West Virginia SHSIP
Appendix E: Financial Analysis

Overview

As noted in Section 12, West Virginia SHSIP implementation is estimated to potentially generate $191 million in net savings through avoided costs on an annual basis over a five-year project period. These savings represent less than 1% of overall projected health care costs during the implementation period. Estimates of the costs necessary to implement the SHSIP are considered in total (not specific to population segments) and compared to total estimated savings across all population segments. This approach allows estimation of potential return on investment over the project period.

As noted, the estimates assume no Model Test funding from CMS and the use of an incremental approach to implementation, leveraging a shared-savings approach to incentivize provider practice transformation and some level of patient engagement through value-based benefit design that rewards patient engagement and compliance. The estimated cost of SHSIP implementation does not duplicate other investments already contemplated as a normal course of business, such as costs to administer the Medicaid, CHIP and PEIA programs and incentive programs underway through Medicaid managed care contracts.

As described in Section 12, the financial analysis focuses on certain specific objectives of the SHSIP that can reasonably be expected to have direct and meaningful impact on the cost of health care in West Virginia based on evidenced-based research and studies of similar interventions. The interventions set forth in the SHSIP are intended to be far-reaching and cross-cutting to the way health care is organized, delivered and consumed in the state. One of the strategies is to align the efforts of payers, using some pilots and demonstrations through the West Virginia Health Transformation Accelerator to demonstrate a “proof of concept” to foster subsequent adoption by other purchasers and payers. As noted in the SHSIP, the particular health care system redesign, payment reform, value-based benefit design and consumer engagement strategies will evolve with the implementation of the SHSIP. In making the estimates of potential cost savings, the SHSIP is considered as a whole to be the required supporting infrastructure needed to achieve the specific objectives described in the proposed model. Some interventions do not have a direct impact on health expenditures; these estimates are associated with the subset of expected outcomes for which an associated potential cost savings can be estimated (i.e., those that are quantifiable and have direct impact on medical expenditures).

Although the SHSIP implementation horizon is five years, the analysis is performed using the 2009 baseline estimates of CCRC (or the per capita alternative calculation as noted below) with medical inflation rates applied. Currency or other valuation modifiers are not applied, and projected future savings are not expressed in present value adjusted format. These estimates are not intended to meet all actuarially sound computation requirements; the estimates combine analysis of other studies and estimates as noted, similar interventional implementations, aggregate estimation methods (estimating and approximating the aggregate impact of the proposed interventions by category rather than
estimating each intervention separately) and an understanding of West Virginia's health care delivery system and health insurance markets. They do not reflect detailed models, simulations or micro-simulations, given that many of the interventions described do not lend themselves to detailed micro-economic modeling in the absence of reliable data associated with the application of the proposed interventions in West Virginia.

**Assumptions, Conditions and Limitations**

As noted, the estimates are intended to err on the side of conservatism, for several reasons: significant risk in the ability to execute the SHSIP implementation plan due to funding; system-level capacity for transformation; significant issues related to workforce and HIT/data use; challenges of multiple levels of change and competing priorities; and significant budget and political uncertainty.

Accordingly, the financial analysis presented in Section 12 is subject to a number of assumptions, conditions and limitations. In some cases, there is a lack of direct data to permit calculations and estimates of financial impact and cost savings opportunities; in these cases, national data or other data sources have been used to extrapolate a possible range or estimate of financial impact in West Virginia of the interventions listed in Sections 4 and 5.

Alternative assumptions or scenarios within the range of possibilities may also be reasonable, and any variation in the assumptions may produce different projected outcomes. As with any forward-looking projections over an extended period of time, no individual projection is uniquely “correct,” and many alternative projections of the future could also be regarded as reasonable. These estimates are intended to simply serve as a useful framework for considering the potential financial impact of the SHSIP in moving to a high-value system of health care delivery and population health improvement.

**Section 12 Tables**

The tables set forth in Section 12 are reflective of the assumptions, conditions and limitations of the estimates set forth in Section 12 overall.

**Table 12.1** provides a summary of data taken from the Medicare & Medicaid Research Review 2011, which provides national and state-level estimates of per capita health care spending and growth rates. The use of this data is representative of the limitations of using assumptions for translation of national studies to West Virginia application. In the absence of specific research or data indicating potential health care savings from systems improvements, population health modification or administrative simplification, national studies and computations have been used to estimate a range of potential savings in West Virginia. These estimates are limited to the degree to which the estimated savings from interventions projected using national data are relevant and aligned with the savings opportunities unique to the West Virginia population and health care delivery system.
In Table 12.2, the estimates prepared by CCRC in 2009 are assumed to be reasonable as well as the CCRC-assumed rate of health care inflation of 6.4%. (This rate is higher than the estimates and projections in the Medicare & Medicaid Research Review; the CCRC rate is reflected in the CCRC estimates in Table 12.2 and serves as an upper-limit cross check of the rates used in column 2 to compute the amounts shown in column 4 of Table 12.2.) Also assumed to be reasonable are the per capita estimates reported by NHE of $7,667 for the base year shown in Table 12.2. The per capita estimate is based on the CMS’ National Health Expenditure Accounts that provide a detailed view of personal health care spending. Further, the use of NHE health inflation rates used for 2010 to 2014 and a 4.9% projected annual future rate for the period of 2015 to 2022, as shown in the second column of Table 12.2, are presumed to be reasonable and reliable to adjust the baseline per capita costs by these annual rates of increase to establish a historical and projected per capita cost. These estimates may be conservative, as West Virginia has experienced in the past a higher rate of health care cost growth due to population demographics.

Table 12.2 also assumes to be accurate and reliable the U.S. Census Bureau reports indicating the West Virginia population as 1,852,994 on April 1, 2010; 1,850,326 on July 1, 2014; and 1,844,128 on July 1, 2015. As noted in the narrative, for purposes of making the total health cost estimates, the official Census population estimates are used for 2009 to 2015, and then a static estimate of 1,844,00 is used for 2016 to 2022. These estimates are subject to the reliability of these sources, the accuracy of these estimates and projections and the correlation of national estimates and projections to the West Virginia population as applicable and relevant. The reliability of these estimates is limited to the nature of the projections. For example, unforeseen trends and events may alter the projections due to omission in the presumptions and significant events such as the recent downturn in the economy of West Virginia that may result in outmigration, which will affect the population demographic trends and distribution by age and socioeconomic status.

Taking 2013 as an example, the projected West Virginia total cost is calculated as follows:

\[ WV \text{ per capita}_{2013} = WV \text{ per capita}_{2012} \times \% \text{ change}_{2013} : \$8,849 = \$8,599 \times 1.0290 \]

\[ \text{Projected WV Total Cost}_{2013} = WV \text{ Per capita}_{2013} \times 1,850,326 \]

For Table 12.3, the prevalence rates and estimated number of adults are subject to the accuracy of responses to the West Virginia Behavioral Risk Factor Survey. Because the survey uses respondent answers to a series of questions premised on whether or not the respondents have been told they have certain diseases, the prevalence rates may be conservative as there is evidence that a significant number of individuals with one or more chronic conditions may not be aware of having (or may not have been diagnosed with

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having) that particular condition. It is worth noting that despite potential measurement error, data from the BRFSS are routinely used in a wide array of academic research.

**Table 12.4** presents data generated from the CDC Chronic Disease Cost Calculator. According to the CDC, the Cost Calculator provides 10-year projections of the medical costs of selected chronic diseases. The projected costs are reported in millions of 2010 dollars and do not project inflation. The percentages of increase shown may vary from tallies due to rounding and formulas within the Calculator. The CDC indicates the statistical analysis used to generate these estimates minimizes double-counting of costs across diseases, which often occurs in other cost estimates.

The CDC notes the following limitations on the Cost Calculator estimates:

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2. All reported numbers are estimates and could differ from actual values. The Cost Calculator is designed to provide the best possible estimates given the data available on each state’s allocation of medical resources for each of the 10 chronic diseases. The default data used by the Chronic Disease Cost Calculator have at least five limitations:

1. Medical Expenditure Panel Survey (MEPS) data used in the Cost Calculator are derived from household reports of medical care utilization. However, provider reported expenditure data are used extensively to supplement the data collected from households to improve accuracy.

2. The MEPS sample design excludes the institutionalized population (i.e., excludes expenditures associated with nursing home residents). Although National Nursing Home Survey data were used to adjust for long term care costs, these adjustments were based on data from 2004, which are older than the other data sources.

3. Although the overall sample size is reasonably large, the expenditure estimates are associated with uncertainty, and the variance in the estimates is greater for those diseases that are less prevalent in the population.

4. The changes in prescription costs caused by Medicare Part D are only partially captured in the Cost Calculator, because these changes were implemented in 2006 but Cost Calculator medical expense data spans from 2004-2008.

5. The cost projections do not reflect changes to the healthcare system that result from technological innovation, changes to the organization of healthcare provision, or recent health reform legislation such as the Affordable Care Act (PL 111-148).

The CDC also notes the following possible sources of variations in the Cost Calculator estimates and estimates using other sources that use different methodologies:

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The statistical analysis used by the Cost Calculator employs an econometric methodology that minimizes double-counting (i.e., overlap of disease costs) of medical expenditures going to multiple diseases. This can be especially important for the many categories of cardiovascular disease included in the Cost Calculator.

The per person cost estimates are based on all persons receiving care for a disease within the interview year, rather than new diagnoses during the year, and include people at any stage of treatment. For example, cancer costs may appear low because they include both people in the acute phase of treatment and those receiving longer term follow-up.

The Cost Calculator estimates expenditures among persons with the disease that are attributed to that disease. Other studies define disease cost by summing only claims with diagnosis codes for the disease or report all medical expenditures for persons with the disease, which can result in higher estimates.

The Cost Calculator only estimates specific costs due to chronic diseases: medical costs and absenteeism costs (time away from paid work). Other costs of chronic diseases, including productivity losses through presenteeism (impaired productivity while at work, associated with future fair/poor general health), premature mortality, and reductions in the quality of life, are not included in the estimates.

The default Cost Calculator estimates are also based on nationally representative data, not state-specific disease data. Further, some estimates may be using data from different years. Users can incorporate more geographically specific or current inputs in the Cost Calculator.

There are additional reasons spending estimates for the Medicaid population in particular might be lower than one might assume:

- Treated population estimates for the Medicaid population may appear lower than expected because the majority of Medicaid beneficiaries are age 18 and under (51%), almost double the proportion found within the general population, and with the exception of asthma and depression these chronic diseases are far less prevalent in this younger population. Because of this, Medicaid costs may be lower than one would assume.

- The majority of Medicaid beneficiaries receiving treatment for any of these 10 chronic diseases are dually eligible for Medicare coverage. The Medicaid expenditure estimates in the Cost Calculator only include the Medicaid portion of spending for dual eligibles and do not include Medicare expenditures. Medicare is the primary payer for most services for dually eligible beneficiaries.
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Finally, CDC notes the following limitation and conditions that can be applied to all of the projections and estimates in Section 12:

The Medical Cost Projections allow users to view projections of the direct medical costs of the selected chronic diseases to all payers combined for each year from 2010 through 2020. The projections are estimates based on default inputs and real 2010 dollars, inflated by 3.6% each year to estimate the average annual growth in per-person medical costs. The projections also incorporate the anticipated demographic changes to the U.S. and state populations. The projections do not reflect changes to the health care system that result from technological innovation, changes to the organization of healthcare provision, or recent and future health reform legislation such as the Affordable Care Act (PL 111-148). They also do not include estimations of future lost productivity or other indirect costs of chronic disease.

In providing an idea of what future chronic disease costs could be, the cost projections have several uses. The projections can be useful for states in their Medicaid planning and for other planning for future chronic disease cost growth. The projections show the impact of coming changes in population size and age and gender distributions on health care costs. Observed differences between Cost Calculator projections and future reported costs may be a useful starting point for research exploring chronic disease cost trends, though it should be stressed that the Cost Calculator itself will not provide any answers for this research, normative or otherwise.

Although the Cost Calculator cost projections are intended to be the best possible estimates, these projections incorporate many unavoidable uncertainties, and no one should rely on them as statements of certainty. As described elsewhere, the “current” calculated costs that the projections are based on themselves contain multiple estimations. All the limitations described above apply, including the fact that the projections are representative of the information we had available at the time of the analysis. Additionally, the cost projections are based on a status quo assumption and only reflect historical medical cost growth and demographic changes. Medical care practice will continue to change in ways both known (the scheduled rollout of the provisions of the Affordable Care Act) and unknown (dissemination of new technology, new modifications to care delivery systems). These changes will impact costs in ways not captured by the Calculator cost projections. Future demographic changes will also not be exactly like those currently predicted. For all of these reasons, as well as potential differences in underlying methodologies, future chronic disease medical costs recorded for states or the nation will vary from the projection numbers provided by the Calculator, and

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potentially by large amounts. Any differences between Calculator cost projections and future recorded medical costs are not by themselves necessarily good or bad, and should not be used to measure the success or failure of the U.S. healthcare system generally or chronic disease cost containment more specifically.

Table 12.5 summarizes the health care cost estimates shown in Tables 12.2 and 12.4. Taking 2010 as an example, the first column of Table 12.5 is the Projected WV Total Cost shown in Table 12.2 ($14,775) in millions of dollars. The second column of Table 12.5 is the Total column of Table 12.4 ($6,749), also in millions of dollars. The third column shows the cost of chronic disease as a percentage of total health care costs: $6,749 / $14,775 = 45.7%. It is subject to the same limitations as noted for the source data in Tables 12.2 and 12.4.

Table 12.6 presents the annual per capita spending on health care attributable to smoking by smoking status and age and is based on information from the Congressional Budget Office and Surgeon General’s report. As noted in the chart, it is based on Medical Expenditure Panel Survey information and is subject to the same limitations and conditions as noted generally for this data source.

Tables 12.8 and 12.9 present extrapolations using AHRQ data on the concentration of health expenditures. The reliability of these estimates is subject to the degree to which West Virginia health care expenditures are concentrated to the same level as national estimates from the AHRQ data sources. There is no direct research available specifically on the concentration of health expenditures in West Virginia.

Table 12.10 presents the estimates of potential savings from three leading studies for population health improvement and health system transformation initiatives. These national studies are used to compute a possible range of savings in West Virginia. The assumptions and computations within these studies are assumed to be reasonable. There is also assumed to be some correlation between these national estimates and the impact that proposed interventions may have on cost savings in West Virginia.

Table 12.11 presents an extrapolation of the components of the studies, using averages and translation to project an upper range of possible savings from similar intervention and improvement efforts outlined in the SHSIP. These rates are used to project savings capture rates (based upon improvement objectives, phased interventions and trend projections) to establish cost savings estimates in Tables 12.12, 12.13 and 12.15.

The estimates of potential cost savings in Tables 12.12, 12.13, 12.14 and 12.15 are extrapolated from national studies cited in Section 12 correlating some degree of cost savings associated with a series of population health improvement, system transformation or administrative reform initiatives. These national estimates are based on evidence-based research from demonstrations and studies using similar interventions. The degree to which these outcomes can be achieved is subject to the conditions and assumptions set forth in Section 12.
For purposes of determining cost savings and intervention cost estimates for computations and projections set forth in **Table 12.12**, medical literature was reviewed to establish evidenced-based approximations of savings potential. One study on obesity costs reviewed 33 published articles addressing the incremental direct medical cost associated with overweight and obese individuals. Among the four highest-quality studies, the 2008 per-person direct medical cost of overweight was $266 and of obesity was $1,723.\(^5\) Using the BPH estimates of $1.4 billion to $1.8 billion in direct obesity cost divided by the number of obese adults produces a range of cost per obese individual of $2,820 to $3,629. The baseline 2008 cost adjusted for medical inflation from 2008 to 2016 (factor of 1.337 from rates in Table 12.2) yields a rate of $2,304 in adjusted 2016 cost. For estimation purposes, the targeted obesity interventions are assumed to reduce the number of obese individuals to merely being overweight, thereby saving the difference between the incremental cost of obesity ($2,304 adjusted from the 2008 baseline) and the adjusted cost for overweight ($355 in 2016 adjusted cost using the 1.337 inflation factor applied to the $266 cost for 2008). For simplicity purposes, the avoided cost factor of $2,000 was used in Table 12.12, column 4. As noted for Table 12.12, an intervention cost of $450 was used to calculate interventions cost ($450 times population impacted of 16,800). The intervention cost is a rounded estimate of therapeutic lifestyle counseling allowed by Medicare and projected costs of deploying the National Diabetes Prevention Program interventions.

Similar research has shown people with diagnosed diabetes incur average medical expenditures of about $13,700 per year, of which about $7,900 is attributed to diabetes. People with diagnosed diabetes, on average, have medical expenditures approximately 2.3 times higher than what expenditures would be in the absence of diabetes.\(^6\) Using this data, the cost difference for diabetes would be $4,466 (The direct additional cost attributable to diabetes of $7,900 less the cost for those without diabetes $3,434 (which is determined by dividing $7,900 by 2.3)). It is presumed for purposes of Table 12.12 that the cost differential is reduced by 11% for operational and implementation costs, thus yielding a cost avoidance rate of $3,952 per diabetic in column 4 of Table 12.12. The intervention cost per diabetic is based upon an estimate of lifestyle intervention counseling cost\(^7\) over five years averaging $785 per year adjusted by 1.08% for medical inflation and adjustment of how the model is deployed, resulting in an estimated annual interventions cost of $850 per participant.

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A similar study indicated the additional medical cost of $4,030 for undiagnosed diabetes and $510 for prediabetes. Because research shows that a significant percentage of individuals with prediabetes will develop diabetes within three years, the undiagnosed and prediabetes cost rates were blended to produce an estimate of $1,297 as the current and present value of future savings from keeping those with prediabetes from developing the disease. This rate was applied in column 4 of Table 12.12. The intervention cost of $450 per participant for obesity was also used for the prediabetes interventions.

A recent study suggests more effective control of hypertension can produce net savings of health care costs. Effective interventions may produce cost savings in the range of $260 per hypertensive patient, mostly in avoided future complication costs. For purposes of Table 12.12 computations, an opportunity capture rate of 45% was assumed, reflecting initial focus of interventions targeting patients with uncontrolled hypertension, resulting in a prospective avoided cost rate of $117 per impacted patient. The intervention cost is based upon an estimated cost of an additional encounter in a primary care setting of $105 per participant per year.

A recent study reports that the excess medical cost for a smoking employee is $2,055. This figure was used in Table 12.12 to calculate potential cost avoidance for smoking interventions. This is consistent with the estimate of $800 million in direct health care costs in West Virginia for smokers (40% of $2 billion as reflected in Section 3.4) divided by 400,000 current adult smokers, which yields a per-smoker medical cost of $2,000. The intervention for tobacco cessation is similar to that of the therapeutic lifestyle intervention for diabetes; accordingly, the per-participant counseling cost of $450 per year used for obesity and diabetes was assumed for purposes of computing the cost of smoking cessation.

As noted, Tables 12.13 and 12.15 utilize an allocated percentage of cost estimates for potential savings and interventions costs rather than intervention-level projections. These percentages are based upon a review of medical literature results for similar interventions, including the comparative use of the Prometheus estimates described in Table 12.14.

Table 12.14 uses estimates from the Prometheus Payment Model to identify a range of potentially avoidable complications associated with care deficiencies (not individual patient health choices) to estimate a range of potential savings from health system improvements. The purpose of Table 12.14 is to serve as a cross-check on the reasonableness of the assumptions in Table 12.13, which utilize percentages rather than

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condition-specific estimates. The Prometheus Model offers an alternative means to estimate the cost impact of system improvement on overall health care costs relative to the most common chronic conditions and the avoidable consequences of preventable care failures.

Another test of the reasonableness of the estimate is the computations set forth in the 2009 CCRC study. In that study, CCRC estimated implementation of the medical home model of care would reduce overall health care expenditures in West Virginia by $642.6 million in 2014 with an ongoing implementation cost of $368.2 million. Similar cost savings for e-prescribing and adoption of electronic health records were estimated at $164.0 million and $317.6 million, respectively, in 2014. Per these estimates, the projections in Tables 12.12 and 12.13 appear reasonable based on the CCRC study. The amounts shown in Table 12.15 contemplate economies and efficiencies from more effective use of HIT and data and reducing administrative complexity through more efficient and effective use of claims, clinical data and patient social determinants data to drive health improvement and system transformation efforts.

Table 12.16 is a summary of potential savings from Tables 12.12, 12.13 and 12.15. Table 12.17 estimates the savings by payer using the distribution of payer coverage and estimated payment allocations for the population. Research has shown that the distribution of cost is not proportionate among payers by covered lives. Accordingly, the chart reflects allocation estimates based upon proportionality of coverage and payment. The coverage estimates are from information in Table 5.3 of the SHSIP, and the payment percentage estimates are based upon the allocation estimates set forth for 2016 in the CCRC Actuaries, LLC, 2009 report, “An Analysis and Projection of the Current System and Potential Transformations” for the WVHCA.

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