

Is “Value-Based” Value Wasted? Examining Value-Based Insurance Designs Through the Lens of Cost-Effectiveness

Steven J. Melnick, MBA, and Brenda R. Motheral, BPharm, MBA, PhD

Health plan sponsors have long sought approaches to care management that not only reduce health care costs but also improve the health of plan members. Nearly a decade ago, disease management programs were first promoted as a possible solution. However, most of the recent evidence from controlled studies suggests that chronic disease management is not delivering on the promise of lowered costs through improved population health.¹⁻³

Today, both in federal budget discussions and for commercial insurers, value-based insurance designs (VBID) are receiving increased attention, particularly for pharmaceuticals. At one time called benefit-based copayments (BBC), the original VBID model called for a shifting of the health plan subsidy away from low-value utilization and towards high-value utilization.

“The BBC allows the copay to vary by the evidence-based benefit of the medication for the individual patient... For any given drug, patients with a high potential benefit would have lower copays than patients with low potential benefit.”⁴

According to the original design for pharmacy benefits, health plans should lower copayments for patients taking medications that will most improve health, thereby potentially reducing health care expenses, and simultaneously raise copayments for patients taking medications that do not contribute as greatly to health improvement. As a result, some higher-priced innovator drugs might be priced at lower copayment levels if they demonstrate greater cost-effectiveness.

VBID implementations have veered from the initially intended course in both design and outcomes expectation. While the original design also called for raising copayments for lower-value medications, many VBID implementations in prescription drug plans to date have only lowered copayments.⁵⁻⁸ Simultaneously, the expectation that lowering copayments will result in medical savings that meet or exceed the loss of copayment revenue seems to be growing.

However, by only lowering copayments, plans are unable to realize sufficient subsidization of increase in use of high-value medication from reduction in use of low-value medication. Without the subsidy opportunity within the pharmacy benefit, the burden of generating cost neutrality or return on investment (ROI) for VBID, if desired, rests solely on the medical cost reductions associated with the anticipated better adherence to

high-value medications. The purpose of this paper is to assess the potential net savings from implementing a copayment reduction for prescription medications in selected therapy classes.

Testing the VBID Theory

VBID for pharmacy benefits is an alluring concept, which purports to generate reductions in health care costs through greater medication compliance. The theory of VBID is that:

- (a) Lowering copayments in key, chronic therapy drug classes will increase utilization and adherence in those classes.
- (b) Increased adherence will improve the health of the persons taking these medications, potentially reducing costly hospitalizations and emergency room (ER) visits.

Each part of the theory can be analyzed for its potential impact in reducing medical costs. The idea that lowering copayments will increase utilization in key therapy classes is derived from the concept of **price elasticity**. The extent to which improved adherence reduces hospitalizations, ER visits, and mortality is one dimension of **clinical efficacy**. By combining the price elasticities, clinical efficacy, and plan data for a proposed VBID program, those implementing or considering VBID can measure the potential impact of a copayment reduction program.

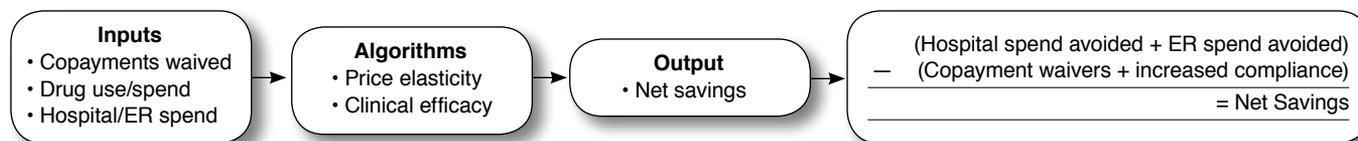
Using the VBID Calculator

For the purpose of the evaluation, we developed a calculator that can model a variety of VBID plans.⁹ Any plan sponsor that knows its drug costs and the rates and costs of avoidable events (i.e., ER visits and inpatient hospitalizations) can determine the potential savings from VBID. Figure 1 identifies the key elements of the model, as well as the calculation used to determine net plan savings. For the calculator’s algorithms, price elasticities were based on the quasi-experimental study of VBID reported by Chernew et al. (2008), which found small increases in medication compliance after lowering prescription copayments.⁶ Although the study has been criticized for its methodology,¹⁰ we wanted to understand if savings were possible if these reported compliance improvements were accurate. The calculator’s assumptions about clinical efficacy were based on published randomized controlled trials of the relevant prescription medications for statins and anti-asthmatics,^{11,12} and on nonexperimental data for diabetes due to limited direct assessments of hospitalization endpoints.¹³

To generate results from the calculator, users enter copayment reduction amounts for VBID programs as well as basic pharmaceutical utilization data. Users can either enter hospitalization and ER utilization rates for their specific population or use default

Note: This article is the subject of an editorial that appears on pages 134-140 of this issue.

FIGURE 1 Elements of the VBID Calculator



ER = emergency room; VBID = value-based insurance design.

rates pre-coded into the calculator based on published and non-published evidence. Instead of producing a single point estimate, the calculator produces ROI ranges for various levels of adherence and hospital/ER reduction, representing “what if” scenarios.⁹

Results from the VBID Calculator

As an example of what a plan sponsor might implement, we input the same design and assumptions that were used in the Chernew et al. study of VBID.⁶ Original copayments for the plan were \$5, \$25, and \$45 for generics, formulary brands, and nonformulary brands, respectively. Copayments were completely waived for generics, and were reduced by 50% for both formulary and nonformulary brand-drug categories. For this scenario, drug costs, prevalence, and avoidable event rates were based on national averages for a commercially insured population, adjusted for inflation and billed versus paid charges.¹⁴⁻¹⁶ Hospitalization rates ranged from 1.4 to 4.9 per 1,000 members and hospitalization expense ranged from \$9,500 to \$22,000 across the therapy classes. ER rates ranged from 6.0 to 7.5 per 1,000 members and ER expense averaged \$1,000 per visit.

Based on the data that mimic the VBID study of drug copayment reduction as reported by Chernew et al., Table 1 displays the net effect on total medical and drug expenditure by therapy class for a 10,000 life group. For each therapy class modeled, the net savings amount was negative, that is, the estimated costs of copayment waivers and increased compliance far exceeded the estimated benefits from adverse event avoidance.¹⁷ The increased cost was greatest for statins, followed by antidiabetics, and then anti-asthmatic drugs.

Why the Lack of Savings From Drug Copayment Reduction?

Three reasons stand out for the lack of net medical savings when VBID is implemented as a drug copayment reduction only:

(a) Price elasticities for prescription drugs are relatively low. Table 2 shows price elasticities by therapy class from the Chernew et al. study.⁶ Price elasticity is the percentage change in demand expected to result from a 100% change in price. For example, the elasticity for angiotensin-converting enzyme (ACE) inhibitors would be interpreted to mean that a 100% increase in the price of ACE inhibitors would result in a 12% decrease in utilization of ACEs. While research on decreasing copayments is limited, the elasticities reported by Chernew et al. are similar to

effects observed when copayments are increased.⁶ These small elasticities indicate that even with large percentage changes in price, demand does not change very much. Thus, even if a plan waives 100% of the copayments for a medication, the plan should expect only a relatively small increase in demand, ranging from 1% to 18% for the 3 therapy classes studied. As noted in a previous editorial on the Chernew et al. study, this change in demand represented an increase of only 7-14 days of drug therapy over an entire year, which is unlikely to produce any demonstrable clinical benefit, let alone medical savings.¹⁰

(b) Avoidable event rates in a commercial population are lower than may be expected. For example, our data for coronary artery disease (CAD, treated with statins) included more than 1,100 statin users but only 49 CAD-related inpatient hospitalizations in a 10,000 life commercially insured group, of which only a subset resulted from medication noncompliance. However, based on copayment reductions from the original design, the cost of waived copayments totaled \$160,842 (i.e., \$118,448 for ongoing prescriptions and \$42,395 for increased compliance) for statins. At an average cost of approximately \$22,000 per CAD-related hospitalization, more than 7 hospitalizations would have to be avoided as a result of the very small adherence improvements documented in the Chernew et al. study to break even. Accordingly, there is not enough avoidable cost in the population to fully offset copayment reductions of that magnitude. While one could suggest that there is a cumulative beneficial effect to compliance, plans must not ignore the parallel and massive cumulative price tag of copayment waivers to achieve those cumulative benefits.

(c) Most of the copayment waivers go to individuals whose behavior is not impacted by them. When VBID is applied across a population, many of the copayment waivers go to people who have been and intend to stay compliant with their drug regimen. For example, the medication possession ratio (MPR) for antidiabetic therapy in the *comparison* group in the Chernew et al. study averaged nearly 70%, indicating that the majority of users were compliant with their medication even without a copayment reduction.⁶ Even for those receiving the waivers, the cost of the medication may not be the reason for poor adherence. Some studies suggest that a small minority of adherence problems are related to affordability of the drug.¹⁸ Medication

TABLE 1 VBID Calculator Results for 10,000-Member Group with Reduced Drug Copayments – Annual Costs

Drug Class	Rx Change	Hospital/ER Change	Cost of Copays/ Compliance	Hospital/ER Avoided
Asthma	7.0%	2.8%	\$26,919	\$5,600
			Net Savings	(\$21,319)
Statins	8.9%	2.3%	\$160,842	\$25,590
			Net Savings	(\$135,252)
Diabetes	7.6%	1.5%	\$82,375	\$3,076
			Net Savings	(\$79,299)

ER = emergency room; rx = pharmacy claims; VBID = value-based insurance design.

adherence is a complex, multifactorial problem that a blanketed approach, whether copayment waivers or reminder letters, will not sufficiently address.

Some may question why these results conflict with some of the assertions of savings from VBID. First, studies that do not use comparison groups can be influenced by other secular or plan trends and may be taking credit for regression to the mean, which erroneously credits natural decreases in the costs of the sickest individuals to the ascribed intervention. Second, reports that model the potential medical savings of VBID frequently are compromised by the healthy adherer effect if they use correlational studies rather than randomized controlled trials of drug efficacy. Research has shown that correlational studies documenting associations between adherence and medical costs can exaggerate the medical benefits of adherence because adherence to drug therapy acts as a surrogate for other healthy behaviors, which also help to reduce medical costs.¹⁹ In the present study's analysis, the diabetes assessment was based on a nonexperimental study that did not address the *healthy adherer effect* and therefore, likely exaggerated the potential savings for the diabetes medication class. Accordingly, whereas we may be quick to credit adherence with decreases in avoidable events when modeling conclusions, exogenous factors and behaviors may be at work.

Recommendations for Obtaining Real Value from VBID Concepts

Despite the lack of ROI from an analysis of VBID implemented as reduction of drug copayments, plan sponsors still have options for lowering costs by promoting improved medication compliance and health of plan members.

(a) Perform plausibility tests before implementation of a program. In the example above, it is virtually impossible to avoid enough hospitalizations and ER visits to offset the cost of the copayment waivers. Simple tests of savings plausibility for VBID, (or any care management program) before implementation can save health plans time and money and can set appropriate expectations about ROI and clinical improvements. The VBID calcula-

TABLE 2 Price Elasticity of Demand in Selected Therapy Classes^a

ACEI	-0.118
Asthma	not significant
Beta blocker	-0.112
Diabetes	-0.135
Statin	-0.182

^aChernew et al. 2008. Impact of decreasing copayments on medication adherence within a disease management environment.⁶

ACEI = angiotensin-converting enzyme inhibitor.

tor is a publicly available tool that allows for this analysis using plan sponsor-specific data.⁹

(b) Return to the original design intent of VBID and raise copayments for lower-value treatments. For health plans committed to VBID approaches, subsidizing copayment waivers with higher copayments for lower-value medications can remove much or all of the savings burden from medical cost avoidance. This subsidization can occur across therapy classes or within therapy classes, either by patient risk characteristic or by drug type. Using cholesterol-lowering medications as the classic example, one could lower copayments for members with documented CAD and raise copayments for patients who are taking the medications for primary prevention, as research has shown that these medications are significantly more cost-effective for secondary prevention.²⁰

(c) Target the intervention to the individuals who need it most. Much of the "waste" in VBID programs comes from copayment waivers for individuals who do not benefit from them for 1 of 2 reasons. First, waiving copayments for those who have been and continue to be compliant lowers the ROI for the whole program. Second, avoidable event risk across those diagnosed with chronic conditions may not be high enough to justify broad copayment waivers. The ideal approach is to focus programs on those with the highest risk of avoidable events and with cost as a barrier (e.g., a CAD patient who has told his doctor that he discontinued his statin because of cost). Because fairness and legal issues may prevent plans from advantaging certain subgroups within the plan, targeted copayment waivers may not be a plausible approach.

(d) Address medication adherence as a multifactorial issue with the right type of interventions. As mentioned above, understanding and improving medication adherence are complex endeavors. Reasons for poor adherence range from tactical (cost, forgetfulness) to medical (side effect issues) to psychological (low motivation) to social (cultural, peer group input).¹⁸ Although point solutions, such as copayment waivers, can modestly "move the needle" of adherence, their effectiveness is limited to the extent to which cost is one of the underlying causes. Research has shown that poor adherence is most effectively addressed with multifactorial and more intense interventions that identify and address the unique underlying reasons for compliance for each patient.²¹

Conclusions

VBID is receiving attention as a tool to increase medication adherence and lower medical costs. However, applying a "plausibility calculation" method to data generated from a recent VBID study involving reduction of drug copayments, this evaluation found that health plan sponsors are highly unlikely to experience net savings by implementing VBID programs, even under generous assumptions, for 2 reasons. First, the price elasticities of medications are too low to generate meaningful increases in medication adherence when copayments are lowered. Second, the potential reductions in the avoidable hospitalization and ER utilization rates across a commercially insured population with varying risk levels are generally not large enough to offset the additional plan costs of lowering copayments to increase medication adherence.

Authors

STEVEN J. MELNICK, MBA, is Vice President; and BRENDA R. MOTHERAL, BPharm, MBA, PhD, is President, CareScientific, Brentwood, Tennessee.

AUTHOR CORRESPONDENCE: Steven J. Melnick, MBA, CareScientific, 5115 Maryland Way, Brentwood, TN 37027. Tel: 615.283.0220; Email: smelnick@carescientific.com.

DISCLOSURES

The authors report no conflicts of interest related to the subjects or products discussed in this article. The VBID Calculator discussed in this article is available online free of charge from CareScientific.

Both authors contributed to concept and design, data collection, data interpretation, and revision of the manuscript. Melnick had primary responsibility for writing the manuscript.

REFERENCES

1. Peikes D, Chen A, Schore J, Brown R. Effects of care coordination on hospitalization, quality of care, and health care expenditures among Medicare beneficiaries: 15 randomized trials. *JAMA*. 2009;301(6):603-18. Available at: <http://jama.ama-assn.org/cgi/reprint/301/6/603>. Accessed December 30, 2009.
2. Brown R, Peikes D, Chen A, Schore J. 15-site randomized trial of coordinated care in Medicare FFS. *Health Care Fin Rev*. 2008;30(1):5-25.
3. Mattke S, Serxner SA, Zakowski SL, Jain AK, Gold DB. Impact of 2 employer-sponsored population health management programs on medical care cost and utilization. *Am J Manag Care*. 2009;15(2):113-20.
4. Fendrick AM, Smith DG, Chernen ME, Shah SN. A benefit-based copay for prescription drugs: patient contribution based on total benefits, not drug acquisition cost. *Am J Manag Care*. 2001;7(9):861-67.
5. Spaulding A, Fendrick AM, Herman WH, et al. A controlled trial of value-based insurance design – The MHealthy: Focus on Diabetes (FOD) trial. *Implement Sci*. 2009;4:19. Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2673203/?tool=pubmed>. Accessed December 10, 2009.
6. Chernen ME, Shah MR, Wegh A, et al. Impact of decreasing copayments on medication adherence within a disease management environment. *Health Aff (Millwood)*. 2008;27(1):103-12.
7. Center for Health Value Innovation. State of Colorado case study: pilot diabetes program yields promising results for Colorado. December 2007. Available at: <http://www.vbhealth.org/papers/Colorado.pdf>. Accessed December 10, 2009.
8. Center for Health Value Innovation. Better health, better bottom line. Case study: Health Alliance Medical Plans value-based benefits for diabetes and asthma. 2008. Available at: <http://www.vbhealth.org/papers/CarleClinic.pdf>. Accessed December 10, 2009.
9. Resources. VBID Calculator. CareScientific. Available at: <http://www.carescientific.com/resources.php>. Accessed December 10, 2009.
10. Fairman KA, Curtiss FR. Making the world safe for evidence-based policy: let's slay the biases in research on value-based insurance design. *J Manag Care Pharm*. 2008;14(2):198-204. Available at: http://www.amcp.org/data/jmcp/JMCPMaga_March%2008_198-204.pdf.
11. Baigent C, Keech A, Kearney PM, et al.; Cholesterol Treatment Trialists' (CTT) Collaborators. Efficacy and safety of cholesterol-lowering treatment: prospective meta-analysis of data from 90,056 participants in 14 randomised trials of statins. *Lancet*. 2005;366(9493):1267-78.
12. Pauwels RA, Pedersen S, Busse WW, et al.; START Investigators Group. Early intervention with budesonide in mild persistent asthma: a randomised, double-blind trial. *Lancet*. 2003;361(9363):1071-76.
13. Ho PM, Rumsfeld JS, Masoudi FA, et al. Effect of medication nonadherence on hospitalization and mortality among patients with diabetes mellitus. *Arch Intern Med*. 2006;166(17):1836-41. Available at: <http://archinte.ama-assn.org/cgi/reprint/166/17/1836>. Accessed December 30, 2009.
14. DeFrances CJ, Lucas CA, Buie VC, Golosinskiy A. 2006 National Hospital Discharge Survey. *National Health Statistics Reports*. July 30, 2008. Available at: <http://www.cdc.gov/nchs/data/nhsr/nhsr005.pdf>. Accessed December 10, 2009.
15. Russo CA, Jiang HJ. Hospital stays among patients with diabetes, 2004. *HCUP Statistical Brief #17*. Agency for Healthcare Research and Quality. November 2006. Available at: <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb17.pdf>. Accessed December 10, 2009.
16. Andrews RM. The national hospital bill: the most expensive conditions by payer, 2006. *HCUP Statistical Brief #59*. Agency for Healthcare Research and Quality. September 2008. Available at: <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb59.pdf>. Accessed December 10, 2009.
17. Note that the calculator shows a slightly greater compliance increase than the original VBID study because it does not factor in the percentage of patients paying a pharmacy usual and customary amount that is lower than the copayment, which would result in a smaller financial savings to the patient from a copayment waiver.
18. Osterberg L, Blaschke T. Adherence to medication. *N Engl J Med*. 2005;353(5):487-97.
19. Dormuth CR, Patrick AR, Shrank WH, et al. Statin adherence and risk of accidents: a cautionary tale. *Circulation*. 2009;119(15):2051-57. Available at: <http://circ.ahajournals.org/cgi/reprint/119/15/2051>. Accessed December 10, 2009.
20. Kahn R, Robertson RM, Smith R, Eddy D. The impact of prevention on reducing the burden of cardiovascular disease. *Circulation*. 2008;118(5):576-85. Available at: <http://circ.ahajournals.org/cgi/reprint/CIRCULATIONAHA.108.190186v1>. Accessed December 10, 2009.
21. McDonald HP, Garg AX, Haynes RB. Interventions to enhance patient adherence to medication prescriptions: scientific review. *JAMA*. 2002;288(22):2868-79. Available at: <http://jama.ama-assn.org/cgi/reprint/288/22/2868>. Accessed December 10, 2009.