care for Joint Replacement
CRC	Colorectal Cancer
COPD	Chronic Obstructive Pulmonary Disease
DRG	Diagnosis-Related Group
LOS	Length of Stay
LEJR	Comprehensive Care for Joint Replacement
LMIC	Low- and Middle-Income Countries
NCD	Non-Communicable Disease
NCDC	National Center for Disease Control and Public Health of Georgia
PAC	Post-Acute Care
PHC	Primary health care
TJA	Total Joint Arthroplasty
UHC	Universal Health Care

Executive Summary

- Containing healthcare costs remains one of the priority topics of Georgia health system from the perspectives of both the public and private sector. Government expenditure on health has been increasing between 2013-2019 after introduction of Universal Health Coverage program, but with the existing health financing methods (capitation, fee for service, input-based payment covering salaries and fee for medicines, supplies and utilities), the efficiency of increased investment of public financing in healthcare remains questionable. On the other hand, private health insurance sector is developing under the competitive market environment with promising outcomes but claims management is becoming rather challenging.
- Since there is a considerable growth in healthcare expenditure in Georgia, driven by both supply and demand, health system would benefit by implementing alternative payment models that will reduce costs and improve quality of care. As mentioned above, existing health financing methods encourage financial resource growth, but do not stimulate healthcare providers to work efficiently and improve care coordination for delivering quality care.
- A bundled payment is one of the alternative payment methods and is defined as a one-off or periodic lump-sum payment for a range of services delivered by one or more providers based on best practices or by following clinical pathways with an increasing emphasis on outcomes

Bundled payment models' overarching mechanisms to reduce healthcare expenditure is based on the following:

- ⇒ By providing a single lumpsum payment, providers assume the risk either individually or collectively for delivering effective and efficient care at a set price.
- ⇒ This type of payment system encourages providers to carefully consider care options that can decrease the total costs of the bundle while providing equal or more effective treatment
- ⇒ Providers feel accountable for the quality and cost of care delivered during a predetermined episode.

Impact of bundled payment on health care cost, utilizations and quality

- According to the best available evidence, bundled payment decreases healthcare cost in many of the fields where it has been implemented including orthopedic care (joint replacement, arthroplasty), cardiac care, gastroenterology and oncology (gynecology); except for spine surgery and diabetes care for which the evidence is inconclusive.
- Bundle payment creates financial incentives for providers to coordinate care over the entire episode. Thus, these payment models promote patient care quality through improved coordination between providers by encouraging communication, shared resources, and clinical continuity.
- Besides its strengths, the model has some weaknesses – there is potential for inappropriate treatment owing to perception of constrained resources, in particular, providing care to low-risk

patients and denying care to high-risk patients with complicated health history. However, there are counterstrategies to prevent such practice:

- A bundle could be coupled successfully with population-level screening quality measures such as frequency of procedure to standardize some of the variation in provider decisions by specifying services included in the bundle and ensuring that providers are meeting quality thresholds
- Risk stratification must be considered for reimbursement fees per episode of care for higher risk patient populations

Context

Current Issue and Question

Containing healthcare costs remains one of the priority topics of Georgia health system from the perspectives of both the government and private health insurance companies. Public health expenditure is rising but the efficiency of increased public investments in health sector is a subject of great public discussion. The government's attempt to improve population access to health services by introducing Universal Health Coverage (UHC) program in Georgia increased motivations of private sector to enter in the healthcare market and facilitated growth in the supply side of the market: Number of outpatient and inpatient care facilities increased by 10% and 20 % between 2012-2019, respectively.

Increased capital investment in Georgia's private health sector became one of the major reasons that tripled public expenditure on health in its absolute amounts after introducing UHC program. The Ministry of IDPs from Occupied Territories, Labor, Health and Social Affairs (MoILHSA) of Georgia is the single public purchaser contracting private healthcare facilities to provide health services to the population under UHC on fee-for-service basis resulting in oversupply of services without improving quality of care (MoILHSA, 2017). Although the public health expenditure is rising in the country, out-of-pocket payments still remain the main contributor of total health expenditure in Georgia constituting 55% (in 2017) according to the National Health Accounts data (MoILHSA, 2017). The recent policy change to introduce new reimbursement method in inpatient settings in Georgia aimed to reduce unnecessary expenditure including out-of-pocket payment on health services in expensive cardiac care caused wide public discussion around the topic (Government of Georgia, 2019). With this new policy mechanism, the MoILHSA aims to smoothly move the existing reimbursement system of inpatient care on DRG to make the public expenditure more efficient and reduce out-of-pocket expenses on healthcare for the population of Georgia.

The aim of this document is to provide evidence to inform ongoing deliberations regarding alternative payment methods to reduce cost and improve quality of care. Specifically, it attempts to inform the following question: What are the effects of bundled payment methods on healthcare spending, service utilization and quality of care?

Local Context

From government perspectives...

Georgia health system current structure and organization is a result of continuous waves of reforms taking place over the past three decades with the aim to improve performance of the overall system and to address existing challenges in financial access to basic healthcare services and to improve financial protection of the population while getting these services (Chikovani & Sulaberidze, 2018).

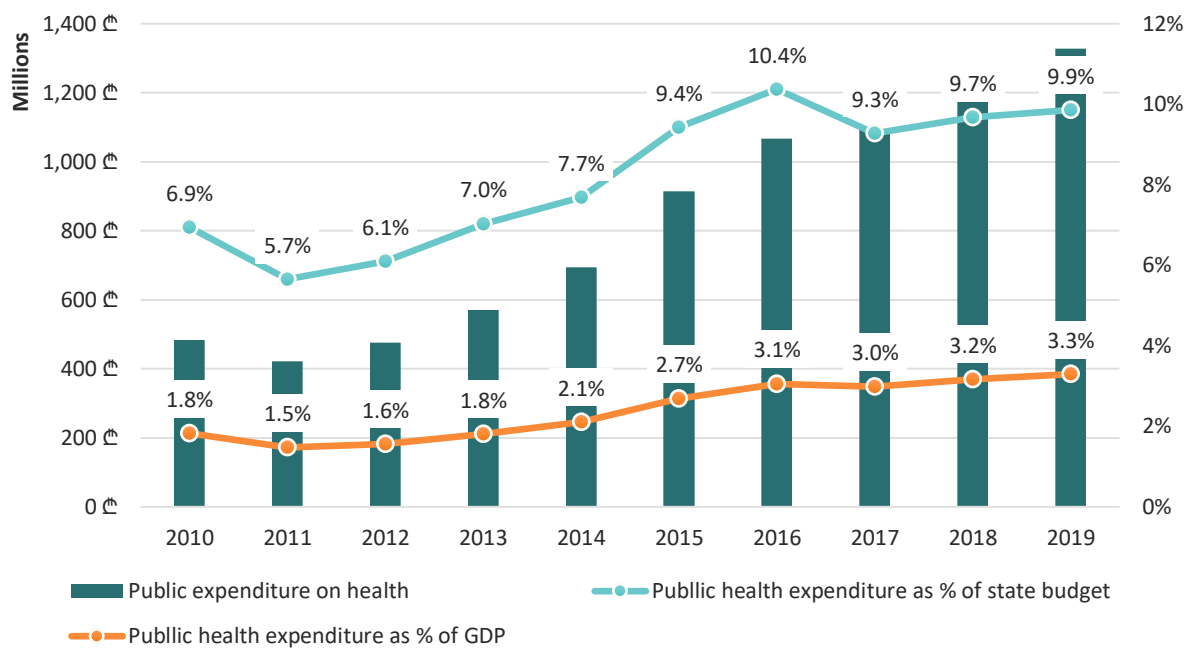
State funded health insurance programs started rapid development since 2007 when the Government of Georgia introduced Medical Insurance for the Poorest segment of the population, which provided publicly financed comprehensive benefits package through the private insurance companies to the nation's poor. Since its introduction the program was gradually expanding by enrolling other targeted

groups of beneficiaries including children aged 0–5 years, pensioners, teachers, students, disabled persons. This process continued until 2013.

In 2013, the newly elected government adopted a UHC program and extended the publicly funded health benefits from 45% to over 90% of the population and substituted the multiple private insurance companies with a single public purchaser. The only exclusion criteria under the eligibility list of getting UHC program benefits package for a resident of Georgia was having a voluntary primary care insurance package (either corporate or individual insurance) when the program went in force in 2013.

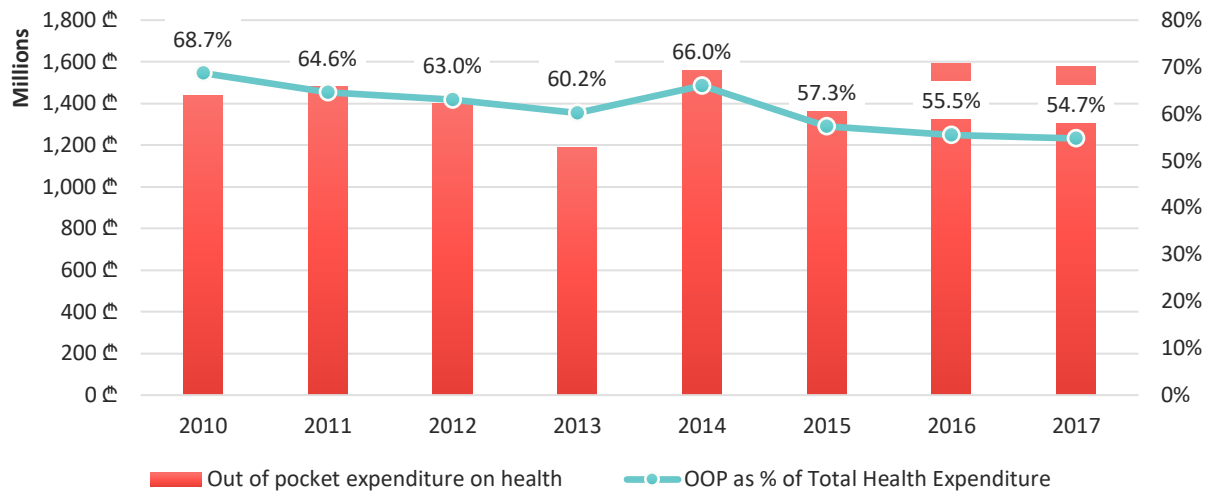
In 2013, Universal Health Coverage (UHC) accelerated the growth of public spending on healthcare and government healthcare spending tripled to GEL 1.3 bn over 2012-2019 (MoF, 2019; MoILHSA, 2017)

Table 1. Tendencies of public health expenditure 2010-2019 yy.



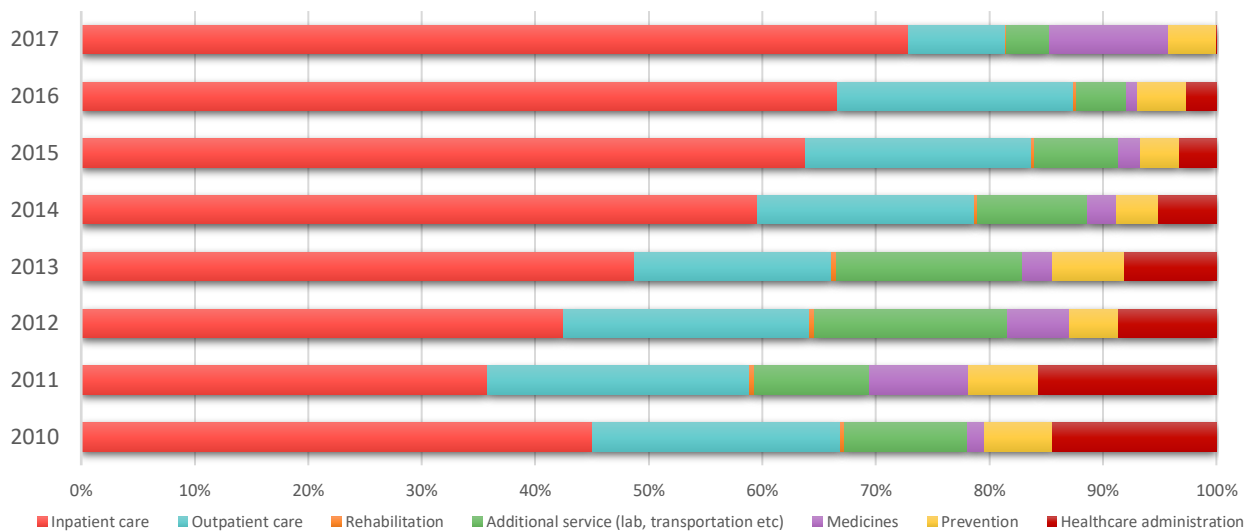
Increased government funding and development of private insurance sector reduced share of out-of-pocket spending in total health expenditure from 69% to 55% over 2010-2017 (MoILHSA, 2017)

Table 2. Tendencies of out-of-pocket expenditure on health 2010-2017 yy.



Increased government spending is unevenly distributed across different levels of care. In particular public spending on inpatient services has been steadily increasing since 2011 and it reached 73% in 2017 while public expenditure proportion dedicated to outpatient care remains constant at around 20% (MoILHSA, 2017)

Table 3. Public health expenditure distribution to health services 2010-2017 yy



Increase of government spending in inpatient care is directly linked to increased utilization of costly hospital services and vice versa. Health financing methods adopted in UHC encourages hospitals to over-treat patients as they get payed per each specific service provided under the fee for service method. While payment methods for outpatient services (capitation is used in UHC outpatient component and family doctors in rural places are payed “fixed salaries” under Rural Doctors state funded program) do not create incentives for Primary Healthcare (PHC) facilities to retain the patient at the outpatient level but they incentivize PHC providers to pull patients towards inpatient care (NCDC, 2019)

Table 4. Inpatient service utilization 2005-2017

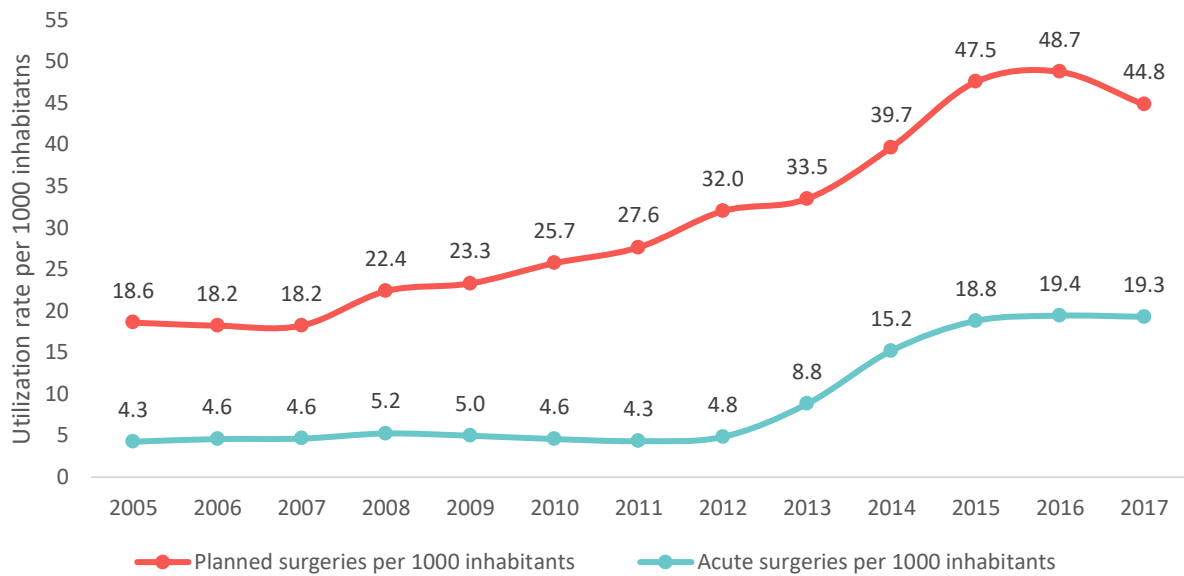
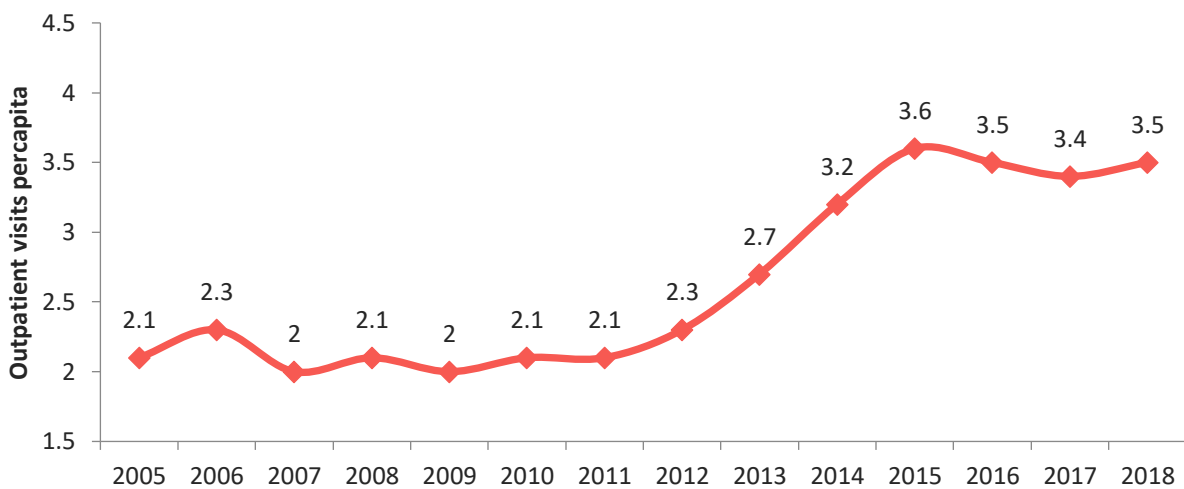


Table 5. Outpatient visits per capita 2005-2018



Introduction of UHC program in 2013 increased access to health services for Georgians and as it seems from service utilization data the program encouraged demand driven service provision for costly inpatient care rather than utilization of low-cost outpatient services. All of these lead to fragmentation of care causing inefficiency of increased government spending.

Hence the government is willing to change existing input-based health financing method towards outputs-oriented payment mechanisms and introduce new health financing method that could encourage coordination of care to achieve better value for money. According to Georgia’s healthcare system development vision for 2030 the MollHSA was preparing the system to move the healthcare sector towards DRG payment model (Social and Health Issues Committee of the Parliament of Georgia, 2017). Although volume still pays in the DRG system and bundled payment is the type of DRG with

advanced scheme to stimulate coordination of care across different levels of providers and contain costs, evidence synthesis has been prepared to feed the discussion around health financing reforms and equip decision makers with evidence.

From private sector perspectives...

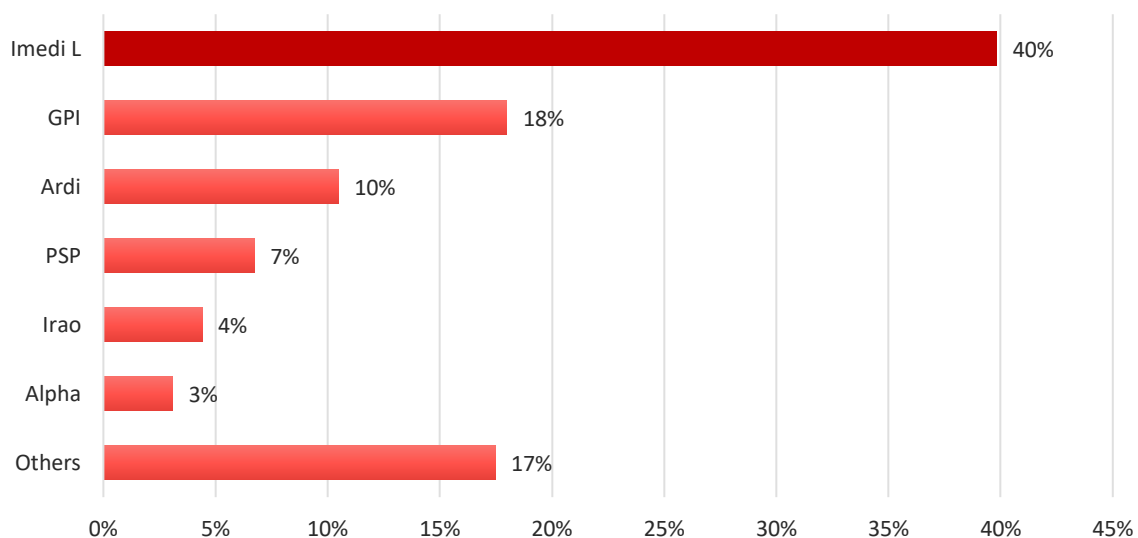
The new Government initiative introduced in 2017 – excluding individuals with annual income of over GEL 40,000 (c.32,000 people) from the UHC coverage and granting only a limited UHC coverage to middle- income citizens, i.e., those with an income of over GEL 1,000 per month but under GEL 40,000 per year (c.400,000 people)– is intended to make the UHC spending more efficient and may potentially expand the private medical insurance market.

In Georgia, private health insurance is mainly aimed to provide value-added services in the form of more extensive coverage for the patients who seek better quality services, faster treatment or more advanced procedures than those covered within the UHC framework.

In the last few decades, the private medical insurance market extended considerably in comparison to the 2006 figure, when only 40,000 Georgian population (or c.1% of the total population) had a voluntary health insurance package, mostly provided as part of a corporate benefits program.

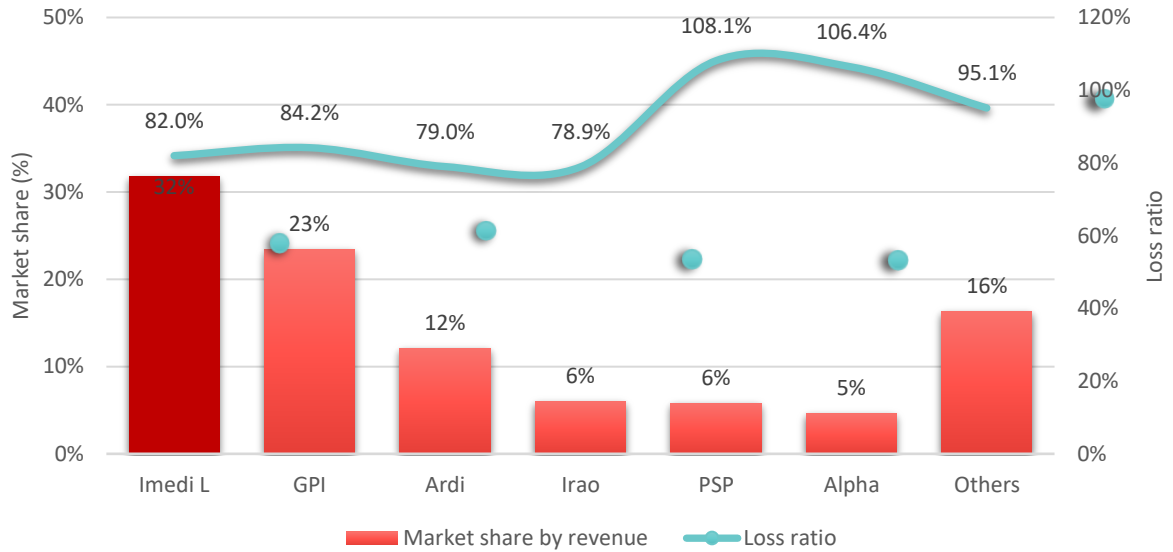
The Georgian insurance market is represented by 17 companies, 13 of which operate in the health insurance segment. Total private medical insurance market in Georgia is GEL 218.3mIn in revenues (38% of the total insurance market) with 603K insured (16% of the total population). As of 30 September 2019, c.594,000 private medical insurance packages have been reported to the Insurance State Supervision Service of Georgia. By the end of 2019, Insurance company Imedi L had the largest market share by number of insured and revenue (ISSS, 2019).

Table 6. Market share by number of insured



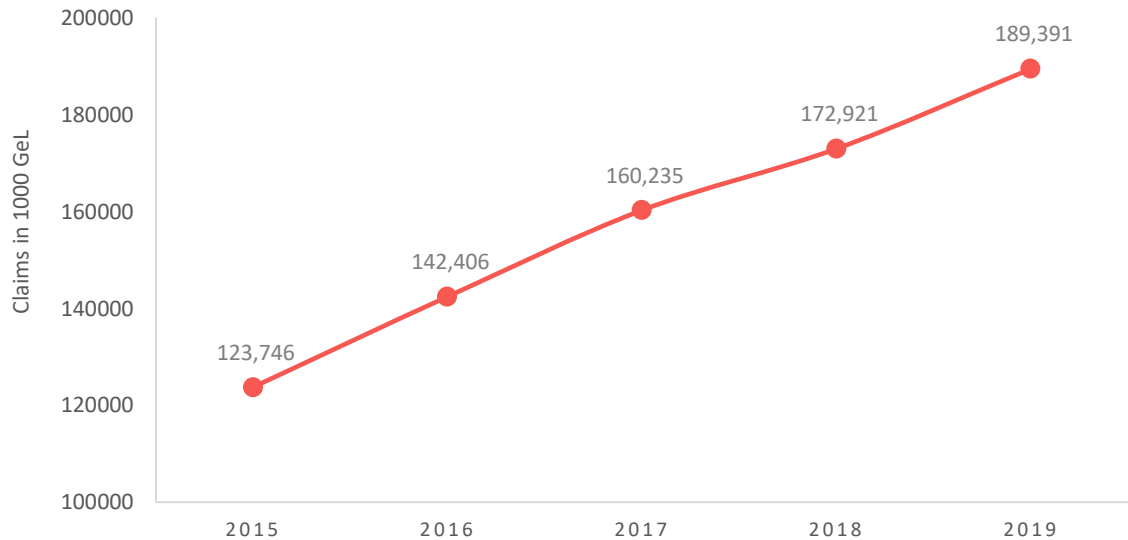
Imedi L was the leading private insurance company not only by the number of insured population but its market share by revenue equaled to 32% in the private health insurance market in total (ISSS, 2019).

Table 6. Market share by revenue



As mentioned above, the role of private health insurance is increasing, and private health insurance companies are becoming significant payers in healthcare market. Healthcare claims have increased by 50% over 2015-2019 (see Table 7).

Table 7. Market healthcare claims



Since there is a considerable growth in healthcare expenditure in Georgia, driven by both supply and demand, private health insurance companies would benefit in implementing alternative payment models that will reduce costs and improve quality of care.

Methods

What is a Evidence Synthesis?

A Evidence Synthesis product responds to requests from policymakers and stakeholders by summarizing the research evidence drawn from systematic reviews and from primary research studies and provides them access to optimally packaged, relevant and best available research evidence.

The preparation of this Evidence Synthesis involved the following steps:

1. Formulating a clear review question on a high priority topic requested by policymakers and stakeholders
2. Establishing what is to be done, and in what timeline
3. Identifying, selecting, appraising and synthesizing the relevant research evidence about the question
4. Drafting the Evidence Synthesis in such a way that the research evidence is presented concisely and in accessible language
5. Submitting the Evidence Synthesis for Peer/Merit Reviews
6. Finalizing the Evidence Synthesis based on the input of the peer/merit reviewers
7. Final submission, validation, and dissemination of the Evidence Synthesis

Evidence search and studies selection

We conducted a literature search in PubMed database. We searched systematic as well as non-systematic review papers.

PubMed search strategy included the following search terms: bundled payment OR episode-based payment OR episode payment OR episode-of-care payment OR evidence-based case rate OR package pricing OR Bundled charges OR Bundled reimbursement OR episode-based reimbursement OR episode-of-care payment. The search was run n titles/abstracts of the papers.

Search was limited to English language papers and last 5 years of publication period (2015-2020).

In total search resulted in 62 references. Two authors reviewed all titles and abstracts generated by the search. Following the screening and full-text assessment, 18 publications were identified and included in the Evidence Synthesis.

A calibration exercise was conducted to ensure the reliability of data extraction. About 15% of studies were extracted jointly by the two researchers. When researchers achieved good agreement on more than 90% of the studies to be included, the two researchers continued data extraction independently. Data was extracted according to the predetermined data extraction form. Among the other information, we extracted a summary of results and, in some instances, primary study level findings for a better understanding of the results.

We did not determine the methodological quality of the studies.



Synthesis of the evidence

We structure the evidence synthesis section in the following way: we begin by (1) defining the bundle payment and its overarching mechanism, followed by an overview of the (2) impact of bundled payment on (a) healthcare spending, (b) service utilization, and (c) quality. We then present findings on (3) unintended consequences of bundled payment methods and conclude with (4) key implementation considerations and (5) insights for action.

Definition of bundled payment and its overarching mechanism

Bundled payments is type of diagnosis-related groups (DRGs) extension because the payer makes one payment for a package of services or care provided by multiple providers (e.g., hospitals, physicians, posthospital services) for a defined episode of care within a defined time period (Matchar, Nguyen, & Tian, 2015).

- A bundled payment is one of the alternative payment methods and is defined as a one-off or periodic lump-sum payment for a range of services delivered by one or more providers based on best practices or by following clinical pathways with an increasing emphasis on outcomes (Steenhuis, Struijs, Koolman, Ket, & Van Der Hijden, 2020).
- A finite budget offered under bundled payment spans the reimbursement for an entire episode of care for a procedure or condition over a designated period.
- Under this framework, payment is allocated to all providers and services: acute inpatient care and post-acute care rehabilitation. Further, incentives exist to minimize return visits within the designated window of the bundled payment plan (Dietz et al., 2019).

As bundled payments improve care coordination across different healthcare providers which is thought to be one of the main challenges of Georgia healthcare system it is anticipated that the bundle payments will address this bottleneck and make the public investments in healthcare more efficient.

Table 8. Comparative table of reimbursement methods

	Increase activity (supply driven demand)	Expenditure control	Improve quality	Enhance technical efficiency	Enhance allocative efficiency
Fee-for-service	Strong	Weak	Strong	Weak	Weak
Global budget	Weak	Strong	Moderate	Weak	Moderate
DRG (pure)	Moderate	Moderate	Moderate	Strong	Moderate

There are various types of bundled payments. They can be episode-based for acute or elective care activities (e.g., hip and knee replacements), or periodic-based for patients with chronic diseases (e.g., diabetes and chronic obstructive pulmonary disease) (Steenhuis et al., 2020).

Bundled payment models **overarching mechanism to reduce healthcare expenditure** is based on the following:

- ⇒ By providing a single lumpsum payment, providers assume the risk either individually or collectively for delivering effective and efficient care at a set price.
- ⇒ This type of payment system encourages providers to carefully consider care options that can decrease the total costs of the bundle while providing equal or more effective treatment (Dietz et al., 2019; Patel, Presser, George, & McClellan, 2016).
- ⇒ Providers feel accountable for the quality and cost of care delivered during a predetermined episode.
- ⇒ Providers that keep costs below a target price share a portion of the resulting savings, but those that exceed the target price encounter financial penalties.

This creates financial incentives for providers to coordinate care over the entire episode (Agarwal, Liao, Gupta, & Navathe, 2020). Thus bundled payment models promote patient care quality through improved coordination between providers by encouraging communication, shared resources, and clinical continuity (Dietz et al., 2019).

Impact of Bundled payment on healthcare spending

Fifteen review papers in total (of which 13 were systematic reviews) examined the effect of bundled payments on healthcare spending. Vast majority of bundled payment models described in these papers focused on orthopedic care covering special bundle payment models referred to as 9 papers about Comprehensive care for Joint Replacement (CJR) and/or Total Joint Arthroplasty (TJA), with majority examining Lower Extremity Joint Replacement (LEJR) entailing knee and hip arthroplasty episodes; followed by 3 papers about spine surgery, 2 papers about cardiac care, 1 paper about oncology (gynecology), gastroenterology, 2 papers about Diabetes, etc. A summary of the key findings is provided below:

- Bundled payment resulted in a decrease in episode payments in **orthopedic care** albeit with wide variation across the different papers. Reduction in medical cost varied from 10% (Piccinin et al., 2018a; Siddiqi et al., 2017; Siddique & Mehta, 2017) to 30% (Feldhaus & Mathauer, 2018), with several papers reporting that the introduction of bundled payment was associated with 20-22% cost reduction in orthopedic care compared with traditional fee-for-service models (Jacofsky, 2017; Piccinin et al., 2018b; Sullivan, Jarvis, O’Gara, Langfitt, & Emory, 2017).
- The highest reduction (34%) in total cost of care caused by bundled payment was observed for **gynecologic oncology** (Apte & Patel, 2016).
- Bundled payment positive effects were found for **chronic heart failure** episode cost reduction but with no exact figures demonstrating the magnitude of cost reduction (Feldhaus & Mathauer, 2018). In another paper, the authors speculated on the potential of bundled payment to control costs, and according to the predictive model, it was forecasted that widespread adoption of

bundled payment would lead to a reduction in direct healthcare spending for **ischemic stroke care** by 10% in 3 years (Matchar et al., 2015).

Bundled payments have shown decline in inpatient episode payments for some **gastroenterological conditions** in the frame of Acute Care Episode (ACE); and even greater reduction is prognosticated for bundled payment in outpatient settings: the primary opportunity is for endoscopic procedures, especially for Colorectal cancer CRC screening and surveillance using colonoscopy (Patel et al., 2016).

Four papers, (among those 3 systematic reviews), further distinguished cost reduction by type of payers (public/private) or for a patient incurred as an out-of-pocket payment:

- ⇒ Costs paid by a **public payer** were reduced by 10%, in addition to a reduction in internal hospital costs as compared to previous years (Siddiqi et al., 2017);
- ⇒ Bundled payment reduced **Medicare (public payer)** expenditures by 20.8% for orthopedic care conditions without complications and by 13.8% for those conditions with accompanied complications (Piccinin et al., 2018b)
- ⇒ **Private insurance companies** saved about 8% to 10% on average per episode cost in a 1-year pilot (Siddique & Mehta, 2017)
- ⇒ 3.6% (\$1,084) episode payment decrease was observed **for patients** undergoing Comprehensive Care for Joint Replacement CJR and 3.9% (\$1,166) decrease for those undergoing Lower Extremity Joint Replacements LEJR (Agarwal et al., 2020)
- Overall, transition from an Fee-for-Service reimbursement to bundled payment was generally associated with a decline in spending of up to 10% across 8 high-income countries: Belgium, the United Kingdom, Italy, Sweden, Taiwan, Japan, the Netherlands, and the US (Feldhaus & Mathauer, 2018)

The main factors contributing to cost reduction were associated with improved coordination between providers and across different levels of care, examinations performed in lower-cost settings, encouragement of low-cost home care service utilization, and implant costs reduction through improved negotiating powers of the hospitals with implant manufacturers/vendors (Jacofsky, 2017; McLawhorn & Buller, 2017; Patel et al., 2016; Piccinin et al., 2018b; Seth Greenwald, Bassano, Wiggins, & Froimson, 2016; Siddiqi et al., 2017).

- Unlike the DRG system where hospitals are being financially incentivized to reduce length of stays, which results in more patients being discharged to skilled nursing facilities, within a bundled payment program, the substantial cost savings and improved clinical outcomes are associated with discharge to home-based health care and physical therapy, mostly in orthopedic services. (Seth Greenwald et al., 2016).

- ⇒ Encouraging patients to be discharged to home rather than an in-patient rehabilitation facility (IRF) has generated significant cost savings. Cost savings of up to 88% was seen by discharging patients to home rather than IRFs (Siddiqi et al., 2017)
- Coordinating care among providers resulted in all-cause readmission rates (at 90 days) decrease from 13 to 8%, which indicated a 20% decrease in 90- day cost over the 3-year period (McLawnhorn & Buller, 2017)

The current state of evidence about bundled payment effects on healthcare spending reduction is inconclusive for spinal surgery and related procedures.

- In particular, according to one paper there were no significant differences in episode payments for spinal surgery (Agarwal et al., 2020).
- The other paper showed that this scheme failed to produce cost savings or quality improvement and actually led to a significant increase in Medicare claims (Piccinin et al., 2018a).
- Some of the reasons for cost variation described in the literature were related to patient heterogeneity, surgical approaches, surgeon's preferences, index hospitalization, and readmission and complication rates (Dietz et al., 2019). The mechanisms that may prevent cost increase for spine surgery are described in implementation consideration section of this document.

Only 2 papers showed negative impact of bundled payment on cost reduction and both of the papers described the Netherlands experience on bundled payment introduction for chronic diseases management including diabetes care.

- This scheme was designed to encourage coordination across only outpatient and primary care services and did not involve inpatient care, medication, medical devices, and diagnostics. The cost for diabetes management increased by 288 EUR per chronic patient enrolled in the bundled payment scheme. Underlying causes of cost increase were not clear, and authors assumed that it may be associated with delaying the use of specialist care which could have resulted in more costly services, or the utilization of the most expensive procedures.
- The other paper also revealed that the impact on new collaboration agreements between care sectors remained inconclusive (Tsiachristas, Dijkers, Boland, & Rutten-van Mólken, 2013).

Impact of bundled payment on service utilization

Out of 12 included systematic reviews, 8 reported reductions in utilization of healthcare services included in the bundle. Most of the studies found a significant decrease in the use of medical services in orthopedic surgery (Agarwal et al., 2020; Feldhaus & Mathauer, 2018; Matchar et al., 2015; Piccinin et al., 2018b; Seth Greenwald et al., 2016; Siddiqi et al., 2017). Two review papers showed that bundle

payments in many countries were associated with 5 to 15% decrease in service utilization, models surveyed in one review focused on bundles that include services beyond acute care, e.g. post-acute services, rehabilitation, and hospice care and another paper was focused on TJA . (Feldhaus & Mathauer, 2018; Piccinin et al., 2018a).

Most of the reduction in utilization stemmed from a decrease in discharges to post-acute care facilities, a shorter average length of stay (LOS) in hospitals and lower readmission rates:

- Eight reviews reported a reduction in average hospital length of stay (LOS); 3 studies focusing on orthopedic surgeries showed an 18% fall in average LOS (McLawnhorn & Buller, 2017; Piccinin et al., 2018b; Siddiqi et al., 2017). Calculated in days, results from bundled payment program indicated a decrease in average hospital length of stay of 4.27 to 3.58 days (McLawnhorn & Buller, 2017; Siddiqi et al., 2017)
 - ⇒ A significant decrease in LOS was found for LEJR, but not for cardiac valve replacement or spinal fusion (Agarwal et al., 2020)
- Readmission rates in Bundled Payment for Care Improvement (BPCI) program focused on orthopedic care decreased from 4.8% to 1.9% (Seth Greenwald et al., 2016)
- According to 4 papers evidence demonstrated reduction in discharges to post-acute care (PAC) utilization in total joint arthroplasty under BPCI (Agarwal et al., 2020; Piccinin et al., 2018b; Seth Greenwald et al., 2016; Siddiqi et al., 2017). The decline in the number of discharged patients to PAC varied from 71% to 44% (McLawnhorn & Buller, 2017)
- Two reviews reported an increase in home health care service utilization, which is considered as a less costly alternative to inpatient rehabilitation facilities. Discharging patients to home instead of inpatient rehabilitation facilities contribute to cost savings of up to 88% (Seth Greenwald et al., 2016; Siddiqi et al., 2017)
- One review showed a decline in the overprovision of cesarean section in England (Srivastava, Mueller, & Hewlett, 2016)

Only one review showed a significant increase in hospital resources and length of hospital stay for spine surgery. Factors that contributed to the increase in utilization were complications and patient heterogeneity. The study indicated that 17.7 % of medical beneficiaries experienced complications, due to the complex patients, that led to overconsumption of hospital resources and increased LOS (Dietz et al., 2019).

- In spite of the above, authors suggest that bundle payment models can shift interventions to less invasive surgical approaches that have been shown to improve infection rates and decrease length of stay and rehabilitation. Minimally invasive surgery or an anterior approach in cervical spine surgery could be emphasized to expedite recovery and mitigate complications to reduce readmissions and PAC (Dietz et al., 2019).

Impact of Bundled payment on healthcare quality

Ten review papers, including 9 systematic reviews, in total examined the effect of bundled payments on healthcare quality. Most bundled payment models mentioned in these papers focused on the orthopedic care (7 systematic review papers); followed by spine surgery (two systematic review), cardiac care (1 systematic review), HIV, Diabetes, etc.

In vast majority of papers, quality was measured by all-cause readmission rate, complication and mortality rates (the latter reported only once).

All-cause readmission rate

- Bundled payment resulted in decrease of readmission rates for 30-, 60-, 90-days. BPCI program showed that the overall program readmission rates declined from 4.8% to 1.9%; mortality and emergency department visits also declined (Seth Greenwald et al., 2016)
- A paper focusing on orthopedic surgeries suggested that all-cause readmission rates at 30-, 60-, and 90-days decreased from 7 to 5%, 11 to 6%, and 13 to 8%, accordingly (McLawnhorn & Buller, 2017)
- Proven Care that was designed for quality improvement in cardiac surgery also indicated a 10% reduction in 30-days readmissions (Srivastava et al., 2016)

Complication rate

Bundled payments models also showed fewer complication rates and improved quality indicators. Bundled payment program demonstrated that severe patients stayed stable, thus savings from bundled payment are not driven by skimping on quality or choosing less risky patients (Dietz et al., 2019; Jacofsky, 2017)

- Analysis of Medicare reimbursement payments of 4,506 patients receiving one-and two-level anterior cervical discectomy and fusion (ACDF) procedures over a 7-year period indicated that complications were relatively uncommon, only 0.7 % of patients had complications in total 90-day reimbursement (Sullivan et al., 2017)
- The Geisinger ProvenCare bundled payment for coronary artery bypass graft (CABG) clinical outcomes demonstrated improved trends in eight out of nine indicators (e.g., patient readmissions to intensive care units decreased from 2.9% to 0.9% and blood products usage decreased from 23.4% to 16.2%). Operative mortality decreased to zero (Srivastava et al., 2016)
- Bundled payment was also associated with high satisfaction rates in patients: beneficiaries were satisfied with the program, especially in regard to their care coordination. 97 % of patients were satisfied with Bundled Payment program in total joint arthroplasty (TJA) procedures (Piccinin et al., 2018b)

- In Sweden, the Stockholm pilot for hip and knee surgery indicated a decrease in waiting times, and complications (26%) (Srivastava et al., 2016).
- In the Netherlands, the bundled payment for diabetes indicated improvements in quality. An evaluation showed that most process indicators improved (HbA1c, BMI checked and blood pressure checked; improvements in kidney function and cholesterol tests). Patients were satisfied with their care but were not informed that they were part of the scheme for diabetes care (Srivastava et al., 2016).
- In Portugal, the average cost for treating HIV/AIDS patients declined while the quality of care was maintained as measured by patient adherence to medication, controlled infection levels, and compliance of providers with the treatment guidelines (Srivastava et al., 2016)

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- One systematic review indicated that there was not any association between bundled payment participation and changes in quality of care in particular in complication and mortality rates (Agarwal et al., 2020)
 - Negative impact of bundled payment on quality of care was observed for acute care episodes. There was a reduction in the use of internal mammary artery grafts in patients undergoing CABG surgery because there was an incentive to reduce cost (operating room time). Surgeons may have moved away from a technically more complex approach, but one that has been shown to improve outcomes. Besides, other harmful impacts on quality were not observed (Srivastava et al., 2016)

Unintended consequences of bundled payments and their counterstrategies

According to the most recent systematic review, the available studies did not show evidence of potential unintended consequences from bundled payment, such as increased procedure volume or case-mix shifts resulting from patient selection (Agarwal et al., 2020). However, there are still concerns that:

- 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 (Matchar et al., 2015; Sullivan et al., 2017).
 - ⇒ There are concerns that bundled payments may restrict care for patients who are at higher risk of complications including patients of lower socioeconomic status (Siddiqi et al., 2017). A lower socioeconomic status was an independent risk factor for a longer hospital length of stay, higher likelihood of discharge to a rehabilitation facility, and higher readmission rate within 90 days (Sullivan et al., 2017).
- The other concern with the bundled payment model is that it may not encourage efficient use of procedures; that is, although the procedure itself may be performed efficiently, this payment

reform does not necessarily encourage the use of appropriate use of procedures in a population (Patel et al., 2016).

Potential solutions to avoid occurrence of unintended consequences

Two options were discussed in the literature that could potentially prevent bundle payment from creating unintended consequences - “cherry picking” (providing care to low-risk patients) and “lemon dropping” (denying care to high-risk patients):

- A bundle could be coupled successfully with population-level screening quality measures such as frequency of procedure to standardize some of the variation in provider decisions by specifying services included in the bundle and ensuring that providers are meeting quality thresholds (Siddiqi et al., 2017).
- Risk stratification must be considered for reimbursement fees per episode of care for higher risk patient populations (Sullivan et al., 2017)
- ⇒ Risk adjustment should be based on a wide number of relevant variables, including patient-related (age, sex, having comorbidities etc.) and procedure-related (complex cases) factors, to create well-functioning bundled payment models (McLawnhorn & Buller, 2017)

Unintended consequences of bundled payments	Possible solutions
Cherry picking - providing care to low-risk patients	Introduce: <ul style="list-style-type: none"> • Risk stratification • Quality thresholds
Lemon dropping -denying care to high-risk patients	

Implementation considerations

The bundle payment models to be successful and achieve the desired goals the following should be taken into consideration:

- Define bundle carefully (Piccinin et al., 2018a; Siddiqi et al., 2017)
 - ⇒ Identify primary episodes of care
 - ⇒ Outline stakeholder responsibilities
 - ⇒ Define inclusions and exclusions of the care agreement
 - ⇒ Determine inclusion or exclusion of inpatient stay, outpatient care, and PAC settings
- Identify the episode period to be included
 - ⇒ Determine episode start & end dates
 - ⇒ Incorporate rate and cost of readmissions
- Refine the patient population for analysis (McLawnhorn & Buller, 2017; Piccinin et al., 2018a)
 - ⇒ Stratify patients based on risk factors

- ⇒ Optimize modifiable risk factors
- Incorporate bundled payment revenue and quality terms (Piccinin et al., 2018a; Seth Greenwald et al., 2016)
 - ⇒ Evaluate impact of more streamlined care pathways on episode volume
 - ⇒ Integrate provisions for financial outlier cases
 - ⇒ Evaluate costs of administrative and procedural changes
- Perform the financial analysis and determine how to distribute payments
 - ⇒ Calculate episode payment required for desired margin of profitability
 - ⇒ Identify areas of potential cost reductions or quality improvements
 - ⇒ Involve surgeons, administrators, and other stakeholders in development of reimbursement models
- Prevent gaming by the providers
 - ⇒ Ensure proper monitoring system is in place using electronic medical records infrastructure allowing data exchange between settings to produce timely, actionable clinical data
 - ⇒ Develop guidelines to evaluate provider performance

In addition to the abovementioned implementation considerations there are also the following factors that are critical to success:

- ⇒ Engaging physicians and securing their active participation in care redesign
- ⇒ Educating physicians and preparing them for change
- ⇒ Investing in IT to support reliable, useful reporting on cost and quality.

Insights for Action from existing bundled payment models

⇒ Payment distribution

Reimbursement distributed across different levels of care: primary recipient was the hospital responsible for the index procedure, receiving between 59.7% and 77% of the bundled payment, followed by surgeon reimbursement (range, 12.8%-14%), and PAC rehabilitation, which received 3.6%-7.3% of payment (Dietz et al., 2019).

⇒ Patient education

A patient-centric coordinated care effort is cost saving to educate patients throughout the operative stages in hopes of reducing the number of patients going to in-patient facilities, hospital length of stay, and postoperative readmissions (Siddiqi et al., 2017).

⇒ Hospitals selection

- ⇒ Successfully managing bundled payments requires hospitals to invest in new or enhanced capabilities, including improved data collection and analysis, technology upgrades, and care coordination resources. Thus, incremental costs necessary to manage a 90-day episode of care in the face of declining target prices for the episode should be anticipated. As a result, bundle payment models may become impractical and unaffordable for low-volume hospitals and may

be more favorable for higher volume tertiary centers with abundant resources and financial capabilities (McLawnhorn & Buller, 2017; Siddiqi et al., 2017)

⇒ **Infrastructure requirements**

It is essential to build on an electronic medical records infrastructure that allows for data exchange between settings to produce timely, actionable clinical data; Ensure the accuracy of the data on use and costs to produce clearly defined bundle (Patel et al., 2016)

⇒ **Care coordination and gainsharing again**

Integrating preoperative and intraoperative processes, reviewing implant purchasing options, and negotiating post-acute care costs are opportunities for cost savings. Information sharing through the electronic medical health record prior to the surgical procedure about the treatment plan ensures not only that the patient’s expectations are met, but also that all parties caring for the patient are working toward the same end point. Although institutional or practice savings can also be implemented (e.g., purchasing options and administrative processes), effective decision-making based on communication will drive the gainsharing opportunities realized under these programs (Seth Greenwald et al., 2016)

Type of care	Discrete procedures
Payment structure	Lump sum for a specific set of services provided during an episode of care
Infrastructure requirements	<ul style="list-style-type: none"> • Electronic medical records infrastructure that allows for data exchange between settings to produce timely, actionable clinical data • Accurate data on use and costs to produce clearly defined bundle • Ability to conduct risk adjustment
Actionable quality measures	Ensure use is appropriate
Strengths	Efficient and transparent market-based pricing tied to quality, not demand
Weaknesses	<ul style="list-style-type: none"> • Potential for inappropriate treatment owing to perception of constrained resources • Care coordination outside the bundle is not supported

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