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RESEARCH BRIEF

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An Updated Analysis of the Roles of Cost per Case and Treated Prevalence in Health Spending Growth

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This report presents data, methods, and findings from a study of the roles of treated disease prevalence (treated prevalence) and cost per person treated (cost per case) on the rate of increase in real per capita health spending by the civilian non-institutional population from 1996 through 2014. The work was funded by the Bureau of Economic Analysis (BEA) for comparison with estimates from their Healthcare Satellite Accounts (HCSA).

Background

In 2015 the Bureau of Economic Analysis (BEA) introduced their Health Care Satellite Account (HCSA) to track the cost of treatment by medical condition. One set of estimates in the HCSA is based fully on Medical Expenditure Panel Survey (MEPS) data, while another supplements MEPS with claims data to reduce volatility. In January 2016, BEA analysts published an article in Health Affairs based on HCSA data that includes a summary of the HCSA data and analytical methods.[1]

The analysis presented here is based on an approach that is described in a series of publications in Health Affairs.[2] There are various reasons these estimates of spending by medical condition will differ from the HCSA estimates as documented elsewhere.[3]

Data and Methods

This study involves two data sets that are constructed from MEPS:

1. Annual spending by medical condition for the civilian non-institutional population for the years 1996 through 2014
2. Annual treated prevalence rates by medical condition for the same population and years.

The first is a subset of data developed for an earlier publication that covers spending by medical condition for all segments of the population from 1996 through 2013.[4] An extensive description of source data and methods is described in the on line appendices and will not be repeated here.[5] In brief, it involves rescaling MEPS data for consistency with an independent estimate of the national health spending by the civilian non-institutional population. It also includes adjustments for a discontinuity in MEPS data that occurs in 2007.[6] For purposes of this study, the larger data set was updated to include 2014 data and then the civilian non-institutional population subset was extracted. The second data set reports treated prevalence by medical condition, which refers to the proportion of the total population receiving treatment for each condition during the year in question. These data are taken directly from MEPS and have also been adjusted to account for the 2007 discontinuity.

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These data sets contain the full set of medical conditions defined in MEPS. For this analysis, they are aggregated into a set of 61 medical conditions as defined by the Agency for Healthcare Research and Quality (AHRQ) in their reporting of spending by medical conditions, with some expanded detail bringing the total to 69 (see exhibit A-1). Two of these conditions were subsequently eliminated from the analysis due to zero prevalence in some years, resulting in a set of 67 medical conditions studied.[7] Spending estimates are converted to real (constant 2014 dollars) per capita amounts using the GDP deflator and MEPS estimates of the civilian non-institutional population. Cost-per-case for a given condition in a particular year is defined as spending per person treated and is equal to per capita spending divided by treated prevalence.

For each of the 67 medical conditions, changes in real per capita spending between year (t) and year (t+1)were divided into a treated prevalence (TP) and cost per case component (CPC) according to the following formulas:[8]

(1) treated prevalence component = $(TP_{t+1} - TP_t) \times (CPC_t + CPC_{t+1})/2$
(2) cost per case component = $(CPC_{t+1} - CPC_t) \times (TP_t + TP_{t+1})/2$

The resulting two components for each of the 67 medical conditions were then divided by real per capita health spending in year (t) to produce the 134 individual contributions to growth (CTG) that sum to the real per capita spending growth rate between years (t) and (t+1). These 134 CTGs were computed for each of the 18 year-to-year changes in the data set (1996-97, 1997-98 … 2013-14).

The share of the real per capita health spending growth attributable to TP can be computed by summing the TP components across all 67 conditions. The CPC share is computed similarly. The share of real per capita spending growth attributable to any medical condition, or combination of conditions is simply the sum of the TP and CPC components of these conditions. CTGs can also be used to compute medical condition contributions to changes in real per capita spending growth rates over time using the following formula:

(3) contribution to growth rate change = $CTG_2 - CTG_1$

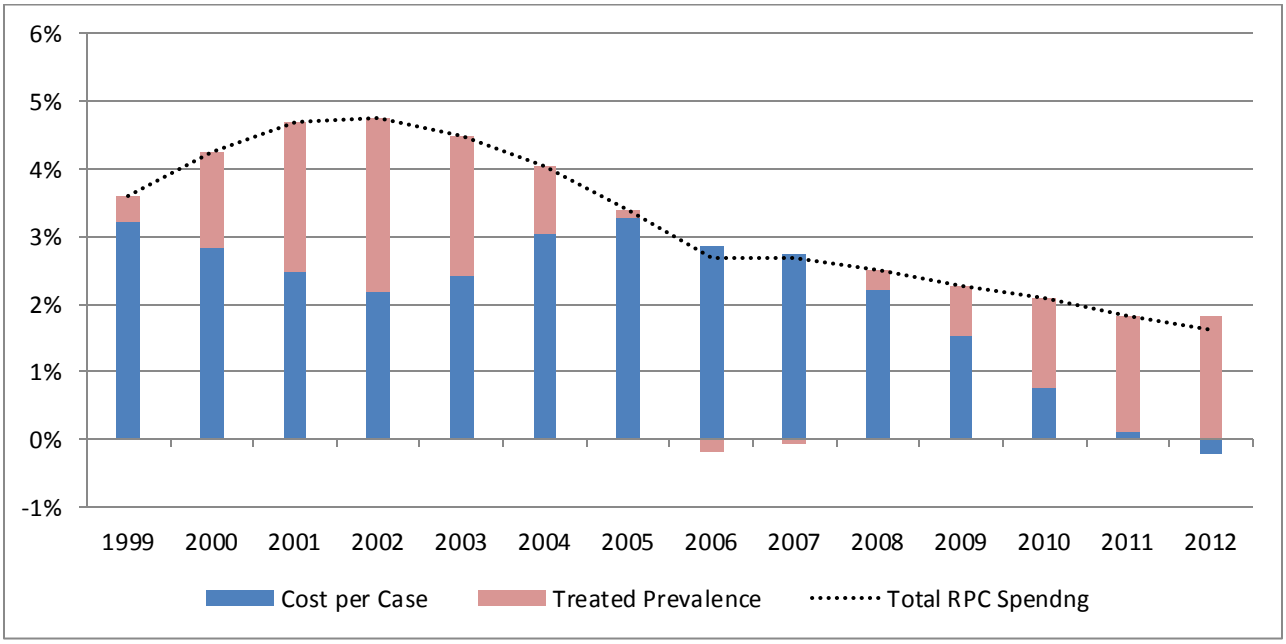
where CTG_2 represents the medical condition contribution to growth during the more recent time period and CTG_1 refers to the earlier time period. Appendices B and C provide details of this methodology along with example calculations.

Results

Exhibit A-2 displays data on treated prevalence, cost per case, and cost per capita for each of the 69 conditions, sorted by prevalence. To reduce noise, statistics are averages for the years 2012 – 2014. Screening and prevention has the highest per capita cost ($427). While its cost per case is fairly low at $760 per case, it has the highest per capita costs due to the high prevalence (56%) – the highest treated prevalence rate among all conditions. Perinatal conditions and appendicitis have highest costs per case at $20.5 thousand and $15.5 thousand respectively. However, due to very low prevalence, their per capita costs are quite low.

Exhibit 1 displays annual growth rates in real per capita costs, broken into the components driven by cost per case and treated prevalence. These rates were smoothed using a five year moving average (unsmoothed data are shown in Exhibit A-3 and are quite noisy). For example, the 1999 growth rates are an average of the growth rates from 1996-97 through 2000-01. Thus, while the annual data on real per capita costs cover 1996 through 2014, the five year averages cover 1999 through 2012 as shown in the exhibit. Real per capita cost growth peaked in 2001 and 2002 and then began a decline that lasted through 2012. The increase between 1999 and 2002, and subsequent decline through 2005 was due to treated prevalence as the cost per case component moved oppositely during this period. The decline from 2005 through 2012 was due to a dramatic decline in the cost per case component.

Exhibit 1: Treated Prevalence and Cost per Case Contribution to Real per Capita Spending Growth: 1999-2012



Note: Growth rates are 5-year moving averages.

Exhibit 2 displays the average annual growth in real per capita health spending for two periods: 1996-2005 and 2005-2014, broken into its treated prevalence and cost per case components. Real per capita health spending grew at a 4.0% annual rate from 1996 to 2005, with cost per case accounting for over three-fourths of this growth. From 2005 to 2014, the annual growth in real per capita health spending dropped by 1.9 percentage points to 2.1%, driven by a 2.0 percentage point decline in the cost per case component that was partially offset by a 0.1 percentage point increase in the treated prevalence component. The shares of growth accounted for by cost per case drops to about half. This is mainly because of much slower growth in cost per case.

Exhibit 2: Treated Prevalence and Cost per Case Contributions to Real per Capita Spending Growth: 1996-2005 and 2005-2014

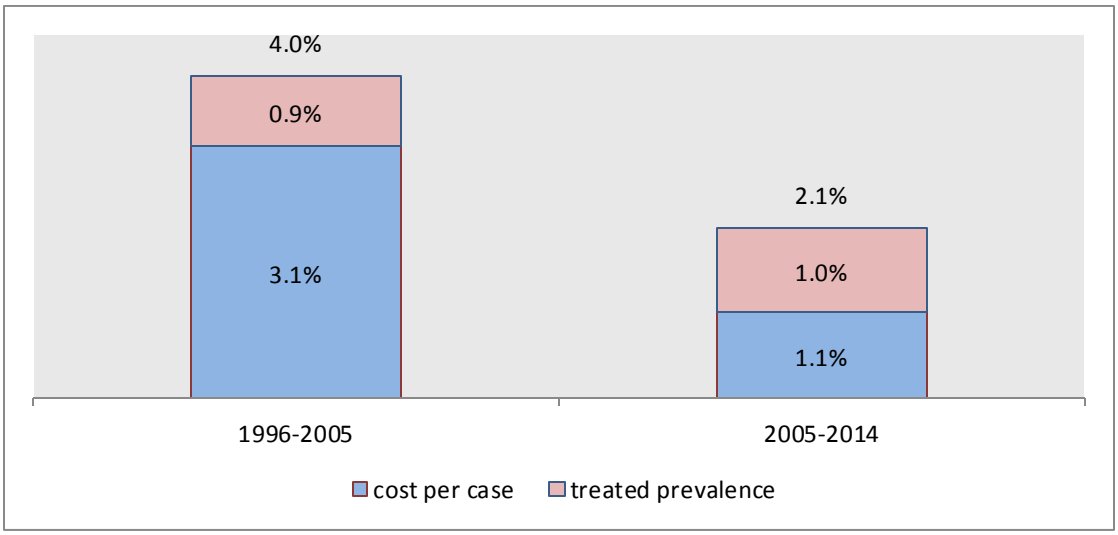


Exhibit 3 provides information on the medical conditions that contributed the most to the 2 percentage point reduction in the overall cost per case slowdown. Trauma (fractures and wounds) was the largest contributor, accounting for 10.5% of the 2 percentage point decline in the cost per case contribution to real per capita spending growth shown in Exhibit 2. Kidney disease was second at 9.8%. Overall, the seven listed conditions accounted for over half of the cost per case slowdown. (Statistics by major diagnostic category are provided in exhibit A-4.)

Of the 67 medical conditions, 53 experienced a slowdown in cost per case growth. The most notable exceptions are diabetes (cost per case growth increased from 1.2% to 5.9%) and cerebrovascular disease (cost per case growth increased from -1.6% to 2.6%) (data not shown).

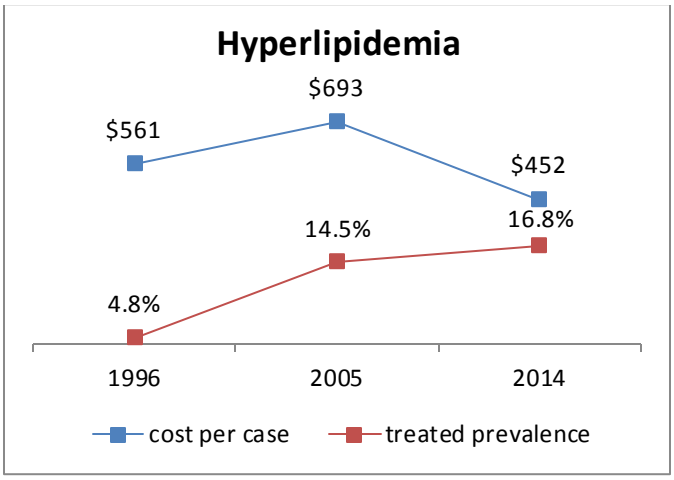
Exhibit 3: Conditions Contributing the Most to the Real Cost per Case Slowdown

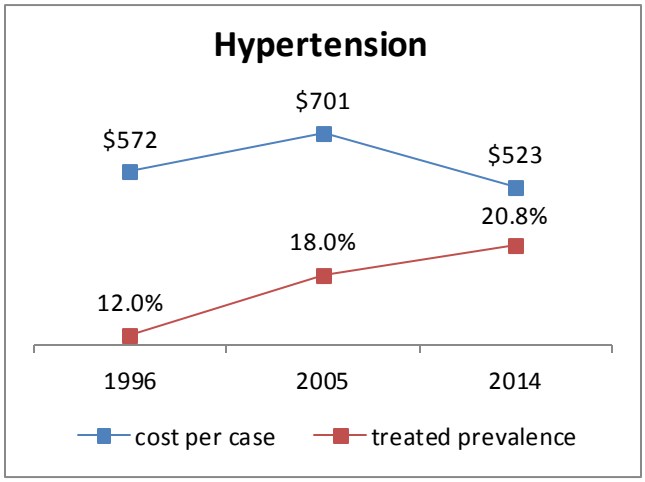
		CPC Growth Rates and Shares of Slowdwon			
Medical Condition	CPC 2005	96-05	05-14	Change	Share of CPC Slowdown
Trauma-related disorders	$2,122.47	4.6%	2.0%	-2.6%	10.5%
Kidney disease	$8,343.32	6.7%	-2.1%	-8.8%	9.0%
Cancer	$6,062.18	2.6%	0.0%	-2.5%	8.3%
Hypertension	$701.16	2.3%	-3.2%	-5.5%	6.4%
Skin disorders	$999.93	7.9%	0.1%	-7.8%	6.4%
Back problems	$1,749.30	4.0%	-0.7%	-4.7%	5.8%
Hyperlipidemia	$693.09	2.4%	-4.6%	-7.0%	5.7%

Note: The column labeled Share of CPC Slowdown refers to how much of the 2 percentage point drop in the CPC contribution to real per capita health spending growth (Exhibit 2) was attributable to the given medical condition.

Hyperlipidemia and hypertension are notable because they experienced significant slowing in both treated prevalence and cost per case growth rates (Exhibit 4). As a result, these two conditions combine to account for one-quarter of the overall slowdown real per capita health spending growth between the two periods.

Exhibit 4: TP and CPC for hyperlipidemia and hypertension: 1996, 2005, 2014





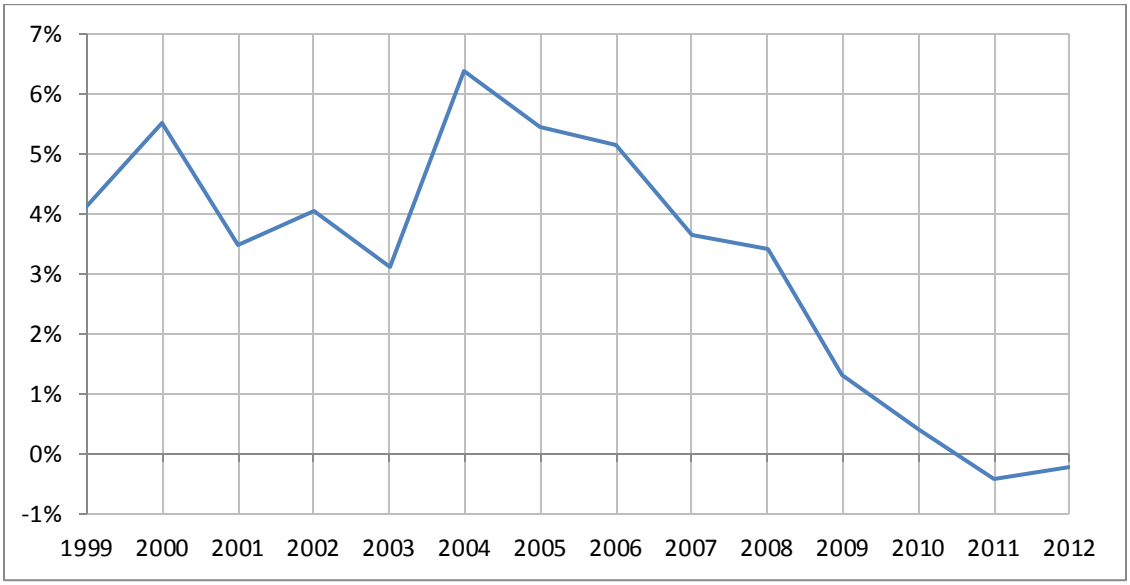
Discussion

During the period 1996 to 2005, real per capita health spending grew at 4.0% annually, with over three-quarters of this growth attributable to rising cost per case. This is consistent with previous findings.[9] During the next nine years, from 2005 to 2014, real per capita spending slowed to a 2.1% annual rate. All of this slowdown (and more) is attributable to a slowdown in the growth in cost per case as the growth in treated prevalence actually crept slightly upward. For this latter period, treated prevalence and cost per case each contributed about equally to the growth in real per capita spending.

It is important to recognize that the decline in cost per case growth is not explained by slower economy-wide price inflation because the analysis is conducted in constant 2014 dollars (cost per case, in this study, refers to real cost per case). Nor is the decline explained by slower health care price growth. Health care price growth exceeded economy-wide price growth by 0.6 percentage points from 1996 to 2005 and 0.5 percentage points from 2005 to 2015. Thus, after converting to constant dollars, health care prices contributed only 0.1 percentage points to the 2.0 percentage point slowdown. This suggests that the slowdown in cost per case was the result of slower growth in the volume of (goods and) services per case.

Among the 67 medical conditions in the study, trauma contributed the most to the decline in cost per case, accounting for over 10% of the overall effect. Exhibit 5 plots the growth in cost per case for trauma from 1999 through 2012 using a 5 year centered moving average to reduce noise. Trauma consists of wounds and fractures and makes substantial use of imaging. A recent study found that federal policies had successfully reduced the use and complexity of imaging starting in 2008. This could help explain the drop in trauma cost per case after 2008.

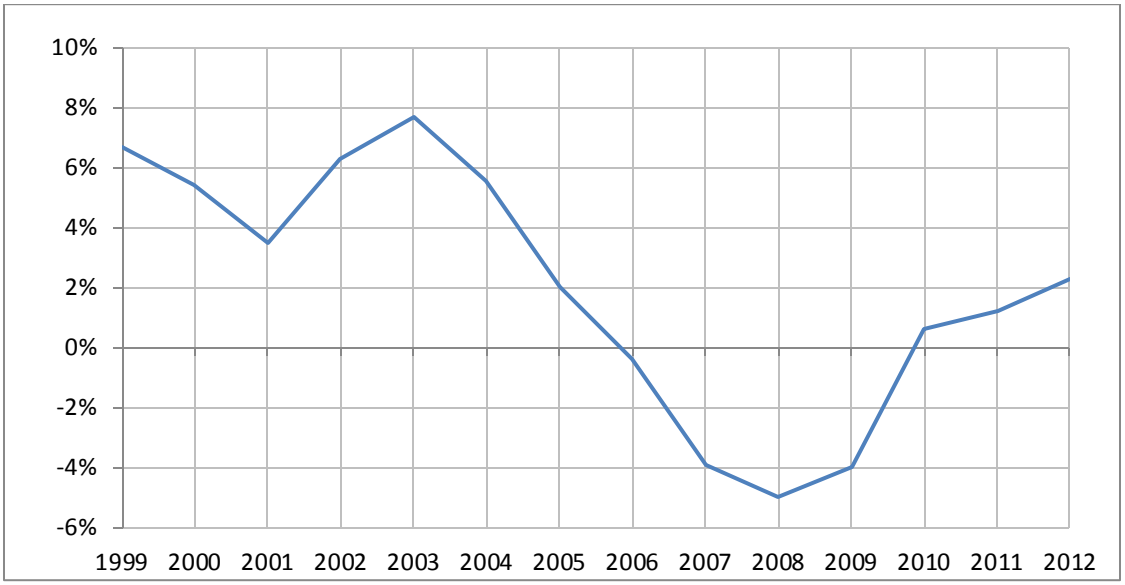
Exhibit 5: Annual growth in cost per case for trauma



Note: Growth rate is 5-year centered moving average.

For kidney disease, cost per case growth bottomed out at negative 5% in 2008 and has since been trending back up (Exhibit 6). Federal policies probably played a significant role in the slowdown. In 2007 through 2009, there was a substantial decline in the use of erythrocyte stimulating agents (ESAs) for dialysis patients due to an FDA warning in 2006 and a change in Medicare reimbursement policies for outpatient dialysis.[10]

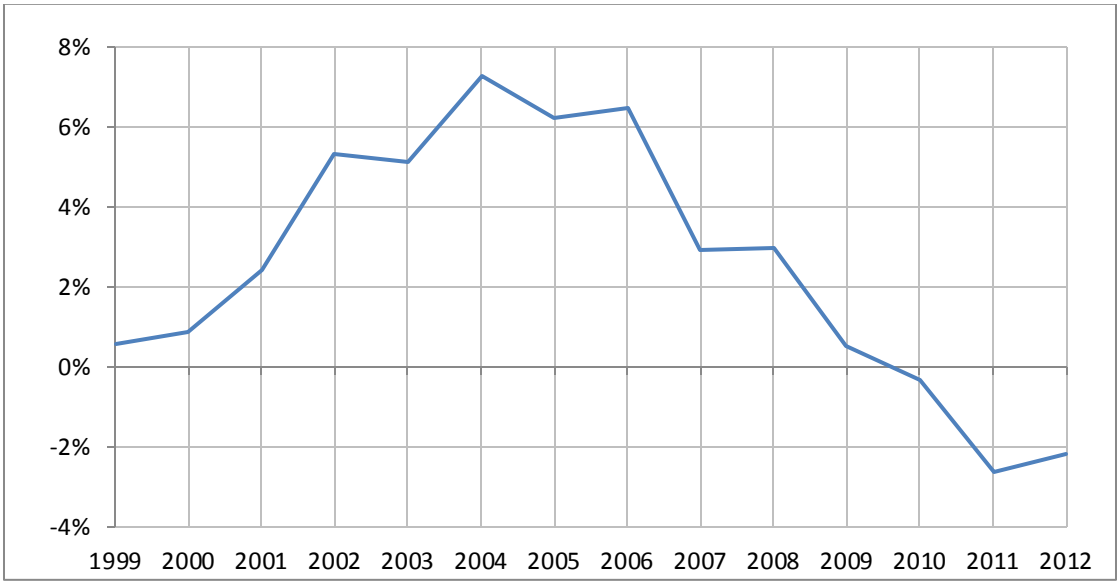
Exhibit 6: Annual growth in cost per case for kidney disease



Note: Growth rate is 5-year centered moving average.

The growth in cost per case for cancer exhibits a third pattern, peaking at over 7% growth in 2004 and then dropping to negative growth starting in 2010.

Exhibit 7: Annual growth in cost per case for cancer



Note: Growth rate is 5-year centered moving average.

Conclusions

The health spending growth slowdown is due to slower growth in cost per case, with treated prevalence showing little overall change between periods considered. This finding is consistent with published research comparing the period 2000 to 2005 with the period 2005 to 2010.[i] This is significant as the data source was the blended HCSA account that incorporates large claims data sets and, as such, differs from the MEPS data used in this study.

The slowdown in cost per case is not explained by prices of health care goods and services as there was little difference in real price growth between these two periods (health prices grew about a half percentage point faster than economy-wide prices in both periods). Thus, the slowdown must be related to changes in the quantity and mix of services associated with the annual treatment per person with a condition.

Seven medical conditions accounted for over half of the slowdown in cost per case and provide some clues as to potential underlying causes. For trauma and back problems, slower spending coincided with less intensive use of imaging. For kidney disease, less use of high-cost medications seems to have been a factor. In both instances, federal policies have been credited with the reduced spending. In the case of hypertension and hyperlipidemia, patent cliffs and subsequent shifts to low-cost generics would appear to be key causes. For cancer, the sources of the slowdown are less clear.

A more in depth analysis is needed, covering more of the high-impact medical conditions, before the sources of the slowdown can be fully described. This initial look suggests that less intensive use of imaging and expensive medications, brought about by federal policy changes, played a significant role. These are important accomplishments but would seem to be limited in their ability to impact growth longer term. One can only reduce the use of imaging and high cost medications so far. Furthermore, the vast majority of prescriptions are now generics and we may be close to the upper limit of what is achievable as long as research continues to produce new and improved medications.

APPENDIX A: SUPPLEMENTAL EXHIBITS

Exhibit A-1: AHRQ Medical Condition Definitions

CCS Codes	Condition Category
42013	Infectious diseases
16742	Cancer
46, 47	Non-malignant neoplasm
48	Thyroid disease
49,50	Diabetes mellitus
51, 52, 54 - 58	Other endocrine, nutritional and immune disorder
53	Hyperlipidemia
59	Anemia and other deficiencies
60 - 64	Hemorrhagic, coagulation, and disorders of white blood wells
65 - 75 (for 1996-2003), 650 - 663 (for 2004-2006), 650 - 670 (since 2007)	Mental disorders
76 - 78	CNS infection
79 - 81	Hereditary, degenerative and other nervous system disorders
82	Paralysis
84	Headache
83	Epilepsy and convulsions
85	Coma, brain damage
86	Cataract
88	Glaucoma
87, 89 - 91	Other eye disorders
92	Otitis media
93 - 95	Other CNS disorders
98,99	Hypertension
96, 97, 100 - 108	Heart conditions
109 - 113	Cerebrovascular disease
114 - 121	Other circulatory conditions arteries, veins, and lymphatics
122	Pneumonia
123	Influenza
124	Tonsillitis
125 , 126	Acute bronchitis and URI
127 - 134	COPD, asthma
135	Intestinal infection
136	Disorders of teeth and jaws
137	Disorders of mouth and esophagus
138 - 141	Disorders of the upper GI
142	Appendicitis
143	Hernias
144 - 148	Other stomach and intestinal disorders
153 - 155	Other GI
149 - 152	Gallbladder, pancreatic, and liver disease
156 - 158, 160, 161	Kidney disease
159	Urinary tract infections
162, 163	Other urinary
164 - 166	Male genital disorders
167	Non-malignant breast disease
168 - 176	Female genital disorders, and contraception
177 - 195	Complications of pregnancy and birth
196, 218	Normal birth/live born
197 - 200	Skin disorders
201 - 204	Osteoarthritis and other non-traumatic joint disorders
205	Back problems
206 - 209, 212	Other bone and musculoskeletal disease
210 - 211	Systemic lupus and connective tissues disorders
213 - 217	Congenital anomalies
219 - 224	Perinatal conditions
225 - 236, 239, 240, 244	Trauma-related disorders
237, 238	Complications of surgery or device
241 - 243	Poisoning by medical and non-medical substances
259	Residual codes
10, 254 - 258	Other care and screening
245 - 252	Symptoms
253	Allergic reactions

Exhibit A-1 (continued)

Additional Detail

Mental disorders

- anxiety and depression: 69, 72, 74
- dementia: 68
- other mental disorders: remaining mental disorders

Heart disease

- coronary heart disease: 100-102, 104
- congestive heart failure: 103, 108
- dysrhythmias: 105–107
- heart valve disorders: 96

Other care and screening

- screening and prevention: 10
    - this category also includes general exams, well child visits, vision exams, and immunizations where no medical condition was listed in MEPS.
- the remaining codes are included under other care and screening

COPD/asthma

- COPD: 127
- asthma: 128
- other respiratory disorders: 129-134

Notes: CCS codes refer to clinical classification software codes developed by AHRQ. The Additional Detail box above shows how the 61 AHRQ aggregate medical conditions shown in the previous box were expanded to a total of 69. For example, "mental disorders" in the AHRQ listing is replaced by three categories: anxiety and depression, dementia, and all other mental disorders.

Exhibit A-2: Medical Condition Descriptive Statistics

Medical Condition	Treated Prevalence	Cost per Case	Per Capita Cost
Screening and prevention	56.1%	$760	$427
Acute bronchitis and URI	20.9%	$193	$40
Hypertension	20.8%	$500	$104
Osteoarthritis and other non-traumatic joint disorders	20.7%	$1,220	$252
Hyperlipidemia	16.8%	$455	$77
Trauma-related disorders	16.8%	$2,533	$426
Anxiety and depression	15.9%	$1,231	$196
Other respiratory disorders	13.2%	$829	$109
Other care and screening	9.9%	$605	$60
Residual codes	9.7%	$944	$92
Skin disorders	9.6%	$1,136	$109
Back problems	9.3%	$1,677	$156
Disorders of the upper GI	9.3%	$1,245	$116
Diabetes mellitus	8.1%	$2,199	$179
Systemic lupus and connective tissues disorders	7.9%	$1,661	$132
Other CNS disorders	7.7%	$1,351	$105
Infectious diseases	7.6%	$1,178	$90
Influenza	7.4%	$163	$12
Other eye disorders	7.3%	$634	$46
Asthma	6.6%	$882	$59
Other endocrine, nutritional, and immune disorder	6.2%	$1,079	$67
Coronary heart disease	6.1%	$3,642	$222
Thyroid disease	5.8%	$363	$21
Cancer	5.7%	$6,355	$365
Female genital disorders, and contraception	5.5%	$996	$55
Intestinal infection	5.4%	$385	$21
COPD	5.2%	$1,481	$76
Symptoms	5.0%	$611	$31
Headache	4.7%	$535	$25
Disorders of teeth and jaw	4.4%	$196	$9
Other GI	4.0%	$1,514	$60
Otitis media	3.7%	$457	$17
Other mental disorders	3.6%	$4,110	$148
Urinary tract infections	3.2%	$1,180	$37
Allergic reactions	2.8%	$406	$11
Other bone and musculoskeletal disease	2.8%	$1,760	$49
Other circulatory conditions arteries, veins, and lymphatics	2.7%	$3,288	$89
Dysrhythmias	2.6%	$3,557	$93
Normal birth/live born	2.4%	$8,104	$197
Kidney disease	2.0%	$7,109	$145

Exhibit A-2: Medical Condition Descriptive Statistics (concluded)

Medical Condition	Treated Prevalence	Cost per Case	Per Capita Cost
Other urinary	2.0%	$1,107	$22
Cataract	1.9%	$1,621	$31
Male genital disorders	1.8%	$868	$16
Pneumonia	1.6%	$4,395	$72
Non-malignant neoplasm	1.6%	$1,487	$23
Amenia and other deficiencies	1.4%	$1,065	$15
Cerebrovascular disease	1.4%	$5,579	$77
Gallbladder, pancreatic, and liver disease	1.3%	$9,115	$122
Glaucoma	1.3%	$787	$10
Heart valve disorders	1.1%	$2,195	$25
Hereditary, degenerative and other nervous system disorders	1.1%	$5,152	$54
Poisoning by medical and non-medical substances	0.9%	$1,239	$11
Other stomach and intestinal disorders	0.9%	$7,119	$64
Hernias	0.8%	$5,094	$43
Epilepsy and convulsions	0.8%	$3,115	$26
Dementia	0.8%	$5,302	$41
Congenital anomalies	0.7%	$3,493	$26
Congestive heart failure	0.7%	$6,891	$48
Complications of pregnancy and birth	0.7%	$3,483	$24
Non-malignant breast disease	0.7%	$1,016	$7
Complications of surgery or device	0.5%	$3,416	$18
Hemorrhagic, coagulation, and disorders of white blood wells	0.5%	$8,376	$38
Tonsillitis	0.4%	$1,474	$6
Disorders of mouth and esophagus	0.4%	$963	$4
Appendicitis	0.2%	$15,537	$25
Perinatal conditions	0.2%	$20,575	$32
Paralysis	0.1%	$7,981	$11
CNS Infection	0.01%	$3,860	$0.3
Coma, brain damage	0.01%	$5,786	$0.3
Total All Conditions			**$5,417**

Note: These figures are averages for the years 2012-2014

Exhibit A-3: Treated prevalence and cost per case contributions to real per capita spending growth: 1997-2014

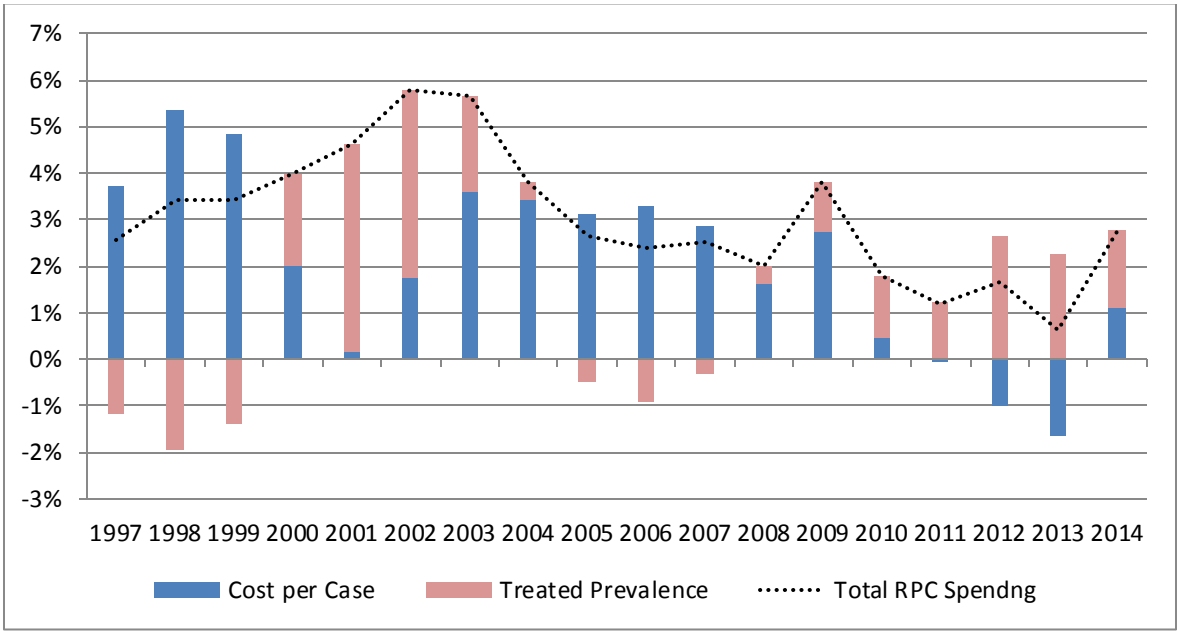


Exhibit A-4: Growth rate contributions by component, major diagnostic category, and time period

	Real Per Capita Spending				Prevalence Contribution				Cost per Case Contribution				2005
	96-05	05-14	Change	Share of Total RPC Change	96-05	05-14	Change	Share of Total RPC Change	96-05	05-14	Change	Share of Total RPC Change	Size of MDC (share of total RPC)
Blood	5.4%	4.4%	-1.0%	-0.3%	-0.8%	3.4%	4.2%	-1.6%	6.2%	0.9%	-5.2%	1.4%	1%
Circulatory	1.9%	-1.8%	-3.7%	35.3%	1.8%	-0.1%	-2.0%	20.8%	0.1%	-1.6%	-1.7%	14.5%	19%
Congenital	4.7%	1.9%	-2.8%	0.8%	-0.4%	1.9%	2.3%	-0.9%	5.1%	0.0%	-5.1%	1.7%	1%
Digestive	6.7%	4.2%	-2.5%	5.7%	1.4%	0.5%	-0.9%	2.8%	5.3%	3.7%	-1.6%	2.9%	7%
Endocrine	7.7%	6.4%	-1.3%	-2.0%	3.3%	3.3%	0.0%	-2.1%	4.3%	3.1%	-1.3%	0.1%	4%
Eye	2.7%	3.3%	0.7%	-0.3%	-3.1%	2.2%	5.2%	-2.1%	5.8%	1.2%	-4.6%	1.8%	1%
Genitourinary	7.0%	1.5%	-5.5%	13.2%	1.3%	2.2%	0.9%	-2.6%	5.7%	-0.7%	-6.4%	15.7%	5%
Infectious diseases	6.1%	4.5%	-1.7%	0.8%	-3.7%	1.0%	4.7%	-3.6%	9.8%	3.5%	-6.3%	4.4%	1%
Injury and poisoning	3.5%	2.3%	-1.1%	5.6%	-1.4%	0.6%	2.0%	-8.9%	4.9%	1.8%	-3.1%	14.5%	8%
Maternal	2.9%	2.3%	-0.5%	1.0%	0.0%	-0.2%	-0.2%	0.5%	2.9%	2.5%	-0.3%	0.6%	4%
Mental disorders	3.3%	3.4%	0.1%	-0.1%	3.3%	2.7%	-0.5%	2.3%	0.1%	0.7%	0.7%	-2.4%	7%
Musculoskeletal	6.1%	3.5%	-2.6%	10.0%	2.3%	1.9%	-0.5%	1.2%	3.7%	1.6%	-2.1%	8.8%	9%
Neoplasms	3.5%	-0.5%	-4.0%	16.7%	0.6%	-0.8%	-1.4%	4.7%	2.9%	0.3%	-2.6%	12.0%	9%
Nervous system	4.1%	1.4%	-2.7%	7.5%	-0.2%	1.7%	1.9%	-5.6%	4.4%	-0.3%	-4.6%	13.1%	5%
Other categories	4.4%	3.7%	-0.7%	1.3%	0.1%	3.3%	3.2%	-5.5%	4.3%	0.4%	-3.9%	6.8%	3%
Respiratory	2.0%	2.6%	0.6%	-1.1%	-0.8%	-0.1%	0.7%	-2.8%	2.9%	2.8%	-0.1%	1.7%	7%
Screening and prevention	4.8%	4.0%	-0.8%	1.6%	0.9%	1.5%	0.6%	-2.7%	3.9%	2.5%	-1.4%	4.3%	7%
Skin	6.5%	1.5%	-5.0%	4.3%	-1.2%	1.5%	2.7%	-2.7%	7.7%	0.0%	-7.7%	7.0%	2%
Grand Total	4.0%	2.1%	-1.9%	100%	0.9%	1.0%	0.2%	-9%	3.1%	1.0%	-2.1%	109%	100%

Notes: This exhibit provides information on how much of the slowdown was attributable to each of an all-inclusive set of disease groupings (major diagnostic categories or MDCs). The first set of columns focus on the full impact of each MDC on the slowdown. These MDC effects are broken into treated prevalence and cost per case components in subsequent columns. The last column indicates the relative size of each MDC in terms of their share of health spending in 2005. Larger MDCs are highlighted. Some figures may not add due to rounding.

APPENDIX B: METHOD FOR COMPUTING CONTRIBUTION TO ANNUAL GROWTH IN REAL PER CAPITA SPENDING

Exhibit B-1 illustrates the method for computing, for any given medical condition, the contributions of treated prevalence (TP) and cost per case (CPC) to the annual growth in real per capita health spending (RPC). The computations use hypertension as the example medical condition and 2005-06 as period of annual growth. The top row shows that RPC increased by $109, or 2.4%. The next rows show the change in TP, CPC, and RPC for hypertension between these two years, with TP up and CPC down, and RPC down. The final two rows compute the TP and CPC components of the change in RPC for hypertension, applying formulas (1) and (2):

(1) TP component = $(TP_{t+1} - TP_t) \times (CPC_t + CPC_{t+1})/2$
(2) CPC component = $(CPC_{t+1} - CPC_t) \times (TP_t + TP_{t+1})/2$

It shows that the increase in TP pushed hypertension RPC up by $4.1 while the decrease in CPC pushed it down by $5.0 for a net decrease of $0.9. The final column divides these dollar amounts by all conditions RPC in 2005 ($4,591) to represent their contributions to the 2.4% growth in all conditions RPC. It shows that hypertension contributed -0.02 percentage points to the 2.4% growth in all conditions RPC with TP contributing 0.09 percentage points and CPC contributing -0.11 percentage points.

Exhibit B-1: Calculation of hypertension contribution to annual real per capita (RPC) growth 2005-06

	2005	2006	change	Contribution to 2005-06 RPC growth rate
All conditions RPC	4,591	4,700	109	2.4%
Hypertention only				
Treated prevalence (TP)	18.0%	18.6%	0.6%	
Cost per case (CPC)	701	674	-27.4	
Real per capita spending (RPC)	126	125	-0.9	-0.02%
TP component of change			4.1	0.09%
CPC component of change			-5.0	-0.11%

APPENDIX C: METHOD FOR COMPUTING CONTRIBUTIONS TO THE SLOWDOWN IN RPC (1996-2005 VERSUS 2005-2014)

The calculations in Exhibit B-1 were applied to all medical conditions for each of the 18 year-to-year changes in the data set between 1996 and 2014. Exhibit C-1 shows how these statistics were used to compute the contribution of a particular medical condition (by TP and CPC component) to the slowdown in the average growth rate in all condition RPC when comparing 1996-05 to 2005-14. The first row shows that the average growth rate in all condition RPC slowed from 4.0% to 2.1% between these two periods, a slowdown of 1.9 percentage points. The next two rows show the contributions of TP and CPC to average RPC growth during each period and, hence, to the slowdown. These contributions are computed by summing the TP and CPC contributions across all medical conditions for each year-to-year change and then taking the average across all of the year-to year changes in each period. These results show how much of the growth in all conditions RPC was due to TP and to CPC in each period and how much TP and CPC contributed to the slowdown (CPC drove all of the slowdown and then some with TP pushing slightly in the opposite direction).

The next rows show the impact of hypertension, and its TP and CPC components, in these various dimensions. The TP and CPC contributions are the averages of the year-to-year contributions across the years in each period. The total hypertension impact (labeled RPC) is the sum of its TP and CPC components.

Exhibit C-1: Calculation of hypertension contribution to RPC slowdown (1996-05 vs 2005-14)

	average annual contribution 1996-05	average annual contribution 2005-14	contribution to slowdown
All conditions RPC	4.0%	2.1%	-1.9%
TP	0.9%	1.0%	0.2%
CPC	3.1%	1.0%	-2.1%
Hypertention only			
TP	0.1%	0.0%	-0.1%
CPC	0.1%	-0.1%	-0.1%
RPC	0.2%	0.0%	-0.2%

Endnotes

[1] Dunn A, Rittmueller L, Whitmire B. Health care spending slowdown from 2000 to 2010 was driven by lower growth in cost per case, according to a new data source. doi: 10.1377/hlthaff.2015.1109 HEALTH AFFAIRS 35,NO. 1 (2016): 132-140.

[2] Roehrig C. Mental disorders top the list of the most costly conditions in the United States at $201 billion. doi: 10.1377/hlthaff.2015.1659 HEALTH AFFAIRS 35, NO. 6 (2016) Data and methods appendix: .http://content.healthaffairs.org/content/suppl/2016/05/13/hlthaff.2015.1659.DC1/2015-1659_Roehrig_Appendix.pdf Roehrig CS, Rousseau DM. The growth in cost per case explains far more of US health spending increases than rising disease prevalence. Health Aff (Millwood). 2011; 30(9):1657–63. Roehrig C, Miller G, Lake C, Bryant J. National health spending by medical condition, 1996–2005. Health Aff (Millwood). 2009;28(2):w358–67.DOI: 10.1377/hlthaff.28.2.w358

[3] Highfill T. Comparing estimates of U.S. health care expenditures by medical condition, 2000-2012. Survey of Current Business, 2016, Vol 96, Issue 3.

[4] See endnote ii.

[5] see Data and methods appendix, endnote ii.

[6] http://altarum.org/publications/correcting-for-the-2007-meps-discontinuity-in-medical-condition-spending-and-treated-prevalence.

[7] The eliminated conditions were CNS infection and coma/brain damage.

[8] For each medical condition, these two components add exactly to the change in real per capita spending and, therefore, their shares add exactly to 100 percent.

[9] Roehrig/Rousseau endnote ii. Starr M, Dominiak L, Aizcorbe A. Decomposing growth in spending finds annual cost of treatment contributed most to spending growth, 1980–2006. Health Aff (Millwood). 2014;33(5):823–31.

[10] Personal communication, Jonathan Segal, University of Michigan Health System, May 2, 2017.