High Spending Growth Rates for Key Diseases In 2000-14 were Driven by Technology and Demographic Factors*

Abe Dunn,¹ Bryn Whitmire,² Andrea Batch,³ Lasanthis Fernando,⁴ and Lindsey Rittmueller⁵

Abstract

We introduce detailed data on spending by medical condition to analyze U.S. health care spending growth in 2000-14. We found that 30 conditions, representing only 11.5 percent of all the conditions we studied, accounted for 42 percent of the real growth rate in per capita spending during this period, even though they accounted for only 13 percent of overall spending in 2000. Primary drivers of spending growth included the use of new technology, a shift toward the provision of preventative-type services, and an aging and more obese population. The health benefits of many new technologies appeared to outweigh the associated expenditures on treatment, indicating that these are cost-effective and provide a net value to society. However, while these technologies may be valuable, new treatments are often more expensive than older ones.

* The views expressed in this paper are solely those of the author and not necessarily those of the U.S. Bureau of Economic Analysis or the U.S. Department of Commerce.

¹ Bureau of Economic Analysis, abe.dunn@bea.gov
² Bureau of Economic Analysis
³ Bureau of Economic Analysis, andrea.julca@bea.gov
⁴ Bureau of Economic Analysis, lasanthis.fernando@bea.gov
⁵ Human Capital Management Services (HCMS Group)
The United States spent 17 percent of its gross domestic product (GDP) on health care in 2016, more than any other nation and almost twice the average of other developed countries.\textsuperscript{1} Health care spending accounted for an even greater share of US consumer spending (20.6 percent in 2014),\textsuperscript{2} highlighting the importance of this topic for individuals. However, there is limited information on which conditions are being treated, and to what extent.

To fill this gap, in 2015 the Bureau of Economic Analysis (BEA) introduced the experimental Health Care Satellite Account (HCSA) to systematically measure spending and cost of treatment by disease in the US.\textsuperscript{3,4} The key estimates from the HCSA come from the “Blended Account”, which is constructed by combining health care spending estimates from both survey data and large medical care claims databases to provide a more complete picture of national trends than has been available from survey data alone.

Until now, a limitation of the Blended Account was that estimates were available for only eighteen broad disease categories (referred to as “aggregate chapters”), such as circulatory conditions or diseases of the nervous system. The nervous system chapter, for example, includes a diverse range of sub-aggregate conditions, from migraines to multiple sclerosis. Aggregating data over such disparate conditions has limited the applications of this account.

With the latest release of the account in 2018, the BEA introduced more detailed statistics of health care spending by disease for the period 2000–14.\textsuperscript{5} The newly released version provides estimates for 261 conditions.\textsuperscript{6,7} This additional detail will help users of the data improve their understanding of national health care spending trends. This is especially important given that no other official data source is regularly produced at this level of granularity.

Examining detailed condition-specific trends has revealed new and important insights. We found that thirty conditions, which accounted for only 13 percent of spending in 2000,
accounted for 42 percent of real per capita spending growth in the period 2000–14. To better understand the factors driving spending growth and to highlight the usefulness of a more granular data source, this article analyzes these thirty conditions, which represent only 11.5 percent of the total 261 conditions. Consistent with much of the health economics literature, we found that new technology is a primary driver of expenditure growth for many of these thirty conditions, including hepatitis, cancer, rheumatoid arthritis, and HIV. There is evidence that many new technologies are cost-effective, but they are often more expensive than older treatments. That is, despite their cost-effectiveness, they are not cost-saving, which leads to rising health care expenditures.

Another related trend involves the rapid growth in spending on preventive services, such as immunizations and screening. While many preventive services have existed for decades, they, like the dissemination of new technologies, tend to be of value to consumers while simultaneously raising expenditures.8

The changing demographics and health of the population also help explain spending trends for these top thirty conditions. The aging of the population coincides with growth in rates of age-related conditions, such as osteoarthritis and dementia. The joint factors of aging and a rising obesity rate are key contributors to the rise in several conditions, such as diabetes and related conditions—including chronic kidney disease and acute renal failure. Yet another factor in spending growth is likely inefficiencies potentially caused by factors such as overtreatment, failure to coordinate care, and administrative complexity.

We hope that these condition-specific data facilitate research into the measurement of treatment quality and inefficiency in health care. In addition to spending by disease, measures of
quality and inefficiency are key ingredients for gaining a more complete understanding of the value of health care spending.

**STUDY DATA AND METHODS**

**Data**

The estimates for the Blended Account are based on three data sources for 2000–14: the Medical Expenditure Panel Survey (MEPS); a private claims data source from Truven Health Analytics®, part of the IBM Watson Health business™; and a Medicare claims data sample. The MEPS data inform studies on spending by condition because they are a nationally representative sample that contains detailed information about individual conditions.9–11 Although MEPS collects data on about 30,000 people annually, many conditions are found in only a small number of patients, which leads to volatile estimates of spending by condition.12 Researchers have turned to the use of large claims databases to address this issue, which motivated the use of claims data in the BEA’s Blended Account. Data from the Truven Health MarketScan® Commercial Database are a convenience sample from employers and insurers. The Medicare claims data are claims from a 5 percent random sample of beneficiaries in fee-for-service Medicare. Both the Truven Health and the Medicare 5 percent claims data capture information on millions of enrollees and billions of claims.
EXHIBIT 1. Relationships Between Major Condition Categories and Detailed Conditions, Using Circulatory Conditions as an Example

SOURCE Authors’ analysis of data from the Bureau of Economic Analysis (BEA) Blended Account, which combines data from the Medical Expenditure Panel Survey and large claims databases. NOTES The figure illustrates the relationships between broad disease categories and their component categories and detail conditions, with a focus on circulatory conditions. The thickness of the lines is proportional to the share of spending. The appendix, pages A9–23, provides additional visualizations of the relationships between aggregate chapters, component categories, and detail conditions; a larger version of the exhibit is on page A108 of the appendix (see note 7 in text). “Blood/bl.-forming org.” is blood and blood-forming organs. “Card. arrest/ven. fib.” is cardiac arrest or ventricular fibrillation. “Comp.” is complication. “CV” is cerebrovascular. “Ess. hyp.” is essential hypertension. “Lymph.” is other diseases of veins and lymphatics. “Periph. atheroscl.” is peripheral atherosclerosis.
Methodology

The three data sources are combined in the Blended Account as follows: Truven Health claims data are used for the commercially-insured population, Medicare claims data are used for Medicare-only beneficiaries and the population dually eligible for Medicare and Medicaid, and MEPS is used for the remaining population (people with Medicaid only or with no insurance). The claims data and MEPS data are combined using population weights to maintain key representativeness properties while exploiting the large samples of available claims. For each database, the BEA allocated spending across conditions. The diagnosis codes in the data were assigned to one of 263 conditions defined by the Clinical Classifications Software (CCS) from the Agency for Healthcare Research and Quality. The BEA aggregated over three conditions used to describe external causes of injury (for example, firearm or machinery), which account for a small share of expenditure, leaving 261 conditions. When possible, the BEA apportioned spending using the primary International Classification of Diseases, Ninth Revision (ICD-9), code listed on the claim. However, alternative methods were applied when diagnosis codes were missing, such as for the commercial drug claims data from Truven Health. More details regarding the methodology of the Blended Account were published in an earlier Health Affairs article.4

While providing highly detailed data is beneficial to researchers, disaggregated data are more volatile because of potential measurement error and other limitations of the source data. In the release of the condition-specific data, the BEA has taken two steps to strike a balance in this trade-off. First, in the 2018 detailed release of the Blended Account, the BEA includes additional statistics that inform readers of the source of the estimates and, likely, the volatility of the
estimates for each condition. Namely, MEPS is known for underreporting, which tends to introduce much of the volatility in the estimates.\textsuperscript{13}

Therefore, the BEA included a measure of the share of spending for each condition that was derived from the MEPS data. Second, the BEA’s 2018 detailed release includes three increasing levels of disaggregation, two of which were not included in the initial release: the original 18 “aggregate chapters”, their 63 “component categories”, and the fully disaggregated 261 “detail conditions.” This approach allows researchers to weigh the advantages and disadvantages of using more granular data. Exhibit 1 demonstrates how these different groupings are related, with a focus on circulatory conditions to demonstrate the approach. For example, the “circulatory” aggregate chapter accounts for 12.0 percent of all spending across all chapters and includes the disaggregated component category “heart conditions.” This “heart conditions” component category accounts for 55.8 percent of spending across all component categories within the “circulatory” chapter and can be further disaggregated into detail conditions such as “congestive heart failure” and “acute myocardial infarction,” representing 14.4 percent and 8.8 percent, respectively, of spending across all detail conditions within the component category “heart conditions.” Additional graphics displaying the classification structure, along with further details on the data and methods, are in the online appendix.\textsuperscript{7}

LIMITATIONS

In prior work using aggregated chapters in the Blended Account,\textsuperscript{4} several key limitations were discussed. Because of their importance, we repeat the main points here. First, the demographic weights ensure that the age-sex-region distribution in the claims data matches that in the MEPS
data, but they do not ensure that the data are representative across all dimensions. For instance, data from Medicare Advantage health plans are not included in the estimates.

Second, the BEA applied a commonly used method, the primary diagnosis method, to allocate expenditures across diseases. However, there is no consensus among researchers on how expenditures should be allocated. This limitation will likely be more controversial as data are released at a finer level of detail. The allocation of expenditures among conditions with a high level of comorbidity, such as diabetes and hypertension, is a challenging problem. While the BEA provides an estimate for disease-level spending, determining the true estimate is currently outside the scope of the Blended Account.

Third, because of limitations in available data sources, the estimates do not include all National Income and Product Account categories of health care spending (for example, dental services, nonprescription drugs, and therapeutic equipment). The MEPS data do not encompass institutionalized populations, so spending at nursing homes is also not represented in the data. The omission of nursing home spending implies that these estimates are likely to understate spending on mental health conditions.14

Finally, a limitation that becomes especially clear at more disaggregated levels is that the BEA’s estimates for the cost of treatment do not control for the quality of treatment or improvements in technology. To understand the real output in the health care sector, economists would ideally like to adjust for the quality of the treatment. Additional details about and discussions of the limitations are in the appendix7 and in previous work.4 Until these limitations are addressed, estimates from this experimental account will not be incorporated into the BEA’s official GDP accounting framework.
SOURCE Authors’ analysis of data for 2000–14 from the Bureau of Economic Analysis (BEA) Blended Account (explained in the source information for exhibit 1) and the Medical Expenditure Panel Survey (MEPS). NOTES Annual per capita spending trends vary widely depending on whether data are from the MEPS Account only or from the Blended Account. The volatility of MEPS-based estimates is driven by small sample sizes, and incorporating the large amounts of data in the Blended Account greatly reduces this volatility. The per capita spending index (y axis) is a metric of the growth in spending per person relative to the value at the base year, 2000: The product of the index at any year and the dollars spent per capita in 2000 is the additional dollars spent per capita in the index year. Appendix pages A100–107 present a more complete comparison of MEPS Account data and the Blended Account data (see note 7 in text).

STUDY RESULTS

Data Comparison and Structure

Incorporating claims data with data on spending is important for obtaining stable estimates of spending trends. Annual per capita spending trends for four selected conditions (breast cancer, coronary atherosclerosis, leukemias, and diabetes mellitus with complications) varied widely in the period 2000–14, depending on whether only MEPS Account data or estimates from the Blended Account were used (exhibit 2). Noticeably, the year-to-year jumps in the MEPS
Account data were extreme, while the Blended Account data show very smooth trend lines. The volatility of condition-specific estimates in the MEPS Account data is driven by small sample sizes, and incorporating large amounts of data in the Blended Account greatly reduces this volatility (these differences are highlighted across numerous figures in pages A100–7 of the appendix).\(^7\) For this reason, the BEA does not publicly report MEPS Account data at the condition-specific level.

**Analysis**

We examined spending for a selected set of the thirty fastest-growing conditions. To identify these conditions, we applied an economywide deflator to remove inflation and normalize all spending statistics to 2014 levels. We excluded conditions for which per capita spending in 2014 was less than $10. Next, we excluded conditions that were classified as “other” (for example, other diseases of the nervous system) because these conditions tend to include a broad range of diagnoses.\(^{15}\) Finally, we ranked the remaining conditions by per capita spending growth rate to select the top thirty (exhibits 3 and 4).

While the top thirty conditions accounted for just 13 percent of the overall spending per capita in 2000, they accounted for 23 percent of the overall spending per capita in 2014 and explained 42 percent of the growth in real spending between 2000 and 2014. Without these conditions, annual per capita growth in health care spending would have decreased by approximately 1 percentage point per year, from 3.1 percent to 2.2 percent growth (data not shown). It is noteworthy that the faster growth for the top thirty conditions appears to be driven by higher average growth both in spending per case and in treated prevalence. However, the distribution of spending growth is specific to each condition, a point that has been highlighted previously.\(^{16}\)
EXHIBIT 3. 2014 spending per capita and per case, treated prevalence, and growth from 2000 to 2014 in components of spending for 30 high-growth detail conditions.

<table>
<thead>
<tr>
<th>Condition Name</th>
<th>Per Capita Spending 2014</th>
<th>Spending Per Case 2014</th>
<th>Treated Prevalence Per 100,000, 2014</th>
<th>Per Capita Spending Growth, 2000-14</th>
<th>Spending Per Case Growth, 2000-14</th>
<th>Treated Prevalence Growth, 2000-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Medical exam (e.g., annual check-ups)</td>
<td>$249.9</td>
<td>$627</td>
<td>39,869</td>
<td>2.12</td>
<td>1.30</td>
<td>1.63</td>
</tr>
<tr>
<td>2. Diabetes w/o complication</td>
<td>$176.6</td>
<td>$1,758</td>
<td>10,047</td>
<td>2.53</td>
<td>1.41</td>
<td>1.79</td>
</tr>
<tr>
<td>3. Rehabilitation care</td>
<td>$143.9</td>
<td>$6,111</td>
<td>2,354</td>
<td>3.84</td>
<td>1.25</td>
<td>3.08</td>
</tr>
<tr>
<td>4. Immunizations, screening, infectious disease</td>
<td>$81.5</td>
<td>$314</td>
<td>25,954</td>
<td>5.21</td>
<td>2.26</td>
<td>2.31</td>
</tr>
<tr>
<td>5. Chronic kidney disease</td>
<td>$90.3</td>
<td>$6,316</td>
<td>1,430</td>
<td>3.53</td>
<td>1.16</td>
<td>3.04</td>
</tr>
<tr>
<td>6. Septicemia (except in labor)</td>
<td>$72.6</td>
<td>$12,406</td>
<td>585</td>
<td>3.73</td>
<td>2.18</td>
<td>1.71</td>
</tr>
<tr>
<td>7. Osteoarthritis</td>
<td>$98.0</td>
<td>$1,923</td>
<td>5,093</td>
<td>1.89</td>
<td>1.36</td>
<td>1.40</td>
</tr>
<tr>
<td>8. Maintenance chemotherapy</td>
<td>$55.6</td>
<td>$14,276</td>
<td>389</td>
<td>3.58</td>
<td>2.22</td>
<td>1.62</td>
</tr>
<tr>
<td>9. Multiple sclerosis</td>
<td>$41.0</td>
<td>$16,938</td>
<td>242</td>
<td>5.59</td>
<td>4.63</td>
<td>1.21</td>
</tr>
<tr>
<td>10. ADHD, conduct, &amp; behavior disorders</td>
<td>$44.0</td>
<td>$1,709</td>
<td>2,574</td>
<td>3.82</td>
<td>1.70</td>
<td>2.24</td>
</tr>
<tr>
<td>11. Social admission</td>
<td>$35.9</td>
<td>$351</td>
<td>10,225</td>
<td>3.17</td>
<td>1.46</td>
<td>2.18</td>
</tr>
<tr>
<td>12. Rheumatoid arthritis &amp; related disease</td>
<td>$36.6</td>
<td>$3,441</td>
<td>1,064</td>
<td>2.70</td>
<td>2.06</td>
<td>1.31</td>
</tr>
<tr>
<td>13. Anemia disorders</td>
<td>$43.4</td>
<td>$913</td>
<td>4,750</td>
<td>2.00</td>
<td>0.92</td>
<td>2.18</td>
</tr>
<tr>
<td>14. Retinal detachments; defects; vascular occlusion</td>
<td>$35.0</td>
<td>$1,274</td>
<td>2,744</td>
<td>2.49</td>
<td>1.79</td>
<td>1.39</td>
</tr>
<tr>
<td>15. HIV infection</td>
<td>$34.4</td>
<td>$16,786</td>
<td>205</td>
<td>2.50</td>
<td>1.64</td>
<td>1.53</td>
</tr>
<tr>
<td>16. Dementia, dementia, and other cognitive disorders</td>
<td>$33.5</td>
<td>$3,542</td>
<td>947</td>
<td>2.10</td>
<td>1.92</td>
<td>1.10</td>
</tr>
<tr>
<td>17. Regional enteritis and ulcerative colitis</td>
<td>$26.1</td>
<td>$5,936</td>
<td>440</td>
<td>2.51</td>
<td>2.17</td>
<td>1.16</td>
</tr>
<tr>
<td>18. Acute and unspecified renal failure</td>
<td>$28.3</td>
<td>$3,976</td>
<td>711</td>
<td>2.25</td>
<td>1.19</td>
<td>1.89</td>
</tr>
<tr>
<td>19. Congestion and hemorrhagic disorders</td>
<td>$22.2</td>
<td>$3,469</td>
<td>640</td>
<td>2.94</td>
<td>2.90</td>
<td>1.01</td>
</tr>
<tr>
<td>20. Nutritional deficiencies</td>
<td>$14.9</td>
<td>$385</td>
<td>3,870</td>
<td>5.10</td>
<td>0.50</td>
<td>10.21</td>
</tr>
<tr>
<td>21. Conduction disorders</td>
<td>$18.1</td>
<td>$1,838</td>
<td>987</td>
<td>2.33</td>
<td>1.31</td>
<td>1.77</td>
</tr>
<tr>
<td>22. Hepatitis</td>
<td>$14.0</td>
<td>$3,473</td>
<td>403</td>
<td>3.41</td>
<td>3.95</td>
<td>0.86</td>
</tr>
<tr>
<td>23. Nausea and vomiting</td>
<td>$17.8</td>
<td>$895</td>
<td>1,989</td>
<td>1.92</td>
<td>1.23</td>
<td>1.56</td>
</tr>
<tr>
<td>24. Contraceptives and procreative management</td>
<td>$14.8</td>
<td>$662</td>
<td>2,231</td>
<td>2.16</td>
<td>1.31</td>
<td>1.65</td>
</tr>
<tr>
<td>25. Late effects of cerebrovascular disease</td>
<td>$11.8</td>
<td>$3,173</td>
<td>371</td>
<td>2.50</td>
<td>1.49</td>
<td>1.68</td>
</tr>
<tr>
<td>26. Primary heart disease</td>
<td>$12.3</td>
<td>$2,919</td>
<td>420</td>
<td>2.34</td>
<td>1.42</td>
<td>1.65</td>
</tr>
<tr>
<td>27. Leukemia</td>
<td>$12.2</td>
<td>$8,123</td>
<td>151</td>
<td>2.18</td>
<td>1.72</td>
<td>1.27</td>
</tr>
<tr>
<td>28. Liver</td>
<td>$12.6</td>
<td>$2,811</td>
<td>450</td>
<td>1.95</td>
<td>1.94</td>
<td>1.00</td>
</tr>
<tr>
<td>29. Inguinal infection</td>
<td>$11.7</td>
<td>$1,183</td>
<td>990</td>
<td>2.11</td>
<td>2.90</td>
<td>0.73</td>
</tr>
<tr>
<td>30. White blood cells diseases</td>
<td>$10.3</td>
<td>$1,647</td>
<td>626</td>
<td>2.22</td>
<td>1.11</td>
<td>2.00</td>
</tr>
<tr>
<td>All Other Conditions</td>
<td>$4,919.5</td>
<td>$1,127.6</td>
<td>436,283</td>
<td>3.36</td>
<td>1.27</td>
<td>1.07</td>
</tr>
</tbody>
</table>

**SOURCE** Authors’ analysis of data for 2000–14 from the Bureau of Economic Analysis (BEA) Blended Account (explained in the source information for exhibit 1). **NOTES** The first thirty conditions are the top thirty fastest-growing in terms of contribution to the growth rate in real per capita spending in 2000–14. Growth measures are in comparison to 2000 levels, adjusted for inflation to 2014 levels. Treated prevalence is defined as the number of people seeking treatment for a condition. This may differ from actual prevalence, defined as the number of people with the condition, whether or not they seek treatment. For comparative purposes, we also show data for the average of all other conditions, with per capita spending and treated prevalence calculated as a simple sum over the other conditions, and with per case spending calculated as the “all other conditions” per capita spending divided by the “all other conditions” treated prevalence count.
There is a wide degree of heterogeneity in spending growth across conditions and in the likely factors driving their growth. For example, exhibit 3 shows that per capita spending for hepatitis is driven by rising treatment costs rather than by growth in prevalence. In contrast, per capita spending for anxiety disorders is driven by growth in prevalence rather than by rising treatment costs. However, per capita spending for attention deficit hyperactivity disorder (ADHD), conduct, and behavior disorders is driven by growth in both prevalence and cost of treatment. More generally, the differences in the drivers of spending across conditions are unique to each condition, as can be seen in the appendix (information about the aforementioned conditions is on pages A41 and A50).7

For many of our top thirty conditions (such as rheumatoid arthritis, hepatitis, HIV infection, and multiple sclerosis), technology — specifically, the diffusion of new and costly drugs — is likely the primary driving factor behind their growth. For example, Food and Drug Administration (FDA) approval of Sovaldi explains the rapid rise in per capita spending for hepatitis in 2013 (see appendix page A50).7 Despite their high costs, many of these new technologies are viewed as cost-effective.17–20 We also saw rapid growth in spending for the “liveborn” condition, which includes low-birthweight newborns. Mortality rates in this area continue to decline, and there exists strong evidence of the marginal effectiveness of new treatments and technologies related to this condition.21

Technology can drive costs higher in other ways. Growth in both the treatment costs and treated prevalence of leukemias and maintenance chemotherapy, which is administered after the primary cancer treatment, continued to be high. Costs for these conditions are likely driven by changes in cancer treatment, but also by improving survival rates.22 As survival rates increase, more people are likely to need additional treatment to prevent the recurrence of cancer or
continued follow-up care after their primary treatment. Similar effects on treated prevalence are likely affecting the estimates for HIV infection, another area in which survival has greatly improved owing to the development of more effective treatments.23

For some technologies, an initial lack of awareness of conditions and treatments may impede the pace at which these technologies are used. Over our study period, we saw rapid growth in the treated prevalence of ADHD, conduct, and behavior disorders, which was a condition viewed as underdiagnosed and undertreated in the early part of our study period.24 The growth in spending was primarily driven by the growing number of people who receive treatment, as we saw the growth in the treated prevalence rate double over the sample period. In general, the treatment is viewed as cost-effective,25 although evidence also suggests that diagnosis may be driven by nonmedical factors.26

Anxiety disorders appear to show a similar pattern of limited diagnosis relative to the afflicted population. Research suggests a widespread prevalence of anxiety disorders, which are estimated to affect as much as 13 percent of the US population.27 However, only about one-third of those afflicted seek treatment, despite the robust evidence of its effectiveness.28 The doubling in growth of spending for anxiety disorders in our data may represent growing recognition of and treatment for this condition.29

SOURCE Authors’ analysis of data for 2000–14 from the Bureau of Economic Analysis (BEA) Blended Account (explained in the source information for exhibit 1). NOTES The conditions are the thirty fastest-growing in terms of contribution to the growth rate in real per capita spending in 2000–14. ADHD is attention deficit hyperactivity
Another trend we observed among the top thirty conditions was greater use of preventive-type services. These include immunization and screening, contraceptives and procreative management, social admission (routine child exams are among the most cited primary diagnoses in outpatient settings), and medical exam (annual checkup). Indeed, there is supportive evidence that many of these preventive treatments are cost-effective though not necessarily cost-saving. For example, one study of the elderly population found that increases in copayments reduced the use of preventive services and associated expenditures but also found an offsetting increase in hospitalizations. However, these lower expenditures were only 20 percent offset by hospitalizations, leading to a net reduction in spending from the increased copayments.

Another detail condition category where preventive services may apply is nutritional deficiencies. Nutritional deficiencies may be harmful to patients or exacerbate comorbidities. The underlying data show that the extreme rate of growth in treated prevalence (more than tenfold) is correlated with a jump in the reporting of vitamin B12 and vitamin D deficiencies (data not shown). The external evidence for the increasing treatment of vitamin D deficiency is strong, with researchers finding that diagnoses of vitamin D deficiency tripled from 2008 to 2010. Moreover, this research indicates that most of these diagnoses were prompted by exams or screenings without associated symptoms that would indicate vitamin D deficiency (for example, rickets symptoms). While there is interest in research linking vitamin D deficiency with non-skeletal conditions, the evidence is inconclusive. Rapid growth in the expanded use of vitamin D screening, testing, and treatment remains controversial.
Many of the top thirty conditions (such as osteoarthritis; retinal detachments, defects, and vascular occlusion; and delirium, dementia, and other cognitive disorders) are almost certainly affected by the aging of the population. However, population aging in combination with the rising obesity rate likely has a unique and growing impact on the prevalence and treatment of many conditions. The obesity rate among people older than age sixty-five has continued to rise, from about 18 percent in 2000 to 25 percent in 2009. Obesity is a major risk factor for diabetes without complications, which can lead to severe conditions such as chronic kidney disease and acute and unspecified renal failure. We found rapid growth in treated prevalence for all three conditions. However, the actual prevalence of chronic kidney disease has not grown substantially, based on clinical data drawn from a random sample of the population. A potential explanation for the discrepancy between the fast growth in treated prevalence in the BEA’s newly released estimates and the flat growth in actual chronic kidney disease in the population is that the awareness of the disease may be growing over the period of study. Indeed, there is evidence that just 7 percent of the population with the disease is aware of having it. The growth in chronic kidney disease may indicate improvement in detecting and treating this serious health condition, rather than increased prevalence. Studies have shown improved detection and treatment for other prominent conditions such as diabetes and hypertension, which are closely related to chronic kidney disease.

There are other conditions where trends in the spending data likely reflect multiple above-listed trends—for example, growth in rehabilitation care, which includes physical and occupational therapy. This growth is affected by the aging of the population, which may lead to a growing demand for rehabilitation services as the number of people with arthritis continues to rise. The demand for follow-up rehabilitation services may be growing in response to the rise in
orthopedic surgeries. These surgeries have grown rapidly over this period, with knee
replacements and spinal fusions growing by over 100 percent between 2000 and 2014, and hip
replacements growing by 70 percent.\textsuperscript{46} More work is needed to determine whether the expanded
use of rehabilitation services contributes to the observed increase in disability-free life-years.\textsuperscript{41}

Another condition whose growth may be attributable to a variety of factors is septicemia
(except in labor), which often occurs when the immune system is weakened.\textsuperscript{47} A weak immune
system could result from other illnesses (such as cancer or AIDS), the effects of aging, or
treatments that weaken the immune system (for example, chemotherapy). Therefore, growth in
treated prevalence for septicemia may be related to technological improvements: As more people
survive cancer, AIDS, and other serious health conditions, septicemia risk rises.

\textbf{DISCUSSION}

In our analysis of the Blended Account data, a common theme is that higher spending is often
related to patients’ seeking treatments that may provide important benefits, even if these
treatments drive expenditures significantly higher. This includes conditions for which major
advancements have been made, those for which technologies are increasingly being adopted, and
preventive-type treatments. It also includes expanded treatment for conditions such as vitamin D
deficiency — where treatment is occurring in the hope that it will provide preventive benefits
such as deterring bone loss, although there is controversy over whether that expanded treatment
is warranted for the population.

While there have clearly been advancements in treatment, the estimates of potential
inefficiency in the health care system are large, and inefficiency likely contributes to some of the
observed growth in spending for many of the conditions we considered.\textsuperscript{48} Even when new
innovations marginally improve outcomes, there is controversy over their prices relative to the
value of incremental innovations.\textsuperscript{49,50} If inefficient spending could be removed, the consumer
benefits from expanded treatment could be realized at a significantly lower cost. The availability
of detailed data in the Blended Account could help pinpoint potential areas for improving
efficiency in the health care system.

Another motivation for making these data available, despite their limitations, is that it
provides an opportunity for the estimates to be evaluated by various users and lead to potential
improvements in the BEA’s data, estimates, and methodology.

**Conclusion**

With the BEA’s release of more detailed condition-specific spending data in the Blended
Account, we found that a small subset of conditions highlights the role of changing technologies
and demographic factors that are driving spending higher. While these condition-specific data
offer a new resource to help understand spending patterns in the US, they also raise critical
questions related to cost-effectiveness and the need for more information on the quality of
treatments. We hope that the availability of these data will contribute to a more comprehensive
analysis of the value of US health care spending.

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REFERENCES

2. Bureau of Economic Analysis. National data, Table, Section 2—personal income and outlays, Table 2.5.5, Personal consumption expenditures by function; 2017 Available from: https://www.bea.gov/iTable/iTable.cfm?reqid=19&step=2


6. There are 263 conditions in the data, but the BEA consolidated the three “E code” conditions, which do not map to our component categories or aggregate chapters, into a single condition. Specifically, the three E codes (“E codes: All [external causes of injury and poisoning],” “E Codes: Transport; not MVT,” and “E Codes: Unspecified”) are combined into a category called (“E Codes: All”). See the online appendix, pages A7–8 (see note 7).

7. To access the appendix, click on the Details tab of the article online.


12. On average, 130 heart attacks per year are observed for Medicare enrollees in MEPS, while 30,000 are observed in the corresponding Medicare claims data.


15. Forty-two of the 261 detail conditions are such nonspecific conditions. Their spending is represented in the “all other conditions” row in exhibit 3. If the 42 nonspecific conditions had been included in our selection, only 7 would be in the top 30, and the growth in spending would be even more concentrated.


30. This includes contraceptive management such as long-acting reversible contraception, repeat prescription for contraceptive pills, and procreation services such as genetic counseling and artificial insemination.


46. These estimates are based on Healthcare Costs and Utilization Project (HCUP) data inpatient hospital data. Available from: https://hcupnet.ahrq.gov/

