ALTARUM INSTITUTE
SYSTEMS RESEARCH FOR BETTER HEALTH

CENTER FOR SUSTAINABLE HEALTH SPENDING

RESEARCH BRIEF
June 2016

Correcting for the 2007 MEPS Discontinuity in Medical Condition Spending and Treated Prevalence

Charles Roehrig, PhD

Background

Under a contract with the Bureau of Economic Analysis (BEA), Altarum has updated estimates of spending by medical condition that were first published in 2009 and that covered the years 1996 through 2005. In this update, data from the Medical Expenditure Panel Survey (MEPS) were used to allocate the civilian non-institutional population portion of spending to medical conditions. The update involved producing estimates for 1996 through 2013 and was complicated by a change in the MEPS survey methodology in 2007 that resulted in a discontinuity in the medical condition spending and prevalence responses.[1]

In order to produce a consistent time series of spending by medical condition, it was necessary to develop adjustments for the spending discontinuity. Our methodology involved adjusting for the treated prevalence discontinuity as well. The adjustments were designed to approximate what treated prevalence and spending would have been in the 1996 through 2007 period if the new survey method had been used in those years (the new method was introduced in 2007 but only to half of those sampled that year).

The Discontinuity in Treated Prevalence

MEPS is a rolling survey in which cohorts of roughly 16,000 individuals are followed for two years. Thus, in each year, MEPS surveys one group of 16,000 individuals for the first time and another group of 16,000 individuals for the second time. The new survey methodology was introduced to the cohort being surveyed for the first time in 2007. The original methodology was used for those being surveyed for the second time in 2007. Under the new methodology, questions about whether individuals had been told they had certain "priority" medical conditions were moved toward the front of the survey. These "priority" conditions included:

- Hypertension
- Heart Disease
- Myocardial Infarction
- Stroke (Cerebrovascular Disease)
- Emphysema (COPD)
- High Cholesterol (Hyperlipidemia)
- Cancer
- Diabetes
- Arthritis
- Asthma

Questions on priority conditions are not used in our methodology to distribute spending to medical conditions. The relevant data are gathered in a

For more information, contact:

Charles Roehrig
Center for Sustainable Health Spending
Altarum Institute
charles.roehrig@altarum.org

Altarum Institute is a 501(c)(3) nonprofit health care research and consulting organization. Altarum integrates independent research and client-centered consulting to deliver comprehensive, system-based solutions that improve health and health care.

separate section of the survey in which individuals are asked about specific medical events such as physician visits and hospital stays. MEPS gathers spending information for each medical event and we allocate this spending to the medical conditions mentioned by the respondent in connection with the event. Our results were impacted because, under the revised ordering, the questions about "priority" conditions were moved ahead of the questions about individual encounters and clearly influenced the responses as to the reasons for these encounters.[2]

This effect is illustrated in Exhibit 1 which compares our average "treated" prevalence measures in 2008-2010 (the first three years under the new question ordering) with those in 2004-2006 (the last three years under the original ordering).[3] Medical conditions are defined according to the 260 individual AHRQ CCS codes except for cancer which is an overall measure formed by summing over the 35 different cancers included in the CCS scheme. We also include a category entitled general exams/well child visits based upon a special field in MEPS that identifies these types of visits. Many of these visits lack a medical condition code and rather than ignoring them, we report them as a separate "condition". We computed the change in prevalence for all conditions and then sorted from largest to smallest.

Exhibit 1 shows that the largest increases in our measure of treated prevalence are concentrated in the "priority" conditions. Of the 15 conditions with the largest growth in treated prevalence, 13 are related to the priority conditions and all of the priority conditions are represented. It is clear that the "priority" questions asked at the start of the survey, and included in the medical event picklist, increased the probability that these conditions would be recorded later as the cause for specific medical encounters.

In order to determine if these conditions were displacing other conditions, or just being added, we display the 8 largest declines in treated prevalence at the bottom of the exhibit. Of these, 5 could be viewed as offsets to the priority conditions. "Other screening" is an odd category that includes significant numbers of prescriptions for hypertension and hyperlipidemia. Back problems could be mentioned less often due to arthritis being mentioned more often. Other upper respiratory disease could have been shifted to COPD while other ill-defined heart disease and other circulatory disease could have been shifted to the more specific heart conditions.

Exhibit 1: Largest Increases and Decreases in Treated Prevalence Pre- and Post-2007

	average prevalence			
CONDITIONS WITH GREATEST INCREASE IN PREVALENCE	2004-2006	2008-2010	change	ratio
053 : Disorders of lipid metabolism	10.2%	16.6%	6.4%	1.63
204 : Other non-traumatic joint disorders	9.2%	13.4%	4.2%	1.46
098 : Essential hypertension	15.8%	19.8%	4.0%	1.26
203 : Osteoarthritis	0.8%	4.6%	3.8%	5.73
135 : Intestinal infection	9.3%	12.8%	3.4%	1.37
101 : Coronary atherosclerosis and other heart disease	1.0%	4.2%	3.2%	4.37
260 : General medical exam/Well child visit	44.2%	46.5%	2.2%	1.05
202 : Rheumatoid arthritis and related disease	0.5%	1.9%	1.4%	4.10
All Cancers (CCS 011-045)	4.2%	5.6%	1.4%	1.33
128 : Asthma	5.1%	6.5%	1.4%	1.26
100 : Acute myocardial infarction	0.6%	1.9%	1.3%	3.31
049 : Diabetes mellitus without complication	6.0%	7.3%	1.3%	1.21
127 : Chronic obstructive pulmonary disease and bronchiectasis	4.3%	5.5%	1.1%	1.26
259 : Residual codes; unclassified	7.0%	8.0%	1.1%	1.15
109 : Acute cerebrovascular disease	0.6%	1.4%	0.8%	2.30
CONDITIONS WITH GREATEST DECREASE IN PREVALENCE				
117 : Other circulatory disease	1.3%	0.9%	-0.4%	0.68
255 : Administrative/social admission	4.2%	3.8%	-0.4%	0.90
074 : Other mental conditions	8.2%	7.5%	-0.7%	0.91
104 : Other and ill-defined heart disease	1.9%	0.9%	-1.0%	0.49
123 : Influenza	4.6%	3.5%	-1.1%	0.76
134 : Other upper respiratory disease	11.2%	9.7%	-1.4%	0.87
205 : Spondylosis; intervertebral disc disorders; other back problems	9.7%	8.2%	-1.6%	0.84
258 : Other screening for suspected conditions	3.4%	1.5%	-1.9%	0.43

Source: author's analysis of MEPS

These changes in treated prevalence will almost certainly impact our distribution of spending by medical conditions since, for each encounter, we allocate spending based upon the conditions cited by the respondent and the increases in treated prevalence are indicative of conditions being cited more frequently. Before turning to the spending data, we will address the adjustments needed for a more accurate time series of treated prevalence estimates.

Treated Prevalence Adjustments

The objective of this section is to estimate adjustment factors that can be applied to the 17 conditions that appear to be most impacted by the 2007 change in the MEPS placement of questions on priority conditions. For each of these 17 conditions, we seek an adjustment factor to convert treated prevalence rates from 1996 through 2006 into what they would have been if the priority condition questions had been in the new order. The adjustment for 2007 would be less than that for the earlier years since half of the surveying was done with the old approach and half with the new.

In order to develop these adjustments, it is necessary to estimate how much of change in measured prevalence before and after the survey change was due to the change in the survey method and how much was due to any underlying trend. To measure the underlying trend, we look at the average annual change in prevalence during the period leading up to 2007 (2004 to 2006) and the period immediately following 2007 (2008-2010). We average these to form an estimate of the trend in effect between 2005 and 2009.[4] As shown in the second column of Exhibit 2, for the first 12 conditions the estimated trends range from -4% to +5% with 7 being negative. The survey effect for those with negative trends will be even higher than the initial ratio in Exhibit 1 while the opposite holds for those with positive trends. For the final 5 conditions in Exhibit 2, trends range from -5% to +2%. Since these conditions showed a drop in prevalence, a negative trend will reduce the estimated survey effect (in the sense of bringing the adjustment factor closer to 1) while a positive trend will increase the estimated survey effect (bringing the factor further below 1).

Exhibit 2: Calculation of Prevalence Adjustments

	2005 prevalence	estimated annual trend	2009 predicted	2009 actual	survey effect	survey effect 2007
053 : Disorders of lipid metabolism	10%	3%	12%	17%	1.43	1.18
204 : Other non-traumatic joint disorders	9%	-2%	8%	13%	1.60	1.23
098 : Essential hypertension	16%	2%	17%	20%	1.14	1.07
203 : Osteoarthritis	1%	4%	1%	5%	4.98	1.67
101 : Coronary atherosclerosis and other heart disease	1%	-4%	1%	4%	5.07	1.67
202 : Rheumatoid arthritis and related disease	0%	-1%	0%	2%	4.20	1.62
All Cancers (CCS 011-045)	4%	-2%	4%	6%	1.42	1.17
128 : Asthma	5%	5%	6%	6%	1.06	1.03
100 : Acute myocardial infarction	1%	-3%	1%	2%	3.78	1.58
049 : Diabetes mellitus without complication	6%	3%	7%	7%	1.06	1.03
127 : Chronic obstructive pulmonary disease and bronchiectasis	4%	-3%	4%	5%	1.40	1.17
109 : Acute cerebrovascular disease	1%	-1%	1%	1%	2.36	1.41
117 : Other circulatory disease	1%	-5%	1%	1%	0.84	0.91
104 : Other and ill-defined heart disease	2%	-4%	2%	1%	0.57	0.73
134 : Other upper respiratory disease	11%	0%	11%	10%	0.88	0.94
205 : Spondylosis; intervertebral disc disorders; other back problems	10%	2%	11%	8%	0.76	0.86
258 : Other screening for suspected conditions	3%	-1%	3%	1%	0.45	0.62

Source: author's analysis of MEPS. Note that 2005 and 2009 "actual" prevalence are three-year averages (2004-2006, and 2008-2010).

We apply this trend to the prevalence estimate for 2005[5] and predict what prevalence would have been in 2009 due to this trend. We assume that the difference between the actual 2009 prevalence and this trended prediction is due to the change in the survey methodology. We assume that the impact is best represented as a multiplicative adjustment and use the ratio of actual 2009 to the trended prediction as the adjustment factor.

For example, for disorders of lipid metabolism (hyperlipidemia), we estimate prevalence to be 10% in 2005 with an annual rate of increase of 3%. Applying the 3% annual trend yields a predicted prevalence of 12% in 2009 while our survey estimate is 17%. We assume the difference is due to the change in survey methods and is best summarized using the ratio of actual over

predicted (1.43). In other words, we assume that the change in the survey caused the measure of treated prevalence to increase by 43%. For each year in which the old method was used (1996 through 2006), we assume that using the new method would have increased the measure of treated prevalence by 43%. Thus, we multiply the survey estimates of treated prevalence for hyperlipidemia by 1.43 in each year from 1996 through 2006 to create consistency with the results from 2008 to present (the years in which the new method was used).

For 2007 we need a special adjustment because half were surveyed under the old method and half under the new. Let AF2007 be the desired adjustment factor and AF be the adjustment factors just developed that apply to 1996 through 2006. Let SURV2007 be the prevalence rate from the survey for 2007 and NEW2007 be our estimate of what the estimate would have been if all of 2007 had been done under the new survey method.

Then we seek to estimate AF2007 such that

(1) AF2007*SURV2007 = NEW2007.

We know that SURV2007 was based half on the old method and half on the new. Therefore

(2) SURV2007 i= average of NEW2007 (the rate using the new survey method) and OLD2007 (the rate using the old method).

We solve for AF2007 as follows:

(3) AF2007 = NEW2007/SURV2007 = NEW2007/(Average of NEW2007 and OLD2007)

But OLD2007 = NEW2007/AF so

(4) AF2007 = NEW2007/(Average of NEW 2007 and NEW2007/AF) or

(5) AF2007 = 2/(1+1/AF)

This is the formula used to estimate AF2007 in the last column of Exhibit 2 (labeled "survey effect 2007") where AF is the value in the next-to-last column (labeled "ratio").

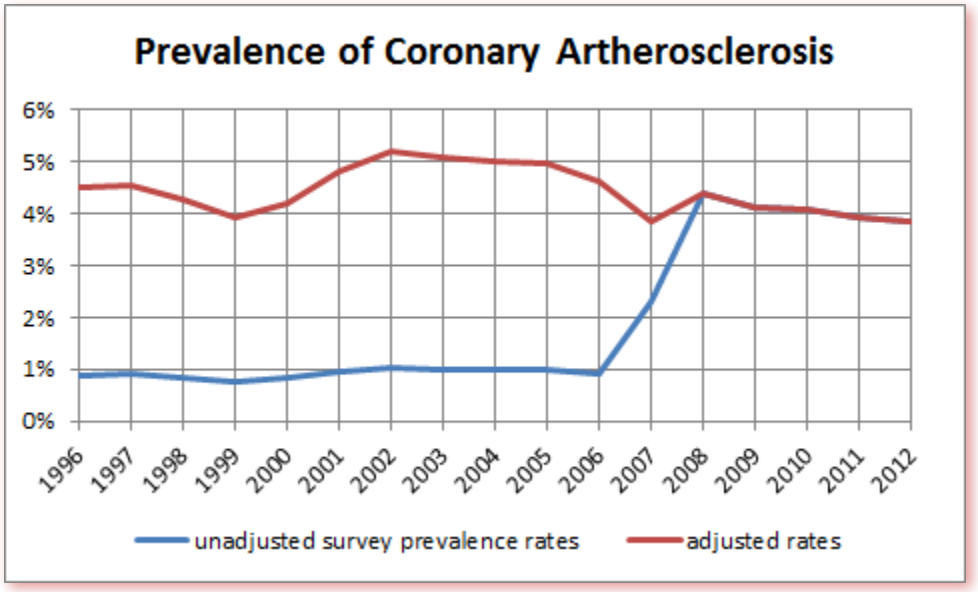
Characteristics of Adjusted Treated Prevalence Estimates

For each year from 1996 through 2006, the adjusted estimates of treated prevalence are simply the original estimates multiplied by the adjustment factor AF ("ratio" in exhibit 2). For 2007, the original estimate is multiplied by AF2007 ("survey effect 2007" in exhibit 2). There are no changes to the original rates for 2008 through 2013.

This means that between 1996 and 2006, annual percent changes in prevalence rates are unaffected by the adjustments. This seems appropriate since the survey methodology was consistent, year-to-year, and therefore should produce unbiased year-to-year percent changes. The same holds true for percent changes during the years 2008 to 2013. They are unaffected because there are no adjustments made. The only impact on percentage changes in prevalence comes for 2006 to 2007 and 2007 to 2008. This is appropriate because survey methods were not consistent, year-to-year, during this period.

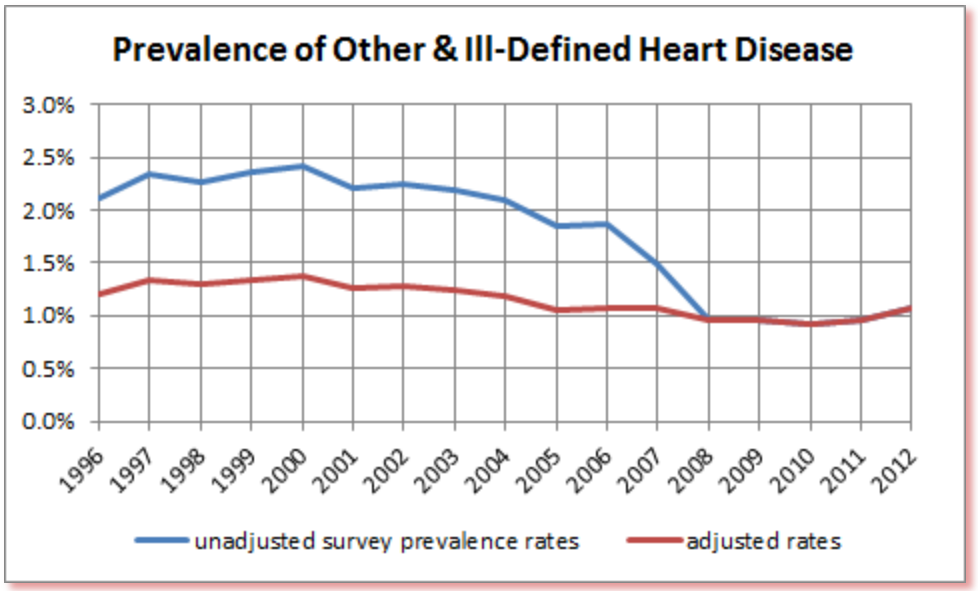
Exhibits 3 and 4 compare initial and adjusted estimates of treated prevalence for two illustrative conditions: coronary atherosclerosis and other and ill-defined heart disease. Exhibit 3 shows how the change in survey methods resulted in a large jump in estimated prevalence in 2007 with and additional jump in 2008. These discontinuities are eliminated in the adjusted data. Exhibit 4 shows that the change in survey methods had the opposite effect on treated prevalence estimates for other and ill-defined heart disease. For this condition, prevalence estimates shifted downward in 2007 and again in 2008. Again, the adjustments eliminate these discontinuities. Combined, these exhibits show how the priority questions regarding heart disease, which specifically use the term "coronary heart disease" when asking about heart disease, altered survey responses later in the survey regarding reasons for health system encounters. Many more responses were mapped to coronary arthrosclerosis and many fewer were mapped to other and ill-defined heart disease. Note that these adjustments are not fully offsetting as prevalence is adjusted up by about 4 percentage points for coronary atherosclerosis and down about 1 percentage point for other and ill-defined heart disease.

Exhibit 3: Original and Adjusted Treated Prevalence of Coronary Atherosclerosis



Source: author's analysis of MEPS

Exhibit 4: Original and Adjusted Treated Prevalence of Other & Ill-Defined Heart Disease



Source: author's analysis of MEPS

The Discontinuity in Spending

The amount spent on a medical condition in a given year (SPEND) is equal to the number of persons treated (TREATED) times the amount spent per person treated (also known as cost-per-case or CPC). The number of persons treated is equal to treated prevalence times total population (POP). In equation form:

(6) SPEND = TREATED x CPC

(7) TREATED = TREATED PREVALENCE x POP

Combining (6) and (7) gives the relationship between spending and treated prevalence:

(8) SPEND = TREATED PREVALENCE x POP x CPC

This formula shows that the discontinuity in treated prevalence should result in a discontinuity in spending. However, the exact nature of the spending discontinuity will depend upon whether or not CPC was also impacted by the change in survey methods.

The Potential Discontinuity in Cost per Case (CPC)

The expected impact of the change in the survey methods on CPC is not immediately obvious. For those medical conditions whose treated prevalence was driven up by the new survey method, CPC could be driven up, down, or remain the same, depending upon whether the newly mentioned events were more costly, less costly, or at the same cost as the originally mentioned events. There could also be an effect on conditions not related to the priority conditions since, for example, respondents might have become more likely to assign a priority condition as a second condition for an event. In such cases, the spending for the event would now be shared and the CPC lowered for the initial condition which, under the old survey method, would have been assigned all of the spending on the event.

Our initial focus is on the conditions showing changes in treated prevalence in the preceding section. For each of these conditions, we computed cost per case from equation (8) using the population counts included in the NHEA. We then converted CPC into real CPC (rCPC) using the GDP deflator from the Bureau of Economic Analysis (BEA). This eliminates the impact of economy-wide inflation from our before and after trend analysis. Exhibit 5 displays the 3-year average rCPC before and after the 2007 survey change. The last column shows the ratio of the rCPC after the change to before the change.

The first 12 conditions listed are those that showed an increase in treated prevalence after 2007. For all but one of these conditions, the rCPC was lower after the survey change. The last 5 conditions are those showing a decline in treated prevalence due to the survey change and 3 of these showed an increase in rCPC. The reduction in rCPC for the first set of conditions could be due to an increase in multiple conditions being attached to an event and the spending being shared. In other words, instead of substituting a priority condition for another condition, the new method caused the priority condition to be added. This conjecture is supported by an analysis of total treated prevalence across all conditions before and after the 2007. For 2004-2006, the average of the sum of treated prevalence across all CCS codes was 348 percent. For 2008-2010, the corresponding figure jumped to 378 percent. Thus, while the new survey method did lead to some substitution of priority conditions for other conditions (as represented by the last 5 conditions in Exhibits 2 and 5), evidence also suggests that they were often added on to form an increase in multiple condition events. It is also possible that increase in treated prevalence under the new methodology was primarily via less expensive events but we have not yet investigated this hypothesis.

Exhibit 5: Real Cost-Per-Case Before and After 2007

	average real cost-per-case		
	2004-2006	2008-2010	ratio
053 : Disorders of lipid metabolism	769	626	0.81
204 : Other non-traumatic joint disorders	1,241	970	0.78
098 : Essential hypertension	831	574	0.69
203 : Osteoarthritis	1,593	901	0.57
101 : Coronary atherosclerosis and other heart disease	3,129	3,181	1.02
202 : Rheumatoid arthritis and related disease	3,474	1,765	0.51
All Cancers (CCS 011-045)	7,552	6,267	0.83
128 : Asthma	873	857	0.98
100 : Acute myocardial infarction	12,716	4,092	0.32
049 : Diabetes mellitus without complication	1,831	1,745	0.95
127 : Chronic obstructive pulmonary disease and bronchiectasis	1,071	1,038	0.97
109 : Acute cerebrovascular disease	8,858	5,825	0.66
117 : Other circulatory disease	2,604	3,000	1.15
104 : Other and ill-defined heart disease	3,638	2,437	0.67
134 : Other upper respiratory disease	462	482	1.04
205 : Spondylosis; intervertebral disc disorders; other back problems	1,468	1,723	1.17
258 : Other screening for suspected conditions	700	529	0.76

Source: author's analysis of MEPS

CPC Adjustments. Our approach to developing adjustments for CPC is similar to that used to develop adjustments for treated prevalence. The objective is to adjust CPC for each of the years 1996 through 2007 to what it would have been under the new survey method. As with treated prevalence, a separate set of factors are needed for 2007 because the new survey method impacted only about half of the respondents. Findings are shown in Exhibit 6.

First we estimated the average annual trend in rCPC between 2005 and 2009 by averaging the trend from 2004 to 2006 with the trend from 2008 to 2010. This is shown in the second column of data in Exhibit 6. For the first 12 conditions in Exhibit 6, the trends range from -7% to +10%, a much broader range than for the trends in prevalence. For the bottom 5 conditions, trends range from -15% to +2%, again showing greater variance than for the prevalence trends.

We then applied this trend to the 2005 rCPC to predict 2009 rCPC based strictly on the trend continuing for these 4 years (third column of Exhibit 6). The survey effect is then estimated as the ratio of the actual 2009 rCPC and the predicted value based on the trend. The survey effect for 2007 is based upon equation (5). Note that the 2005 and209 rCPC values are the 3 year averages shown in Exhibit 5.

Exhibit 6: Calculation of CPC Adjustments

	2005 rCPC	estimated annual trend	2009 predicted	2009 actual	survey effect	survey effect 2007
053 : Disorders of lipid metabolism	769	-2%	701	626	0.89	0.94
204 : Other non-traumatic joint disorders	1,241	10%	1,792	970	0.54	0.70
098 : Essential hypertension	831	-4%	691	574	0.83	0.91
203 : Osteoarthritis	1,593	-3%	1,402	901	0.64	0.78
101 : Coronary atherosclerosis and other heart disease	3,129	8%	4,203	3,181	0.76	0.86
202 : Rheumatoid arthritis and related disease	3,474	-7%	2,600	1,765	0.68	0.81
All Cancers (CCS 011-045)	7,552	2%	8,143	6,267	0.77	0.87
128 : Asthma	873	0%	883	857	0.97	0.99
100 : Acute myocardial infarction	12,716	-2%	11,558	4,092	0.35	0.52
049 : Diabetes mellitus without complication	1,831	7%	2,369	1,745	0.74	0.85
127 : Chronic obstructive pulmonary disease and bronchiectasis	1,071	7%	1,390	1,038	0.75	0.86
109 : Acute cerebrovascular disease	8,858	4%	10,419	5,825	0.56	0.72
117 : Other circulatory disease	2,604	2%	2,777	3,000	1.08	1.04
104 : Other and ill-defined heart disease	3,638	-15%	1,868	2,437	1.30	1.13
134 : Other upper respiratory disease	462	5%	569	482	0.85	0.92
205 : Spondylosis; intervertebral disc disorders; other back problems	1,468	1%	1,531	1,723	1.13	1.06
258 : Other screening for suspected conditions	700	2%	751	529	0.70	0.83

Source: author's analysis of MEPS. Note that 2005 and 2009 "actual" rCPCs are the three-year averages (2004-2006, and 2008-2010) shown in Exhibit 5.

While the adjustments in Exhibit 6 were computed using rCPC, the adjustment factors are applicable to nominal CPC. The first 12 conditions in Exhibit 6 are those whose treated prevalence was found to have been increased by the change in survey methods and all show a CPC adjustment factor ("survey effect") less than one. Thus, we find that the new survey method resulted in higher treated prevalence but lower cost per case for each of these 12 conditions. The 5 conditions at the bottom of Exhibit 6 are those whose treated prevalence fell due to the change in the survey method. For 3 of these 5 conditions, we estimate that the change in the survey method caused CPC to increase.

Spending Adjustments

Combining the Prevalence and CPC Effects. Because spending is simply the product of treated prevalence and CPC, the spending adjustment is the product of the prevalence and CPC adjustments. Calculations are shown in Exhibit 7.

Exhibit 7: Calculation of Spending Adjustments

	prev effect	rCPC effect	spending effect	spending 2007
053 : Disorders of lipid metabolism	1.43	0.89	1.27	1.12
204 : Other non-traumatic joint disorders	1.60	0.54	0.87	0.93
098 : Essential hypertension	1.14	0.83	0.95	0.97
203 : Osteoarthritis	4.98	0.64	3.20	1.52
101 : Coronary atherosclerosis and other heart disease	5.07	0.76	3.84	1.59
202 : Rheumatoid arthritis and related disease	4.20	0.68	2.85	1.48
All Cancers (CCS 011-045)	1.42	0.77	1.09	1.04
128 : Asthma	1.06	0.97	1.03	1.01
100 : Acute myocardial infarction	3.78	0.35	1.34	1.14
049 : Diabetes mellitus without complication	1.06	0.74	0.78	0.88
127 : Chronic obstructive pulmonary disease and bronchiectasis	1.40	0.75	1.05	1.02
109 : Acute cerebrovascular disease	2.36	0.56	1.32	1.14
117 : Other circulatory disease	0.84	1.08	0.90	0.95
104 : Other and ill-defined heart disease	0.57	1.30	0.74	0.85
134 : Other upper respiratory disease	0.88	0.85	0.75	0.86
205 : Spondylosis; intervertebral disc disorders; other back problems	0.76	1.13	0.86	0.92
258 : Other screening for suspected conditions	0.45	0.70	0.32	0.48

Source: author's analysis of MEPS

For each of the first 12 conditions, the prevalence and CPC effects are in opposite directions. For nine of those conditions, the prevalence effect dominates and spending was driven up by the survey change. For the remaining three, the net effect was a decrease in spending. The prevalence and CPC effects were in opposite directions for three out of the five last conditions. However, in all cases, the prevalence effect dominated and the spending adjustment factor was less than one. In summary, for all but three of the 17 conditions the spending adjustment is in the same direction as the prevalence adjustment.

The three exceptions are hypertension, diabetes, and other non-traumatic joint disorders. It is a bit counterintuitive to find that the change in survey method caused these three conditions to be mentioned more often (prevalence up) while also causing estimated spending to fall. The likely explanation is related to the fact that the estimated impact of the survey change on prevalence for each of these conditions is relatively small compared to the estimated impact on other conditions that often appear along with these conditions. For hypertension and diabetes, the survey impact on prevalence was quite small with adjustment factors of 1.14 and 1.06 respectively. On the other hand, the survey impact on coronary atherosclerosis was dramatic with an adjustment factor of 5.07. It seems likely that the new survey method would cause medical events associated with diabetes and hypertension to be more likely to have coronary arthrosclerosis added and, therefore, to have a smaller share of the event spending allocated to diabetes and hypertension. For other non-traumatic joint disorders, there is an increased likelihood of being paired with osteoarthritis and rheumatoid arthritis as the prevalence of these conditions also jumped dramatically with adjustment factors of 4.98 and 4.20.

Implementation and Impact of Spending Adjustments

In our approach to estimating national health spending by medical condition, MEPS data provide estimates of the percentage distribution of spending across medical conditions for the civilian non-institutionalized population. These percentage distributions are computed separately for each of the following categories of health care services and products:

(9) Hospital care
(10) Physician and clinical services
(11) Other professional services
(12) Dental services
(13) Home health care
(14) Nursing home care
(15) Prescription drugs

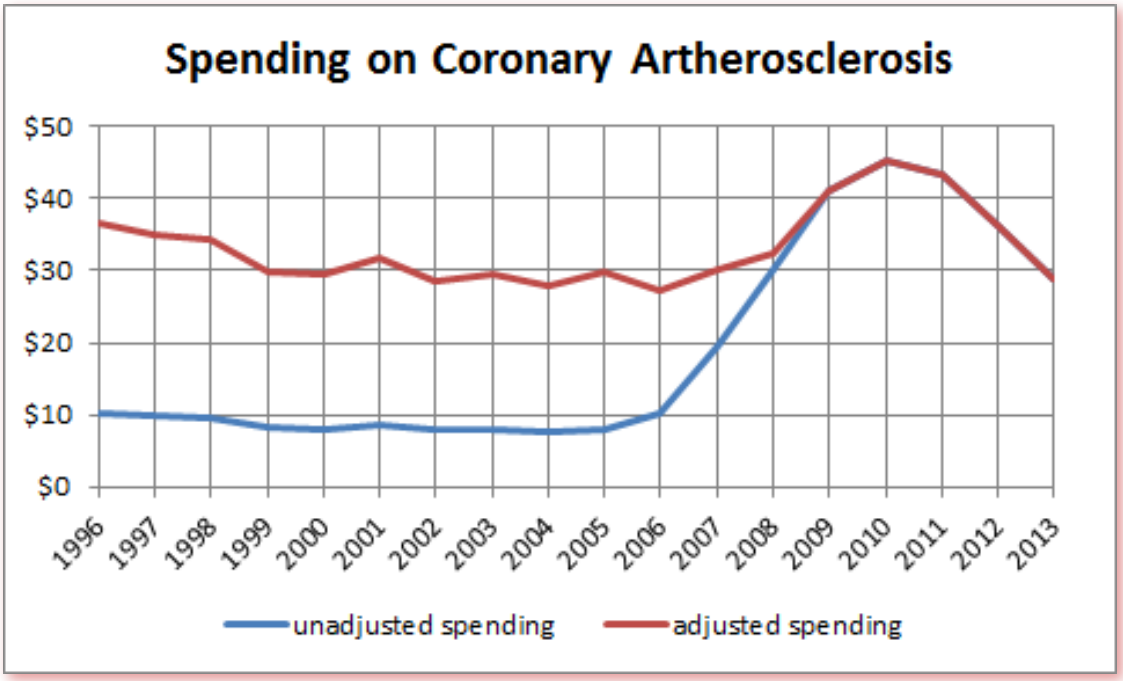
We estimate spending by medical condition within each service/product category by applying these percentage distributions to our NHEA-based estimates of total spending within each category.[6]

Our approach to computing the percentage distributions across medical conditions for each service/product category is described below using hospital spending as our example:

1. Estimate MEPS hospital spending by individual medical condition.
2. For each of the 17 medical conditions shown to be impacted by the 2007 discontinuity, multiply MEPS spending by the appropriate adjustment factors shown in Exhibit 7 (only years 1996 through 2007 are affected).
3. Estimate the resulting percentage distribution of (adjusted) MEPS spending across medical conditions.

Exhibits 8 and 9 show the impact of the spending adjustments for coronary atherosclerosis and other and ill-defined heart disease, the same conditions used previously to illustrate the prevalence adjustments. Unadjusted spending on coronary atherosclerosis stays relatively constant at about ten billion dollars every year through 2006 and then jumps abruptly to 36 billion dollars in 2008. Adjusted spending is about 30 billion dollars through 2006, making the increase in 2008 much less pronounced. Note that there is a strong upward trend between 2008 and 2010 so the increase in adjusted spending between 2006 and 2008 seems appropriate.

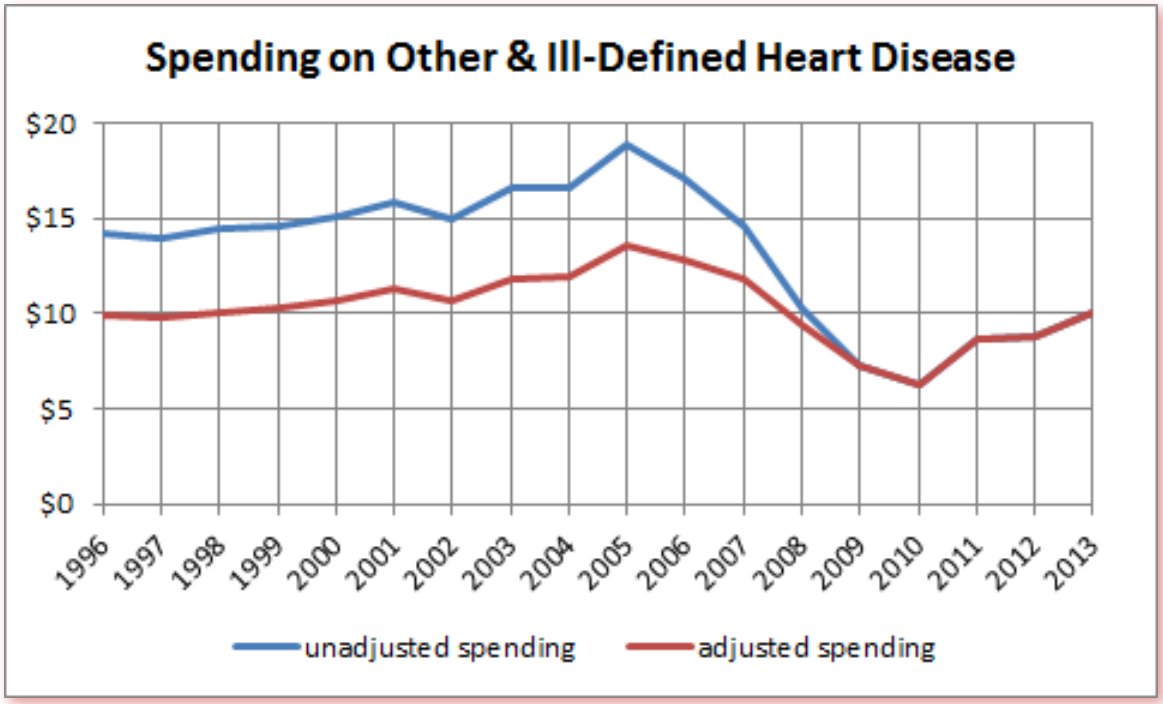
Exhibit 8: Unadjusted and Adjusted Spending on Coronary Atherosclerosis



Source: author's calculations. Spending estimates are for the civilian non-institutional population from the spending by medical condition database developed according to the methodology described here.

For other and ill-defined heart disease, unadjusted spending grows from 14 billion dollars to 18 billion dollars between 1996 and 2005 and then drops to 10 billion in 2008. Adjusted spending is lower by a factor of 0.74 between 1996 and 2006, growing from 10 billion dollars to 13 billion dollars. While the drop in spending between 2006 and 2008 is still substantial, it is much smaller and is consistent with the trend between 2008 and 2010.

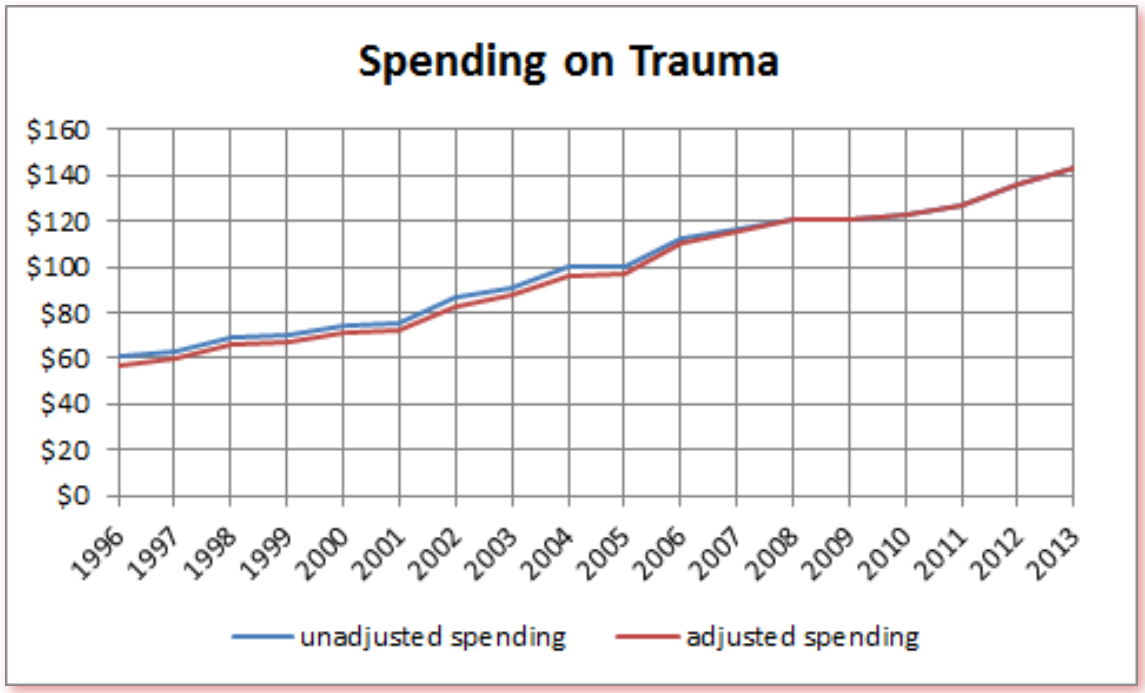
Exhibit 9: Unadjusted and Adjusted Spending on Other & Ill-Defined Heart Disease



Source: author's calculations. Spending estimates are for the civilian non-institutional population from the spending by medical condition database developed according to the methodology described here.

Our adjustments impact spending on all medical conditions, not just those for which we developed specific adjustment factors. Since total spending across all conditions is held fixed, and spending is increased for most of the priority conditions, spending is decreased for each of the remaining conditions. This is shown in Exhibit 10 using trauma as an illustrative example of a medical condition was not included in the 17 for which we developed specific adjustments. As shown, adjusted spending is slightly lower (by about 5%) than unadjusted spending until they converge in 2008. This means that the adjustment has led to a slightly faster increase in spending on trauma between 1996 and 2008. This is due to the increased weight given to coronary heart disease with the adjustments, combined with the fact that spending on this condition actually falls between 1996 and 2008 (see Exhibit 8).

Exhibit 10: Unadjusted and Adjusted Spending on Trauma



Source: author's calculations. Spending estimates are for the civilian non-institutional population from the spending by medical condition database developed according to the methodology described here.

[1] See Chevarley, "Does Moving the Condition Questions to the Beginning of Round 1 in the Medical Expenditure Panel Survey Produce Different Condition Estimates?" http://meps.ahrq.gov/mepsweb/data_stats/Pub_ProdResults_Details.jsp?pt=Conference+Proceedings&opt=3&id=1237

[2] According to Chevarley (see previous footnote), *The panel 12 change also involved moving the priority condition questions to the beginning of the round 1 interview, before the collection of the medical events. For persons identified by the questions to have a specified condition, the identified condition is added to the condition roster for that person. If a condition on the condition roster is identified as the reason for a medical event, then the interviewer can select that condition from the condition roster instead of having to type it.*

[3] We also did the comparison between the two 2007 cohorts. However, this cuts the sample size and also compares a group being surveyed for the second time with a group being surveyed for the first time which could introduce its own biases. In order to increase the sample size and reduce noise, we averaged over the three years just before and after the change in the MEPS survey method.

[4] Annual trend ={ (2006 prev/2004 prev)*(2010 prev/2008prev)}^(1/4) - 1

[5] We estimate 2005 and 2009 prevalence with three-year averages (2004-2006 and 2008-2010) in order to reduce noise.

[6] The NHEA provide spending by service and product but do not isolate spending by the civilian non-institutionalized population. We developed estimates of the share of NHEA spending due to the civilian non-institutionalized population for each service/product category. A detailed description of methods can be found here.