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Reconciling Medical Expenditure Estimates from the MEPS and NHEA, 2007

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Objective: Provide a comparison of health care expenditure estimates for 2007 from the Medical Expenditure Panel Survey (MEPS) and the National Health Expenditure Accounts (NHEA). Reconciling these estimates serves two important purposes. First, it is an important quality assurance exercise for improving and ensuring the integrity of each source's estimates. Second, the reconciliation provides a consistent baseline of health expenditure data for policy simulations. Our results assist researchers to adjust MEPS to be consistent with the NHEA so that the projected costs as well as budgetary and tax implications of any policy change are consistent with national health spending estimates.

Data Sources: The Medical Expenditure Panel Survey produced by the Agency for Healthcare Research and Quality, and the National Health Center for Health Statistics and the National Health Expenditures produced by the Centers for Medicare & Medicaid Service's Office of the Actuary.

Results: In this study, we focus on the personal health care (PHC) sector, which includes the goods and services rendered to treat or prevent a specific disease or condition in an individual. The official 2007 NHEA estimate for PHC spending is \$1,915 billion and the MEPS estimate is \$1,126 billion. Adjusting the NHEA estimates for differences in underlying populations, covered services, and other measurement concepts reduces the NHEA estimate for 2007 to \$1,366 billion. As a result, MEPS is \$240 billion, or 17.6 percent, less than the adjusted NHEA total.

Keywords: national health accounts, medical expenditures, health care costs, health financing, health resource

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Introduction

The National Health Expenditure Accounts (NHEA) and Medical Expenditure Panel Survey (MEPS) provide comprehensive estimates of health care spending in the U.S. NHEA estimates are produced annually by the Office of the Actuary at the Centers of Medicare & Medicaid Services (CMS). Based on aggregate provider revenue data, administrative records of publicly administered programs, and a variety of other data sources, the NHEA provides aggregate estimates for the entire U.S. population of a full range of health care expenditures, including government administration, net cost of insurance, public health services and investment in research, structures, and equipment. As such, the NHEA are typically referenced as the official U.S. government estimates of overall health spending, and are the only data available by type of service and source of funding. MEPS is produced annually by the Agency for Health Care Research and Quality (AHRQ) and the National Center for Health Statistics. It, too, provides detailed estimates of health expenditures, but MEPS estimates are based on person-level information from a nationally-representative sample of households in the civilian, non-institutionalized population. Analysts often use the MEPS and NHEA in concert, with MEPS providing person-level data on expenditures, insurance coverage, and demographics and NHEA providing aggregate national health spending totals that are considered the most comprehensive estimates available. Together, these two sources of health spending can be used for microsimulation models for projecting health spending.

Study Data and Methods

In this paper, we compare NHEA and MEPS while focusing on 2007 in order to make use of detailed establishment estimates from the U.S. Census Bureau's quinquennial Economic Census (U.S. Census Bureau, 2007). Reconciling MEPS and NHEA estimates serves two important purposes. First, it is an important quality assurance exercise for improving and ensuring the integrity of each source's estimates. Identifying service types and sources of payment with larger gaps helps AHRQ and CMS focus future research efforts aimed at improving their respective expenditure estimates. Second, a detailed MEPS-NHEA reconciliation offers useful guidance to analysts seeking to align MEPS with NHEA, to obtain a consistent baseline of health expenditure data for policy simulations and incidence analyses requiring household-level data. (Heffler, Nuccio, & Freeland, 2009; Cohen, Cohen, & Banthin, 2009).

Although each source provides a measure of national spending on personal health care (PHC), unadjusted estimates are significantly different. We make adjustments to account for the differences in underlying populations, covered services, and other measurement concepts to reconcile the expenditure estimates. Once we adjust the NHEA to make it consistent with MEPS, we compare and discuss potential reasons for the differences for each service category and source of payment. We also discuss how the expenditure estimates have changed since the

previous reconciliations on 1996 and 2002 data (Selden et al., 2001; Sing, Banthin, Selden, Cowan, & Keehan, 2006).

NHEA

The NHEA measures total health spending in the U.S. by payers and providers of goods and services and public health services and investment (CMS, 2012a, 2012b). In this study, we focus on the Personal Health Care (PHC) sector, which includes the goods and services rendered to treat or prevent a specific disease or condition in an individual. The latest NHEA estimate for PHC spending in 2007 is \$1,915 billion (83 percent of total health spending). Exhibit 1 presents the unadjusted NHEA estimates for 2007 by service and source of payment categories.

The Office of the Actuary develops NHEA expenditure totals by type of service using aggregate estimates of provider revenues from data sources, such as the U.S. Census Bureau's Economic Census and Service Annual Survey, the American Hospital Association (AHA), IMS Health (a market research firm that monitors drug sales from pharmacies), and government administrative data. The Office of the Actuary does not directly collect any of the data, but uses a variety of surveys and other data sources to construct the estimates. While each of these data sources would have sampling errors or bias associated with them, it is not possible to develop a single sampling error estimate for the NHEA estimates.

Hospital expenditures comprise revenues from all sources, including net patient revenue (gross charges, fewer contractual adjustments, bad debts, and charity care), non-patient revenue (such as cafeteria revenue), non-operating revenue, and government appropriations. Included in this category are expenditures for hospital services, as well as revenues received for inpatient pharmacy, hospital-based nursing home care, hospital-based home health care and fees for any other services billed by the hospital. Expenditures for physician and clinical, dental, other professional, home health, and nursing home services are primarily based upon the total receipts collected by the 2007 Economic Census (CMS, 2012b).

To categorize NHEA expenditures by source of payment, government spending on health care by type of service is computed from government program data, such as Medicare claims data, Medicaid reports from the states, and budget data. Total private expenditures are calculated as the residual of total expenditures minus government, with the allocation between out of pocket, private health insurance (PHI), and private non-patient revenue being based on a range of data sources (including the Census Bureau's Service Annual Survey, the AHA surveys, MEPS, and other data sources). These results are then compared with other study results (including MEPS), for reasonableness.

Exhibit 1. Unadjusted National Health Accounts for Personal Health Care, 2007¹

Type of Service	Out-of-Pocket	Private Health Insurance	Medicare	Medicaid	Defense	Veterans' Affairs	Workers' Compensation	Other Federal	Other State	Private Non-Patient	Type of Service Totals
Hospital	22.4	250.1	192.6	122.4	13.7	22.6	11.6	3.0	18.3	35.8	692.5
Physician and Clinical Services	46.8	222.2	96.0	35.9	10.3	3.6	12.8	4.1	1.0	29.1	461.8
Other Professional Services	16.1	22.8	11.0	3.9	--	--	1.3	0.2	0.6	3.7	59.5
Dental	43.0	47.6	0.2	5.2	0.9	0.1	--	0.2	0.2	0.1	97.3
Other Personal Health Care	6.1	4.8	3.9	57.0	--	1.4	--	5.6	14.4	14.6	107.7
Home Health	5.5	5.1	24.3	20.2	--	0.4	--	--	1.4	1.0	57.8
Nursing Home	37.2	10.2	24.8	42.1	--	3.3	--	--	2.8	6.2	126.4
Prescription Drugs	53.0	106.8	45.9	19.2	4.9	2.6	0.9	0.0	2.9	--	236.2
Durable Medical Equipment	18.8	4.0	7.0	3.9	--	--	0.4	0.1	0.1	--	34.3
Other Non-Durable Medical Products	38.4	--	2.5	--	--	--	--	--	--	--	41.0
Source of Payment											
Totals	287.3	673.5	408.2	309.7	29.8	33.8	27.0	13.2	41.6	90.4	1,914.6

¹In billions of 2007 U.S. dollars.

SOURCE: Centers for Medicare & Medicaid Services, Office of the Actuary: Data from the National Health Accounts, 2012.

MEPS

MEPS is a household survey designed to support nationally-representative estimates of health expenditures and use, health insurance coverage, health status, employment, demographic and socioeconomic characteristics of the civilian, non-institutionalized U.S. population (Cohen, 1997). MEPS is produced by the Agency for Health Care Research and Quality (AHRQ) and the National Center for Health Statistics.

MEPS expenditure data are based on household-reported information on health care use and expenditures. Because households may have difficulty reporting third-party payments, MEPS supplements household reports of such payments with data

obtained through a follow-back survey of providers (AHRQ, 2008). It has an overlapping panel design in which data are collected through five rounds of interviews during a 2.5-year period to cover use and expenditures over 2 calendar years. The MEPS sample includes data from 29,370 individuals with a positive sampling weight in calendar year 2007 (AHRQ, 2009). Exhibit 2 presents unadjusted MEPS expenditure estimates for the civilian non-institutionalized population by type of service and source of payment in 2007. The total expenditure estimate is \$1,126 billion with a 95-percent confidence interval of \$1,077 billion to \$1,175 billion.

Exhibit 2. Expenditure Estimates from the Medical Expenditure Panel Survey (MEPS), by Type of Service and Source of Payment: 2007¹

Type of Service	Out-of-Pocket	Private Health Insurance	Medicare	Medicaid	Defense	Veterans' Affairs	Workers' Compensation	Other Public	Other Sources	Type of Service Totals
Hospital	17.7 (2.0)	187.6 (12.7)	141.9 (8.0)	42.1 (4.6)	1.7 (0.4)	10.6 (2.4)	5.1 (1.1)	2.1 (0.5)	7.3 (2.3)	416.2 (16.7)
Physician	28.8 (0.7)	134.2 (4.7)	53.3 (2.1)	17.1 (0.8)	2.9 (0.7)	5.7 (0.6)	3.3 (0.4)	3.1 (0.8)	2.5 (0.4)	250.8 (5.9)
Other Providers	15.4 (0.8)	44.6 (5.9)	12.3 (1.1)	5.2 (0.6)	0.6 (0.1)	1.6 (0.3)	1.6 (0.3)	0.9 (0.2)	1.7 (0.3)	83.9 (6.2)
Dental	40.3 (1.2)	36.0 (1.0)	0.7 (0.2)	3.5 (0.3)	0.4 (0.07)	0.4 (0.1)	0.0 (0)	0.3 (0.05)	0.6 (0.1)	82.0 (1.9)
Home Health	2.4 (0.5)	2.8 (0.8)	12.7 (1.2)	15.7 (4.4)	0.1 (0.07)	0.1 (0.05)	0.1 (0.05)	3.9 (0.6)	0.2 (0.1)	37.9 (4.8)
Prescription Drugs	64.5 (1.3)	83.1 (3.1)	57.6 (2.4)	18.5 (1.3)	3.3 (0.4)	4.2 (0.5)	0.4 (0.1)	1.0 (0.2)	0.0 (0)	232.6 (4.8)
Other Medical Equipment	13.6 (0.9)	4.5 (0.5)	1.0 (0.1)	2.1 (0.4)	0.2 (0.05)	0.4 (0.1)	0.1 (0.1)	0.2 (0.1)	0.4 (0.1)	22.6 (1.2)
Source of Payment Totals	182.7 (3.4)	492.8 (18.6)	279.4 (10.8)	104.2 (8.0)	9.1 (1.1)	23.0 (2.7)	10.6 (1.5)	11.5 (1.2)	12.7 (2.4)	1,126.1 (25.1)

¹In billions of 2007 U.S. dollars.

NOTE: Standard errors are in parentheses.

SOURCE: Agency for Healthcare Research and Quality, Center for Financing, Access, and Cost Trends: Data from the Medical Expenditure Panel Survey Household Component, 2007.

NHEA and MEPS differences

The NHEA and MEPS differ with respect to included populations, included services, service category definitions, inclusion of payments such as grants and supplemental payments, public health spending, and investment in medical care for future consumption. In terms of populations, active duty military personnel, foreign visitors to the U.S., and people in institutions such as nursing homes and assisted living facilities who are included in NHEA are out-of-scope for MEPS.

In terms of funding sources, MEPS excludes private non-patient care revenues, such as revenues from philanthropic giving, cafeterias, and investment income. MEPS does not include data on goods and services such as non-prescription non-durable goods (such as over-the-counter medications) and other health, residential, and personal care (OHRPC). The NHEA category of OHRPC covers health services provided in non-traditional settings including school health, worksite health care, Medicaid home and community based waivers, some ambulance services, and residential mental health and substance abuse facilities. These expenditures are not technically out-of-scope for MEPS, but are highly unlikely to be reported. The largest payer of other OHRPC services is Medicaid through its home and community-based waivers. Many of the home and community-based waivers involve non-medical assistance with activities of daily living, and thus we deemed OHRPC out-of-scope for the purpose of this analysis, although MEPS may capture a small amount of personal care services.

With respect to payments, MEPS estimates expenditures that are directly linked to patient care events, and accordingly does not measure provider grants and lump-sum retrospective adjustments that are included in NHEA. For instance, MEPS does not include maternal and child health grants for public and other community health clinics, Medicaid disproportionate share payments, and certain lump-sum provider payments associated with managed care (see discussion below). MEPS also does not include public health programs and investments (research, structures and equipment).

In terms of service category definitions, NHEA service categories are defined according to the type of establishment that collected the revenue, whereas MEPS service categories are defined according to the type of service provided to an individual. For example, expenditures for hospital-based home health are included in the hospital category in NHEA, whereas they are included in the home health category in MEPS.

NHEA adjustments

Adjustments to the NHEA to make it consistent with MEPS can be roughly grouped into four broad categories: (1) aligning service categories, (2) adjusting the scope of included populations, (3) adjusting for patient care services not included in MEPS, and (4) adjusting for expenditures not tied to specific patient events.

Exhibit 3 summarizes some of the adjustments we make to align NHEA and MEPS service categories. Exhibit 4 summarizes the subtractions from and additions to the NHEA to make the included population and patient care expenditures consistent with MEPS. Whereas Exhibits 3 and 4 provide aggregate change, our detailed reconciliation adjusts the NHEA by type of service and source of payment. These adjustments require detailed estimates for expenditure categories and population subsets that are often difficult to measure accurately.

Exhibit 3. Selected Adjustments to Align National Health Expenditure Accounts (NHEA) and the Medical Expenditure Panel Survey Service Categories

Amount Shifted ¹	Adjustment	Initial NHEA Category	Adjusted NHEA Category
\$7.0	Hospital-Based Home Health	Hospital	Home Health
\$4.7	Hospital-Based Pharmacy Sales	Hospital	Prescription Drugs
\$2.2	Hospital-Based Personal Care	Hospital	Other Personal Care
\$8.1	Outpatient Mental Health	Physician & Clinical Svcs.	Other Professional Svcs.
\$5.9	Kidney Dialysis Providers	Physician & Clinical Svcs.	Other Professional Svcs.
\$10.0	Other Providers	Physician & Clinical Svcs.	Other Professional Svcs.
\$6.0	Prescription Drugs	Physician & Clinical Svcs.	Prescription Drugs
\$4.7	Durable Medical Equipment	Physician & Clinical Svcs.	Other Medical Equipment
\$31.6	Independently-Billed Laboratory	Physician & Clinical Svcs.	Other Professional Svcs.

¹In billions of 2007 U.S. dollars.

SOURCES: Calculations based on the MEPS (AHRQ, 2009), NHEA (CMS, 2012a), and other data sources.

The reconciliation presented in this paper improves upon the previous methodology of estimating the amount the institutional population spends on health care outside of the institution in several respects. Acute care expenditures for the institutionalized Medicare beneficiaries are based on the Medicare Current Beneficiary Survey (MCBS). Based on the MCBS, in 2007 there were 1.584 million Medicare beneficiaries in nursing homes, 69,000 in mental health hospitals, 5,000 in facilities for mental retardation and developmental disabilities (MR/DD), and 802,000 in assisted living and other residential care facilities. In addition, we exclude expenditures for Medicare beneficiaries with skilled nursing facility stays that are longer than 30 days—stays that are likely to be counted as institutionalization in MEPS. For institutionalized Medicaid enrollees without Medicare we use the Medicaid Statistical Information Statistics. The estimates for the institutionalized population without Medicare were developed, as in prior reconciliations, by applying age-specific expenditure estimates from MEPS and MCBS to population totals from a number of data sources, including the Social Security Administration and the Department of Justice. In a further improvement over past reconciliations, we reduced the estimate of institutionalized acute-care spending by the \$14.7 billion in expenditures captured by MEPS for persons who were institutionalized during the year

(expenditures occurring while these persons were in the community), so that we subtract from the NHEA only the amount outside the scope of MEPS.

Exhibit 4. Subtractions from and Additions to the National Health Expenditure Accounts (NHEA) to Make it Consistent with the Medical Expenditure Panel Survey

Amount Subtracted ¹	Health Care Service or Type of Expenditure
Adjusting the Scope of Included Populations	
Long-Term Care Facility Expenditures	
\$23.0	Hospital (Non-Community)
\$144.5	Nursing Home
\$5.0	Hospital (Veterans' Administration)
\$0.8	Physician (Veterans' Administration)
\$3.5	Physicians in Long Term Care Hospitals
Acute Care Expenditures of Institutionalized	
\$98.1	Acute Care Services for People in Institutions
Expenditures for Active Duty Military and Foreign Visitors	
\$14.4	Active Duty Military Expenditures
\$2.2	Services for Foreign Visitors to U.S.
Adjusting for Patient Care Services Not Included in MEPS	
\$41.0	Non-Durable Medical products (e.g., Aspirin and Bandages)
\$95.5	Other Personal Health Care (e.g., Housekeeping Services)
\$6.9	Outpatient Care Centers not in MEPS
\$2.3	Personal Care Expenditures in Medicaid Home Health
Adjusting for Expenditures not Tied to Specific Patient Events	
Non-Patient Care Revenues Not Included in MEPS	
\$71.2	Private Non-Patient Services (e.g. Gift Shop Revenue)
\$1.3	Replace NHEA Other Public Expenditures with MEPS Other Public Expenditures
\$23.2	Disproportionate Share Hospital (DSH), Graduate Medical Education (GME) and Indirect Medical Education (IME)
\$8.0	Public Grants to Hospitals
\$13.4	Medicaid Non-DSH Supplemental Payments
\$5.7	Non-patient Revenues for Physician Services Paid by Other Federal and Other State
Previously Paid Expenditures	
\$5.4	Lab Services and Tests Paid by Other Providers
\$565.4	Total Subtractions from NHEA
\$17.3	Prescription Drug Rebates (additions to NHEA)
\$548.2	Net Subtraction from NHEA

¹In billions of 2007 U.S. dollars.

SOURCES: Available on request from Didem Bernard, Ph.D., Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850. Email: Didem.Bernard@ahrq.hhs.gov

Exhibit 4 also includes adjustments to NHEA to align with MEPS' Other Federal, Other State and Local, and Other Source payment categories. We replace NHEA's Other Federal and Other

State and Local expenditures with the corresponding MEPS amounts, because these NHEA payment categories are dominated by spending not directly linked to individual patients. Examples include funds supporting the operation of public and other community health clinics, such as maternal and child health expenditures and some subsidies for public hospitals and clinics. With respect to the MEPS “Other Source of Payment” category, no corresponding Source of Payment (SOP) category exists in the NHEA. The MEPS category includes private non-health insurance payments (primarily auto coverage) and miscellaneous payment sources. We add this payment category to the adjusted NHEA, and we offset this addition by removing equal amounts from the NHEA PHI column (by service category), since auto and property/casualty payments for medical expenses are included in NHEA’s PHI estimate. We remove the NHEA Private Nonpatient revenue expenditures because these revenues (which include revenues from philanthropic giving, gift shops, cafeterias, and investment income) are not directly linked to a specific patient care event (but can be used by hospitals to offset costs) and are therefore not captured by MEPS. Due to a lack of reliable estimates, no adjustment is made for provider revenues received from uncompensated care pools or similar indigent care programs that reimburse providers in some states for care, though such payments are unlikely to have been captured by MEPS. We also subtract \$13.4 billion in Medicaid non-DSH supplemental payments based on GAO (2008).

Study Findings

The adjusted NHEA estimate for 2007 is \$1,366 billion (Exhibit 5), compared with the unadjusted NHEA estimate of \$1,915 billion (Exhibit 1). Thus, our reconciliation removes \$548 billion from the NHEA. The total MEPS expenditure estimate is \$1,126 billion (Exhibit 2). The MEPS is \$240.3 billion (17.6 percent) less than the adjusted NHEA total (Exhibit 6).

Comparisons with previous reconciliations

There have been two prior reconciliations between the NHEA and MEPS. The NHEA-MEPS difference of 17.6 percent is higher than the differences found in both 2002 (13.8 percent) and 1996 (6.7 percent). However, this apparent widening of the MEPS-NHEA gap should be interpreted with caution. As discussed by Sing, Bantlin, Selden, Cowan, and Keehan (2006), the 2002 reconciliation differed in many respects from the 1996 reconciliation. Estimates of acute care spending by the institutionalized were improved, Economic Census data were better-suited to the alignment due to the shift in industry coding (from SIC to NAICS), and in several instances the definition of what was deemed in-scope for MEPS was broadened to include some hard-to-measure spending categories. All of these modifications had the effect of widening the apparent gap between NHEA and MEPS. When combined with refinements in the editing of MEPS expenditure data after 1996 that tended to reduce expenditures, much of the 1996 to 2002 widening of the NHEA-MEPS gap stemmed from changes in methodology.

Exhibit 5. National Health Expenditure Accounts (NHEA) Adjusted to be Consistent with the Medical Expenditure Panel Survey: 2007¹

Type of Service	Out-of-Pocket	Private Health Insurance	Medicare	Medicaid	Defense	Veterans' Affairs	Workers' Compensation	Other Public	Other Sources	Type of Service Totals
Hospital	14.6	215.2	140.2	71.7	3.0	15.7	11.0	2.1	7.3	480.7
Physician	25.6	175.4	70.9	26.0	5.9	1.9	10.8	3.1	2.5	322.1
Other Providers	27.0	46.0	20.2	8.2	0.8	0.3	3.0	0.9	1.7	108.0
Dental	42.5	46.5	0.2	5.2	0.4	0.1	0.0	0.3	0.6	95.6
Home Health	5.4	7.7	25.0	18.7	0.2	0.6	0.1	3.9	0.2	61.8
Prescription Drugs	53.2	116.3	45.7	20.8	4.9	2.3	0.9	1.0	0.0	245.1
Other Medical Equipment	25.1	8.1	11.7	6.9	0.0	0.0	0.5	0.2	0.4	52.9
Source of Payment Totals	193.3	615.2	313.8	157.4	15.1	21.0	26.3	11.5	12.7	1,366.3

¹In billions of 2007 U.S. dollars.

SOURCE: Calculations based on the MEPS (AHRQ, 2009), NHEA (CMS, 2012a), and other data sources.

Exhibit 6. Differences Between Adjusted Medical Expenditure Panel Survey and Adjusted National Health Expenditure Accounts (NHEA): 2007¹

Type of Service	Out-of-Pocket	Private Health Insurance	Medicare	Medicaid	Defense	Veterans' Affairs	Workers' Compensation	Type of Service Totals	Percent of Adjusted NHEA
Hospital	3.1	-27.6	1.8	-29.5	-1.3	-5.1	-5.9	-64.6	-13.4%
Physician	3.2	-41.2	-17.6	-8.9	-3.0	3.7	-7.5	-71.3	-22.1%
Other Providers	-11.5	-1.4	-7.9	-3.0	-0.2	1.3	-1.4	-24.1	-22.3%
Dental	-2.2	-10.5	0.5	-1.7	-0.1	0.3	0.0	-13.6	-14.2%
Home Health	-3.1	-4.8	-12.3	-3.0	-0.1	-0.5	0.0	-23.9	-38.6%
Prescription Drugs	11.3	-33.2	11.9	-2.3	-1.6	1.9	-0.5	-12.5	-5.1%
Other Medical Equipment	-11.4	-3.6	-10.7	-4.8	0.2	0.4	-0.4	-30.3	-57.3%
Source of Payment Totals	-10.6	-122.4	-34.4	-53.2	-6.0	2.0	-15.7	-240.3	-17.6%
Percent of Adjusted NHEA	-5.5%	-19.9%	-11.0%	-33.8%	-39.8%	9.5%	-59.7%	-17.6%	-

¹In billions of 2007 U.S. dollars.

SOURCE: Calculations based on the Medical Expenditure Panel Survey, NHEA, and other data sources, 2007.

With respect to the difference between 2002 and 2007, there are once again methodological improvements that complicate interpretation. First, NHEA now includes ambulance expenditures beyond those paid by Medicare and Medicaid (an increase of \$7.9 billion or 0.6 percent of the adjusted NHEA). Second, as noted above, the current analysis further refines estimates of acute care spending by the institutionalized. In addition to drawing upon better data, our current method includes a \$14.7 billion adjustment, not explicitly made in 2002, for expenditures of the part-year institutionalized for health care use during time spent in the community. Third, it is important to note that like any survey database, MEPS estimates fluctuate from year to year in part due to random sampling variation. Relative standard errors for MEPS aggregate expenditure estimates generally range between 2 and 3 percent, and estimates by type of service and source of payment can have larger relative standard errors. The 2002 reconciliation pooled MEPS data from 2002 and 2003. This helped reduce variation, but it also narrowed the overall NHEA-MEPS gap by nearly 2 percentage points. Although sampling variation remains a concern, the current analysis relies only on the 2007 MEPS, in part due to concerns over the onset of the recession in December 2007 (NBER, 2008).

In the remainder of the paper, we discuss the differences between MEPS and NHEA expenditure estimates by type of service and source of payment, focusing on the largest service and payment categories.

Comparison by service category

The adjusted NHEA expenditure estimates are greater than those from MEPS for every service category (Exhibit 6). The two largest spending categories in both NHEA and MEPS are the Hospital and Physician sectors, and these two categories account for over half of the overall NHEA-MEPS difference. For Hospital, MEPS is \$64.6 billion or 13.4 percent lower than the adjusted NHEA. Nearly half of this difference is associated with Medicaid, a payment source with large NHEA-MEPS gaps in all service categories (see below). Private Health Insurance accounts for almost half of the difference as well. A comparison between MEPS and Marketscan claims data for 2005 revealed that nearly half of the shortfall in MEPS may stem from having too few stays with extreme costs (Aizcorbe, Liebman, Pack, Cutler, & Chernew, 2012). Long hospitalizations and those that result in death, institutionalization, or a change in residence following discharge all pose difficulties for measurement by MEPS. For Out-of-Pocket (OOP) and Medicare, MEPS is close to the adjusted NHEA.

We observe an even larger gap of \$71.3 billion (22.1 percent) for Physician services. This pattern is consistent with findings from 2002, in which the Hospital and Physician gaps were 8.1 percent and 21.2 percent, respectively. This may in part reflect imperfections in our alignment of NHEA and MEPS. It may not always be clear to MEPS respondents whether a particular ambulatory visit is to a physician office or clinic versus an outpatient facility owned by a hospital. Nevertheless, it is also plausible that MEPS respondents may be better able to recall major events, such as hospitalization or emergency room visits, than office or clinic visits,

explaining why the difference is larger for physician services. Two other factors may help explain the NHEA-MEPS gap for Physician. First, although the reconciliation makes several adjustments for provider payments not linked to patient events (such as the removal from NHEA of Medicaid Disproportionate Share Hospital (DSH), Graduate Medical Education (GME), Indirect Medical Education (IME), and private nonpatient revenues), there may be other provider payments that are not directly linked to events collected in MEPS. For example, although MEPS contains event-level expenditures for capitated as well as fee-for-service events, MEPS misses provider payments tied to performance and global fees charged for administration—payments that are likely to be increasingly prevalent. Second, duplicative payments pose a potential problem for the NHEA insofar as NHEA relies on data collected at the office or clinic level. If revenue received by one establishment is paid out to other establishments (in essence as subcontractors) then double counting would arise. We subtract \$5.4 billion from the NHEA to avoid double-counting payments that physician offices and clinics receive from hospitals for lab services, since these payments are already included in the NHEA hospital estimates. However, other duplicative payments have likely grown over time as integration among health care providers, such as hospitals and physician practice groups, has increased (Kocher & Sahni, 2011).

Another factor that could be contributing to the gap in spending for physicians' services in MEPS and NHEA is the method used to estimate physician spending for Medicaid in the NHEA. Specifically, the NHEA Medicaid estimates include expenditures associated with managed care plans or capitated payments, which are distributed by service type by first removing 11.8 percent of total payments associated with a net cost factor, and then allocating the remaining paid benefit total to service categories using the Fee-for-Service (FFS) Medicaid distribution. FFS plans generally pay for services separately while managed care plans provide the majority of care to people in exchange for a monthly payment. Using a FFS distribution may assign too much spending to hospitals and not enough to physician services to the extent that managed care enrollees are younger and healthier than FFS enrollees, and managed care plans rely more on providing physician and preventive services than FFS plans.

For the next largest spending category, Prescription Drugs, MEPS expenditures are 5.1 percent below the adjusted NHEA. There is less NHEA-MEPS agreement, however, across payment sources for Prescription Drugs, with OOP and Medicare expenditures being larger in MEPS while PHI and Medicaid are greater in the adjusted NHEA. An important caveat to these results is that AHRQ has refined its editing rules starting in 2008, and the post-2007 changes have the effect of reducing these source-of-payment discrepancies (AHRQ, 2010). Applying the 2008 MEPS prescription drug editing rules to the 2007 data, we observe the following changes to the NHEA-MEPS percentage gaps for prescription drugs by source of payment: Out-of-Pocket changes from being 21.2 percent above adjusted NHEA to being 17.2 percent above adjusted NHEA; the PHI gap declines from 28.5 percent to 21.1 percent; Medicare changes from being 26.0 percent above adjusted NHEA to being only 8.7 percent above adjusted NHEA; and the

Medicaid gap declines from 10.9 percent to 8.5 percent. We caution readers that these percentages apply only to aggregate MEPS 2007 estimates. Due to the inherent variability of survey data, the effect of the editing refinements (especially those involving the handling of outliers) would likely vary across subgroups of the 2007 data and across other MEPS years.

The NHEA-MEPS difference for Other Providers in 2007 is \$24.1 billion, with MEPS 22.3 percent below adjusted NHEA. As discussed by Sing et al., it is likely that a major contributor to this gap is under-reporting of separately-billed laboratory tests in MEPS. Such expenditures would not be captured in the provider follow-back survey, and in the 2002 reconciliation, MEPS household respondents reported only 1/3 of the independently-billed lab fees in the NHEA (Sing et al., 2006). The 22.3 percent NHEA-MEPS gap in 2007 is lower than the corresponding 29.0 percent gap reported for 2002. However, this apparent narrowing can be traced to the 2002 reconciliation having relied on Service Annual Survey data that had not been aligned with the 2002 Economic Census, and showed total expenditures for clinics \$10 billion higher than the final Economic Census estimates. This in turn caused the amount that shifted from Physician to Other Provider to be too large. Using revised estimates for 2002 based on final data, the NHEA-MEPS differences in 2002 and 2007 are very similar (and the 2002 Physician gap would be correspondingly somewhat wider).

With respect to Dental, the 2007 NHEA-MEPS gap is \$13.6 billion, with MEPS 14.2 percent below adjusted NHEA. This is slightly smaller than the overall gap of 17.6 percent. One note of caution with respect to this estimate is that some dental care is provided outside of dental establishments (e.g., in clinics) so that comparing MEPS with the adjusted NHEA Dental category may modestly understate the true difference.

The extent to which MEPS is below adjusted NHEA for Home Health and Other Medical Equipment (OME) has widened between 2002 and 2007, from 26.0 to 38.6 percent for Home Health and from 41.0 to 57.3 percent for OME. These results should be interpreted with caution, insofar as sampling variation can lead to year-to-year variations in MEPS for relatively rare events, such as Home Health and OME. Nevertheless, it is clear that large NHEA-MEPS gaps exist in all years for these expenditure categories. MEPS respondents likely have difficulty reporting some types of durable medical equipment and/or home help as health care goods and services. Also, over one-third of the NHEA-MEPS gap for OME arises because MEPS events reported as ambulance services are \$11.8 billion below the adjusted NHEA benchmark of \$14.4 billion (not shown in Exhibits). Additionally, MEPS, by design, is unlikely to capture a large percentage of durable medical equipment purchases. Reconciling NHEA and MEPS ambulance spending, however, is complicated by the possibility that at least some ambulance expenditures in MEPS are folded into other provider bills. Alignment issues would also arise to the extent that not all hospice (Home Health) dollars reported in MEPS may be identified as such by respondents or billing records from the medical provider survey.

Yet another factor driving NHEA-MEPS gaps for Home Health and OME may be fraud and abuse. We discuss below the possible contribution of improper payments to the NHEA-

MEPS gaps, but it is worthwhile to note, in the context of Home Health and OME, that a recent report by the Government Accountability Office (GAO) found that the Home Health and durable medical equipment portions of OME are the services that are most vulnerable to such abuses (GAO, 2010).

Comparison by source of payments

The four largest payment source categories from the adjusted NHEA are all greater than those from MEPS, with a 33.8 percent difference for Medicaid, a 19.9 percent difference for PHI, a 11.0 percent difference for Medicare, and a 5.5 percent difference for OOP (Exhibit 6).

For Medicaid, a likely contributor to the 33.8 percent gap is that MEPS undercounts Medicaid enrollees. MEPS 2007 contains 40.9 million person-years of Medicaid coverage. Working with tabulated CMS MAX estimates, an approximate benchmark for the non-institutionalized population is 46.0 million person-years (inclusive of separate state CHIP enrollment and exclusive of emergency and family-planning only Medicaid; CMS, 2012c; Kenney & Cook, 2010). Thus, MEPS undercounts Medicaid enrollment in 2007 by approximately 11 percent (an estimate similar to the 12 percent found by Banthin and Sing, 2006). Indeed, a portion of this MEPS undercount of Medicaid enrollees likely involves hard-to-survey persons who might also have above-average expenditures, such as the homeless and those residing in settings at the margins between “community” and “institution.” Another potential explanation for the NHEA-MEPS Medicaid gap is fraudulent payments. A recent GAO analysis cites CMS estimates that such payments totaled \$22.5 billion in 2009 (GAO, 2011). To the extent these payments are not reported by MEPS respondents, they may help to explain the NHEA-MEPS gap. It is possible that future research using matched administrative claims data may help clarify the distribution of MEPS under-reporting by service type, and the contribution to the overall Medicaid gap of undercounting the Medicaid population.

Our reconciliation shows MEPS Medicare spending to be \$34.4 billion or 11.0 percent below the adjusted NHEA. To provide a more direct analysis of MEPS expenditure reporting, AHRQ researchers examined Medicare administrative claims data linked to MEPS respondents in 2001–2003 with fee-for-service Medicare (Olin et al., 2008; Zuvekas and Olin, 2008). They focused on MEPS expenditures corresponding approximately to the Hospital, Physician, and Other Provider service categories in our tabulated results, finding that MEPS under-reported Medicare expenditures for these services by 12 percent. This is close to the 10.3 percent gap we find for these three groups (combined). Also consistent with our results is their finding of larger gaps for ambulatory visits than for inpatient care. In contrast, a subsequent report examined matched claims data for Home Health, finding much smaller gaps than we measure between adjusted NHEA and MEPS (OME was not examined; Zuvekas, 2009). Home Health and OME together account for approximately two-thirds of the overall NHEA-MEPS Medicare gap (see discussion above). One factor to consider with respect to the overall NHEA-MEPS Medicare gap—and Home Health and OME in particular—is the potential for fraud and abuse. In Fiscal

Year 2007, detected Medicare fraud totaled \$1.8 billion (CMS, 2008). To the extent these amounts would not be reported by MEPS respondents, this explains a small portion of the NHEA-MEPS gap. Undetected fraud and abuse may be much larger. According to GAO (2011), undetected fraud and abuse in Medicare was \$48 billion in 2009 (excluding improper payments in Part D). However it should be noted that the fraud and abuse dollars shown above are cumulative and, at this point in time, cannot be linked to specific events or a specific year.

For out-of-pocket expenditures, MEPS is 5.5 percent below the adjusted NHEA, which is roughly one-third of the difference for overall expenditures. Out-of-pocket estimates are considered to be one of MEPS' strengths as they are more readily reported by households. In the NHEA, OOP payments and PHI are residual source-of-payment categories, and the allocation of expenditures between them is sensitive to the underlying assumptions regarding total and government spending.

Given the close proximity of the OOP spending between the two data sources, we might expect a similar difference for PHI. However the MEPS estimate for PHI is \$122.4 billion, or 19.9 percent below the adjusted NHEA. As was the case in 2002, the PHI gap is approximately twice as large in percentage terms as for Medicare. Why this difference arises still remains unclear. One might expect the gap for Medicare to be larger than for PHI given that MEPS can miss expenditures when respondents living alone die during the year, or when persons are discharged from hospital stays either to institutions or to a different residence in the community—situations that arise disproportionately for Medicare recipients. Perhaps Medicare beneficiaries, notwithstanding their age and/or disability, are simply better respondents than those with private insurance, due to fewer time pressures, simpler family structures, better book-keeping, and/or less complex insurance arrangements. The larger gap for PHI than for Medicare could also stem in part from our back-out for the institutionalized population. The institutional adjustment is based on data from MCBS and, whereas MCBS expenditures are based on claims for Medicare, they are self-reported (and subject to potential undercounting) for PHI. If our back-out for the institutionalized population reduces NHEA by the correct amount for Medicare, but by too little for PHI, this could contribute to a larger PHI gap for the non-institutionalized population. It is also noteworthy that NHEA PHI is calculated as part of a residual. Provider survey data is used for total spending estimates and administrative data is used for the government spending estimates. Spending for PHI, OOP, and other private spending is then calculated by subtracting government administrative data from total spending; consequently, if there are any conceptual or measurement differences between the provider data and the administrative data it would be reflected partially in the PHI estimate. However, when PHI premium estimates are compared with other sources, such as the MEPS Insurance Component, the Bureau of Labor Employer Costs for Employee Compensation, and various other private health insurance surveys, the results are very similar. Finally, note that our estimate of a 19.9 percent NHEA-MEPS gap for PHI is approximately twice as large as the 9.8 percent gap found by Aizcorbe et al. (2012) between MEPS and Marketscan (for 2005).

Conclusions

We estimate that total health care expenditure estimates differ between MEPS and adjusted NHEA by \$240.3 billion, or 17.6 percent. There is some sensitivity in this estimate since aligning the two estimates entails numerous assumptions and the adjustments we implement are subject to error. It is difficult to test the sensitivity of the results to all the assumptions underlying the many steps involved in reconciling the two sources of data since many of them are interrelated. However, we believe the results presented here provide an adequate estimate of the relationship between the NHEA and MEPS.

The differences we observe across service types and sources of payment suggest that measurement issues in MEPS and NHEA may contribute to the gaps. For MEPS, the reconciliation highlights the importance of improving data collection from high-expenditure cases and maintaining appropriate corrections for survey attrition. MEPS may also be able to improve collection of high-cost hospital and physician expenditures that occur just before the sampled persons die or are placed in a nursing home (cases in which it is difficult for MEPS to locate a respondent to report use and expenditures).

For NHEA, measurement issues may explain some of the gaps in PHI and OOP expenditures. Since private expenditures in NHEA are calculated as residual, they are subject to measurement errors associated with provider surveys and program data. Another potential issue is that improper payments due to fraud and abuse are included in NHEA, whereas the amounts captured by MEPS are unknown. Currently there are several projects underway at CMS to refine the NHEA, including improving estimates of the self-insured insurance market, developing more detailed OOP estimates, and looking into ways to improve the Medicaid managed care service distributions.

As a closing caveat to this analysis, we conducted this analysis for 2007 in order to make use of detailed estimates from the quinquennial Economic Census (available in that year). Nevertheless, we recognize that researchers may wish to apply the 2007 NHEA-MEPS gaps presented in this paper to more recent years of MEPS. Because of sampling variation, editing changes in MEPS, changes in NHEA, and in some cases program changes, uncritical application of factors derived from our 2007 analysis to other years of MEPS could result in unreliable estimates by service type and source of payment. In a separate analysis, the authors will discuss the strategies available to researchers who want to use the findings from this paper, but apply them to more recent MEPS data (AHRQ and CMS, forthcoming).

Disclaimer

The views expressed in this article are those of the authors, and no official endorsement by the U.S. Department of Health and Human Services, AHRQ, or CMS is intended or should be inferred.

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