The Effect of Reporting Aid Use on the Accuracy of Household-Reported Medical Expenditure Data

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Introduction

Increasing medical expenses are currently an important public policy issue. The Medical Expenditure Panel Survey (MEPS) can be used to produce estimates of expenditures for the U.S. civilian non-institutionalized population. In 2003, an estimated 85.6 percent of that population incurred a medical expense. However, medical expenses are often difficult for household respondents to report completely and accurately. To address this concern, MEPS encourages the use of reporting aids to help respondents provide complete and accurate reports. For example, participants in the survey are given a monthly planning calendar to record doctor appointments, names of prescribed medicines, and the amounts paid by different sources for each medical event incurred by family members. Other aids used include explanation of benefits documents from insurance carriers (EOB), medical bills, checkbooks, and medicine bottles. In this study, the expenditures reported by respondents to the Household Component (HC) of MEPS are compared to data obtained from their healthcare providers in the Medical Provider Component (MPC) of MEPS. The effects of using reporting aids on the accuracy of the expense reports provided by the respondents are examined for the out-of-pocket and the private insurance sources of payment for office-based physician visits.

For this study, the "accuracy" of a payment report is judged by how closely the household reported their payment information when compared to the payment figures based on data obtained from the medical provider. The medical provider reports are considered to be the "gold standard" because they are often more accurate and more complete than information gleaned from the household respondent. The ten potential sources of payment categories in MEPS are:

1. family/patient out-of-pocket
2. Medicare
3. Medicaid
4. private insurance
5. Veterans Administration
6. TRICARE
7. other Federal (e.g., Indian Health Service, military treatment facilities, federally funded NIH care)
8. other State (e.g., community and neighborhood clinics, state and local health departments, state programs other than Medicaid)
9. worker's compensation
10. other sources (e.g., automobile, homeowner's, or liability insurance payments, miscellaneous)

While a particular medical event may involve just one source of payment, it is not uncommon for more than one payment source to be associated with the same event. For example, a person may have private insurance that pays for most of the expenses for a physician visit, but may be responsible themselves for an out-of-pocket co-payment.

This study uses data from both the Household Component (HC) and the Medical Provider Component (MPC) of the 2003 Medical Expenditure Panel Survey (MEPS) to assess the accuracy of complete medical payment reports. The MEPS-HC is a large, national probability sample survey sponsored by the Agency for Healthcare Research and Quality. The annual survey collects information from respondents to produce national- and regional-level estimates of health care use, health status, health conditions, medical expenditures, sources of payment, insurance coverage, and health care access for the U.S. civilian noninstitutionalized population as well as for policy-relevant sub-groups. The MEPS-HC is a two-year overlapping panel survey with a new panel introduced each year. Five rounds of interviews are conducted with each new panel to yield health care use and expenditure data for two calendar years. The MEPS sample is a sub-sample of respondents to the prior year's National Health

Interview Survey that is conducted by the National Center for Health Statistics (Cohen, 2000). The 2003 HC covered 32,681 persons and 120,113 qualified office-based physician visits.

The MEPS-MPC is a telephone survey of a sample of providers that were identified in the household survey. The MPC is conducted the year following the household data collection year and is dependent on receiving permission from the respondent to contact the medical provider and obtaining cooperation from the provider to participate in the survey. Because the MPC is based on records from the medical provider, it is generally more complete and more accurate than information provided by household respondents.

This paper examines the impact of various types of reporting aid use on the accuracy of household reports of expenditures for office-based healthcare visits in the Medical Expenditure Panel Survey. These visits will be referred to as "events". Events that are matched between the HC and the MPC and are classified as being complete on both sources are used for the analysis. Multivariate logistic models were used to estimate the effects of various reporting aids on the accuracy of the household medical expense reports.

Methods

To determine the accuracy of medical payment reports, we used matched and complete records from the 2003 HC and the 2003 MPC. For office-based physician visits (events) in the 2003 HC survey, the number of permission forms obtained varied by survey round but was about ¾ of the households. MEPS sampled about 40% of the medical providers and their cooperation rate was 83.5%. Once the MPC reports were obtained, events were matched to events reported in the HC using the probabilistic matching software AUTOMATCH, which utilizes the Fellegi and Sunter methodology (Winglee et al, 2000). In 2003, the overall match rate was 83.8%.

For both the HC and the MPC data, for events to be classified as being "complete", the events must include payment information for all relevant payment sources. For this study, the payment sources examined are out-of-pocket and private insurance. The number of complete and matched records for these payment sources for office-based physician visits is shown in Table 1. Flat fee records, where one fee was paid for multiple office visits, were not included in this analysis.

Table 1 – Number of Complete and Matched Records by Source of Payment Categories, Office-based Physician Visits, 2003 MEPS

Payment Source	Sample Size
Out-of-Pocket	43,128
Private Insurance	4,708

It is assumed that provider reports of medical expenditures are generally more accurate than household reports because the providers know the payment amounts and from which sources they originated. However, the provider reports may not be perfect. For example, providers would report all payments as out-of-pocket when a patient pays the provider for the entire bill out-of-pocket but then submits paperwork to their private insurance company for reimbursement. In addition, providers may provide bills that do not reflect actual payments made and errors from abstracting and recording the data may also occur. It should also be noted that because the matching process between household-reported and provider-reported events is based on a probabilistic algorithm, there may be some false-negative as well as some false-positive matches.

The accuracy criteria used in this study are summarized in Table 2. To determine if a value reported by the household in the HC was "accurate," it would have to fall within one or both of these constraints when compared to the matched value reported by the medical provider on the MPC. The criteria were chosen to be consistent with those used in previous research performed on the 1996 MEPS data (Machlin et al, 1999) and were selected to allow for reasonable tolerances in absolute and relative terms: for out-of-pocket, the mean HC expense was $15 and for private insurance, the mean HC expense was $79.

Table 2 – Accuracy Criteria for Office-based Physician Visits by Source of Payment Categories, 2003 MEPS

Payment Source	Accuracy Criteria
Out-of-Pocket	$5 or 10%
Private Insurance	$10 or 10%

The accuracy rates for the two payment sources are shown in Table 3. For a more detailed description of the accuracy criteria, see Kashihara and Wobus, 2006.

Table 3 – Accuracy Rates for Office-based Physician Visits by Source of Payment Categories, 2003 MEPS

Payment Source	Percent Accurate
Out-of-Pocket	77.9
Private Insurance	50.2

The primary function of the reporting aids was to improve the completeness and accuracy of the household medical expense reports. The various aids used by respondents are:

1. Explanation of benefits (EOB)
2. Medical bill
3. Calendar (MEPS Monthly Planner)
4. Checkbook
5. Prescribed medicine bottle
6. Other (receipts, etc.)
7. Memory only (no reporting aids)

The EOB is a document that is sent to the insured person that shows the payments for a medical event. A medical bill is a document received for services from the medical provider. The calendar is a "monthly planner" that the MEPS survey provides to households with instructions to write records of: all doctor appointments, hospital visits, and other health events; the reason for each visit and the name of the health care provider or facility; the names of any prescribed medicines or refills; and the total cost and any amount that they or other sources, such as insurance, had to pay for the visit or for the medical expenses. Use of a checkbook, medicine bottle, and receipts were also categorized. Memory only (i.e. no aids indicated as being used) was set as the reference category for this study.

Logistic regression models were developed for both the out-of-pocket and the private insurance analyses with the dependent variable being "accurate" (1) or "not accurate" (0). The control variables were chosen to represent a wide variety of factors that may influence the accuracy of household reports. The variables (see Appendix) included respondent characteristics, household characteristics, insurance coverage, interview round, and reporting aids. The reporting aid variable for the out-of-pocket analysis had eight categories that were chosen such that all of the combinations of reporting aids that comprised at least 2% of the sample were given their own category. The remaining combinations of reporting aids used were grouped together in the "all other" category. Table 4 shows the categories used for the out-of-pocket analysis with their percentages of occurrence.

For the private insurance model, the reporting aids variable was slightly different than that used in the out-of-pocket model. The categories were slightly different and instead of eight categories, the private insurance reporting aids variable had nine categories, as shown in Table 5.

Table 4 – Out-of-Pocket Reporting Aids Categories by Percentage of Use, 2003 MEPS

Categories	Percentage of Use
Memory only	59.8
Calendar only	20.0
Bill only	5.3
Calendar & checkbook/pill bottle	3.1
Checkbook/pill bottle only	2.9
EOB only	2.4
Calendar & bill	2.0
All other combinations	4.5

Table 5 – Private Insurance Reporting Aids Categories by Percentage of Use, 2003 MEPS

Categories	Percentage of Use
Memory only	35.2
Bill only	23.2
EOB only	11.2
Calendar only	9.0
Calendar & bill	6.3
EOB & bill	3.6
Calendar & EOB	2.4
Checkbook/pill bottle only	2.0
All other combinations	7.1

"Memory only" was the largest category for the private insurance analysis, but not quite as overwhelmingly as for the out-of-pocket model (35% versus 60%). The most frequently used aid for private insurance expenses was a bill from the medical provider (23%) while the most frequently used aid for out-of-pocket expenses was the MEPS monthly planning calendar (20%).

Results

The logistic regression coefficients and the odds ratios (OR) of the control variables for the two multivariate logistic regression models are shown in the Appendix. Table 6 summarizes the results for the reporting aids categories in the out-of-pocket model. There was only one significant aid in the out-of-pocket model: the MEPS Monthly Planner. At the 0.05 level of significance, respondents who used the MEPS calendar were significantly more likely to provide accurate out-of-pocket expense data than those who relied on memory only (OR=1.16).

Table 7 summarizes the results for the reporting aids categories in the private insurance model. In this model, three categories were significantly more accurate than memory alone. These categories were "bill only" (OR = 1.30), an "explanation of benefits" form only (OR = 2.49), and the combined use of an EOB from the insurance company and a bill from the medical provider (OR = 2.06). Moreover, using the EOB as a reporting aid alone or in conjunction with a bill was significantly better than using just a provider bill.

Table 6 – Odds Ratios for Out-of-Pocket Reporting Aids Categories, 2003 MEPS

Categories	Odds Ratio
Memory only	1.00
Calendar only	1.16 *
Bill only	0.88
Calendar & checkbook/pill bottle	0.87
Checkbook/pill bottle only	0.80
EOB only	1.04
Calendar & bill	0.84
All other combinations	0.93

* Significant at 0.05

Table 7 – Private Insurance Reporting Aids Categories by Odds Ratios, 2003 MEPS

Categories	Odds Ratio
Memory only	1.00
Bill only	1.30 *
EOB only	2.49 *
Calendar only	1.51
Calendar & bill	0.96
EOB & bill	2.06 *
Calendar & EOB	0.75
Checkbook/pill bottle only	1.61
All other combinations	1.16

* Significant at 0.05

Summary

Our analysis is not based on a nationally representative subsample of MEPS respondents but it suggests that some types of reporting aids may facilitate MEPS household respondents to more accurately report medical expenses for physician office visits. In particular, household reported data on private insurance expenses appears to be substantially improved when respondents utilize EOBs during the interview and somewhat improved for respondents who referred to their medical bills. In addition, our analysis suggests that reporting of out-of-pocket expenses may be slightly better for respondents who use the MEPS calendar. Although several of the reporting aids – or combinations thereof – were not significantly better than relying on memory alone in reporting expenses accurately, there may be benefits from their use since they all have the potential to provide mental cues to help respondents recall events and they may also help the respondents to recall other related events as well. Therefore, it's important to encourage the use of all possible reporting aids when collecting medical expense reports from households.

References

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The views expressed in this paper are those of the authors and no official endorsement by the Department of Health and Human Services or the Agency for Healthcare Research and Quality is intended or should be inferred.

Appendix – Logistic Regression Analysis: Characteristics Associated with Accuracy by Payment Source for Office-based Physician Visits, MEPS 2003

Source of Payment (R-Square)	**Out-of-Pocket** (0.078)			**Private Insurance** (0.050)		
Measure	**Odds Ratio**	**Beta**	**S.E.**	**Odds Ratio**	**Beta**	**S.E.**
Intercept	3.29	1.19	0.16	0.93	-0.07	0.36
Age				*		
0 - 24	1.16	0.14	0.12	1.12	0.12	0.31
25 – 64	(ref)	0.00		(ref)	0.00	
65 +	1.20	0.18	0.16	0.41	-0.90	0.32
Gender						
Male	1.05	0.05	0.07	1.01	0.01	0.13
Female	(ref)	0.00		(ref)	0.00	
Health status						
Fair/poor	(ref)	0.00		(ref)	0.00	
Other	1.03	0.03	0.08	0.97	-0.04	0.20
Race/ethnicity						
White	(ref)	0.00		(ref)	0.00	
Black	0.96	-0.04	0.08	0.65	-0.43	0.23
Asian/other/multiple race	1.24	0.21	0.14	0.80	-0.23	0.32
Hispanic	1.16	0.15	0.11	0.69	-0.38	0.23
Education						
< High school	(ref)	0.00		(ref)	0.00	
HS/GED/unknown	0.89	-0.11	0.09	1.02	0.02	0.15
College +	0.83	-0.19	0.10	1.13	0.12	0.16
Poverty status	*					
Poor/near poor/missing	(ref)	0.00		(ref)	0.00	
Low	0.74	-0.31	0.13	0.71	-0.34	0.30
Middle	0.74	-0.30	0.12	0.80	-0.22	0.26
High	0.87	-0.15	0.13	0.88	-0.13	0.25
Region						
Northeast	(ref)	0.00		(ref)	0.00	
Midwest	0.83	-0.18	0.12	1.14	0.13	0.18
South	0.94	-0.07	0.11	1.01	0.01	0.17
West	0.90	-0.11	0.14	0.87	-0.14	0.21
MSA status						
MSA	(ref)	0.00		(ref)	0.00	
Non-MSA	1.00	-0.00	0.07	1.03	0.03	0.12
Round						
1	(ref)	0.00		(ref)	0.00	
2	1.03	0.30	0.07	0.86	-0.15	0.19
3	1.04	0.04	0.07	1.03	0.02	0.15
4	0.95	-0.05	0.08	0.83	-0.19	0.17
5	1.03	0.03	0.09	0.83	-0.19	0.19

Appendix – continued.

	Out-of-Pocket			Private Insurance		
Measure	**Odds Ratio**	**Beta**	**S.E.**	**Odds Ratio**	**Beta**	**S.E.**
Type of Insurance	*			*		
< 65 any private	(ref)	0.00		(ref)	0.00	
< 65 public only	6.46	1.87	0.14	1.00	0.00	0.00
< 65 uninsured	0.96	-0.04	0.14	1.00	0.00	0.00
65 + Medicare only	1.36	0.31	0.21	1.00	0.00	0.00
65 + Medicare/private	1.30	0.27	0.17	3.29	1.19	0.30
65 + Medicare/Medicaid	5.88	1.77	0.30	1.00	0.00	0.00
Managed care insurance				*		
HMO/managed care	(ref)	0.00		(ref)	0.00	
Fee for service/other	0.89	-0.12	0.08	1.35	0.30	0.11
Respondent type						
Self	0.95	-0.05	0.07	0.89	-0.11	0.11
Family	(ref)	0.00		(ref)	0.00	
Number of events	*					
1	(ref)	0.00		(ref)	0.00	
2	0.91	-0.09	0.06	0.86	-0.15	0.14
3 – 5	0.97	-0.03	0.06	0.95	-0.05	0.11
6 +	1.23	0.21	0.08	0.89	-0.12	0.14
Reporting aids	*			*		
Memory only	(ref)	0.00				
Calendar only	1.16	0.15	0.07			
Bill only	0.88	-0.13	0.09			
Calendar & checkbook/bottle	0.87	-0.14	0.14			
Checkbook/bottle only	0.80	-0.23	0.15			
EOB only	1.04	0.03	0.15			
Calendar & bill	0.84	-0.18	0.17			
All other combinations	0.93	-0.08	0.11			
Memory only				(ref)	0.00	
Bill only				1.30	0.27	0.12
EOB only				2.49	0.91	0.18
Calendar only				1.51	0.41	0.23
Calendar & bill				0.96	-0.04	0.21
EOB & bill				2.06	0.72	0.27
Calendar & EOB				0.75	-0.29	0.40
Checkbook/bottle only				1.61	0.48	0.30
All other combinations				1.16	0.15	0.19

(ref) = reference group
*Wald F: * significant at the 0.05 level, ** significant at the 0.10 level*
Probability modeled is accurate = 1, not accurate = 0.
Sources of data: Agency for Healthcare Research and Quality, 2003 Medical Expenditure Panel Survey – Household and Medical Provider Components.