More than 23 million Americans have diabetes, and of these, 5.7 million are undiagnosed. 1 This disease prevalence cost the United States an estimated $174 billion in 2007. 2 As the prevalence rate of chronic diseases such as diabetes continues to escalate, along with soaring healthcare costs and an aging population (Table 1, page 28), payers as well as employers are seeking alternative strategies to control costs, obtain value from their healthcare spending, and improve clinical outcomes.

Many payers are turning to initiatives such as value-based insurance design (VBID) for their members, including those with diabetes, to encourage patient adherence to cost-effective therapies and potentially avoid expensive medical costs in the future. 3 VBID initiatives originated in response to the challenges faced by private and public purchasers of healthcare to control costs, while maximizing health outcomes with available healthcare dollars. 4

VBID is just one of many value-based levers—such as health risk assessments or lifestyle coaching—that have been developed to influence patient behavior and improve clinical outcomes, while attempting to control costs. For optimal impact, multiple levers are typically used together to initiate such changes.

According to A. Mark Fendrick, MD, Co-Director of the Center for Value-Based Insurance Design,
Evidence has shown that overall healthcare costs increase with the prevalence of chronic diseases and their associated costs. Patient lack of adherence to medication therapy increases out-of-pocket expenses based on the clinical benefit value achieved for the money being spent; therefore, the more clinically beneficial the service is for patients, the lower their cost-sharing would be.1

Value-based insurance design initiatives have developed as a strategy that is focused on improving clinical outcomes, while potentially also controlling costs. More than 23 million Americans have diabetes, and of these, 5.7 million are undiagnosed.3

Evidence has shown that overall healthcare costs decrease for patients with diabetes as their adherence to medication therapy increases.4

Using actuarial data and modeling related to services, not only drugs.3,4 Value-based insurance design initiatives have been shown to have high value based on strong evidence through clinically sensitive copayment designs that lower or eliminate patient copayments for strong evidence-based, cost-effective services and increased or high copayments or no coverage for weak evidence-based services. The initial focus of VBID has been on drug therapy copayment designs that lower or eliminate patient copayments for chronic disease drug therapy, although the VBID concept can apply to all medical services, not only drugs.3,4

In general, VBID moves benefit design toward value and price rather than legacy or price, tying copayments at the point of service to the evidence base and the value of specific services for certain groups or certain individuals. VBID strategies may adjust copayment designs for physician, hospital, or ancillary services, as well as for prescription drugs.4

The Figure (page 29) presents a graphic algorithm for evaluating health insurance services or benefits. The placement of services or benefits in a particular quadrant depicted in the Figure is presented for illustration purposes only; health plans are encouraged to create their own quadrant interpretations based on their specific circumstances and their patient populations.4

The Figure is based on modeling of MedStat commercial claims data, National Health and Nutrition Examination Survey population data sets from the Centers for Disease Control and Prevention, and the actuarial group’s internal Health Cost Guidelines, which are used to determine health claim costs and premium rates for various health plans.4

Key concepts targeted by VBID initiatives include:

- High-value services without differentiating among individuals who receive the intervention
- Patients with certain clinical diagnoses
- Providers who meet quality outcome criteria
- Patients’ medication adherence behavior

The present article analyzes data collected by Milliman, a large actuarial group, using MedStat claims, National Health and Nutrition Examination Surveys, and its own 2008 health cost guidelines to develop an

Table 1: Drivers of Change in Healthcare in the United States

<table>
<thead>
<tr>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 85% of healthcare spending is for patients with chronic disease.4</td>
</tr>
<tr>
<td>• &gt;$2.5 trillion ($8160/resident) was spent on healthcare in 2009.6</td>
</tr>
<tr>
<td>• Healthcare expenditures were &gt;16% of the gross domestic product in 2007.6</td>
</tr>
</tbody>
</table>

**Chronic diseases**

- 45% of all Americans have 1 or more chronic diseases.d
- 90% of Americans 65 years of age and older have 1 or more chronic diseases.d
- Between 1960 and 2004, diagnosis of childhood chronic diseases nearly quadrupled.d
- Lost productivity costs the United States $1 trillion/yr.4

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1. University of Michigan, a VBID plan adjusts patients’ out-of-pocket expenses based on the clinical benefit value achieved for the money being spent; therefore, the more clinically beneficial the service is for patients, the lower their cost-sharing would be.1

2. VBID directs plan members toward services or benefits that have been shown to have high value based on strong evidence through clinically sensitive copayment structures: reduced or waived copayment for strong evidence-based, cost-effective services and increased or high copayments or no coverage for weak evidence-based services. The initial focus of VBID has been on drug therapy copayment designs that lower or eliminate patient copayments for chronic disease drug therapy, although the VBID concept can apply to all medical services, not only drugs.3,4

3. In general, VBID moves benefit design toward value and price rather than legacy or price, tying copayments at the point of service to the evidence base and the value of specific services for certain groups or certain individuals. VBID strategies may adjust copayment designs for physician, hospital, or ancillary services, as well as for prescription drugs.4


actuarial assessment of VBID programs for diabetes care and therapy. The actuarial group’s findings were compiled into a client report that is the basis for much of the present article. The VBID model provides a framework for assessing the value of benefits provided and directs patients toward cost-effective services supported by strong evidence-based medicine.

Value-Based Levers in Healthcare

Value in healthcare has been defined as the clinical or medical benefit achieved for the money spent, and this is at the very core of a current nationwide trend in healthcare that reflects many stakeholders’ belief that the “value of care” should replace “volume of care” in the way healthcare is being provided and consumed in the United States. This trend comprises many existing and evolving value-based strategies, such as:

- Consumer-driven health plans
- Wellness and prevention programs and benefits
- Health information technology (HIT) to collect, analyze, measure, and disseminate data
- Patient-centered medical home
- Pay-for-performance initiatives
- Employee engagement.

Each of these strategies encompasses a vast array of actionable levers or measures that can be implemented and integrated with one another to influence patient behavior and improve healthcare outcomes. Some examples of these levers include health risk assessments, biometric screening, lifestyle coaching, nurse and employee-assistance program hotlines, onsite health center access, medical home resources, and waived or reduced copayments or coinsurance, as in VBID. In fact, the Center for Health Value Innovation—a panel of healthcare experts, headed by Cyndy Nayer, who are focused on innovation in benefit design—states that there are more than 100 levers available.

In a survey of various-sized US-based companies that have had a value-based design in place for more than 2 years, many levers, including the following strategies, were used successfully by many of the organizations surveyed:

- Disease management programs—implemented by 80% of organizations
- Reduced/waived copay for utilizing the lowest cost appropriate site of care, such as urgent care, convenient care, and onsite services—70%
- Incentives for the use of employee-assistance programs—58%
- Insurance premium incentive for completion of a health risk assessment—40%

The Center for Health Value Innovation has suggested that payers determine the combination of levers that are best suited for their organizations to use them to their advantage. But with so many levers to choose from, this may not be easy to do. Health plans and other payers must first understand the needs and capacities of their members to determine the levers that will be most beneficial. For payers considering VBID, this requires data, technology, and due diligence.

For example, health plans can use HIT to collect and analyze data on their members to help them identify high-value services, target specific patient populations, and understand challenges with medication adherence. Sophisticated data systems are therefore necessary; HIT can be implemented internally or outsourced to a vendor. Although the initial outlay may mean a short-term rise in operational costs, the use of HIT is critical, because “you can’t qualify what you can’t quantify.” Benchmark information must be obtained and data—which are captured on an ongoing basis—must be measured against it to determine if improvements have been achieved.

In addition, health plans may want to review the existing evidence-based research. For example, applying the concepts of VBID within the scope of diabetes care shows that:

- Only 55.7% of patients with diabetes are reaching the American Diabetes Association–recommended goal of hemoglobin (Hb) A1c <7%, even with improvements in glycemic control
- Approximately 35% of patients are nonadherent with antidiabetic therapy

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**Figure** Framework for Evaluating the Value of Benefits

![Framework for Evaluating the Value of Benefits](image-url)
• Doubling patient copayments can result in a 25% decline in the use of antidiabetic drugs.

• A 47.6% reduction in copayments for diabetes medications resulted in a significant 73.3% improvement in medication adherence, and the number of nonadherent patients decreased by 33.4%.

• Healthcare costs decrease as the level of adherence to antidiabetic therapy increases; improving adherence and glycemic control can help to reduce costs, according to a 2005 study.

**VBID and Diabetes Drug Therapy: An Actuarial Assessment**

As with most value-based levers, payers may also consider professional assessments of VBID programs for diabetes care and therapy. One such assessment by the actuarial group models 3 prospective VBID strategies and contrasts their expected impact on adherence, the extent to which a patient’s behavior coincides with medical advice, with that of a standard copayment model (Table 2).

In this model, costs are calculated as dollars per patient per month and per member per month (PMPM).

Per patient per month results are costs spread across patients with type 2 diabetes, whereas PMPM results are costs spread across all health plan members.

Because employers may not be able to measure adherence directly, the actuarial group developed a different approach based on the belief that the nature of prescription changes, and the progressive nature of diabetes indicates that simple approaches to tabulating adherence from utilization data might underestimate adherence.

Using this information, “virtual adherence” was created, defined as a medication possession ratio of ≥80% days annually. This was based on standards that translate available utilization rate into useful information to measure VBID according to the following methodology:

- Distinguishing between patients with type 1 and type 2 diabetes
- Identifying utilization of multiple pharmacies within broad drug categories
- Making assumptions for changing therapies and doses.

These measures are derived from actuarial modeling rather than from treatment arm/control arm studies. Such modeling shows that when copayments are reduced, adherence increases; it does not attempt to model any medical cost offsets that may be achieved with better diabetes therapy adherence. Medical cost offsets are difficult to model, because there is often insufficient knowledge about the impact of incremental improvements in adherence on health status.

This approach to modeling used actuarial assumptions to convert utilization into adherence and was done using several steps:

1. Each diabetes drug claim was classified by linking every claim to plan descriptions, placing each claim into component class by National Drug Code and therapeutic class, and using *International Classification of Diseases, Ninth Revision* codes to determine diabetes type.

2. Elasticity curves were developed by component class and type of diabetes, the total day supply of diabetes prescriptions for patients with full-year membership by component class calculated, as well as the copayment for each component class, and the total day supply of patients in the same copayment averaged to construct 8 sets of data for regression analysis.

3. Elasticity curves for each of the 8 combinations were developed using previously established internal guidelines, which were developed for all drug classes and patients, and then these elasticity curves were used to calculate the aggregate adherence rate and virtual adherence in the copayment structures.

Table 2 shows a consistent increase in adherence for patients with type 2 diabetes when copayments are low-

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**Table 2** Cost and Adherence Impact of 3 Benefit Designs for Patients with Type 2 Diabetes

<table>
<thead>
<tr>
<th>Plan</th>
<th>Standard</th>
<th>VBID1</th>
<th>VBID2</th>
<th>VBID3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copay structure: generic/preferred brand/nonpreferred brand, $</td>
<td>10/25/40</td>
<td>0/12.50/30</td>
<td>0/0/0</td>
<td>10/10/10</td>
</tr>
<tr>
<td>Net of copayment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per patient per month, $</td>
<td>60</td>
<td>79</td>
<td>102</td>
<td>80</td>
</tr>
<tr>
<td>PMPM, $</td>
<td>2.16</td>
<td>2.82</td>
<td>3.65</td>
<td>2.85</td>
</tr>
<tr>
<td>PMPM increment to base, $</td>
<td>NA</td>
<td>0.67</td>
<td>1.49</td>
<td>0.69</td>
</tr>
<tr>
<td>Virtual adherence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients adherent, %</td>
<td>49</td>
<td>60</td>
<td>69</td>
<td>57</td>
</tr>
<tr>
<td>Increment to base, %</td>
<td>0</td>
<td>22</td>
<td>41</td>
<td>16</td>
</tr>
</tbody>
</table>

**NOTE:** Copayments are listed by tier 1/tier 2/tier 3. Model uses data on the actuarial impact of copayments. Virtual population is based on typical employee population. NA indicates not applicable; PMPM, per member per month; VBID, value-based insurance design. Adapted with permission from Reference 4.
er from the standard design of $10/$25/$40 copayment. Although each plan increases cost and virtual adherence, the only benefit design model with a no-copay ($0/$0/$0) structure (VBID2) resulted in the most dramatic increase in virtual adherence. Milliman’s findings show that improving access to diabetes drugs through VBID can lead to better adherence; adherence to diabetes drug therapy is inversely proportional to patient copayments.

Table 3 highlights the different benefit approaches that can be implemented and compares them with analogous management techniques to reduce costs and improve value. Actuarial modeling shows that adjusting copayment designs is in line with other value-based approaches aimed at reducing long-term cost.

Successful Application of VBID within Diabetes Management

Successful Application of VBID within Diabetes Management

The concept of VBID is still evolving, but when it is used in conjunction with other value-based levers, success in the form of improved clinical outcomes and potential cost-savings is achievable. Early adopters of VBID, such as Marriott, Pitney Bowes, and the city of Asheville, NC, have already demonstrated improved patient adherence and clinical outcomes, as well as cost-savings, through the use of reduced or waived copayments, along with disease management, onsite clinics, and patient education and coaching by community pharmacists.

More recently, results from the Diabetes Ten City Challenge have shown a $1079 (7.2%) average annual total healthcare cost reduction per patient (N = 573) participating in this program, which integrated disease management strategies and enrollment, waived copays on medications for people with diabetes, evidence-based diabetes care guidelines, community-based pharmacist coaching, and self-management strategies. In addition, participants’ mean HbA1c levels decreased from 7.5% to 7.1% (P = .002). Many large employers, such as Caterpillar, are achieving successful results with VBID. As many as 50% of enrollees in a diabetes disease management program at Caterpillar experienced an HbA1c reduction from 8.7% to 7.2% during the course of 1 year; 96% of the enrollees are measuring their HbA1c levels. Part of this success has been attributable to incentives, such as zero copayments for drugs for diabetes and its associated comorbidities, as well as a $900 reduction in yearly insurance premiums for employees who complete a health risk assessment and participate in a disease management program.

Health plans are also achieving success in adopting VBID. The Hotel Employees and Restaurant Employees International Union saw its total medical cost trends drop from 14.5% per year at baseline to <4.5% over a 2-year period. One key way in which this was accomplished was by reducing the cost of prescribed medication and improving patient adherence through waived copayments for generics and some brand-name pharmaceuticals. In addition, employees were required to enroll in care management, health education, and pharmacy management programs through a health risk assessment that included biometric screenings.

Using health coaching—which addressed patients’ needs and encouraged their active participation in their health management—and employee engagement that included incentives for no-cost supplies and reduced-cost treatments, as well as rewards such as family trips to resorts, more than 60% of the participants knew their body mass index, blood pressure, blood glucose level, and cholesterol level, and had seen their physician within 3 months of starting the program.

Conclusion

The health plans and employers that are integrating VBID into their overall healthcare benefit designs for diabetes drug therapy to improve chronic diabetes management and reduce long-term healthcare costs related to diabetes are reaping the benefits of their decisions and finding “value—the health dividend they can achieve in terms of workforce performance and bottom-line results from the right investments in healthcare.”

Payers who are considering implementing a VBID

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Comparative Values of Various Options and Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analogous benefit options</strong></td>
<td><strong>Typical incremental cost</strong></td>
</tr>
<tr>
<td>VBID diabetes options in this actuarial report</td>
<td>$0.81-$1.86</td>
</tr>
<tr>
<td>Diabetes disease management (total cost)</td>
<td>$0.50-$1.00</td>
</tr>
<tr>
<td>Wellness (total cost)</td>
<td>$0.40-$14.00</td>
</tr>
<tr>
<td><strong>Analogous management techniques</strong></td>
<td></td>
</tr>
<tr>
<td>Decrease inpatient admissions by 1.7 per 1000 members (typically &lt;4% reduction)</td>
<td>$1.40-$1.50</td>
</tr>
<tr>
<td>Decrease bariatric surgery by 20%</td>
<td>$0.30-$0.70</td>
</tr>
</tbody>
</table>

*Per member per month (PMPM); $0.40 PMPM includes basic promotion; $14.00 PMPM includes full range of services, such as health risk assessment incentives or gym subsidy.

Adapted with permission from Reference 4.

Adapted with permission from Reference 4.
program can benefit from keeping abreast of the outcomes and data of these previous adopters of such benefit designs. In addition, they may benefit from analyzing and selecting other value-based levers that could be integrated with VBID to provide the most optimal healthcare benefits for their members with diabetes.

Although VBID is just one of many levers, it has been shown to produce effective and efficient care delivery, while maximizing clinical outcomes at any level of healthcare expenditure. VBID is a cost-containment and quality-improvement tool that has the potential to play a vital role in healthcare reform.

Acknowledgment
The author wishes to thank Julie Gegner, PhD, for providing editorial support for the manuscript preparation.

Funding Source
Funding for this article was provided by Takeda Pharmaceuticals North America, Inc.

Author Disclosure Statement
Ms Arevalo reported no conflicts of interest related to the contents of this article.

References

Re-Engineering the Healthcare Continuum: Implementing Value-Based Insurance Design to Improve Diabetes Management

Payers/Employers: Over the past decade we have witnessed a dramatic shift back to the center in managed care insurance benefit designs, based on traditional cost-containment methods that provided limitations for specific populations and reduced customer satisfaction for patients and providers. During this same period, the US healthcare system has experienced its greatest challenge ever—how to fix a broken model. Within this process of repairing and re-engineering the healthcare continuum, the term “value” evolved as a key concept to describe what is right or rational in the US healthcare, or at least that from which all stakeholders can derive benefit, as Michael E. Porter, PhD, describes in his recent discussion of value in healthcare.1

Value-based insurance design (VBID) is part of the rebranding and new campaign led by national insurers and recognized employers who are actively engaged in containing healthcare costs, delivering efficient resources, and ultimately satisfying the end-paying consumer of healthcare—employers, government, and patients. This new approach of VBID described in the present article by Jennifer Decker Arevalo is our way of fixing one of the shortsighted methods used over the past few decades of managed care that, in our rush to reduce, maintain, and control the spending on medical resources (especially pharmaceuticals) and utilization management, created an imbalance in care.

VBID signifies our recognition of the importance of removing barriers to healthcare for those in greatest

Acknowledgment
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References
need for care. Analogous to the medical home model of care, VBID offers managed care organizations and employers the ability to offer incentives for the “right behavior,” while reducing the burden of navigating an already twisted path to better health.

Diabetes and obesity—for which the term “diabesity” was recently coined—are the 2 key public health issues facing our nation today. As payers, we must endorse, support, and improve the marketing of VBID. Although we are not the caregivers, we are managing the care of an expensive and expansive population, and it is time that we support and stop blocking the core actors in this transaction—the provider and the patient. Using business principles, we can clearly see the short- and long-term payoff, the return on investment, and the applications of VBID in diabetes and in other chronic diseases.

It will take time to undo the past, and it is up to all healthcare stakeholders to generate the best evidence for the value of improved outcomes and efficient use of resources. Maximizing return equals getting our diabetic patients to goal in a timely manner that is safe and effective, expanding our efforts, addressing relevant measures of success in peer-reviewed journals, and communicating with consumers with clarity. Taking these steps will strengthen our position and demonstrate that we can achieve the optimal outcomes when we align all parties to recognize the trade-offs required.

If VBID works for diabetic patients and meets the 3 points of success—improved outcomes, increased access, and lowered cost—then what is stopping us from applying VBID to other chronic conditions? Are we waiting for the word “mandatory”?

The proof is contained in the present article, and it is now up to us to apply it to our local plans. It is not time to create more buzz words or fancy acronyms, nor is it time to generate mountains of paper or brochure programs. We need to innovate and solve these problems by extending our care community and involving all participants in shared responsibilities and benefits. We need to make it simple for providers, patients, and employers to get the most from their healthcare dollar.

We can learn a lot from a recent example of a model market dynamic that may apply equally to healthcare—the example of Apple announcing the purchase of 10 billion applications from its App Store. The Motorola Droid is quickly catching up, with an alternate platform. What we can learn from our current/future consumers is that they are willing to use technology, and we are beginning to rely on this tool to address business, human, and social needs that were not considered essential until recently. We engage in text messaging, e-mail, Skype, and instant messaging. Unlimited data and low-cost entrants to the market enable us all to carry an electronic device. Let’s use the platform that is socially acceptable and see if we can build communities of care, share our success, and extend the value of our healthcare dollars by using similar social and humanistic techniques that will engage current and future generations. Maybe VBID will include unlimited data for chronic disease patients and beyond.

**PATIENTS:** It is time to engage in activating patients and encouraging their best performance to achieve optimal care. Offering patients with diabetes incentives to seek care, monitoring adherence, and reducing serious complications (eg, amputations, hospitalizations, and vision loss) all translates into great care, saves our system millions of dollars annually, and drives rational behavior by a system that is forced to solve the long-term care gap that threatens to overwhelm the United States.

I challenge all of us in managed care to look at the top 5 chronic disease categories; if you are like most plans, you will agree that diabetes, hypertension, chronic obstructive pulmonary disease, congestive heart failure, and inappropriate cholesterol levels create a entire case of disease management services to engage patients and employers in optimal chronic care management, healthier activities, and improved medication adherence.

Patients and providers will be rewarded in the new healthcare model by creating strategies such as the Asheville Project (pharmacist), the medical home (nurse/team), and Walmart’s $4.00 generic program (corporate), all of which will create continuity of care, increase patient contact and understanding, and improve access to healthcare.


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