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RESEARCH ARTICLE

Methodological Considerations When Studying the Association between Patient-Reported Care Experiences and Mortality

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Objective. To illustrate methodological considerations when assessing the relationship between patient care experiences and mortality.

Data Source. Medical Expenditure Panel Survey data (2000–2005) linked to National Health Interview Survey and National Death Index mortality data through December 31, 2006.

Study Design. We estimated Cox proportional hazards models with mortality as the dependent variable and patient experience measures as independent variables and assessed consistency of experiences over time.

Data Extraction Methods. We used data from respondents age 18 or older with at least one doctor's office or clinic visit during the year prior to the round 2 interview. We excluded subjects who died in the baseline year.

Principal Findings. The association between overall care experiences and mortality was significant for deaths not amenable to medical care and all-cause mortality, but not for amenable deaths. More than half of respondents were in a different care experience quartile over a 1-year period. In the five individual experience questions we analyzed, only time spent with the patient was significantly associated with mortality.

Conclusions. Deaths not amenable to medical care and the time-varying and multifaceted nature of patient care experience are important issues to consider when assessing the relationship between care experience and mortality.

Key Words. Patient care experiences, mortality, quality of care

A cardinal feature of high-quality care is that it should be “patient-centered,” that is, “respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions” (Institute of Medicine 2001). Asking patients about their care experiences is one way of assessing whether care is patient-centered (Cleary and McNeil 1988;

Cleary et al. 1991; Cleary 1999; Goldstein et al. 2001). The Agency for Healthcare Research and Quality's Consumer Assessments of Healthcare Providers and Systems (CAHPS) project has developed standardized surveys for assessing patient care experiences in a variety of settings (Homer et al. 1999; Hargraves, Hays, and Cleary 2003; Daniels et al. 2004; Landon et al. 2004).

Research has found positive associations between patient experience measures and other quality of care indicators and patient outcomes. For example, a systematic review by Doyle, Lennox, and Bell (2013) identified 40 studies assessing the association between patient-reported experiences and patient safety and clinical outcomes. They found positive associations "across a range of disease areas, study designs, settings, population groups and outcome measures" (p. 3). Husson, Mols, and van de Poll-Franse (2011) reviewed five prospective observational studies among cancer survivors. These studies showed that the provision of appropriate information by clinicians is associated with lower depression and anxiety scores and better health-related quality of life scores among patients as measured by instruments such as the mental component summary of the SF-12 and the European Organization for Research and Treatment of Cancer quality of life questionnaire. Patient-reported experiences also have been found to be related to survival in cancer patients (Gupta, Rodeghier, and Lis 2013) and after hospitalization for a heart attack (Meterko et al. 2010).

One recent and widely publicized study by Fenton et al. (2012), however, reported that better patient ambulatory care experiences were negatively associated with survival. Their findings caused some to question the value of patient experience measures (Elliott and Zaslavsky 2012). There are numerous reasons why different quality measures could show low or negative association with patient outcomes. Fenton et al. (2012) addressed many methodological issues related to their analyses, but it is very difficult to evaluate accurately the complex relationships between patient care experience and mortality when using observational data that are not specifically collected for that purpose.

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Observational studies are subject to confounding that is often difficult to account for. For example, sicker patients tend to receive better technical quality of care, but they have worse outcomes of care (Kahn et al. 2007). Sicker patients may need more information and clinicians may spend more time with them, resulting in a positive association between better patient-centered care and mortality (Elliott et al. 2013). Another complexity is that the associations between patient experiences and outcomes can be sensitive to the measures selected. For example, access may be related to patient outcomes differently than communication. Composites that aggregate respondents' answers across multiple questions may obscure distinctions between different aspects of patient-centered care. Patient experiences with care also vary over time and the relationship between care experiences and outcomes may be sensitive to when assessments are conducted. Furthermore, assessments of whether better patient experiences lead to higher or lower mortality should take into account that not all deaths can be prevented or delayed by medical care (Boys, Forster, and Jozan 1991; Nolte and McKee 2008).

Studies seeking to discern the relationship between patient-reported experiences and mortality should carefully address these types of methodological issues to reduce the risk of spurious findings. In this article, we reexamine the data analyzed by Fenton et al. (2012) to highlight some of the challenges faced by researchers when assessing the relationships between patient-reported health care experiences and mortality.

METHODS

Data Source

We used the same data, that is, 2000–2005 Medical Expenditure Panel Survey (MEPS) data linked to National Health Interview Survey (NHIS) mortality data, and a similar analytic strategy as used by Fenton et al. (2012). The MEPS is a nationally representative survey of the U.S. civilian noninstitutionalized population. The household component of the survey is supplemented by data from respondents' employers and medical providers (doctors, hospitals, etc.). The MEPS uses a panel design with a new panel of sample households selected each year and the panel followed over two full calendar years with five rounds of interviews (<http://meps.ahrq.gov/mepsweb>).

Like Fenton et al. (2012), we restricted our sample to respondents age 18 or older who had at least one doctor's office or clinic visit during the year prior to the round 2 interview (i.e., when questions on experiences with care were first

asked). This ensured that all respondents in our sample were eligible to complete the patient care experience questions in MEPS. We excluded 12 subjects who died in the baseline year because several of the explanatory variables in our analyses (e.g., medical care utilization) required data for the entire baseline year.

Measures

Mortality. Mortality data through December 31, 2006, were obtained from the NHIS-National Death Index Linked Mortality Public-Use File. Not all deaths can be prevented or delayed with high-quality care. For example, the prognosis of patients with end-stage pancreatic cancer is not likely modifiable by the type of care they receive. Thus, for each respondent, we analyzed amenable and nonamenable mortality, as well as all-cause mortality (Boys, Forster, and Jozan 1991; Nolte and McKee 2008). We defined amenable versus nonamenable mortality following the approach used by Nolte and McKee (2008) based on each patient's cause of death, with slight modifications due to availability of data in MEPS (Appendix SA2). To the extent that the association between better patient experiences and higher mortality observed by Fenton et al. (2012) represents a causal rather than spurious relationship, we would expect to observe an association among amenable cases, but not among nonamenable cases. The association observed in the nonamenable cases would allow us to estimate the magnitude of any spurious relationship that might bias the estimate of the causal association between patient experience and overall mortality.

Patient Self-Reported Health Care Experience. For each panel in the MEPS survey, questions about patient experiences with health care were asked using a self-administered questionnaire during rounds 2 and 4. We used the same items that were used by Fenton et al. (2012) for measuring patient experiences with care: "In the last 12 months, how often did doctors or other health providers . . .?" (1) listen carefully to you; (2) explain things in a way that was easy to understand; (3) show respect for what you had to say; and (4) spend enough time with you. Each question was answered using a categorical response scale (1 = never, 2 = sometimes, 3 = usually, and 4 = always). A fifth item, asking "Using any number from 0 to 10 where 0 is the worst health care possible and 10 is the best health care possible, what number would you use to rate all your health care in the last 12 months?" was also included.

We constructed a composite measure in the way Fenton et al. (2012) did by first standardizing the score of each item (i.e., mean of 0 and standard

deviation of 1) and calculating the average of the five standardized scores. A higher score on this composite measure indicates more positive experiences with care. Also following the approach used by Fenton et al. (2012), that measure was then recoded into quartiles to indicate four different levels of care experience, ranging from quartile 1 (i.e., least positive experience) to quartile 4 (i.e., most positive experience). We constructed two measures for each respondent using data from round 2 and round 4, respectively.

Covariates. To account for factors that may confound the relationship between patient experiences with health care and mortality, we also adjusted for other patient characteristics used by Fenton et al. (2012) in their analyses. Those included sociodemographic characteristics (age, gender, race and ethnicity, education, household income, metropolitan statistical area [MSA] status, and census region), access to usual source of care, insurance coverage, smoking status, number of chronic conditions (diabetes, hypertension, coronary heart disease, myocardial infarction, cerebrovascular disease, asthma, emphysema, and arthritis), general health status (measured by a self-rated overall health item and the SF-12 physical and mental health component summary scores), number of drug prescriptions, and use of medical care services (total medical care expenditure, number of office visits, any emergency department visits, and any inpatient admissions), all measured over the baseline year for each panel. Total medical care expenditures, number of drug prescriptions, and number of office visits were log-transformed because of their skewed distributions.

Statistical Analysis

To assess the association between baseline patient experience with care and mortality, we first estimated a Cox proportional hazards model for all-cause mortality using measures of patient experience from round 2 as the primary explanatory variable, while adjusting for other patient characteristics and the calendar year of the subject's baseline interview. We also estimated parallel Cox proportional hazards models using amenable and nonamenable mortality, respectively, as the dependent variable. When estimating the hazard of death from amenable causes, subjects who experienced death from nonamenable causes can no longer experience death from amenable causes, so we treated deaths with a nonamenable cause as censored data, and vice versa when analyzing nonamenable mortality. Survival was measured in quarters

from the beginning of a respondent's second year in the panel until either death or censoring.

To assess the stability of patients' experience with care over time, we cross-tabulated the quartiles of their experiences in rounds 2 and 4. Agreement between the two measurements was assessed using the Kappa statistic. To illustrate the impact of accounting for the time-varying nature of patients' experience with health care, we estimated Cox proportional hazards models for all-cause mortality using information from both round 2 and round 4 measures of care experiences. Specifically, we coded each respondent as being in the highest quartile (i.e., most positive experience) in both rounds, in the medium-high quartile in both rounds, in the medium-low quartile in both rounds, and having different quartiles of health care experience in the two rounds (reference group = having the lowest quartile in both rounds).

Finally, we reestimated the Cox proportional hazards models for all-cause mortality using individual questions about patients' health care experience from round 2 as independent variables, instead of the composite score. The responses were dichotomized using the "top-box" approach (i.e., "always" vs. the other categories for the four categorical items and 9–10 vs. 0–8 for the all health care rating item). Unless otherwise noted, statistical analyses were adjusted to account for the complex survey design of MEPS including stratification, clustering, and weighting. Analyses were conducted in R 2.15 and SAS 9.2.

RESULTS

Respondents' characteristics are presented in Table 1. These are comparable to those reported by Fenton et al. (2012). Individuals in the highest quartile of patient experience tended to be older, publicly insured, have a usual source of care, less likely to have had an emergency department visit, have fewer office visits, have a greater number of prescription medicines, and self-report better health status than those with worse patient experiences with care.

Amenable versus Nonamenable Mortality

Among the 34,180 respondents, 1,287 died during the study follow-up period. Of these deaths, 1,022 (79 percent) were considered not modifiable by health care, while only 265 (21 percent) were classified as amenable to health care.

Table 1: Patient Characteristics by Quartiles of Care Experience (n = 34,180)

Characteristics	Patient Health Care Experience Quartile				p-value
	Quartile 1 (Lowest) (n = 7,984)	Quartile 2 (n = 9,100)	Quartile 3 (n = 7,358)	Quartile 4 (Highest) (n = 9,738)	
Age (mean)	44.8	48.6	49.2	51.3	<.0001
Female (%)	58.0	58.7	56.4	59.0	.030
Race/ethnicity (%)					
Non-Hispanic white	75.2	79.9	77.0	79.2	<.0001
Non-Hispanic black	9.2	7.6	10.4	10.2	
Hispanic	9.3	7.8	8.2	7.5	
Non-Hispanic other	6.3	4.8	4.4	3.1	
Metropolitan statistical area (%)	81.8	81.2	81.5	79.0	.001
Poverty category (%)					
Poor	11.2	8.1	8.9	9.1	<.0001
Near poor	3.7	3.1	3.3	3.9	
Low income	12.6	11.7	11.9	12.4	
Middle income	32.2	30.6	30.1	29.7	
High income	40.4	46.5	45.8	45.0	
Education (%)					
< High school	5.9	5.0	5.7	6.1	<.0001
Some high school	10.7	8.2	8.6	9.3	
High school grad	32.0	30.7	31.4	33.4	
Some college	23.6	24.2	24.1	23.4	
College grad	27.7	31.9	30.3	27.8	
Health insurance (%)					
Any private	74.9	80.6	79.8	77.9	<.0001
Public only	14.4	13.3	14.1	16.3	
Uninsured	10.7	6.2	6.2	5.8	
Has usual source of care (%)	83.5	88.4	88.5	90.0	<.0001
Number of chronic diseases (%)					
None	51.5	48.2	47.9	45.8	<.0001
1	26.9	27.6	28.4	28.7	
2	13.0	14.2	15.0	15.5	
3	5.3	6.1	6.0	6.4	
≥4	3.3	3.9	2.6	3.6	
Current smoker (%)	24.7	17.9	18.5	18.0	<.0001
Mean SF-12 physical score (mean)	46.3	47.7	48.7	49.0	<.0001
Mean SF-12 mental score (mean)	46.5	50.1	51.1	52.8	<.0001

continued

Table 1. *Continued*

Characteristics	Patient Health Care Experience Quartile				<i>p</i> -value
	Quartile 1 (Lowest) (<i>n</i> = 7,984)	Quartile 2 (<i>n</i> = 9,100)	Quartile 3 (<i>n</i> = 7,358)	Quartile 4 (Highest) (<i>n</i> = 9,738)	
Self-rated health (%)					
Excellent	15.4	19.6	22.4	28.5	<.0001
Very good	32.4	36.2	35.4	33.4	
Good	31.1	29.6	28.3	25.3	
Fair	15.4	11.0	10.6	9.2	
Poor	5.7	3.6	3.3	3.7	
Total health expenditure (\$, mean)	\$4,546	\$4,703	\$4,406	\$4,498	<.0001*
Number of office-based physician visits (mean)	5.1	5.5	5.0	4.9	<.0001*
Any emergency department visits (%)	19.3	16.4	15.6	14.2	<.0001
Any hospital discharge (%)	11.0	12.2	10.7	11.3	.040
Number of drug prescriptions (mean)	15.2	16.9	15.8	17.1	<.0001*

Notes. Data reflect statistics after adjustment for sampling design.

SF-12 = 12-item short form health survey.

*Test was conducted on log-transformed value.

For example, 56 percent of all deaths (721/1,287) occurred in persons at age 75 or older, and 8 percent (109/1,287) were due to malignant neoplasm of trachea, bronchus, and lung that are deemed not amenable to health care (Nolte and McKee 2008).

The results for the separate Cox Proportional Hazards models for all-cause, amenable, and nonamenable deaths are presented in Table 2. Similar to results in Fenton et al. (2012), our analyses using all deaths suggest a significant difference in all-cause mortality between the highest and the lowest quartile of positive care experience with an adjusted hazard ratio (HR) of 1.23 (95 percent confidence interval [CI]: 1.03–1.49, $p = .03$). Patients in the highest quartile also had a significantly greater hazard of death from nonamenable reasons (HR = 1.26, 95 percent CI: 1.02–1.55, $p = .03$) than those in the lowest quartile. However, patients' experience with health care was not significantly associated with amenable mortality, with adjusted HRs (95 percent CI) being 1.27 (0.85–1.89), 1.28 (0.84–1.95), and 1.23 (0.82–1.84), respectively, for respondents in the medium-low, medium-high, and high quartiles, compared with those in the lowest quartile.

Table 2: Results of Cox Proportional Hazards Ratio Model for All-Cause Mortality, Amenable Mortality, and Non-amenable Mortality ($n = 34,180$)

<i>Patient Care Experience*</i>	<i>All-Cause Mortality</i>			<i>Nonamenable Mortality</i>			<i>Amenable Mortality</i>		
	<i>HR</i>	<i>95% CI</i>	<i>p-value</i>	<i>HR</i>	<i>95% CI</i>	<i>p-value</i>	<i>HR</i>	<i>95% CI</i>	<i>p-value</i>
Quartile 1 (least positive)	Reference			Reference			Reference		
Quartile 2	1.09	(0.89, 1.33)	.40	1.07	(0.86, 1.33)	.56	1.27	(0.85, 1.89)	.25
Quartile 3	1.01	(0.82, 1.24)	.93	0.96	(0.76, 1.20)	.70	1.28	(0.84, 1.95)	.25
Quartile 4 (most positive)	1.23	(1.03, 1.49)	.03	1.26	(1.02, 1.55)	.03	1.23	(0.82, 1.84)	.32
Overall <i>p</i> -value for patient care experience quartiles			.08			.03			.59

*Model also adjusted for patients' age, sex, race and ethnicity, education, household income, metropolitan statistical area (MSA) status, census region, access to usual source of care, insurance coverage, smoking status, number of chronic conditions, self-rated overall health, SF-12 physical and mental health component summary scores, number of drug prescriptions, total medical care expenditure, number of office visits, any emergency department visits, any inpatient admissions, and survey panel.
CI, confidence interval; HR, hazard ratio.

Time-Varying Patient Experiences with Care

Patients’ follow-up time ranged from 1 quarter to 6 years since the baseline year, with a mean of 3.4 years. Among those who died, the median survival time was 2.25 years (interquartile range [IQR]: 1.25–3.50 years). Over half of the deaths (51 percent) occurred more than 2 years after the baseline assessment (data not shown). Therefore, patients’ subsequent interaction with health care providers, in addition to their health care experience in baseline year, could have played an important role in determining whether patient care experiences are associated with survival.

A cross-tabulation of patients’ self-reported health care experiences in rounds 2 and 4 is shown in Table 3. Among those who had their experience with care measured in both round 2 and round 4 ($N = 26,260$), 55 percent were in a different quartile in round 4, demonstrating the time-varying nature of a patient’s experiences with care. In particular, among those in the quartile with the most positive experiences in round 2, 43 percent were in a lower quartile in round 4. The weighted kappa (with squared [quadratic] weights) between round 2 and round 4 quartiles was only 0.49. The bivariate correlation coefficient between the round 2 and round 4 composite scores was 0.48.

Although the cut-offs for these quartiles were sample-specific such that patients in the same quartile in round 2 may not have the exact same response

Table 3: Change in Patient Self-Reported Care Experience between Round 2 and Round 4 of MEPS Survey, among Those Who Answered Care Experience Questions in Both Rounds*

	<i>Patient Care Experience (Round 4)</i>				<i>Total</i>
	<i>Quartile 1</i>	<i>Quartile 2</i>	<i>Quartile 3</i>	<i>Quartile 4</i>	
Patient Care Experience (Round 2) (%)					
Quartile 1	2,930 (49.3)	1,772 (29.8)	682 (11.5)	554 (9.3)	5,938 (100)
Quartile 2	1,446 (20.1)	3,087 (42.9)	1,456 (20.3)	1,201 (16.7)	7,190 (100)
Quartile 3	655 (11.6)	1,585 (28.2)	1,637 (29.1)	1,750 (31.1)	5,627 (100)
Quartile 4	442 (5.9)	1,198 (16.0)	1,591 (21.2)	4,274 (56.9)	7,505 (100)

Notes. $N = 26,260$. Data reflect unweighted frequency, and row percentages are provided within parentheses. Forty-five percent ($n = 11,928$) of the patients were in the same quartile at round 2 and round 4.

*Among the 34,180 respondents who completed care experience questions in round 2 interview, 7,920 (23.2%) did not answer care experience questions in round 4 because they did not have any visit at “a doctor’s office or clinic” for health care during the past 12 months (hence not eligible for care experience questions), had missing data on at least one of the five care experience questions, or died or were lost to follow-up by round 4. Most (70%) were due to lack of health care visit.

to the survey questions in round 4, we found a similar level of disagreement when comparing the responses to the original survey items between rounds 2 and 4. For the four categorical care experience items, the weighted Kappa coefficient ranged from 0.36 to 0.43. For the all health care rating item (0–10 scale), the correlation between the two rounds was 0.43.

To further illustrate the importance of accounting for the time-varying nature of a patient’s experiences with care, we conducted multivariable regression analyses of the association between patient experience and all-cause mortality while taking into consideration patients’ experience in both round 2 and round 4 (Table 4). Patients who consistently experienced more positive experience with care in both round 2 and round 4 had HRs that were not significantly different from those who consistently reported worst experience. The adjusted HRs for mortality were 0.89 (95 percent CI: 0.66–1.19), 1.13 (95 percent CI: 0.75–1.70), and 1.09 (95 percent CI: 0.82–1.45), respectively, for the medium-low, medium-high, and high quartiles versus the lowest quartile. We also estimated a model in which we distinguished the effect of moving to a higher quartile versus a lower quartile among respondents whose care experience changed between round 2 and round 4, and the results were comparable (data not shown).

Table 4: Multivariable Regression Analysis of the Association between Patient Self-Reported Care Experiences and All-Cause Mortality, Accounting for Patient Experience with Care in Both Rounds 2 and 4

<i>Patient Care Experience (Round 2: Round 4)*</i>	<i>All-Cause Mortality (n = 26,260, Number of All-Cause Deaths = 928)</i>		
	<i>Hazard Ratio</i>	<i>95% Confidence Interval</i>	<i>p-value</i>
Quartile 1: Quartile 1	Ref		
Quartile 2: Quartile 2	0.89	(0.66, 1.19)	.42
Quartile 3: Quartile 3	1.13	(0.75, 1.70)	.57
Quartile 4: Quartile 4	1.09	(0.82, 1.45)	.54
Different quartiles in round 2 and round 4	0.88	(0.67, 1.15)	.35

Notes. Sample size in this analysis is smaller than in Tables 1, 2, and 5 because this analysis was limited to respondents who had completed care experience questions in both Round 2 and Round 4. Model also adjusted for patients’ age, sex, race and ethnicity, education, household income, metropolitan statistical area (MSA) status, census region, access to usual source of care, insurance coverage, smoking status, number of chronic conditions, self-rated overall health, SF-12 physical and mental health component summary scores, number of drug prescriptions, total medical care expenditure, number of office visits, any emergency department visits, any inpatient admissions, and survey panel.

*For example, Quartile 1: Quartile 1 = Patient self-reported care experience was in the lowest quartile in both round 2 and round 4.

Table 5: Association between Individual Items of Patient Self-Reported Care Experience (Rather Than the Composite Score) and All-Cause Mortality

<i>Patient Care Experience</i>	<i>All-Cause Mortality (n = 34,180, Number of All-Cause Deaths = 1,287)</i>		
	<i>Hazard Ratio</i>	<i>95% Confidence Interval</i>	<i>p-value</i>
Explain things in a way that was easy to understand*	1.09	(0.96, 1.23)	.17
Listen carefully to you*	0.98	(0.84, 1.13)	.76
Show respect for what you had to say*	1.05	(0.92, 1.20)	.44
Spent enough time with you*	1.17	(1.01, 1.35)	.03
Rating of health care [†]	1.10	(0.97, 1.24)	.15

Notes. Model also adjusted for patients' age, sex, race and ethnicity, education, household income, metropolitan statistical area status, census region, access to usual source of care, insurance coverage, smoking status, number of chronic conditions, self-rated overall health, SF-12 physical and mental health component summary scores, number of drug prescriptions, total medical care expenditure, number of office visits, any emergency department visits, any inpatient admissions, and survey panel.

*"Always" versus "never"/"sometimes"/"usually."

[†]Rating of health care 9–10 versus 0–8.

Composite versus Individual Measures of Health Care Experience

Table 5 shows results using individual questions about care experiences from round 2 interview, rather than the composite score. Only the item measuring whether providers always spent enough time with the respondent was significantly associated with all-cause mortality (HR = 1.17, 95 percent CI: 1.01–1.35, $p = .03$).

DISCUSSION

The goal of the analyses presented herein is to highlight several methodological issues that should be carefully considered in studies intending to characterize the relationship between patient experiences and outcomes. Although one should always be alert to the possibility of spurious associations, special vigilance is called for when results are implausible. Given that most studies have found a positive association between quality of care and positive outcomes, the direction of the association reported by Fenton et al. (2012) was surprising. If their results reflected a causal association, the magnitude of the association

would imply that more patient-centered care is as strong a predictor of mortality as some chronic conditions (Fan et al. 2002; Han et al. 2012).

Some of our results suggest that the positive correlation between good health care experiences and all-cause mortality reported by Fenton et al. (2012) may reflect a spurious association. First, there was not a significant association between amenable mortality and patient experiences. Although this lack of statistical significance may reflect less statistical power because of the lower number of amenable deaths, rather than a real lack of difference in hazards of amenable mortality by care experience quartile, hazard ratios for non-amenable deaths are well-estimated and the similarity of their magnitude to that for overall deaths casts doubt on a causal interpretation of good patient experience increasing mortality risk. Second, for amenable deaths, the hazard ratio for the highest quartile was slightly, although not significantly, *lower* than the second and third quartiles, which is inconsistent with the trend for non-amenable deaths and with the argument that the best care is associated with the highest mortality.

Moreover, we showed that among respondents who had care experiences measured in both round 2 and round 4 of the MEPS interview, more than half fell into a different care experience quartile over this relatively short time period (approximately 1 year). This highlights the time-varying nature of a patient's health care experience. Using a one-time assessment of patient experience at baseline to predict mortality outcomes several years later could miss important information from subsequent years that also might have affected survival.

We also found that the estimated relationship between patient care experiences and mortality is sensitive to the experience measure analyzed. Of the five questions we examined, only time spent with the patient was significantly associated with mortality. This is consistent with a previous study demonstrating that patients near the end of their lives often receive better patient-centered care (Elliott et al. 2013), and it may indicate a confounding effect of sicker patients receiving more attention. Thus, it is possible that the association between the composite experience measure and all-cause mortality may have been driven in part by extra time spent with patients near the end of life.

The linked datasets that we and Fenton et al. (2012) used have several limitations when trying to assess the relationship between patient care experiences and mortality. One is the way the questions were worded. The original CAHPS questions were changed so that they asked about "doctors or other health providers," rather than a specific doctor or provider. Such questions yield responses that probably reflect an average of experiences with several

providers or settings of care and they may or may not reflect the care delivered by the provider(s) most responsible for measured outcomes (Anhang Price et al. 2014). Furthermore, the patient experience measures are limited to 2 years for each panel, and amenable versus nonamenable mortality cannot be defined exactly the way suggested by Nolte and McKee (2008) due to lack of specific 10th revision of the International Statistical Classification of Diseases, Injuries, and Causes of Death (ICD-10) codes. However, the data are useful for illustrating the methodological challenges in studying the association of patient experience with mortality.

In summary, use of observational data to study the complex relationship between patient experience with health care and mortality is subject to important methodological challenges. Caution is needed in future analyses to distinguish between amenable and nonamenable death, be aware of changes in patient experiences over time, and distinguish between questions that ask about different aspects of care.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Appendix SA2: Define Amendable versus Nonamenable Deaths.