

1. Arnold, D. R. (2017). "Countervailing incentives in value-based payment." *Healthc (Amst)* **5**(3): 125-128.
Payment reform has been at the forefront of the movement toward higher-value care in the U.S. health care system. A common belief is that volume-based incentives embedded in fee-for-service need to be replaced with value-based payments. While this belief is well-intended, value-based payment also contains perverse incentives. In particular, behavioral economists have identified several features of individual decision making that reverse some of the typical recommendations for inducing desirable behavior through financial incentives. This paper discusses the countervailing incentives associated with four behavioral economic concepts: loss aversion, relative social ranking, inertia or status quo bias, and extrinsic vs. intrinsic motivation.
2. Bao, Y., et al. (2017). "Value-based payment in implementing evidence-based care: the Mental Health Integration Program in Washington state." *Am J Manag Care* **23**(1): 48-53.
OBJECTIVES: To assess the role of value-based payment (VBP) in improving fidelity and patient outcomes in community implementation of an evidence-based mental health intervention, the Collaborative Care Model (CCM). STUDY DESIGN: Retrospective study based on a natural experiment. METHODS: We used the clinical tracking data of 1806 adult patients enrolled in a large implementation of the CCM in community health clinics in Washington state. VBP was initiated in year 2 of the program, creating a natural experiment. We compared implementation fidelity (measured by 3 process-of-care elements of the CCM) between patient-months exposed to VBP and patient-months not exposed to VBP. A series of regressions were estimated to check robustness of findings. We estimated a Cox proportional hazard model to assess the effect of VBP on time to achieving clinically significant improvement in depression (measured based on changes in depression symptom scores over time). RESULTS: Estimated marginal effects of VBP on fidelity ranged from 9% to 30% of the level of fidelity had there been no exposure to VBP ($P <.05$ for every fidelity measure). Improvement in fidelity in response to VBP was greater among providers with a larger patient panel and among providers with a lower level of fidelity at baseline. Exposure to VBP was associated with an adjusted hazard ratio of 1.45 (95% confidence interval, 1.04-2.03) for achieving clinically significant improvement in depression. CONCLUSIONS: VBP improved fidelity to key elements of the CCM, both directly incentivized and not explicitly incentivized by the VBP, and improved patient depression outcomes.
3. Benzer, J. K., et al. (2014). "Sustainability of quality improvement following removal of pay-for-performance incentives." *J Gen Intern Med* **29**(1): 127-132.
BACKGROUND: Although pay-for-performance (P4P) has become a central strategy for improving quality in US healthcare, questions persist about the effectiveness of these programs. A key question is whether quality improvement that occurs as a result of P4P programs is sustainable, particularly if incentives are removed. OBJECTIVE: To investigate sustainability of performance levels following removal of performance-based incentives. DESIGN, SETTING, AND PARTICIPANTS: Observational cohort study that capitalized on a P4P program within the Veterans Health Administration (VA) that included adoption and subsequent removal of performance-based incentives for selected inpatient quality measures. The study sample comprised 128 acute care VA hospitals where performance was assessed between 2004 and 2010. INTERVENTION: VA system managers set annual performance goals in consultation with clinical leaders, and report performance scores to medical centers on a quarterly basis. These scores inform performance-based incentives for facilities and their managers. Bonuses are distributed based on the attainment of these performance goals. MEASUREMENTS: Seven quality of care measures for acute coronary syndrome, heart failure, and pneumonia linked to performance-based incentives. RESULTS: Significant improvements in performance were observed for six of seven quality of care measures following adoption of performance-based incentives and were maintained up to the removal of the incentive; subsequently, the observed performance levels were sustained. LIMITATIONS: This is a quasi-experimental study without a comparison group; causal conclusions are limited. CONCLUSION: The maintenance of performance levels after removal of a performance-based incentive has implications for the implementation of Medicare's value-based purchasing initiative and other P4P programs. Additional research is needed to better understand human and system-level factors that mediate sustainability of performance-based incentives.
4. Bolz, N. J. and R. Iorio (2016). "Bundled Payments: Our Experience at an Academic Medical Center." *J Arthroplasty* **31**(5): 932-935.

BACKGROUND: The landscape of health care is transitioning from a fee-for-service model to value-based purchasing. **METHODS:** We developed evidence-based clinical pathways and risk stratification measures to effectively implement the Bundled Payments for Care Improvement model of value-based purchasing. **RESULTS:** We decreased patients' length of stay, discharge to inpatient facilities, and cost of an episode of patient care. **CONCLUSION:** The bundled care payment initiative has been successfully implemented for Diagnosis Related Groups 469 and 470, delivering high-quality patient care at a reduced price.

5. Calikoglu, S., et al. (2012). "Hospital pay-for-performance programs in Maryland produced strong results, including reduced hospital-acquired conditions." *Health Aff (Millwood)* **31**(12): 2649-2658.

Over the past decade Medicare has put in place several pay-for-performance programs for hospitals, including one that stopped paying hospitals for treating hospital-acquired conditions and the Hospital Value-Based Purchasing Program that went into effect in October 2012. In this article we describe how the State of Maryland crafted two pay-for-performance programs applicable to all hospitals and payers—a Quality-Based Reimbursement Program similar to Medicare's value-based purchasing program and a separate program that compared hospitals' risk-adjusted relative performance on a broad array of hospital-acquired conditions. In the first program, all clinical process-of-care measures improved from 2007 to 2010, and variations among hospitals decreased substantially. For example, the statewide average rate of provision of influenza vaccines to patients with pneumonia increased by 20.5 percentage points, from 71.5 percent in 2007 to 92.0 percent in 2010. As a result of the second program, hospital-acquired conditions in the state declined by 15.26 percent over two years, with estimated cost savings of \$110.9 million over that period. Extrapolating these results, the Medicare fee-for-service program nationally would have saved \$1.3 billion over two years by implementing a similar hospital-acquired conditions program. The state programs used strong and consistent financial incentives to motivate hospitals' efforts to improve quality. This experience demonstrates that successful state experimentation can inform and influence federal policy and efforts to coordinate payment strategies in other states.

6. Caspers, B. A. and B. Pickard (2013). "Value-based resource management: a model for best value nursing care." *Nurs Adm Q* **37**(2): 95-104.

With the health care environment shifting to a value-based payment system, Catholic Health Initiatives nursing leadership spearheaded an initiative with 14 hospitals to establish best nursing care at a lower cost. The implementation of technology-enabled business processes at point of care led to a new model for best value nursing care: Value-Based Resource Management. The new model integrates clinical patient data from the electronic medical record and embeds the new information in care team workflows for actionable real-time decision support and predictive forecasting. The participating hospitals reported increased patient satisfaction and cost savings in the reduction of overtime and improvement in length of stay management. New data generated by the initiative on nursing hours and cost by patient and by population (Medicare severity diagnosis-related groups), and patient health status outcomes across the acute care continuum expanded business intelligence for a value-based population health system.

7. Colaianni, C. A., et al. (2017). "Integrating Data Collection Into Office Work Flow and Electronic Health Records for Clinical Outcomes Research." *JAMA Facial Plast Surg*.

Meticulous collection of clinical outcomes metrics in patients undergoing elective surgery is important to ensure quality care; it is also increasing in importance as the Centers for Medicare & Medicaid Services moves to tie reimbursement to outcomes and insurance approval. This study assesses a systematic method for gathering preoperative and postoperative data on patients with nasal obstruction who undergo functional septorhinoplasty that was developed at the Massachusetts Eye and Ear Infirmary, Harvard Medical School, Boston, Massachusetts. The electronic database was initiated in July 2013, patients continue to be actively enrolled, and follow-up data continue to be collected. This procedure represents a systematic method for the initial visit evaluation, collection of patient-reported outcome measures, documentation of surgical management, and follow-up of patients. For consistency and ease of data collection, as well as data interpretation, this method is integrated into a RedCap survey database and the institution's electronic health record system. During the 4 years that this process has been in place, outcomes data have been collected on more than 1000 patients at 7 time points to create an institutional database. This system allows the tracking of patients' outcomes data and the mining of the institutional database for future research. As

Centers for Medicare & Medicaid Services moves from a volume-driven health care model to a value-driven health care model, demonstration of measurable outcomes in patients undergoing elective surgery will be of paramount importance.

8. Collden, C., et al. (2017). "A value-based taxonomy of improvement approaches in healthcare." *J Health Organ Manag* **31**(4): 445-458.

Purpose The concept of value is becoming increasingly fashionable in healthcare and various improvement approaches (IAs) have been introduced with the aim of increasing value. The purpose of this paper is to construct a taxonomy that supports the management of parallel IAs in healthcare.

Design/methodology/approach Based on previous research, this paper proposes a taxonomy that includes the dimensions of view on value and organizational focus; three contemporary IAs - lean, value-based healthcare, and patient-centered care - are related to the taxonomy. An illustrative qualitative case study in the context of psychiatric (psychosis) care is then presented that contains data from 23 interviews and focuses on the value concept, IAs, and the proposed taxonomy. Findings Respondents recognized the dimensions of the proposed taxonomy and indicated its usefulness as support for choosing and combining different IAs into a coherent management model, and for facilitating dialog about IAs. The findings also suggested that the view of value as "health outcomes" is widespread, but healthcare professionals are less likely than managers to also view value as a process. **Originality/value** The conceptual contribution of this paper is to delineate some important characteristics of IAs in relation to the emerging "value era". It also highlights the coexistence of different IAs in healthcare management practice. A taxonomy is proposed that can help managers choose, adapt, and combine IAs in local management models.

9. Dalzell, M. D. (2017). "In Utah, Process Measures Are Winning Friends, Influencing Outcomes." *Manag Care* **26**(7): 19-21.

Choosing the right blend of quality metrics for each DRG is one of the many intricacies of Value-Driven Outcomes (VDOs), Utah's answer to the challenge of how to "do" value-based care. An initiative five years in the making, VDO matches indicators of quality to DRGs with substantial variation in cost within Utah's own system.

10. D'Andreamatteo, A., et al. (2015). "Lean in healthcare: A comprehensive review." *Health Policy* **119**(9): 1197-1209.

BACKGROUND: Lean seems to be the next revolution for a better, improved, value-based healthcare. In the last 15 years Lean has been increasingly adapted and adopted in healthcare. Accordingly, Lean healthcare has been developing into a major strand of research since the early 2000s. The aim of this work is to present a comprehensive overview of the main issues highlighted by research on implementation of Lean in a complex context such as the healthcare one. **METHOD:** Comprehensive literature review was conducted in order to identify empirical and theoretical articles published up to September 2013. Thematic analysis was performed in order to extract and synthesis data. **FINDINGS:** 243 articles were selected for analysis. Lean is best understood as a means to increase productivity. Hospital is the more explored setting, with emergency and surgery as the pioneer departments. USA appears to be the leading country for number of applications. The theoretical works have been focused mainly on barriers, challenges and success factors. Sustainability, framework for measurement and critical appraisal remain underestimated themes. Evaluations of "system wide approach" are still low in number. **CONCLUSION:** Even though Lean results appear to be promising, findings so far do not allow to draw a final word on its positive impacts or challenges when introduced in the healthcare sector. Scholars are called to explore further the potentiality and the weaknesses of Lean, above all as for the magnitude of investments required and for the engagement of the whole organization it represents increasingly strategic choice, whilst health professionals, managers and policy makers could and should learn from research how to play a pivotal role for a more effective implementation of lean in different health contexts.

11. De Rosis, S. and S. Nuti (2017). "Public strategies for improving eHealth integration and long-term sustainability in public health care systems: Findings from an Italian case study." *Int J Health Plann Manage*.

eHealth is expected to contribute in tackling challenges for health care systems. However, it also imposes challenges. Financing strategies adopted at national as well regional levels widely affect eHealth long-term sustainability. In a public health care system, the public actor is among the main "buyers" eHealth. However,

public interventions have been increasingly focused on cost containment. How to match these 2 aspects? This article explores some central issues, mainly related to financial aspects, in the development of effective and valuable eHealth strategies in a public health care system: How can the public health care system (as a "buyer") improve long-term success and sustainability of eHealth solutions? What levers are available to match in the long period different interests of different stakeholders in the eHealth field? A case study was performed in the Region of Tuscany, Italy. According to our results, win-win strategies should be followed. Investments should take into account the need to long-term finance solutions, for sustaining changes in health care organizations for obtaining benefits. To solve the interoperability issues, the concept of the "platform approach" emerged, based on collaboration within and between organizations. Private sector as well as beneficiaries and final users of the eHealth solutions should participate in their design, provision, and monitoring. For creating value for all, the evidence gap and the financial needs could be addressed with a pull mechanism of funding, aimed at paying according to the outcomes produced by the eHealth solution, on the base of an ongoing monitoring, measurement, and evaluation of the outcomes.

12. Engelman, D. T. (2017). "Value-based health care: How to succeed in a bundled care APM." *Bull Am Coll Surg* **102**(3): 24-28.
13. Favini, N., et al. (2017). "Comparative Trends in Payment Adjustments Between Safety-Net and Other Hospitals Since the Introduction of the Hospital Readmission Reduction Program and Value-Based Purchasing." *Jama* **317**(15): 1578-1580.
14. Figueroa, J. F., et al. (2016). "Association between the Value-Based Purchasing pay for performance program and patient mortality in US hospitals: observational study." *BMJ* **353**: i2214.

OBJECTIVE: To determine the impact of the Hospital Value-Based Purchasing (HVBP) program-the US pay for performance program introduced by Medicare to incentivize higher quality care-on 30 day mortality for three incentivized conditions: acute myocardial infarction, heart failure, and pneumonia. DESIGN: Observational study. SETTING: 4267 acute care hospitals in the United States: 2919 participated in the HVBP program and 1348 were ineligible and used as controls (44 in general hospitals in Maryland and 1304 critical access hospitals across the United States). PARTICIPANTS: 2 430 618 patients admitted to US hospitals from 2008 through 2013. MAIN OUTCOME MEASURES: 30 day risk adjusted mortality for acute myocardial infarction, heart failure, and pneumonia using a patient level linear spline analysis to examine the association between the introduction of the HVBP program and 30 day mortality. Non-incentivized, medical conditions were the comparators. A secondary outcome measure was to determine whether the introduction of the HVBP program was particularly beneficial for a subgroup of hospital-poor performers at baseline-that may benefit the most. RESULTS: Mortality rates of incentivized conditions in hospitals participating in the HVBP program declined at -0.13% for each quarter during the preintervention period and -0.03% point difference for each quarter during the post-intervention period. For non-HVBP hospitals, mortality rates declined at -0.14% point difference for each quarter during the preintervention period and -0.01% point difference for each quarter during the post-intervention period. The difference in the mortality trends between the two groups was small and non-significant (difference in difference in trends -0.03% point difference for each quarter, 95% confidence interval -0.08% to 0.13% point difference, P=0.35). In no subgroups of hospitals was HVBP associated with better outcomes, including poor performers at baseline. CONCLUSIONS: Evidence that HVBP has led to lower mortality rates is lacking. Nations considering similar pay for performance programs may want to consider alternative models to achieve improved patient outcomes.

15. Ghany, R., et al. (2017). "A screening echocardiogram to identify diastolic dysfunction leads to better outcomes." *Echocardiography* **34**(8): 1152-1158.

BACKGROUND: Diastolic dysfunction (DD) can lead to heart failure and higher mortality. Echocardiograms can detect DD but are not indicated for screening in older adults. Our aim was to evaluate the prevalence of DD and the impact of identifying it in seniors. METHODS: We performed screening echocardiograms in 5227 consecutive patients between January 2014 and March 2015 in 36 senior-focused value-based clinics across six states. We determined the presence of the grade of DD and defined stage B grade II/III (asymptomatic) and of stage C grade II/III (symptomatic) DD by the presence or absence of typical HF symptoms. We obtained prescribed medications from the electronic health record to determine absolute changes in HF

therapy before and after the echocardiogram. RESULTS: We included a group with no DD (n=649), a group with grade 1 DD (n=2875), and those with grades 2 and 3 (n=1357) who had normal ejection fraction. The prevalence of grade 2 or 3 DD with preserved ejection fraction was 25%; 95% CI: 24-26. The absolute change of ace-inhibitor use before and after the echocardiogram increased by 14, 19, 23, 27 in patients without DD, those with grade 1, grade 2 or 3 asymptomatic and grade 2 or 3 symptomatic, respectively. The use of beta-blocker, statin, and diuretic had similar trends. CONCLUSIONS: Seniors without previously known stage B or stage C heart failure have moderate-to-severe DD, 27% of whom were stage C. Identifying seniors with DD leads to improvement in care.

16. Gichoya, J. W., et al. (2017). "Proving Value in Radiology: Experience Developing and Implementing a Shareable Open Source Registry Platform Driven by Radiology Workflow." *J Digit Imaging*.

Numerous initiatives are in place to support value based care in radiology including decision support using appropriateness criteria, quality metrics like radiation dose monitoring, and efforts to improve the quality of the radiology report for consumption by referring providers. These initiatives are largely data driven. Organizations can choose to purchase proprietary registry systems, pay for software as a service solution, or deploy/build their own registry systems. Traditionally, registries are created for a single purpose like radiation dosage or specific disease tracking like diabetes registry. This results in a fragmented view of the patient, and increases overhead to maintain such single purpose registry system by requiring an alternative data entry workflow and additional infrastructure to host and maintain multiple registries for different clinical needs. This complexity is magnified in the health care enterprise whereby radiology systems usually are run parallel to other clinical systems due to the different clinical workflow for radiologists. In the new era of value based care where data needs are increasing with demand for a shorter turnaround time to provide data that can be used for information and decision making, there is a critical gap to develop registries that are more adapt to the radiology workflow with minimal overhead on resources for maintenance and setup. We share our experience of developing and implementing an open source registry system for quality improvement and research in our academic institution that is driven by our radiology workflow.

17. Groves, K. S. (2017). "Examining the impact of succession management practices on organizational performance: A national study of U.S. hospitals." *Health Care Manage Rev*.

BACKGROUND: Spearheaded by the industry's transition from volume- to value-based care, the health care reform movement has spurred both unprecedented challenges and opportunities for developing more effective and sustainable health care delivery organizations. Whereas the formidable challenges of leading hospitals and health systems have been widely discussed, including reimbursement degradation, the rapidly aging workforce, and the imminent wave of executive retirements, the opportunity to leverage succession management and talent development capabilities to overcome these challenges has been largely overlooked. **PURPOSE:** To address this key research and practice need, this multiphase study develops and validates an assessment of succession management practices for health care organizations. **METHODOLOGY:** Utilizing data collected from two national samples of hospital organizations, the results provide a 32-item succession management assessment comprising seven distinct sets of succession management practices. **RESULTS:** The results indicate that succession management practices are strongly associated with multiple hospital performance metrics, including patient satisfaction and Medicare Spending per Beneficiary, leadership bench strength, and internal/external placement rate for executive level positions. **PRACTICE IMPLICATIONS:** The author concludes this article with a discussion of several practical implications for health care executives and boards, including employing the succession management assessment for diagnosing development opportunities, benchmarking succession planning and talent development practices against similar hospitals or health systems, and elevating the profile of succession management as a strategic priority in today's increasingly uncertain health care landscape.

18. Hippen, B. E. and F. W. Maddux (2017). "Integrating kidney transplantation into value-based care for people with renal failure." *Am J Transplant*.

Healthcare reimbursement is increasingly tied to value instead of volume, with special attention paid to resource-intensive populations such as patients with renal disease. To this end, Medicare has sponsored pilot projects to encourage providers to develop care coordination and population health management strategies to provide quality care while reducing resource utilization. In this Personal Viewpoint essay, we argue in favor

of expanding one such pilot project—the Comprehensive ESRD Care (CEC) initiative—to include patients with advanced chronic kidney disease and kidney transplant recipients. The implementation of the Medicare Access and CHIP Reauthorization Act (MACRA) offers a time-sensitive incentive for transplant centers in particular to align with extant CECs. An "expanded" CEC model proffers opportunity for robust cooperation between general nephrology practices, dialysis providers, and transplant centers to develop care coordination strategies for all patients with renal disease, realign incentives for all clinical stakeholders to increase kidney transplantation rates, and reduce total costs of care.

19. Kamstra, B. and M. K. Huntington (2017). "Population Health Management and Cancer Screening." *S D Med No:* 37-41.

Population health management (PHM) is a new health care model being implemented. It has been defined as "the health outcomes of a group of individuals, including the distribution of such outcomes within the group." This includes health outcomes and patterns of health determinants, and policies and interventions that link these two. Moving from a fee-for-service payment system to a quality- or value-based system, this model places on the clinician more responsibility for the costs of health care and its reimbursements. Screening for disease is an area that could benefit from PHM. Electronic health records (EHRs) employ algorithms to capture PHMrelated data such as diagnostic codes, clinical quality indicators, and other parameters useful in identifying those for whom screening is appropriate and in monitoring the efficacy at implementing the screening in the clinic's population. Registries of patients at risk for a variety of diseases are created in the EHR, and these patients can be notified to visit with their clinician for a shared decision-making conversation about the screening. PHM requires a team approach to input, analyze, and implement this data. The physicians must be the driving force behind population health, but advanced practice clinicians, nurses, case managers, quality coordinators, information technology support, and many others collaborate to make this successful.

20. Kirkpatrick, J. R., et al. (2015). "Using value-based analysis to influence outcomes in complex surgical systems." *J Am Coll Surg* **220**(4): 461-468.

BACKGROUND: Value-based analysis (VBA) is a management strategy used to determine changes in value (quality/cost) when a usual practice (UP) is replaced by a best practice (BP). Previously validated in clinical initiatives, its usefulness in complex systems is unknown. To answer this question, we used VBA to correct deficiencies in cardiac surgery at Memorial Healthcare System. **STUDY DESIGN:** Cardiac surgery is a complex surgical system that lends itself to VBA because outcomes metrics provided by the Society of Thoracic Surgeons provide an estimate of quality; cost is available from Centers for Medicare and Medicaid Services and other contemporary sources; the UP can be determined; and the best practice can be established. **RESULTS:** Analysis of the UP at Memorial Healthcare System revealed considerable deficiencies in selection of patients for surgery; the surgery itself, including choice of procedure and outcomes; after care; follow-up; and control of expenditures. To correct these deficiencies, each UP was replaced with a BP. Changes included replacement of most of the cardiac surgeons; conversion to an employed physician model; restructuring of a heart surgery unit; recruitment of cardiac anesthesiologists; introduction of an interactive educational program; eliminating unsafe practices; and reducing cost. **CONCLUSIONS:** There was a significant ($p < 0.01$) reduction in readmissions, complications, and mortality between 2009 and 2013. Memorial Healthcare System was only 1 of 17 (1.7%) database participants ($n = 1,009$) to achieve a Society of Thoracic Surgeons 3-star rating in all 3 measured categories. Despite substantial improvements in quality, the cost per case and the length of stay declined. These changes created a savings opportunity of \$14 million, with actual savings of \$10.4 million. These findings suggest that VBA can be a powerful tool to enhance value (quality/cost) in a complex surgical system.

21. Kuhn, B. and C. Lehn (2015). "Value-Based Reimbursement: The Banner Health Network Experience." *Front Health Serv Manage* **32**(2): 17-31.

Many organizations in healthcare are moving rapidly to adopt value-based reimbursement (VBR) models that reward value instead of volume. By shifting a significant percentage of clinical and financial risk from payers to providers, VBR programs can help reduce costs significantly, improve the quality of care, and increase efficiency. The experience of Banner Health Network (BHN) with VBR in commercial and government plans indicates that a large health system can transition to VBR with renewed focus on quality,

cost efficiencies, population health management tactics, and member engagement. In December 2011, BHN was selected in a competitive bid process as one of 32 organizations to participate in a Centers for Medicare & Medicaid Services (CMS) value-based demonstration initiative called the Pioneer accountable care organization (ACO). As a Pioneer ACO with consistent and positive results, BHN, based in Phoenix, Arizona, has demonstrated that VBR can lead to results that are beneficial to the member, the healthcare organization, and the community. BHN has been a top performer in returning shared savings to Medicare while improving appropriate service utilization and performance on quality metrics. The development of simultaneous commercial ACO products was a requirement of the Pioneer agreement with CMS, as well as a clear goal for BHN. The initial period of ACO partnership formation revealed an uncomfortable reality: Payers and providers would need to collaborate and share information as never before. Further, many payers were uncertain about working closely with providers who were working simultaneously with other payers on similar partnerships. Before long, however, there were enough successful VBR arrangements to allay these initial payer anxieties. Today, BHN has high-value network arrangements with nearly every major payer in Arizona.

22. Labovitz, J. M. and G. F. Kominski (2016). "Forecasting the Value of Podiatric Medical Care in Newly Insured Diabetic Patients During Implementation of the Affordable Care Act in California." *J Am Podiatr Med Assoc* **106**(3): 163-171.

BACKGROUND: Because value-based care is critical to the Affordable Care Act success, we forecasted inpatient costs and the potential impact of podiatric medical care on savings in the diabetic population through improved care quality and decreased resource use during implementation of the health reform initiatives in California. **METHODS:** We forecasted enrollment of diabetic adults into Medicaid and subsidized health benefit exchange programs using the California Simulation of Insurance Markets (CalSIM) base model. Amputations and admissions per 1,000 diabetic patients and inpatient costs were based on the California Office of Statewide Health Planning and Development 2009-2011 inpatient discharge files. We evaluated cost in three categories: uncomplicated admissions, amputations during admissions, and discharges to a skilled nursing facility. Total costs and projected savings were calculated by applying the metrics and cost to the projected enrollment. **RESULTS:** Diabetic patients accounted for 6.6% of those newly eligible for Medicaid or health benefit exchange subsidies, with a 60.8% take-up rate. We project costs to be \$24.2 million in the diabetic take-up population from 2014 to 2019. Inpatient costs were 94.3% higher when amputations occurred during the admission and 46.7% higher when discharged to a skilled nursing facility. Meanwhile, 61.0% of costs were attributed to uncomplicated admissions. Podiatric medical services saved 4.1% with a 10% reduction in admissions and amputations and an additional 1% for every 10% improvement in access to podiatric medical care. **CONCLUSIONS:** When implementing the Affordable Care Act, inclusion of podiatric medical services on multidisciplinary teams and in chronic-care models featuring prevention helps shift care to ambulatory settings to realize the greatest cost savings.

23. Lekander, I., et al. (2017). "Hospital comparison of stroke care in Sweden: a register-based study." *BMJ Open* **7**(9): e015244.

BACKGROUND AND PURPOSE: The objective of this study was to estimate the level of health outcomes and resource use at a hospital level during the first year after a stroke, and to identify any potential differences between hospitals after adjusting for patient characteristics (case mix). **METHOD:** Data from several registries were linked on individual level: seven regional patient administrative systems, Swedish Stroke Register, Statistics Sweden, National Board of Health and Welfare and Swedish Social Insurance Agency. The study population consisted of 14 125 patients presenting with a stroke during 2010. Case-mix adjusted analysis of hospital differences was made on five aspects of health outcomes and resource use, 1 year post-stroke. **RESULTS:** The results indicated that 26% of patients had died within a year of their stroke. Among those who survived, almost 5% had a recurrent stroke and 40% were left with a disability. On average, the patients had 22 inpatient days and 23 outpatient visits, and 13% had moved into special housing. There were significant variations between hospitals in levels of health outcomes achieved and resources used after adjusting for case mix. **CONCLUSION:** Differences in health outcomes and resource use between hospitals were substantial and not entirely explained by differences in patient mix, indicating tendencies of unequal stroke care in Sweden. Healthcare organisation of regions and other structural features could potentially explain parts of the differences identified.

24. Ljungqvist, O., et al. (2017). "ERAS-Value based surgery." *J Surg Oncol.*

This paper reviews implementation of ERAS and its financial implications. Literature on clinical outcomes and financial implications were reviewed. Reports from many different surgery types shows that implementation of ERAS reduces complications and shortens hospital stay. These improvements have major impacts on reducing the cost of care even when costs for implementation, and investment in time for personnel and training is accounted for. The conclusion is that ERAS is an excellent example of value based surgery.

25. Lopert, R. and R. Viney (2014). "Revolution then evolution: the advance of health economic evaluation in Australia." *Z Evid Fortbild Qual Gesundhwes* **108**(7): 360-366.

All governments face immense challenges in providing affordable healthcare for their citizens, and the diffusion of novel health technologies is a key driver of growth in expenditure for many. Although important methodological and process variations exist around the world, health economic evaluation is increasingly seen as an important tool to support decision-making around the introduction of new health technologies, interventions and programmes in countries of varying stages of economic development. In Australia, the assessment of the comparative cost-effectiveness of new medicines proposed for subsidy under the country's national drug subsidy programme, the Pharmaceutical Benefits Scheme, was introduced in the late 1980s and became mandatory in 1993, making Australia the first country to introduce such a requirement nationally. Since then the use of health economic evaluation has expanded and been applied to support decision-making across a broader range of health technologies, as well as to programmes in public health.

26. Maciejewski, M. L., et al. (2014). "Value-based insurance design program in north Carolina increased medication adherence but was not cost neutral." *Health Aff (Millwood)* **33**(2): 300-308.

Value-based insurance design (VBID) has shown promise for improving medication adherence by lowering or eliminating patients' payments for some medications. Yet the business case for VBID remains unclear. VBID is based on the premise that higher medication and administrative expenses incurred by insurers will be offset by lower nonmedication expenditures that result from better disease control. This article examines Blue Cross Blue Shield of North Carolina's VBID program, which began in 2008. The program eliminated copayments for generic medications and reduced copays for brand-name medications. Patient adherence improved 2.7-3.4 percent during the two-year study period. Hospital admissions decreased modestly, but there were no significant changes in emergency department use or total health expenditures. The insurer incurred \$6.4 million in higher medication expenditures; total nonmedication expenditures for the study population decreased \$5.7 million. Our results provide limited support for the idea that VBID can be cost-neutral in specific subpopulations. The business case for VBID may be more compelling over the long term and in high risk subgroups for whose members cost is an important barrier to improved medication adherence.

27. Maeng, D. D., et al. (2017). "Impact of a value-based insurance design for physical therapy to treat back pain on care utilization and cost." *J Pain Res* **10**: 1337-1346.

OBJECTIVE: To assess the impact of a value-based insurance design providing enhanced access to physical therapy (PT) for treatment of back pain on treatment patterns and cost of care. **STUDY DESIGN:** A retrospective analysis of claims data obtained from Geisinger Health Plan (GHP). In April 2013, GHP began offering "PT bundle" - i.e., a bundle of up to five PT visits for a single one-time copay that can be renewed for another bundle of five PT visits - for its employer-based plan members with back pain. **METHODS:** A cohort of GHP members who were preauthorized for the PT bundle were compared against a contemporaneous cohort of GHP members who were preauthorized for PT under the standard per-visit copay arrangement between January 2013 and October 2014. **RESULTS:** Among the PT bundle cohort, the PT visit rate during the first 9 months since the PT preauthorization date had dramatically increased and then gradually decreased in subsequent months. The PT bundle was also associated with 29%-35% short-term reductions in emergency department visits and with 12%-20% reductions in primary care visits after 6 months. No significant impact on hospitalization or cost was observed. **CONCLUSION:** Implementation of the PT bundle appears to have led to a change in the treatment pattern of back pain that is more consistent with the recommended guidelines to use more conservative management such as PT as the first-line treatment for back pain.

28. Maeng, D. D., et al. (2016). "The value of value-based insurance design: savings from eliminating drug co-payments." *Am J Manag Care* **22**(2): 116-121.

OBJECTIVES: To estimate the cost impact of a \$0 co-pay prescription drug program implemented by a large healthcare employer as a part of its employee wellness program. STUDY DESIGN: A \$0 co-pay program that included approximately 200 antihypertensive, antidiabetic, and antilipid medications was offered to Geisinger Health System (GHS) employees covered by Geisinger Health Plan (GHP) in 2007. Claims data from GHP for the years 2005 to 2011 were obtained. The sample was restricted to continuously enrolled members with Geisinger primary care providers throughout the study period. METHODS: The intervention group, defined as 2251 GHS employees receiving any of the drugs eligible for \$0 co-pay, was propensity score matched based on 2 years of pre-intervention claims data to a comparison group, which was defined as 3857 non-GHS employees receiving the same eligible drugs at the same time. Generalized linear models were used to estimate differences in terms of per-member-per-month (PMPM) claims amounts related to prescription drugs and medical care. RESULTS: Total healthcare spending (medical plus prescription drug spending) among the GHS employees was lower by \$144 PMPM (13%; 95% CI, \$38-\$250) during the months when they were taking any of the eligible drugs. Considering the drug acquisition cost and the forgone co-pay, the estimated return on investment over a 5-year period was 1.8. CONCLUSIONS: This finding suggests that VBID implementation within the context of a wider employee wellness program targeting the appropriate population can potentially lead to positive cost savings.

29. Malseptic, G. G., et al. (2017). "Complex care models to achieve accountable care readiness: Lessons from two community hospitals." *Healthc (Amst)*.

Massachusetts' community hospitals face the challenge of achieving accountable care readiness with fewer financial and operational resources and a higher share of publicly-insured patients than their academic medical center counterparts. They are thus doubly constrained to make the investments necessary to perform in a value-based payment environment. Hallmark Health System and Lowell General Hospital are among 25 community hospital awardees engaged with the Massachusetts Health Policy Commission's Community Hospital Acceleration, Revitalization, and Transformation (CHART) investment program to implement clinical transformation programs to reduce unnecessary hospital utilization; enhance care for individuals with social, behavioral, and medical complexity; and improve post-acute community-based care, as means to advance accountable care readiness. The programs are payer-blind and designed to operate at-scale based on clinical and/or utilization criteria. Using examples from Hallmark Health System and Lowell General Hospital, we report on early lessons learned, representative of experiences from across the Phase 2 cohort: 1) locally-derived data enables hospitals to plan and implement action-oriented initiatives that are tailored to their communities; 2) investments in appropriate technologies facilitate near real-time patient engagement upon presentation to the acute care setting and/or immediately post-discharge; 3) non-medical providers are a cost-effective and high-value addition to complex care teams serving individuals with complex needs; and 4) collaboration with community partners improves care continuity and promotes stability outside the hospital-a promising approach to cost-effective population health management.

30. McLaughlin, N., et al. (2014). "Value-based neurosurgery: the example of microvascular decompression surgery." *J Neurosurg* **120**(2): 462-472.

OBJECT: Value of care is emerging as a promising framework to restructure health care, emphasizing the importance of reporting multiple outcomes that encompass the entire care episode instead of isolated outcomes specific to care points during a patient's care. The authors assessed the impact of coordinated implementation of processes across the episode of surgical care on value of neurosurgical care, using microvascular decompression (MVD) as an example. METHODS: This study is a retrospective review of consecutive cases involving patients with either trigeminal neuralgia or hemifacial spasm undergoing first-time MVD. Patients were divided into 2 groups: Group 1 included patients who underwent surgery between February 2008 and November 2009 and Group 2 included those who underwent surgery between January 2011 and October 2012. The authors collected data on outcome measures spanning the entire surgical episode of care according to the Outcome Measures Hierarchy. RESULTS: Forty-nine patients were included: 20 patients in Group 1 and 29 patients in Group 2. Thirty-one patients underwent MVD for trigeminal neuralgia and 18 for hemifacial spasm. A zero mortality rate and high degree of symptom resolution were

achieved in both groups. Group 2 benefited from a reduction in the average total operating room time, a decrease in the mean and median postoperative length of hospital stay, a decrease in the mean length of stay on the floor, and a reduction in the rates of complications and readmissions. CONCLUSIONS: Comprehensive implementation of improvement processes throughout the continuum of care resulted in improved global outcome and greater value of delivered care. Enhanced-recovery perioperative protocols and diagnosis-specific clinical pathways are two avenues built around global care delivery that can help achieve an "optimal episode of surgical care" in every case.

31. Mostashari, F., et al. (2017). "Finding the Bright Spots in Value-Based Care." *Fam Pract Manag* **24**(5): 21-27.
32. Mueller, K., et al. (2017). "Advancing Value-Based Medicine: Why Integrating Functional Outcomes With Clinical Measures Is Critical to Our Health Care Future." *J Occup Environ Med* **59**(4): e57-e62.
33. Nilsson, K., et al. (2017). "Experiences from implementing value-based healthcare at a Swedish University Hospital - an longitudinal interview study." *BMC Health Serv Res* **17**(1): 169.

BACKGROUND: Implementing the value-based healthcare concept (VBHC) is a growing management trend in Swedish healthcare organizations. The aim of this study is to explore how representatives of four pilot project teams experienced implementing VBHC in a large Swedish University Hospital over a period of 2 years. The project teams started their work in October 2013. **METHODS:** An explorative and qualitative design was used, with interviews as the data collection method. All the participants in the four pilot project teams were individually interviewed three times, with interviews starting in March 2014 and ending in November 2015. All the interviews were transcribed and analyzed using qualitative analysis. **RESULTS:** Value for the patients was experienced as the fundamental drive for implementing VBHC. However, multiple understandings of what value for patients' means existed in parallel. The teams received guidance from consultants during the first 3 months. There were pros and cons to the consultant's guidance. This period included intensive work identifying outcome measurements based on patients' and professionals' perspectives, with less interest devoted to measuring costs. The implementation process, which both gave and took energy, developed over time and included interventions. In due course it provided insights to the teams about the complexity of healthcare. The necessity of coordination, cooperation and working together inter-departmentally was critical. **CONCLUSIONS:** Healthcare organizations implementing VBHC will benefit from emphasizing value for patients, in line with the intrinsic drive in healthcare, as well as managing the process of implementation on the basis of understanding the complexities of healthcare. Paying attention to the patients' voice is a most important concern and is also a key towards increased engagement from physicians and care providers for improvement work.
34. Nilsson, K., et al. (2017). "Value-based healthcare as a trigger for improvement initiatives." *Leadersh Health Serv (Bradf Engl)*.

Purpose This study explores four pilot teams' experiences of improvements resulting from the implementation of value-based healthcare (VBHC) at a Swedish University Hospital. The aim of this study is to gain a deeper understanding of VBHC when used as a management strategy to improve patients' health outcomes. **Design/methodology/approach** An exploratory design was used and qualitative interviews were undertaken with 20 team members three times each, during a period of two years. The content of the interviews was qualitatively analysed. **Findings** VBHC worked as a trigger for initiating improvements related to processes, measurements and patients' health outcomes. An example of improvements related to patients' health outcomes was solving the problem of patients' nausea. Improvement related to processes was developing care planning and increasing the number of contact nurses. Improvement related to measurements was increasing coverage ratio in the National Quality Registers used, and the development of a new coding system for measurements. VBHC contributed a structure for measurement and for identification of the need for improvements, but this structure on its own was not enough. To implement and sustain improvements, it is important to establish awareness of the need for improvements and to motivate changes not just among managers and clinical leaders directly involved in VBHC projects but also engage all other staff providing care. **Originality/value** This study shows that although the VBHC management strategy may serve as an initiator for improvements, it is not enough for the sustainable

implementation of improvement initiatives. Regardless of strategy, managers and clinical leaders need to develop increased competence in change management.

35. Parra, E., et al. (2017). "Assessing value-based health care delivery for haemodialysis." *J Eval Clin Pract* **23**(3): 477-485.

RATIONALE, AIMS AND OBJECTIVES: Disparities in haemodialysis outcomes among centres have been well-documented. Besides, attempts to assess haemodialysis results have been based on non-comprehensive methodologies. This study aimed to develop a comprehensive methodology for assessing haemodialysis centres, based on the value of health care. The value of health care is defined as the patient benefit from a specific medical intervention per monetary unit invested (Value = Patient Benefit/Cost). This study assessed the value of health care and ranked different haemodialysis centres. **METHOD:** A nephrology quality management group identified the criteria for the assessment. An expert group composed of stakeholders (patients, clinicians and managers) agreed on the weighting of each variable, considering values and preferences. Multi-criteria methodology was used to analyse the data. Four criteria and their weights were identified: evidence-based clinical performance measures = 43 points; yearly mortality = 27 points; patient satisfaction = 13 points; and health-related quality of life = 17 points (100-point scale). Evidence-based clinical performance measures included five sub-criteria, with respective weights, including: dialysis adequacy; haemoglobin concentration; mineral and bone disorders; type of vascular access; and hospitalization rate. The patient benefit was determined from co-morbidity-adjusted results and corresponding weights. The cost of each centre was calculated as the average amount expended per patient per year. **RESULTS:** The study was conducted in five centres (1-5). After adjusting for co-morbidity, value of health care was calculated, and the centres were ranked. A multi-way sensitivity analysis that considered different weights (10-60% changes) and costs (changes of 10% in direct and 30% in allocated costs) showed that the methodology was robust. The rankings: 4-5-3-2-1 and 4-3-5-2-1 were observed in 62.21% and 21.55%, respectively, of simulations, when weights were varied by 60%. **CONCLUSIONS:** Value assessments may integrate divergent stakeholder perceptions, create a context for improvement and aid in policy-making decisions.

36. Patti, J. C., et al. (2017). "Value-based assessment of robotic pancreas and liver surgery." *Hepatobiliary Surg Nutr* **6**(4): 246-257.

Current healthcare economic evaluations are based only on the perspective of a single stakeholder to the healthcare delivery process. A true value-based decision incorporates all of the outcomes that could be impacted by a single episode of surgical care. We define the value proposition for robotic surgery using a stakeholder model incorporating the interests of all groups participating in the provision of healthcare services: patients, surgeons, hospitals and payers. One of the developing and expanding fields that could benefit the most from a complete value-based analysis is robotic hepatopancreaticobiliary (HPB) surgery. While initial robot purchasing costs are high, the benefits over laparoscopic surgery are considerable. Performing a literature search we found a total of 18 economic evaluations for robotic HPB surgery. We found a lack of evaluations that were carried out from a perspective that incorporates all of the impacts of a single episode of surgical care and that included a comprehensive hospital cost assessment. For distal pancreatectomies, the two most thorough examinations came to conflicting results regarding total cost savings compared to laparoscopic approaches. The most thorough pancreaticoduodenectomy evaluation found non-significant savings for total hospital costs. Robotic hepatectomies showed no cost savings over laparoscopic and only modest savings over open techniques. Lastly, robotic cholecystectomies were found to be more expensive than the gold-standard laparoscopic approach. Existing cost accounting data associated with robotic HPB surgery is incomplete and unlikely to reflect the state of this field in the future. Current data combines the learning curves for new surgical procedures being undertaken by HPB surgeons with costs derived from a market dominated by a single supplier of robotic instruments. As a result, the value proposition for stakeholders in this process cannot be defined. In order to solve this problem, future studies must incorporate (I) quality of life, survival, and return to independent function alongside data such as (II) intent-to-treat analysis of minimally-invasive surgery accounting for conversions to open, (III) surgeon and institution experience and operative time as surrogates for the learning curve; and (IV) amortization and maintenance costs as well as direct costs of disposables and instruments.

37. Peaslee, A., et al. (2016). "Impact of a Combined Value-Based Insurance Design and Medication Therapy Management Program on Diabetes Medication Adherence." *J Manag Care Spec Pharm* **22**(11): 1303-1309.

BACKGROUND: Value-based insurance design (VBID) waives or reduces prescription copayments in order to decrease member cost barriers to refilling medications. Medication therapy management (MTM) is a member clinical intervention designed to reinforce members' knowledge of their medications, which addresses barriers to medication adherence. Both methods have been shown to increase adherence in members, particularly when used in combination. To date, studies of such combined programs have often been completed within integrated health systems but have rarely included control populations. **OBJECTIVE:** To determine the effect of a combined VBID and MTM program on key medication adherence metrics among diabetic members of a large employer group in the Midwest. **METHODS:** A retrospective pre/post longitudinal analysis of pharmacy claims data was performed for 77 participants in a combined VBID/MTM program and 77 eligible nonparticipants, matched by the baseline adherence metrics of proportion of days covered (PDC) and number of days without therapy, also known as gaps in therapy (GIT). Oral antidiabetic medication adherence and cost-related outcomes for all pharmacy claims were evaluated within and between groups over a 6-month period. Post hoc analyses were performed to investigate the effect of the intervention by gender and among a less adherent subpopulation of participants with a PDC of < 100% at baseline. **RESULTS:** Introduction of the intervention resulted in a nonsignificant increase in PDC from 92.9% to 95.4%, in contrast to a nonsignificant decrease from 92.8% to 91.7% in the comparison group. GIT underwent a nonsignificant decrease of 2.83 days during intervention, while nonsignificantly increasing 2.82 days in the comparators. Pharmacy claims costs paid by the plan per member per 6-month period significantly increased in the intervention group from \$1,991.23 to \$3,092.74, compared with a nonsignificant increase from \$1,402.21 to \$1,645.68 in the comparison group. Among the less-adherent subpopulation, PDC increased significantly after intervention from 84.7% to 93.1% compared with a nonsignificant increase from 84.6% to 89.0% among nonparticipants. A significant 10.69-day decrease in GIT was also observed among nonadherent participants compared with a nonsignificant 3.59-day decrease among nonparticipants. Female participants experienced a significant PDC increase from 91.5% to 96.8% and a GIT decrease of 7.32 days, while male participants did not change significantly. **CONCLUSIONS:** While statistically significant improvements to adherence were not observed among this population of members who were highly adherent at baseline, improvement trends and subgroup analyses demonstrated that the combined VBID/MTM program may have the potential to influence member behavior in employer groups. Larger, longer-term studies are needed to confirm this potential. Additional benefit may be realized by targeting members with lower adherence metrics at baseline and examining potential cost savings associated with medical outcomes. **DISCLOSURES:** Funding for this project was provided by Navitus Health Solutions. Peaslee, Wickizer, and Olson are employed by Navitus Health Solutions. Peaslee is a clinical staff pharmacist working in Formulary Services and a former PGY-1 Managed Care Clinical Pharmacy Resident at this location. Wickizer is the Associate Manager of Clinical Programs and Residency Programs. Olson is the Director of Clinical Programs and Product Development. Topp is the Patricia A. Chin Nursing Research Endowed Professor at the Hahn School of Nursing and Health Science at the University of San Diego specializing in statistics. Topp received consulting fees from Navitus Health Solutions for work on this project. Study concept and design were contributed by Peaslee, Wickizer, and Olson, with assistance from Topp. Peaslee took the lead in data collection, with assistance from Wickizer, and data interpretation was performed by Peaslee, Topp, Wickizer, and Olson. The manuscript was written primarily by Peaslee, with assistance from the other authors, and revised by Topp, Wickizer, and Olson, assisted by Peaslee.

38. Peele, P., et al. (2017). "Advancing Value-Based Population Health Management Through Payer-Provider Partnerships: Improving Outcomes for Children With Complex Conditions." *J Healthc Qual*.

Population health management (PHM) approaches to improve cost and quality remain limited. To address this gap, stakeholders within an integrated delivery and financing system in Western Pennsylvania designed, implemented, and tested a value-based care model for children with medically complex conditions that could be scaled across the broader pediatric population. The model included: (1) a multilevel, interdisciplinary infrastructure; (2) actionable analytics reports to guide continuous quality improvement; (3) alternative provider payments; (4) consumer-directed spending accounts; and (5) shared savings with practices. Four practices caring for 215 children (<age 21) with medically complex conditions participated in the demonstration. Quality and cost outcomes were compared between the intervention group and a

comparison group using propensity scores. The program generated cost savings over a 2-year performance period, although the difference between the intervention and comparison groups was not significant, likely because of the small N. Quality of care was maintained or improved for the intervention group from baseline to the end of the performance period. This model is an example of how real-world laboratories that leverage strong payer-provider partnerships can be a useful platform for testing value-based PHM models with the potential to reduce healthcare costs while maintaining or improving care quality.

39. Reid, K. J., et al. (2015). "Value-Based Benefit Design to Improve Medication Adherence for Employees with Anxiety or Depression." *Am Health Drug Benefits* **8**(5): 263-271.

BACKGROUND: Through reduced out-of-pocket costs and wellness offerings, value-based benefit design (VBBD) is a promising strategy to improve medication adherence and other health-related outcomes across populations. There is limited evidence, however, of the effectiveness of these policy-level changes among individuals with anxiety or depression. **OBJECTIVES:** To assess the impact of a multifaceted VBBD policy that incorporates waived copayments, wellness offerings, and on-site services on medication adherence among plan members with anxiety or depression, and to explore how this intervention and its resulting improved adherence affects other health-related outcomes. **METHODS:** A retrospective longitudinal pre/post design was utilized to measure outcomes before and after the VBBD policy change. Repeated measures statistical regression models with correlated error terms were utilized to evaluate outcomes among employees of a self-insured global health company and their spouses (N = 529) who had anxiety or depression after the VBBD policy change. A multivariable linear regression model was chosen as the best fit to evaluate a change in medication possession ratio (MPR) after comparing parameters for several distributions. The repeated measures multivariable regression models were adjusted for baseline MPR and potential confounders, including continuous age, sex, continuous modified Charlson Comorbidity Index, and the continuous number of prescriptions filled that year. The outcomes were assessed for the 1 year before the policy change (January 1, 2011, through December 31, 2011) and for 2 years after the change (January 1, 2012, through December 31, 2013). The primary outcome was a change in MPR. The secondary outcomes included healthcare utilization, medical or pharmacy costs, the initiation of medication, generic medication use, and employee absenteeism (the total number of sick days). **RESULTS:** The implementation of the VBBD strategy was associated with a significant increase in average MPR (0.65 vs 0.61 in the pre-VBBD period; P = .004), the initiation of new medications for anxiety or depression (31.4% vs 29.5%, respectively; P = .033), and the filling of generic medications for anxiety or depression (85.1% vs 80.5%, respectively; P <.001). A multivariable adjusted analysis revealed a 0.05 increase in MPR after the benefit enhancement (P = .002). Healthcare utilization, costs, and absenteeism were not statistically different before and after the VBBD policy change. **CONCLUSION:** The VBBD strategy was associated with improved medication adherence and cost-conscious medication use. Future analyses should explore whether these trends persist over time, and if they can further impact healthcare utilization, cost, and absenteeism.

40. Rolfson, O., et al. (2016). "Defining an International Standard Set of Outcome Measures for Patients With Hip or Knee Osteoarthritis: Consensus of the International Consortium for Health Outcomes Measurement Hip and Knee Osteoarthritis Working Group." *Arthritis Care Res (Hoboken)* **68**(11): 1631-1639.

OBJECTIVE: To define a minimum Standard Set of outcome measures and case-mix factors for monitoring, comparing, and improving health care for patients with clinically diagnosed hip or knee osteoarthritis (OA), with a focus on defining the outcomes that matter most to patients. **METHODS:** An international working group of patients, arthroplasty register experts, orthopedic surgeons, primary care physicians, rheumatologists, and physiotherapists representing 10 countries was assembled to review existing literature and practices for assessing outcomes of pharmacologic and nonpharmacologic OA therapies, including surgery. A series of 8 teleconferences, incorporating a modified Delphi process, were held to reach consensus. **RESULTS:** The working group reached consensus on a concise set of outcome measures to evaluate patients' joint pain, physical functioning, health-related quality of life, work status, mortality, reoperations, readmissions, and overall satisfaction with treatment result. To support analysis of these outcome measures, pertinent baseline characteristics and risk factor metrics were defined. Annual outcome measurement is recommended for all patients. **CONCLUSION:** We have defined a Standard Set of outcome measures for monitoring the care of people with clinically diagnosed hip or knee OA that is appropriate for use across all treatment and care settings. We believe this Standard Set provides meaningful, comparable,

and easy to interpret measures ready to implement in clinics and/or registries globally. We view this set as an initial step that, when combined with cost data, will facilitate value-based health care improvements in the treatment of hip and knee OA.

41. Ryan, A., et al. (2014). "Does winning a pay-for-performance bonus improve subsequent quality performance? Evidence from the Hospital Quality Incentive Demonstration." *Health Serv Res* **49**(2): 568-587.

OBJECTIVE: To test whether receiving a financial bonus for quality in the Premier Hospital Quality Incentive Demonstration (HQID) stimulated subsequent quality improvement. **DATA:** Hospital-level data on process-of-care quality from Hospital Compare for the treatment of acute myocardial infarction (AMI), heart failure, and pneumonia for 260 hospitals participating in the HQID from 2004 to 2006; receipt of quality bonuses in the first 3 years of HQID from the Premier Inc. website; and hospital characteristics from the 2005 American Hospital Association Annual Survey. **STUDY DESIGN:** Under the HQID, hospitals received a 1 percent bonus on Medicare payments for scoring between the 80th and 90th percentiles on a composite quality measure, and a 2 percent bonus for scoring at the 90th percentile or above. We used a regression discontinuity design to evaluate whether hospitals with quality scores just above these payment thresholds improved more in the subsequent year than hospitals with quality scores just below the thresholds. In alternative specifications, we examined samples of hospitals scoring within 3, 5, and 10 percentage point "bandwidths" of the thresholds. We used a Generalized Linear Model to estimate whether the relationship between quality and lagged quality was discontinuous at the lagged thresholds required for quality bonuses. **PRINCIPAL FINDINGS:** There were no statistically significant associations between receipt of a bonus and subsequent quality performance, with the exception of the 2 percent bonus for AMI in 2006 using the 5 percentage point bandwidth (0.8 percentage point increase, $p < .01$), and the 1 percent bonus for pneumonia in 2005 using all bandwidths (3.7 percentage point increase using the 3 percentage point bandwidth, $p < .05$). **CONCLUSIONS:** We found little evidence that hospitals' receipt of quality bonuses was associated with subsequent improvement in performance. This raises questions about whether winning in pay-for-performance programs, such as Hospital Value-Based Purchasing, will lead to subsequent quality improvement.

42. Ryan, A. M., et al. (2017). "Association Between Hospitals' Engagement in Value-Based Reforms and Readmission Reduction in the Hospital Readmission Reduction Program." *JAMA Intern Med* **177**(6): 862-868.

Importance: Medicare is experimenting with numerous concurrent reforms aimed at improving quality and value for hospitals. It is unclear if these myriad reforms are mutually reinforcing or in conflict with each other. **Objective:** To evaluate whether hospital participation in voluntary value-based reforms was associated with greater improvement under Medicare's Hospital Readmission Reduction Program (HRRP). **Design, Setting, and Participants:** Retrospective, longitudinal study using publicly available national data from Hospital Compare on hospital readmissions for 2837 hospitals from 2008 to 2015. We assessed hospital participation in 3 voluntary value-based reforms: Meaningful Use of Electronic Health Records; the Bundled Payment for Care Initiative episode-based payment program (BPCI); and Medicare's Pioneer and Shared Savings accountable care organization (ACO) programs. We used an interrupted time series design to test whether hospitals' time-varying participation in these value-based reforms was associated with greater improvement in Medicare's HRRP. **Main Outcomes and Measures:** Thirty-day risk standardized readmission rates for acute myocardial infarction (AMI), heart failure, and pneumonia. **Results:** Among the 2837 hospitals in this study, participation in value-based reforms varied considerably over the study period. In 2010, no hospitals were participating in the meaningful use, ACO, or BPCI programs. By 2015, only 56 hospitals were not participating in at least 1 of these programs. Among hospitals that did not participate in any voluntary reforms, the association between the HRRP and 30-day readmission was -0.76 percentage points for AMI (95% CI, -0.93 to -0.60), -1.30 percentage points for heart failure (95% CI, -1.47 to -1.13), and -0.82 percentage points for pneumonia (95% CI, -0.97 to -0.67). Participation in the meaningful use program alone was associated with an additional change in 30-day readmissions of -0.78 percentage points for AMI (95% CI, -0.89 to -0.67), -0.97 percentage points for heart failure (95% CI, -1.08 to -0.86), and -0.56 percentage points for pneumonia (95% CI, -0.65 to -0.47). Participation in ACO programs alone was associated with an additional change in 30-day readmissions of -0.94 percentage points for AMI (95% CI, -1.29 to -0.59), -0.83 percentage points for heart failure (95% CI, -1.26 to -0.41), and -0.59 percentage points for pneumonia (95% CI, -1.00 to -0.18). Participation in multiple reforms led to greater improvement: participation in all 3 programs was associated with an additional change in 30-day readmissions of -1.27 percentage points for

AMI (95% CI, -1.58 to -0.97), -1.64 percentage points for heart failure (95% CI, -2.02 to -1.26), and -1.05 percentage points for pneumonia (95% CI, -1.32 to -0.78). Conclusions and Relevance: Hospital participation in voluntary value-based reforms was associated with greater reductions in readmissions. Our findings lend support for Medicare's multipronged strategy to improve hospital quality and value.

43. Ryan, A. M., et al. (2017). "Changes in Hospital Quality Associated with Hospital Value-Based Purchasing." *N Engl J Med* **376**(24): 2358-2366.

BACKGROUND: Starting in fiscal year 2013, the Hospital Value-Based Purchasing (HVBP) program introduced quality performance-based adjustments of up to 1% to Medicare reimbursements for acute care hospitals. **METHODS:** We evaluated whether quality improved more in acute care hospitals that were exposed to HVBP than in control hospitals (Critical Access Hospitals, which were not exposed to HVBP). The measures of quality were composite measures of clinical process and patient experience (measured in units of standard deviations, with a value of 1 indicating performance that was 1 standard deviation [SD] above the hospital mean) and 30-day risk-standardized mortality among patients who were admitted to the hospital for acute myocardial infarction, heart failure, or pneumonia. The changes in quality measures after the introduction of HVBP were assessed for matched samples of acute care hospitals (the number of hospitals included in the analyses ranged from 1364 for mortality among patients admitted for acute myocardial infarction to 2615 for mortality among patients admitted for pneumonia) and control hospitals (number of hospitals ranged from 31 to 617). Matching was based on preintervention performance with regard to the quality measures. We evaluated performance over the first 4 years of HVBP. **RESULTS:** Improvements in clinical-process and patient-experience measures were not significantly greater among hospitals exposed to HVBP than among control hospitals, with difference-in-differences estimates of 0.079 SD (95% confidence interval [CI], -0.140 to 0.299) for clinical process and -0.092 SD (95% CI, -0.307 to 0.122) for patient experience. HVBP was not associated with significant reductions in mortality among patients who were admitted for acute myocardial infarction (difference-in-differences estimate, -0.282 percentage points [95% CI, -1.715 to 1.152]) or heart failure (-0.212 percentage points [95% CI, -0.532 to 0.108]), but it was associated with a significant reduction in mortality among patients who were admitted for pneumonia (-0.431 percentage points [95% CI, -0.714 to -0.148]). **CONCLUSIONS:** In our study, HVBP was not associated with improvements in measures of clinical process or patient experience and was not associated with significant reductions in two of three mortality measures. (Funded by the National Institute on Aging.).

44. Sheetz, K. H., et al. (2017). "Targeting Value-Driven Quality Improvement for Laparoscopic Cholecystectomy in Michigan." *Ann Surg*.

OBJECTIVE: The purpose of this study was to evaluate complete episode expenditures for laparoscopic cholecystectomy, a common and lower-risk operation, to characterize novel targets for value-based quality improvement. **SUMMARY BACKGROUND DATA:** Despite enthusiasm for improving the overall value of surgical care, most efforts have focused on high-risk inpatient surgery. **METHODS:** We identified 19,213 patients undergoing elective laparoscopic cholecystectomy from 2012 to 2015 using data from Medicare and a large private payer. We calculated price-standardized payments for the entire surgical episode of care and stratified patients by surgeon. We used linear regression to risk- and reliability-adjusted expenditures for patient characteristics, diagnoses, and the use of additional procedures. **RESULTS:** Fully adjusted total episode costs varied 2.4-fold across surgeons (\$7922-\$17,500). After grouping surgeons by adjusted total episode payments, each component of the total episode was more expensive for patients treated by the most expensive versus the least expensive quartile of surgeons. For example, payments for physician services were higher for the most expensive surgeons [\$1932, 95% confidence interval (CI) \$1844-\$2021] compared to least expensive surgeons (\$1592, 95% CI \$1450-\$1701, $P < 0.01$). Overall differences were driven by higher rates of complications (10% vs. 5%) and readmissions (14% vs. 8%), and lower rates of ambulatory procedures (77% vs. 56%) for surgeons with the highest versus lowest expenditures. Projections showed that a 10% increase ambulatory operations would yield \$3.6 million in annual savings for beneficiaries. **CONCLUSIONS:** Episode payments for laparoscopic cholecystectomy vary widely across surgeons. Although improvements in several domains would reduce expenditures, efforts to expand ambulatory surgical practices may result in the largest savings to beneficiaries in Michigan.

45. Sondheim, S. E., et al. (2017). "Governance Practices in an Era of Healthcare Transformation: Achieving a Successful Turnaround." *J Healthc Manag* **62**(5): 316-326.

EXECUTIVE SUMMARY: This article illustrates the successful application of principles established by the American Hospital Association (AHA) to foster hospital transformations (). We examined a small community hospital's successful transition from one emergency care center (ECC) physician group to another and the methods by which significant improvements in outcomes were achieved. The foundation of this transformation included a generative governance style at the board level, a shared governance model at the employee level, a renewed sense of employee and physician engagement, and a sense of individual accountability. Outcomes included improved communication, a more unified vision throughout the ECC (which led to improved efficiency and accountability among staff), improved metrics, and a positive impact on the community's perception of care. Press Ganey scores and ECC operational metrics demonstrated significant increases in patient satisfaction and decreases in wait times for seven operational metrics. These data serve as a proxy for the transformation's success. Structured interviews revealed an increase in employee satisfaction associated with the transition. The positive outcomes demonstrate the importance of the AHA-articulated governance principles. The AHA recommendations for a superior value-based care model closely align with the methods illustrated through Bristol Hospital's successful transformation. Other institutions can apply the lessons from this case study to drive positive change and improve patient care.

46. Stephan, B., et al. (2015). "Value-based Clinical Quality Improvement (CQI) for Patients Undergoing Abdominal Wall Reconstruction." *Surg Technol Int* **26**: 135-142.

Patients with complex ventral/incisional hernias often undergo an abdominal wall reconstruction (AWR). These operations have a high cost of care and often result in a long hospital stay and high complication rates. Using the principles of clinical quality improvement (CQI), several attempts at process improvement were implemented in one hernia program over a 3-year period. For consecutive cases of patients undergoing abdominal wall reconstruction, process improvement attempts included the use of a long-term resorbable synthetic mesh (TIGR(R) Resorbable Matrix, Novus Scientific, Uppsala, Sweden) in place of a biologic mesh, the use of the transversus abdominis release approach in place of an open or endoscopic component separation (external oblique release) technique, and the use of a preoperative transversus abdominis plane (TAP) block using a long-acting local anesthetic (Exparel(R), Pacira Pharmaceutical, Parsippany, NJ) as a part of perioperative multi-modal pain management and an enhanced recovery program. After over 60 cases, improvement in materials costs and postoperative outcomes were documented. No mesh-related complications occurred and no mesh removal was required. In this real-world, value-based application of CQI, several attempts at process improvement led to decreased costs and improved outcomes for patients who underwent abdominal wall reconstruction for complex ventral/incisional hernias. Value-based CQI could be a tool for improved health care value globally.

47. Strazzabosco, M., et al. (2017). "Value-based care in hepatology." *Hepatology* **65**(5): 1749-1755.

The migration from legacy fee-for-service reimbursement to payments linked to high-value health care is accelerating in the United States because of new legislation and redesign of payments from the Centers for Medicare and Medicaid Services. Because patients with chronic diseases account for substantial use of health care resources, payers and health systems are focusing on maximizing the value of care for these patients. Because chronic liver diseases impose a major health burden worldwide affecting the health and lives of many individuals and families as well as substantial costs for individuals and payers, hepatologists must understand how they can improve their practices. Hepatologists practice a high-intensity cognitive subspecialty, using complex and costly procedures and medications. High-value patient care requires multidisciplinary coordination, labor-intensive support for critically ill patients, and effective chronic disease management. Under current fee-for-service reimbursement, patient values, medical success, and financial success can all be misaligned. Many current attempts to link health outcomes to reimbursement are based on compliance with process measures, with less emphasis on outcomes that matter most to patients, thus slowing transformation to higher-value team-based care. Outcome measures that reflect the entire cycle of care are needed to assist both clinicians and administrators in improving the quality and value of care. A comprehensive set of outcome measures for liver diseases is not currently available. Numerous researchers now are attempting to fill this gap by devising and testing outcome indicators and patient-reported outcomes for the major liver conditions. These indicators will provide tools to implement a value-based

approach for patients with chronic liver diseases to compare results and value of care between referral centers, to perform health technology assessment, and to guide decision-making processes for health authorities. This review sets the groundwork for implementing a value-based, patient-centered approach to chronic liver diseases within a health system. (Hepatology 2017;65:1749-1755).

48. Tan, R. Y., et al. (2016). "Using Quality Improvement Methods and Time-Driven Activity-Based Costing to Improve Value-Based Cancer Care Delivery at a Cancer Genetics Clinic." *J Oncol Pract* **12**(3): e320-331.

PURPOSE: To meet increasing demand for cancer genetic testing and improve value-based cancer care delivery, National Cancer Centre Singapore restructured the Cancer Genetics Service in 2014. Care delivery processes were redesigned. We sought to improve access by increasing the clinic capacity of the Cancer Genetics Service by 100% within 1 year without increasing direct personnel costs. **METHODS:** Process mapping and plan-do-study-act (PDSA) cycles were used in a quality improvement project for the Cancer Genetics Service clinic. The impact of interventions was evaluated by tracking the weekly number of patient consultations and access times for appointments between April 2014 and May 2015. The cost impact of implemented process changes was calculated using the time-driven activity-based costing method. **RESULTS:** Our study completed two PDSA cycles. An important outcome was achieved after the first cycle: The inclusion of a genetic counselor increased clinic capacity by 350%. The number of patients seen per week increased from two in April 2014 (range, zero to four patients) to seven in November 2014 (range, four to 10 patients). Our second PDSA cycle showed that manual preappointment reminder calls reduced the variation in the nonattendance rate and contributed to a further increase in patients seen per week to 10 in May 2015 (range, seven to 13 patients). There was a concomitant decrease in costs of the patient care cycle by 18% after both PDSA cycles. **CONCLUSION:** This study shows how quality improvement methods can be combined with time-driven activity-based costing to increase value. In this paper, we demonstrate how we improved access while reducing costs of care delivery.

49. Tang, K. L., et al. (2014). "A systematic review of value-based insurance design in chronic diseases." *Am J Manag Care* **20**(6): e229-241.

OBJECTIVES: Value-based insurance design (V-BID) is an insurance cost-sharing model in which patients pay less for medications deemed to be of higher value. Our objective was to determine the association between V-BID and medication adherence, clinical outcomes, healthcare utilization, and spending in patients with or at risk for cardiovascular chronic diseases, compared with no differential lowering of drug co-payments. **STUDY DESIGN:** Systematic review. **METHODS:** We searched PubMed, MEDLINE, EMBASE, CINAHL, Cochrane Controlled Trials Register, Current Controlled Trials, and reference lists of included studies and relevant reviews up to September 2012. Two reviewers independently identified primary research studies with the following study designs: randomized controlled trial, interrupted time series, and controlled before-after studies. Two reviewers independently extracted data and assessed quality. **RESULTS:** Ten studies were identified: 1 high-quality randomized controlled trial, 1 interrupted time series analysis, and 8 controlled before-and-after studies. Heterogeneity in study populations and interventions, overall low study quality, and lack of standard error reporting precluded meta-analysis. All reported improvement in medication adherence for medications subject to V-BID, of between 2 and 5 percentage points. Impact on clinical outcomes was unclear, with only 1 study reporting on this, noting no difference in the primary outcome, but a reduction in adverse secondary outcomes with V-BID. Of the four studies that examined the impact of V-BID on healthcare expenditures, V-BID tended to increase overall prescription drug spending, though three of the four studies reported similar overall healthcare costs due to decreased non drug medical spending. **CONCLUSIONS:** V-BID is associated with improved medication adherence but its effects on clinical outcomes, healthcare utilization, and spending remain uncertain.

50. Turner, J. S., et al. (2015). "Is There a Relationship Between Value-Based Purchasing and Hospital Profitability? An Exploratory Study of Missouri Hospitals." *Health Serv Res Manag Epidemiol* **2**: 2333392815606096.

Recent US legislation is attempting to transition inpatient Medicare payments to a value-based purchasing (VBP) program. The VBP program is a pay-for-performance (P4P) system that incentivizes hospitals to improve patient satisfaction, health outcomes, and adherence to clinical protocols while simultaneously holding down costs. Our study evaluates (1) the impact of financial performance on the VBP adjustments and (2) whether there is a correlation between the VBP adjustment and the financial performance of Missouri

hospitals that opted into the program. While upward and downward adjustments to the inpatient base rate may be related to hospital financial performance, prior financial performance may also be related to the adjustments. Financial health may allow facilities to invest and position the hospital for favorable future P4P adjustments. The results of our analysis indicate the VBP adjustment to the inpatient base rate is very small (+/-0.18%), clustered around zero, and is not correlated with financial performance. We also find that financial performance and improvement in the years prior to the adjustment are not related to the VBP adjustment or its respective components. This suggests that CMS is avoiding penalizing less profitable facilities, but the adjustment is also so small and tightly clustered around zero that it is failing to provide an adequate incentive to hospitals. The costs of improving patient satisfaction, clinical process adherence, health care outcomes, and efficiency above that of peers coupled with the growing number of metrics being used to calculate the VBP adjustments call into question the financial incentives of the hospital VBP program.

51. Wang, C. J., et al. (2017). "Association of a Bundled-Payment Program With Cost and Outcomes in Full-Cycle Breast Cancer Care." *JAMA Oncol* **3**(3): 327-334.

Importance: Value-driven payment system reform is a potential tool for aligning economic incentives with the improvement of quality and efficiency of health care and containment of cost. Such a payment system has not been researched satisfactorily in full-cycle cancer care. **Objective:** To examine the association of outcomes and medical expenditures with a bundled-payment pay-for-performance program for breast cancer in Taiwan compared with a fee-for-service (FFS) program. **Design, Setting, and Participants:** Data were obtained from the Taiwan Cancer Database, National Health Insurance Claims Data, the National Death Registry, and the bundled-payment enrollment file. Women with newly diagnosed breast cancer and a documented first cancer treatment from January 1, 2004, to December 31, 2008, were selected from the Taiwan Cancer Database and followed up for 5 years, with the last follow-up data available on December 31, 2013. Patients in the bundled-payment program were matched at a ratio of 1:3 with control individuals in an FFS program using a propensity score method. The final sample of 17940 patients included 4485 (25%) in the bundled-payment group and 13455 (75%) in the FFS group. **Main Outcomes and Measures:** Rates of adherence to quality indicators, survival rates, and medical payments (excluding bonuses paid in the bundled-payment group). The Kaplan-Meier method was used to calculate 5-year overall and event-free survival rates by cancer stage, and the Cox proportional hazards regression model was used to examine the effect of the bundled-payment program on overall and event-free survival. Sensitivity analysis for bonus payments in the bundled-payment group was also performed. **Results:** The study population included 17940 women (mean [SD] age, 52.2 [10.3] years). In the bundled-payment group, 1473 of 4215 patients (34.9%) with applicable quality indicators had full (100%) adherence to quality indicators compared with 3438 of 12506 patients (27.5%) with applicable quality indicators in the FFS group ($P < .001$). The 5-year event-free survival rates for patients with stages 0 to III breast cancer were 84.48% for the bundled-payment group and 80.88% for the FFS group ($P < .01$). Although the 5-year medical payments of the bundled-payment group remained stable, the cumulative medical payments for the FFS group steadily increased from \$16000 to \$19230 and exceeded pay-for-performance bundled payments starting in 2008. **Conclusions and Relevance:** In Taiwan, compared with the regular FFS program, bundled payment may lead to better adherence to quality indicators, better outcomes, and more effective cost-control over time.

52. Vetter, T. R., et al. (2017). "Value-based Healthcare: Preoperative Assessment and Global Optimization (PASS-GO): Improving Value in Total Joint Replacement Care." *Clin Orthop Relat Res* **475**(8): 1958-1962.

53. Zhao, M., et al. (2015). "Value-based purchasing, efficiency, and hospital performance." *Health Care Manag (Frederick)* **34**(1): 4-13.

The Medicare hospital value-based purchasing (HVBP) program that links Medicare payments to quality of care became effective in 2013 in the United States. Hospital efficiency will be added to the HVBP in 2015. It is unclear whether hospital efficiency-specific hospital characteristics are associated with HVBP performance scores and the subsequent incentive payments. Using data from the American Hospital Association Annual Survey the Medicare Hospital Compare, this article examines the association of hospital efficiency hospital characteristics with the HVBP performance scores. The results indicate that less efficient hospitals are more likely to have lower patient satisfaction scores and total performance scores compared with more efficient hospitals. Hospital size, ownership, and payer mix also have significant impact on HVBP performance scores.

The findings of this study provide significant policy practice implications. On the one hand, hospitals should consider investing their limited resources into identifying implementing the most cost-effective procedures to improve their patient experience total performance scores. On the other hand, policymakers should consider the unintended negative impact that these new payment incentives will likely have on hospitals that serve a higher proportion of low-income racial ethnic minority populations.