ALTARUM
HEALTHCARE VALUE HUB

RESEARCH BRIEF NO. 24 | FEBRUARY 2018

Non-Financial Provider Incentives: Looking Beyond Provider Payment Reform

The U.S. healthcare system has long required a transformation—from rewarding volume to encouraging the delivery of high-value care. Our current system is plagued with inefficiencies. Unit prices are high, quality is uneven and lack of transparency complicates matters at every turn. Additionally, approximately one third of healthcare spending is wasted on services that could be eliminated without negatively impacting the quality of care that patients receive.[1]

Healthcare consumers, payers, providers and policymakers consistently call for better value, but we have not yet found a "silver bullet" when it comes to consistently delivering high-value care. As frontline providers, physicians play a critical role in these efforts, making them the primary target of strategies to address poor quality and high costs.

SUMMARY

Physicians play a critical role in efforts to deliver better value, making them the primary target of strategies to address poor quality and high costs.

Efforts to modify provider behaviors have emphasized new reimbursement methods, with mixed success. But a growing body of evidence suggests that non-financial incentives may be an equally effective way to incentivize a value-driven approach to care. This brief evaluates the ability of non-financial incentives—such as mission-based incentives, reputational incentives and eliminating informational barriers—to deliver better healthcare value.

For decades, efforts to modify provider behavior have emphasized new methods of reimbursement—with mixed success.[2] Rather, a growing body of evidence suggests that a combination of financial and *non-financial* incentives is key to improving healthcare value.[3,4]

This brief describes various types of non-financial provider incentives and evaluates their ability to deliver better value by increasing the use of high-value services, decreasing the use of low-value services and lowering excess prices.

What are Non-Financial Provider Incentives?

Broadly, non-financial incentives can be categorized into three groups: mission-based incentives, reputational incentives and eliminating informational barriers to the delivery of high-value care.[5]

Mission-Based Incentives

Although many physicians are generously compensated for their services, the intrinsic reward of helping patients in need is often the driving force that motivates them. Mission-based incentives aim to influence physician behavior by tapping into providers' "internal motivation to be a good doctor."[6]

Appeals to physicians' better natures have long existed, yet they have not prevented our healthcare system from evolving into one that is inefficient and promotes low-value care. This may be due, in part, to systemic stressors (such as poor work-life balance, workforce shortages and a lack of resources) that can diminish providers' intrinsic motivation over time. Furthermore, research shows that intrinsic motivation can be overridden by other incentives, such as financial gain and loss.[7] Despite these challenges, evidence suggests that mission-based incentives can be

successfully employed at the organizational level to engage clinicians in the pursuit of better value. The following sections explore two ways in which organizational leaders can inspire this change.

Tapping into Providers' Professional Ethos

It is common for physicians to take a ceremonial oath upon graduation in which they pledge to uphold a number of medical ethical standards. As a result, they often feel a tremendous moral responsibility to act in ways that are consistent with that oath.[8] By using language that resonates with clinicians' guiding principles, organizational leaders can impress the importance of (and better incentivize physicians to participate in) value improvement activities.

For example, while administrators often measure "value" in terms of an organization's ability to improve quality while reducing or maintaining costs, it is important for them to recognize that physicians may define value quite differently. Rather, a physician might view value as a willingness to do everything possible to improve patient outcomes *despite* the cost. At the system level, this mentality may (and frequently does) result in the overuse of services that increase spending yet provide minimal additional patient benefit. Rather than focusing on reducing avoidable costs to the organization, leaders can incentivize change by reframing the issue to emphasize the various types of patient harm that can result from overuse. This framing more closely aligns with physicians' priorities and invokes their professional obligation to "do no harm."[9]

Establishing Shared Purpose

Organizations may also attempt to inspire behavioral change by creating a sense of shared purpose. This strategy seeks to align organizational values with "core principles of the medical profession" to unite leadership and clinicians in the pursuit of common goals.[10]

In a healthcare setting, aligning physician goals with organizational aims can be difficult due to the fact that some physicians are not employees of the organizations in which they provide care. As a result, these physicians may be less susceptible to the traditional punishments and rewards that motivate most employees.[11,12] Furthermore, physician engagement may be lower due to their strong sense of professional autonomy. Many providers' loyalty primarily lies with the patients they serve rather than the organizations in which they work.

Types of Non-Financial Provider Incentives

Mission-Based Incentives	Tapping into providers' professional ethos
	Establishing shared purpose
Repuational Incentives	Internal peer comparisons
	Public reporting
Eliminating Informational Barriers	Comparative-effectiveness and cost-effectiveness research where gaps exist
	"Just-in-time" information: improving clinical decision support and computerized physician order entry design

As discussed above, creating a common language is essential for organizational leaders to effectively engage clinicians in value improvement initiatives. Once this language has been established, leaders should create a statement of shared purpose to guide providers' efforts moving forward. Effective statements articulate a focus on prioritizing patients' needs; acknowledge that current conditions are unacceptable and must change; and express that collective action is required to achieve shared goals.[13]

To increase buy-in, leaders should present objective data linking a proposed initiative to improved efficiency and health outcomes, and provide anecdotes highlighting individual patient experiences. This approach taps into providers' rationality and desire to put patients' needs first, inspiring them to make changes that may initially be uncomfortable.[14] Physician champions can also be tremendously helpful in this process, especially if the champion is a well-respected peer. Characteristics that organizations should look for when recruiting physician champions include: excitement and passion for the proposed improvement initiative; strong interpersonal,

leadership and communication skills; and responsiveness to opposition and feedback.[15]

Ultimately, the ability of organizational leadership to establish a shared purpose can make or break the success of an initiative. Engaging physicians in the pursuit of a common goal increases the likelihood that they will take ownership of the project—helping develop, evaluate and improve the initiative. Oppositely, improvement activities that are not built on shared purpose may be perceived as "manipulative, disrespectful to physicians' professional identity and as statements of power."[16]

Despite its significance within an organization, development of a shared purpose alone is unlikely to sufficiently incentivize the steadfast delivery of high-value care. Rather, the strategy should be viewed as a complement to other, more direct incentives, such as peer comparisons or public reporting.

Reputational Incentives

Like many highly skilled professionals, physicians take pride in their expertise and appreciate positive feedback. Reputational incentives leverage physicians' desire for respect and recognition by distributing performance data both within and outside the organization.

Internal Peer Comparisons

Arguably, the majority of physicians desire the respect and admiration of their colleagues and generally strive to perform at or above the level of their peers. By making a physician's performance data internally transparent, healthcare organizations and insurers aim to change the behavior of "outliers" to more closely align with standards of care.

Peer comparisons come in many forms, including mailed letters, emails and automated dashboards. A strong body of literature supports the notion that peer comparison is an effective strategy to incentivize behavioral change, although the effectiveness varies significantly depending on the manner in which the "peer pressure" is applied. A 2016 study published in *JAMA* found that emails comparing clinicians' prescribing habits to those of "top performers" significantly decreased inappropriate antibiotic prescribing rates, from 20 to 4 percent.[17] In contrast, researchers from MIT and Columbia University recently found that mailed letters comparing "outlier prescribers" to top performers in the Medicare Part D program had a negligible effect on physician prescribing habits.[18,19]

Peer Comparison Example

At Partners Healthcare System, unmasking data to allow physician groups to compare their physicians' use of expensive radiology tests resulted in a 10 to 15 percent reduction in usage, primarily among those identified as over-utilizers. The intervention created significant cost savings without compromising patient safety.[22]

Furthermore, research conducted at the organizational level reveals that aggressive comparisons (in which there is a greater perceived risk of reputational harm) are more effective than passive strategies at incentivizing change.[20] Passive strategies shy away from "shaming" clinicians by making their data internally available, but omitting personal identifiers or declining to rank order the data.[21] These methods hold poor performers less personably accountable than more aggressive approaches, such as unmasking data so that physicians with poor performance can be easily identified (see box above).

Additionally, evidence suggests that peer comparisons using utilization data may be more effective when provided with normative benchmarks (i.e., information on the appropriate amount of care to provide).[23] In fact, failure to provide normative benchmarks may have the opposite of the intended effect. For example, ambiguity over what constitutes desirable behavior could cause low-utilizing physicians to increase their use of unnecessary services in an effort to conform to the practices of their high-utilizing peers.[24]

Public Reporting

Public reporting similarly holds providers accountable for quality and costs by making performance indicators available to external audiences, such as consumers, employers, insurers and other providers. The underlying strategy is to incentivize physicians to deliver better value

in an effort to "protect their reputations and the demand for their services."[25]

Cost Reporting: Public reporting of costs (also known as price transparency) has successfully incentivized some providers to reduce their prices. A 2014 study published in *Health Affairs* analyzing the impact of price transparency on patients' selection of high-value MRI providers observed that approximately 30 providers lowered their prices in order to remain competitive after being publically compared to their peers.[26]

Cost reporting in reference pricing—in which consumers must pay more out-of-pocket to go to providers whose charges exceed a certain benchmark—has also incentivized high-cost providers to lower their prices to remain competitive.[27] In a now famous example where CalPERS established reference prices for hip and knee replacements, the savings from high-cost providers lowering their prices exceed the savings from consumers "voting with their feet."[28] It is important to note, however, that the same price transparency may also incentivize some low-cost providers to increase their prices to meet the established rate.[29]

Quality Reporting: Case studies suggest that, under the right circumstances, public reporting of quality metrics can also provide a meaningful impetus for change. In the early 2000s, an employer-purchasing cooperative based in Madison, Wisconsin released a report containing performance results for local hospitals using information from a statewide database. Studies showed that, compared to Wisconsin hospitals not subject to public reporting, Madison-area hospitals participated in more quality improvement initiatives and "improved more over time."[30,31]

At University of Utah Health Care, posting patient experience data and comments online led to a significant increase in patients' satisfaction with their physician. Before the initiative, only 1 percent of the health system's physicians ranked in the top 1 percent for patient satisfaction nationally. After the intervention, the proportion of physicians ranking in the first percentile increased to over 25 percent.[32,33]

Despite anecdotal evidence of effectiveness, determining the impact of public reporting on quality is difficult for a number of reasons. For one, as of 2015, no randomized controlled trials have been conducted on the subject. Moreover, conclusions from studies comparing provider performance before and after public reporting are weakened by delays between the times performance indicators are announced and when reporting begins. This lag time allows providers to jumpstart improvement activities before baseline performance is actually measured, biasing results. Finally, public reporting initiatives are often implemented in combination with other improvement activities (like financial incentive programs), making it difficult for researchers to determine the effectiveness of the standalone intervention.[34]

It is important to note that the effectiveness of this strategy may be severely limited depending on the environment in which it is applied. For example, public reporting is largely ineffective when applied to non-shoppable services (such as emergency care) for which consumers do not have the time nor the resources necessary to make an informed decision. Additionally, observations that few consumers use this information to shop for services (even when it is available) may diminish public reporting's impact on providers' behavior.

Furthermore, public reporting has been associated with a number of unintended consequences. Perhaps most notably, critics argue that publically reporting quality metrics like mortality rates unfairly penalizes providers that take on sicker patients and/or perform high-risk interventions.[35] This is because most consumers interpret higher mortality rates as a sign of low quality, not realizing that the measure may not adequately represent a provider's ability to provide high-quality care if the provider treats a high volume of patients with low chances of survival. Additionally, mortality rates may be artificially inflated for providers that perform procedures on a small number of patients, versus those with high caseloads. Thus, fear of reputational harm may cause some providers to take on fewer high-risk patients.[36,37] Inadvertently incentivizing physicians to solely focus on providing high quality care in areas that are publicly reported (at the risk of neglecting other aspects of care) and encouraging them to "treat to the measure" are also causes for concern.[38,39]

Eliminating Informational Barriers to the Use of High-Value Care

Even with reputational and mission-based incentives, clinicians cannot alter their practice patterns to deliver better value without a basic understanding of evidence-based guidelines, quality and costs. The Institute of Medicine (IOM) estimates that approximately 50 percent of U.S. healthcare services are delivered without clear evidence of effectiveness.[40] Stated plainly, nearly half of all clinical decisions are based on judgement, with costs and patient outcomes varying widely as a result. Increasing funding for comparative-effectiveness and cost-effectiveness research will be critical to addressing the evidence gap identified by the IOM.[41]

When evidence-based standards of care *do* exist, efforts to make the information widely available will help providers improve quality and avoid unnecessary spending. These include making evidence-based clinical guidelines and cost information readily accessible at the point of care.

It is important to note that increasing provider awareness of costs and best practices is unlikely to motivate behavioral change when implemented in isolation. However, in combination with other financial and non-financial incentives, these indirect incentives can successfully promote the "high-quality, cost-conscious use of…resources."[42]

Clinical Decision Support

Embedding clinical decision support (CDS) into electronic medical records systems (EMRs) is a common way to facilitate the use of best practices at the point of care. Ideally, CDS aids physician decision-making by providing patient-specific, timely information in the form of alerts, reminders and condition-specific order sets, among other supports.[43,44]

CDS has been shown to improve adherence to evidence-based guidelines, particularly with preventive care and prescription drugs. Specifically, studies have found that CDS increased use of preventive care, improved accuracy of provider medication selection and decreased the likelihood that a patient would have an adverse reaction to a drug.[45,46] Successful adoption of preventive care and drug prescribing CDS has been attributed to the fact that these systems require minimal data input during the physician-patient interaction. This allows for useful recommendations to be generated instantaneously at the point of care, causing minimal disruption to the physician's workflow.

Diagnostic CDS—which assists in the determination of patients' diagnoses—has had comparatively less of an impact on provider decision-making, largely stemming from the increased complexity of electronically generating a diagnosis compared to a simple alert or reminder.[47] Unlike preventive care and prescription drug CDS, diagnostic CDS requires substantial amounts of patient information to generate a meaningful result. Information that is not electronically available (for example, through an EMR) must be manually entered into the system, increasing physicians' workload and slowing the pace of a patient encounter. The added burden may cause some physicians to abandon the system and revert to their traditional mode of practice, defeating the purpose of electronic decision support. Integrating CDS into an EMR can be an efficient way to ensure that the necessary electronic patient information is readily available at the point of care, increasing busy physicians' ability to incorporate the technology into their daily workflows.[48,49]

Other reasons for the comparatively low adoption of diagnostic CDS include decreased accuracy of diagnoses caused by incomplete data entry; delay between the time recommendations are generated and when a physician needs them; and low-specificity of advice. Addressing these problems is vital to successfully incentivizing providers to use CDS in the pursuit of higher-value care.[50]

Computerized Physician Order Entry

Computerized physician order entry (CPOE) systems can also be integrated into EMRs to allow physicians to order medications, tests, procedures and consultations electronically.[51] Systematic reviews have shown that, when implemented successfully, CPOE improves quality by decreasing prescribing errors among clinicians.[52]

The Meaningful Use program encouraged providers to adopt CPOE by offering financial incentives to those who used CPOE between 30 and 80 percent of the time for eligible patients.[53,54] As a result, the majority of hospitals

Recommendations for Effective Computerized Physician Order Entry Design

Display prices compared to alternatives: The authors of a study published in the *Journal of General Internal Medicine* recommend that CPOE systems be designed to graphically display the price of an intervention as a multiple of a less expensive but equally effective option. Presenting pricing information in this manner would allow providers to instantly compare the chosen treatment with reasonable alternatives, with minimal workflow disruption. Additionally, assigning "grades" to each alternative based on cost-effectiveness data can help providers quickly and easily determine the most prudent course of action. In situations where a grading system for a certain diagnostic test has not yet been developed, organizations can empower physicians to provide high-value care by depicting comparative sensitivity, specificity and cost information graphically, in addition to major contraindications for the various alternatives. This will similarly provide physicians with "evidence-based information in a manner that is meaningful and relevant to the decision at hand."

Using alerts: CPOE systems could also be programmed to alert physicians when they are attempting to choose a treatment option for which there is a more cost-effective alternative. These alerts should clearly present the cost and quality trade-offs, encouraging physicians to choose the option that delivers better value. While this strategy could increase the likelihood that physicians will choose the lower-cost alternative, organizations should be aware that a high volume of or poorly designed alerts could cause alert fatigue, frustrating physicians and ultimately causing them to ignore the notifications.

Changing defaults: Changing CPOE defaults to automatically suggest the lower priced, equally effective intervention may also increase the likelihood that an ordering physician will select the highest value mode of treatment. For example, rather than requiring physicians to manually enter the name of the medication they wish to prescribe, systems could be pre-set to suggest generic (as opposed to brand-name) versions of the drug, which delivers identical results at a lower cost. Physicians could "opt out" of using the defaults in situations they deem appropriate—preserving clinicians' right to decide what is best for their patients, while also incentivizing the responsible stewardship of resources.

Source: Patel, Mitesh S., and Kevin G. Volpp, "Leveraging Insights from Behavioral Economics to Increase the Value of Health-Care Service Provision," *Journal of General Internal Medicine*, Vol. 27, No. 11 (November 2012).

and outpatient providers use some type of CPOE today. As with CDS, CPOE systems vary and some are more user-friendly than others.

Poorly designed systems can add to physicians' workloads, leading to the use of workarounds or abandonment of the system altogether. Thus, designing CPOE systems to be simple to use and integrate smoothly into clinical workflows is vital to encouraging uptake among physicians.[55,56]

CPOE systems can contribute to efforts to improve healthcare value by providing pricing information to encourage providers to make value-driven decisions at the point of care. For example, when ordering a prescription or service, most providers must manually enter the name of the medication or test they wish to order, the prices of which are likely unknown. Designing CPOE interfaces to display the price of a medication or test next to the providers' selection would help them compare the costs of various treatment alternatives, possibly leading to the selection of a cheaper but equally effective course of action. Studies have shown, however, that increasing the availability of pricing information alone may not be sufficient to change providers' ordering habits.[57,58] Rather, some researchers posit that it is the manner in which the information is presented that determines the level of impact (see box above).

Spotlight on Financial Incentives

Health system transformation activities at the state and federal levels have primarily relied on financial incentives to alter provider behavior, including pay-for-performance, capitation and bundled payments. Generally, these incentives aim to advance policy goals (e.g., improve quality or reduce wasteful spending) by aligning them with providers' self-interest. The underlying rationale is that paying physicians based on their ability to meet specific quality or efficiency measures will incentivize them to do it more frequently.[59]

Research suggests that, while financial incentives are important and do lead to some improvements in care delivery, they alone are not moving the market toward achieving higher value care. Studies show that financial incentives work best for narrow, routine tasks, but become less effective as the task's complexity increases. In fact, tangible rewards may actually decrease motivation to complete a desired task in situations that are highly complex or require creativity.[60] The goal of improving healthcare value is inherently complex, made more so by a lack of agreement on what high-value care is and how to measure it. It also requires significant creativity on the part of providers to "hunt for waste, resolve safety issues and sustain improvement."[61]

Another barrier to success has been an inability to align payers to reward performance based on a core set of quality metrics. Because many providers receive payments from multiple sources, incentive programs tying physicians' reimbursement to different measures can send conflicting messages, making it difficult for providers to meaningfully invest in improvement activities.[62] Thus it behooves us to look beyond the use of financial incentives alone in our efforts to transform healthcare delivery.

Combining Financial and Non-Financial Incentives

Ultimately, the greatest behavioral change will likely result from an informed combination of financial and non-financial incentives. Blue Cross Blue Shield of Massachusetts has had some success with its Alternative Quality Contract (AQC), which combines these incentives in attempt to improve quality and limit spending growth.

The AQC holds participating provider groups financially accountable for quality and costs by paying them through global budgets, rather than the traditional fee-for-service. Global budgets provide a one-time, fixed payment for the continuum of care over a specified period of time, exposing providers to both upside and downside risk. Additionally, the program offers bonuses for positive performance on quality, outcomes and patient experience metrics. These awards are distributed at the organizational level, preserving autonomy by allowing provider groups to determine how rewards will be allocated amongst individual clinicians. Importantly, bonuses are based on absolute (as opposed to relative) performance, allowing all organizations demonstrating superior performance to be recognized.

Non-financial incentives are delivered through the AQC Support Program, which provides a number of resources designed to help participating organizations succeed. For example, Practice Pattern Variation Analyses aim to reduce informational barriers by highlighting differences in physicians' treatment of similar clinical conditions. These reports help provider groups recognize opportunities to employ best practices, supporting the use of high-value care. Other data and analytics reports offer a comprehensive overview of patients' medical care to help participants identify areas for improvement and to measure progress. The reports also include peer comparisons to further inspire high performance.[63]

An evaluation conducted four years into the program revealed that the AQC's unique combination of financial and non-financial incentives reduced costs, improved quality and slowed spending growth among participating organizations.[64] Moreover, evidence suggests that provider

groups generally support the program, with many altering traditional modes of practice to improve performance. Examples of changes include adopting new staffing models to facilitate team-based care; hiring professionals to address behavioral and social needs; embracing new forms of health information technology; and developing and/or strengthening relationships with other provider groups. Participants also reported seeking partnerships with like-minded organizations and, in some cases, distanced themselves from partners that are less focused on improving quality and controlling costs.[65]

Conclusion

Although many strategies to improve healthcare value rely on financial incentives, it has become increasingly clear that financial incentives alone will not achieve our goal of getting to better healthcare value. Like all humans, physicians are complex, and their behaviors are motivated by factors beyond financial self-interest. Therefore, diversifying incentive programs to incorporate non-financial incentives can be incredibly effective in encouraging the provision of high-value care.

Conversations about achieving healthcare value are compromised by a lack of consensus over what healthcare value is and how to measure it. As noted above, best practices do not exist for every condition, challenging even the most well-intentioned providers to consistently deliver the highest quality care. Additionally, cost-effectiveness studies do not exist for every treatment, forcing physicians to make personal judgements about which therapies offer the greater value. Increasing the availability of these studies and providing forums for physicians to regularly discuss new evidence and research are important prerequisites to delivering higher value care.[66]

Ultimately, the greatest behavioral change will likely result from an informed combination of financial and non-financial incentives. Furthermore, the appropriate suite of incentives will vary depending on the care setting in which it is applied.[67] For example, physicians' reactions to incentives differ according to the types of organizations and cultures in which they work, how they are paid, their areas of professional focus and individual personality traits. Understanding and accounting for these differences is difficult, but essential for successfully incentivizing change.

Notes

1. Lallemand, Nicole Cafarella, "Health Policy Brief: Reducing Waste in Health Care," *Health Affairs* (Dec. 13, 2012).
2. Damberg, Cheryl L., et al., *Measuring Success in Health Care Value-Based Purchasing Programs: Findings from an Environmental Scan, Literature Review, and Expert Panel Discussions*, RAND Corporation, Santa Monica, Calif. (2014).
3. Navathe, Amol S., et al., *Into Practice: How Advocate Health System Uses Behavioral Economics to Motivate Physicians in Its Incentive Program*, The Commonwealth Fund (Aug. 3, 2016).
4. Khullar, Dhruv, and Dana G. Safran, "Using Behavioral Economics in Provider Payment to Motivate Improved Quality, Outcomes & Cost: The Alternative Quality Contract," *Healthcare*, Vol. 5, No. 1-2 (March 2017).
5. Bishop, Tara F., et al., "Academic Physicians' Views on Low-Value Services and the Choosing Wisely Campaign: A Qualitative Study," *Healthcare*, Vol. 5, No. 1-2 (March 2017).
6. Ibid.
7. de Brantes, François, and Stacey Eccleston, *Improving Incentives to Free Motivation*, Altarum, Ann Arbor, Mich. (Aug. 7, 2013).
8. Berenson, Robert A., and Thomas Rice, "Beyond Measurement and Reward: Methods of Motivating Quality Improvement and Accountability," *Health Services Research*, Vol. 50, No. 2 (December 2015).
9. Parchman, Michael L., et al., "Taking Action on Overuse: Creating the Culture for Change," *Healthcare*, Vol. 5, No. 4 (December 2017).
10. Biller-Andorno, Nikola, and Thomas H. Lee, "Ethical Physician Incentives—From Carrots and Sticks to Shared Purpose," *New England Journal of Medicine*, Vol. 368, No. 11 (March 14, 2013).
11. Lee, Thomas H., and Toby Cosgrove, "Engaging Doctors in the Health Care Revolution," *Harvard Business Review* (June 2014).
12. Navathe, Amol S., et al., "New Strategies for Aligning Physicians with Health System Incentives," *American Journal of Managed Care*, Vol. 22, No. 9 (September 2016).
13. Lee and Cosgrove (June 2014).
14. Ibid.

15. Joshi, Maulik, et al., *Leading Health Care Transformation: A Primer for Clinical Leaders*, CRC Press (2016).
16. Biller-Andorno and Lee (March 14, 2013).
17. Meeker, Daniella, et al., "Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices: A Randomized Clinical Trial," *JAMA*, Vol. 315, No. 6 (Feb. 9, 2016).
18. Sacarny, Adam, et al., "Medicare Letters to Curb Overprescribing of Controlled Substances Had No Detectable Effect on Providers," *Health Affairs*, Vol. 35, No. 3 (March 2016).
19. The findings from this evaluation contradict numerous studies demonstrating a positive impact of "similar informative letters," leading researchers to recommend further investigation to determine whether alternative types of letters may be more effective.
20. Song, Hummy, et al., "Closing the Productivity Gap: Improving Worker Productivity through Public Relative Performance Feedback and Validation of Best Practices," *Management Science* (Dec. 24, 2016).
21. Lee, Thomas H., "Financial versus Non-Financial Incentives for Improving Patient Experience," *Journal of Patient Experience*, Vol. 2, No. 1 (May 2015).
22. Lee and Cosgrove (June 2014).
23. Liao, Joshua M., Lee A. Fleisher, and Amol S. Navathe, "Increasing the Value of Social Comparisons of Physician Performance Using Norms," *JAMA*, Vol. 316, No. 11 (Sept. 20, 2016).
24. Ibid.
25. James, Julia, "Public Reporting on Quality and Costs," Health Affairs Policy Brief (March 8, 2012).
26. Wu, Sze-jung, et al., "Price Transparency for MRIs Increased Use of Less Costly Providers and Triggered Provider Competition," *Health Affairs*, Vol. 33, No. 8 (August 2014).
27. Boynton, Ann, and James C. Robinson, "Appropriate Use of Reference Pricing Can Increase Value," *Health Affairs* Blog (July 7, 2015).
28. Robinson, James, and Timothy Brown, *Evaluation of Reference Pricing: Final Report*, letter to David Cowling of CalPERS (May 15, 2013). Available at: https://kaiserhealthnews.files.wordpress.com/2014/05/reference-pricing-california-berkeley.pdf.
29. Robinson, James C., and Timothy T. Brown, "Increases in Consumer Cost Sharing Redirect Patient Volumes and Reduce Hospital Prices for Orthopedic Surgery," *Health Affairs*, Vol. 32, No. 8 (August 2013).
30. Roland, Martin, and R. Adams Dudley, "How Financial and Reputational Incentives Can Be Used to Improve Medical Care," *Health Services Research*, Vol. 50, No. 2 (December 2015).
31. Hibbard, Judith H., Jean Stockard and Martin Tusler, "Does Publicizing Hospital Performance Stimulate Quality Improvement Efforts?" *Health Affairs*, Vol. 22, No. 2 (March/April 2003).
32. Lee (May 2015).
33. Lee and Cosgrove (June 2014).
34. Roland and Dudley (December 2015).
35. Narins, Craig R., Ann M. Dozier, and Frederick S. Ling, "The Influence of Public Reporting of Outcome Data on Medical Decision Making by Physicians," *JAMA*, Vol. 165, No.1 (Jan. 10, 2005).
36. Liao, Fleisher and Navathe (Sept. 20, 2016).
37. James (March 8, 2012).
38. Roland and Dudley (December 2015).
39. Maxwell, Bryan G., et al., "Temporal Changes in Survival after Cardiac Surgery Are Associated with the Thirty-Day Mortality Benchmark," *Health Services Research*, Vol. 49, No. 5 (October 2014).
40. Altarum Healthcare Value Hub, information page on comparative-effectiveness research page, http://www.healthcarevaluehub.org/improving-value/browse-strategy/comparative-effectiveness-research/ (accessed Dec. 11, 2017).
41. de Brantes and Eccleston (Aug. 7, 2013).
42. Emanuel, Ezekiel J., et al., "Using Behavioral Economics to Design Physician Incentives That Deliver High-Value Care," *Annals of Internal Medicine*, Vol. 164, No. 2 (Jan. 19, 2016).
43. HealthIT.gov, Clinical Decision Support (CDS), https://www.healthit.gov/policy-researchers-implementers/clinical-decision-support-cds (accessed Dec. 15, 2017).
44. Jaspers, Monique W.M., et al., "Effects of Clinical Decision-Support Systems on Practitioner Performance and Patient Outcomes: A Synthesis of High-Quality Systematic Review Findings," *Journal of the American Medical Informatics Association*, Vol. 18, No. 3 (May 1, 2011).
45. Bright, Tiffani J., et al., "Effect of Clinical Decision-Support Systems: A Systematic Review," *Annals of Internal Medicine*, Vol. 157, No. 1 (July 3, 2012).
46. Jaspers, et al. (May 1, 2011).
47. Ibid.
48. Ibid.

49. National Academies of Sciences, Engineering & Medicine, *Improving Diagnosis in Health Care*, The National Academies Press (Sept. 22, 2015). http://www.nationalacademies.org/hmd/Reports/2015/Improving-Diagnosis-in-Healthcare.aspx
50. Jaspers, et al. (May 1, 2011).
51. Agency for Healthcare Research and Quality, *Computerized Provider Order Entry*, https://psnet.ahrq.gov/primers/primer/6/computerized-provider-order-entry (accessed Dec. 16, 2017).
52. Nuckols, Teryl K., et al., "The Effectiveness of Computerized Order Entry at Reducing Preventable Adverse Drug Events and Medication Errors in Hospital Settings: A Systematic Review and Meta-Analysis," *Systematic Reviews*, Vol. 3, No. 56 (June 2014).
53. Charles, Krista, et al., "Can Utilizing a Computerized Provider Order Entry (CPOE) System Prevent Hospital Medical Errors and Adverse Drug Events?" *Perspectives in Health Information Management*, Vol. 11 (Fall 2014).
54. Percent of the time providers were required to use CPOE increased with each stage of the program: from 30 percent of the time for eligible patients in Stage 1 to 80 percent of the time for eligible patients by Stage 3.
55. Khajouei, R., and M.W. Jaspers, "CPOE System Design Aspects and Their Qualitative Effect on Usability," *Studies in Health Technology and Informatics*, Vol. 136 (2008).
56. Khajouei, R., and M.W. Jaspers, "The Impact of CPOE Medication Systems' Design Aspects on Usability, Workflow and Medication Orders: A Systematic Review," *Methods of Information in Medicine*, Vol. 49, No. 1 (2010).
57. Chien, Alyna T., et al., "A Randomized Trial of Displaying Paid Price Information on Imaging Study and Procedure Ordering Rates," *Journal of General Internal Medicine*, Vol. 32, No. 4 (April 2017).
58. Sedrak, Mina S., et al., "Effect of a Price Transparency Intervention in the Electronic Health Record on Clinician Ordering of Inpatient Laboratory Tests: The PRICE Randomized Clinical Trial," *JAMA Internal Medicine*, Vol. 177, No. 7 (July 2017).
59. Wynia, Matthew K., "The Risks of Rewards in Health Care: How Pay-for-performance Could Threaten, or Bolster, Medical Professionalism," *Journal of General Internal Medicine*, Vol. 24, No. 7 (July 2009).
60. de Brantes and Eccleston (Aug. 7, 2013).
61. Ibid.
62. Stewart, Diane, *Aligning Physician Incentives: Lessons and Perspectives from California*, Pacific Business Group on Health, San Francisco, Calif. (September 2005).
63. Khullar and Safran (March 2017).
64. Song, Zirui, et al., "Changes in Health Care Spending and Quality 4 Years into Global Payment," *New England Journal of Medicine* (Oct. 30, 2014).
65. Khullar and Safran (March 2017).
66. Bishop et al. (March 2017).
67. Altarum Healthcare Value Hub, *Zones of Healthcare Spending: A Convening Report* (forthcoming).

Amanda Hunt, policy analyst, authored this report. Thanks to Bob Berenson, Urban Institute; Hannah Neprash, University of Minnesota; Richard Kronick, University of California San Diego; and Amita Rastogi, Altarum, for their review.

ALTARUM
HEALTHCARE VALUE HUB

ABOUT THIS SERIES

The Healthcare Value Hub takes a careful look at the evidence and consults with experts in order to clarify for advocates, media and policymakers the important cost drivers and the promising policy solutions. Hub Research Briefs, Easy Explainers, infographics and other products are available at our website.

Contact the Hub: 2000 M Street, NW, Suite 400, Washington, DC 20036
(202) 828-5100 | www.HealthcareValueHub.org | @HealthValueHub

Support provided by the Robert Wood Johnson Foundation