Performance Measures

Variation in Quality of Care Within Health Systems

Steve Hines, Ph.D.; Maulik S. Joshi, Dr.P.H.

Although knowledge about the quality of care individual hospitals provide has grown rapidly during the past 10 years, little is known about how hospital systems compare in quality, or even whether quality can be reliably measured at the system level. This gap in knowledge is an important one, given an increase in the number of hospitals that affiliate with a national or local system.[1,2] More than 54% of the community hospitals in the United States now report affiliating with a hospital system, a percentage that has risen from 51% between 1999 and 2004.[3] Yet despite this increasing trend toward health systems, we know very little about how they operate. Anecdotally, health systems may differ in terms of standardization of clinical practices, quality measurement, quality reporting, education and training, clinical information system use, information technology implementation, and quality improvement implementation. At one extreme, a very centralized system would centrally deploy all major processes, whereas at the other extreme, a very decentralized system would enable the individual health care organizations to drive their own processes.

Measurement of quality at the system level is important for several reasons. In at least some systems, hospital budgets and priorities are established or must be approved at the system level. Decisions about major investments that may affect quality, such as health information technology, are often made systemwide. Health care purchasers, including purchasers seeking to pay for quality, often negotiate reimbursement rates with systems rather than with individual hospitals. Moreover, many systems have little sense of how their aggregate quality compares with that of other systems or whether it is improving over time. Without this information, hospital system leaders have limited ability to prioritize improvement initiatives or to monitor or provide incentives for progress. This is a particularly acute concern when systems include a number of relatively small hospitals, whose individual performance on many quality measures is difficult or impossible to reliably measure because of insufficient volume.

The Dartmouth Atlas of Health Care now reports a limited number of outcome and process measures for larger hospital

Article-at-a-Glance

Background: Although many hospitals belong to health care systems, little is known about the quality of care provided by those systems, or whether characteristics of health care systems are related to the quality of care patients receive. Dimensions of the quality of care provided in 73 hospital systems were examined using hospital quality data publicly reported by the Centers for Medicare & Medicaid Services (CMS). The hospital systems consisted of six or more acute care hospitals and represented 1,510 hospitals. The study was designed to determine whether these dimensions of system quality could be reliably measured, to describe how systems varied with respect to quality of care, and to explore system characteristics potentially related to care quality.

Methods: Data were made available by CMS for 19 indicators of care quality for pneumonia, surgical infection prevention, acute myocardial infarction (AMI), and congestive heart failure.

Results: At the system level, reliable measures (alphas > .70) were constructed for each of the four clinical areas, and these measures were combined into a single measure of quality (alpha = .85). Variability in system quality was substantial, ranging from 94% to 70% on the combined quality measure. On the clinical area measures, the smallest range was for AMI (99%–85%), whereas the largest was for surgical infection prevention (95%–54%). System ownership and system centralization were significant predictors of quality, accounting for 30% of variance in the combined quality measure. Geographic region, inclusion of teaching hospitals, and system size were unrelated to quality.

Discussion: Systems vary greatly in terms of quality of care in each of the four clinical areas, with for-profit and more decentralized systems appreciably lower in quality of care. System-level quality measures and data could be used to compare processes within systems and to drive improvement efforts.

systems,[4] but comparing system performance is not easy, and the number of process measures reported is limited. Moreover, the reliability of these measures for system-level analyses has never been established. Jha et al., who examined the reliability of these measures at the hospital level, concluded that clinical area measures were marginally reliable and essentially unrelated to performance in the other clinical areas.[5] No other published studies have compared the quality performance of hospital systems or examined how system characteristics relate to performance. For example, although systems are classified by the American Hospital Association on the basis of a taxonomy that ranges from independent systems with limited centralization to highly centralized systems, the impact of this system feature on quality is not known.[6–8]

This article described a study that addressed three aims:

1. To determine whether publicly reported Centers for Medicare & Medicaid Services (CMS) quality measures can reliably assess the quality of care at the system level

2. To assess whether systems vary substantially with respect to the quality of care they provide

3. To examine relationships between system characteristics and the quality measures

Methods

Clinical Conditions and Measures

Quality measures for four clinical conditions—pneumonia, surgical site infections, acute myocardial infarction (AMI), and congestive heart failure (CHF), as described elsewhere[5,9]—are publicly reported by the CMS. Seven quality indicators address pneumonia: assessment and administration of pneumococcal and influenza vaccination, receipt of initial antibiotic within four hours, appropriateness of initial antibiotic, receipt of blood culture prior to an antibiotic, oxygenation assessment, and the provision of smoking cessation advice or counseling. Surgical infection prevention (SIP) quality is assessed with two measures: receipt of preventive antibiotic one hour before incision and stopping preventive antibiotic within 24 hours of surgery. Six measures of quality are used for AMI: the provision of smoking cessation advice or counseling, the provision of aspirin at arrival and at discharge, the provision of beta blocker at arrival and at discharge, and the use or nonuse of angiotensin-converting enzyme (ACE) or angiotensin receptor blocker (ARB) for left ventricular systolic dysfunction. Two other AMI measures (provision of percutaneous intervention within 120 minutes of arrival and use of thrombolytic medication within 30 minutes or arrival) were not included in our analyses because a majority of the systems had denominators for these measures under 75. Four quality measures were used for CHF: the provision of smoking cessation advice or counseling, evaluation of left ventricular systolic function, the use or nonuse of ACE or ARB for left ventricular systolic dysfunction, and the provision of discharge planning. Details on the specifications for these measures as well as the process that CMS used to validate the accuracy of these data are available.[10]

Measurement Period and Process

We used data available from CMS for a one-year period that encompassed the final three quarters of 2005 and the first quarter of 2006.[11] For each of the 19 measures, the denominators and numerators for all eligible cases drawn from all of the hospitals within the system were summed together. These numbers were used to calculate the percentage of eligible persons within each system who received the recommended care on each quality measure.

System Selection, Classification, and Characterization

Source of Information. We linked CMS quality data, which includes the provider identification number, hospital location, accreditation status, and availability of an emergency department, to annual survey data from the American Hospital Association (AHA) to obtain information on system affiliation and number of beds. Information on hospitals that could not be linked to the AHA data was obtained from hospitals' and hospital systems' Web sites. A random sample of 125 hospitals from the systems included in our final sample was audited to determine the accuracy of our match rate. We reviewed the system Web sites and determined that more than 98% of these hospitals were correctly classified with respect to system affiliation.

System Selection. We limited our analyses to systems that included data from at least six hospitals and that had a minimum of 75 cases in the denominator for each measure. The 73 systems that met these criteria were initially classified as a for-profit hospital management system (3 systems), a for-profit system that owned a large majority of its hospitals (9), a nonprofit system operated by a religious organization (33), or a nonprofit system operated by a government entity or another civic organization (28). Initial comparisons revealed negligible differences between the two types of for-profit systems and between the nonprofit systems operated by religious, government, or civic entities. We consolidated these groupings into two system types: for-profit and not-for-profit systems. Collectively, the 73 systems included 1,510 hospitals that

reported data on one or more of the quality measures.

System Classification. Systems were also classified on the basis of size, geographic region, inclusion of a teaching hospital, and the extent of centralization. System size was initially measured in two ways: (1) we computed the number of hospitals in the system reporting one or more of the quality measures, and (2) we considered the total number of beds in those hospitals. Because the number of hospitals and beds in a system were highly correlated (r = .91), we used system beds as the single measure of system size. Systems were classified as small (< 2,500 beds), medium (2,500–7,200 beds), or large (> 7,200 beds). The cutoff point for determining what should be classified as a system is admittedly subjective. The Dartmouth Atlas uses 10 hospitals as its cutoff point[4]; we used 6 as our minimum to ensure that virtually all systems included would have sufficient numbers of cases for inclusion in our analyses. Although this approach excluded some smaller systems with between 2 and 5 hospitals, preliminary analyses did not show any linear relationship between system size and our outcome variables, even when these smaller systems were included.

System region was established on the basis of the location of hospitals in the system. Using the four regions defined by the U.S. Census Bureau, the 25 systems with hospitals in three or more regions were classified as multiregional. All other systems had two or fewer hospitals in a region outside the region where the majority of their hospitals were located. These systems were classified as located in the South (16), Northeast (5), Midwest (17), or West (10).

Systems were also classified as either having or not having at least one teaching hospital. This was determined using AHA data regarding whether each hospital was a member of the Council of Teaching Hospitals (COTH). The extent of system centralization was determined using the Bazzoli et al. taxonomy included in the AHA database.[7,8] This taxonomy is based on the extent to which integration, differentiation, and centralization exist within the system, as determined by hospital responses to questions about services provided by the system or network with which they affiliate: Systems that were classified as "centralized health systems" or "centralized physician/insurance health systems" were placed in the "extensive" category; a second grouping included "moderately centralized" health systems. A third category included systems labeled as either "decentralized" or "independent."

Each of the system variables we examined has conceptual or empirical relationships to dimensions of quality care and is of interest to policy makers. Profit status is of considerable interest in light of debates concerning whether nonprofit hospitals provide sufficient value to warrant their tax exemption. For example, Jha et al.[5] found higher quality measure scores in teaching hospitals, as well as those that are COTH members, and also observed regional differences.[12] In addition, because most analyses of hospital quality examine the size of the facility, we examined the size of the system, as well as the extent to which the systems were centralized.

Statistical Analysis

Reliability of the quality measures was assessed using Cronbach's alphas. The relationships between ownership type, size, geographic region, inclusion of teaching hospitals, and extent of centralization and the quality measures were examined in multivariable linear regressions. Because the focus of this paper in on variability between hospital systems, our analyses did not address the issue of within-system variability. Clearly, variability within systems exists, along with variability between units and between shifts within hospitals. At each of these levels, smaller sample sizes make variability more difficult to accurately estimate. To the extent that within-system variability exists, its effect would be to reduce the magnitude of the relationships that we report.

Results

Reliability of Quality Measures

Each of the four clinical area quality measures possessed an acceptable to very good level of reliability, ranging from an alpha of .87 for the AMI measure to .79 for the pneumonia, .76 for the CHF, and .72 for the SIP measure. All four clinical area measures were positively related to one another, with the strongest relationship between AMI and CHF (r = .72, $p < .001$) and the weakest between AMI and SIP (r = .65, $p < .001$). The combined measure Cronbach's alpha was .85. When we examined the reliabilities for these measures within the for-profit and nonprofit systems, the differences were negligible. Table 1 (page 329) further illustrates the extent to which systems that performed well on the overall quality measure performed well on each of the four clinical area measures. Approximately three fourths of the systems in the top and bottom quartiles overall were in the top and bottom quartiles in each of the four clinical areas.

Variability in System Quality

Table 2 (page 330) provides the means and standard deviations for each of the five quality measures. The range between the top- and the bottom-performing systems varied by 15% for AMI and by more than 30% for both CHF and SIP. On the

Table 1. Relationships Between Overall Quality Scores and Scores in Specific Clinical Domains*

	Overall Quality Quartile			
	1	2	3	4
AMI				
Top Quartile	78%	22%	0%	0%
Second Quartile	21%	53%	21%	5%
Third Quartile	0%	11%	63%	26%
Fourth Quartile	0%	17%	17%	66%
CHF				
Top Quartile	83%	11%	6%	0%
Second Quartile	16%	47%	37%	0%
Third Quartile	0%	37%	42%	21%
Fourth Quartile	0%	6%	17%	77%
Pneumonia				
Top Quartile	78%	22 %	0%	0%
Second Quartile	21%	53%	26%	0%
Third Quartile	0%	26%	48%	26%
Fourth Quartile	0%	0%	28%	72%
SIP				
Top Quartile	67%	33%	0%	0%
Second Quartile	32%	58%	10%	0%
Third Quartile	0%	11%	63%	26%
Fourth Quartile	0%	0%	22%	78%

* The combined measure represents systems' mean performance on the four clinical area measures.

AMI, acute myocardial infarction; CHF, congestive heart failure; SIP, surgical infection prevention.

combined quality measure, system performance reflected a range of 24% from the top- to the bottom-performing system. Whereas 12 systems (16%) had overall quality scores of ≥ 90% or above, 16 systems (22%) were < 80% on the overall quality measure.

Relationships Between System Characteristics and Quality

Previous research has demonstrated mixed results in the association of hospital characteristics, such as ownership and teaching status, with quality of care indicators.[12,13] We examined the relationships between system characteristics and each of the quality measures, as also reported in Table 2. Two characteristics had relatively consistent relationships with the quality measures. System ownership status was strongly associated with each of the quality measures. After adjusting for the other system characteristics, means in nonprofit systems were between 6% and 9% higher than in for-profit systems. Ownership type alone accounted for 21% of the variance in the combined quality measure. The extent of system centralization also was a significant predictor of quality on the combined quality measure and the pneumonia measure. More centralized systems tended to have better performance on the quality measures. A model including both ownership type and extent of centralization accounted for 30% of the variance in the combined quality measure.

Other variables had negligible relationships with the quality measures. Inclusion of a teaching hospital in the system had no significant association with quality, nor did geographic region or system size. Although all these analyses combined all for-profit systems and all nonprofit systems into two groups, separate analyses for of each type of for- and nonprofit systems yielded similar results.

Table 3 (page 331) shows the scores of the five highest- and five lowest- performing systems. The system with the highest combined quality measure score was Alegent Health, a religiously affiliated system that includes 9 acute care hospitals in Nebraska and Southwestern Iowa. Alegent also had the highest mean pneumonia and SIP rates. Covenant Health, a faith-based system in West Texas and eastern New Mexico, includes 3 cornerstone hospitals and another 10 that are managed or leased; Covenant had the lowest overall quality score, as well as the lowest scores on the CHF and SIP measures.

Discussion

This article provides the first glimpse into system-level performance on a set of widely used quality measures. By examining a full year's worth of quality data for 73 hospital systems that include more than 1,500 hospitals, we obtained clear answers to several key questions. The study's first key aim concerned the determination of whether publicly reported CMS quality measures can reliably assess the quality of care at the system level. Jha et al. found that hospital performance in some clinical areas was weakly related at best to performance in other areas and that there was no evidence that good hospitals could be identified that performed consistently well across areas.[5] Our analyses point to a very different conclusion. Quality indicators within each of the four clinical areas were reliably related to one another, as evidenced by Cronbach's alphas at ≥ .72. Moreover, the combined measures of quality for each of the four clinical areas were substantially correlated with one another and could be combined into an overall quality measure with excellent reliability (alpha = .85).

We believe that three statistical factors account for the divergent results we report. First, CMS reports data for hospitals that

Table 2. Relationships Between System Characteristics and Quality Measures*

Overall System Measures	Combined Measure	AMI	CHF	Pneumonia	SIP
System Mean	84%	93%	82%	83%	77%
System Maximum	94%	99%	94%	95%	95%
System Minimum	70%	84%	63%	71%	54%
Standard Deviation	5.20%	3.30%	6.10%	5.50%	8.80%
Characteristic of Hospital					
Ownership Type					
Not-for-Profit	85%†	94%†	84%†	85%†	78%†
For-Profit	78%†	88%†	75%†	79%†	68%†
Academic Status					
1+ Hospitals COTH Member	82%	92%	80%	81%	73%
0 Hospitals COTH Member	81%	90%	79%	83%	72%
Region					
Midwest	80%	90%	79%	81%‡	71%
Northeast	83%	91%	80%	84%‡	77%
South	80%	91%	79%	82%‡	70%
West	79%	91%	78%	79%‡	69%
Multiregion	84%	93%	83%	85%‡	77%
Centralization					
Extensive	84%‡	93%	82%	86%†	76%
Some	81%‡	91%	79%	80%†	72%
Limited	79%‡	90%	78%	80%†	70%
No of Beds					
< 2,500 Beds	82%	91%	80%	81%	75%
2,500–7,200 Beds	81%	90%	79%	82%	72%
> 7,200 Beds	82%	92%	78%	83%	72%

* Reported means were adjusted using linear regression based on each of the other four predictor variables. The combined measure represents systems' mean performance on the four clinical area measures. AMI, acute myocardial infarction; CHF, congestive heart failure; SIP, surgical infection prevention; COTH, Council of Teaching Hospitals.
† $p < .01$
‡ $p < .05$

have a minimum of 25 cases in the denominator for the quality indicator, and Jha et al. used the same criteria. Because we limited our analyses to systems with at least 75 cases in the denominator for each indicator (most were much larger), the estimates of system performance on each clinical indicator were substantially more precise. Combining more precise measures inevitably produces more reliable measures, which in turn, will be reflected in higher correlations with other related measures. Second, we were able to use system data for a full year, which also yielded more precise estimates of system performance. Finally, because we included more specific indicators in each of the clinical areas, reliability also was enhanced.

Although these methodological issues may seem arcane, they have important implications for quality improvement research, as well as for those using CMS quality measures to assess and even reward performance. For researchers, efforts to examine the relationships between these process measures and other factors such as hospital culture, clinical outcomes, or structural characteristics must ensure the process measures they employ are reliable. Failure to do so risks creating a body of research in which process measures are consistently unrelated to other factors solely because measure reliability is low.

Persons who use these measures in applied settings also must exercise caution. Although CMS had legitimate strategic reasons for selecting a low denominator size cutoff point for reporting on hospital performance, a substantially higher threshold may be needed to truly assess and incentivize hospital quality. We do not know where this threshold should be set or how long a period of time can be appropriately aggregated to ensure enough cases for reliable measures. Obtaining answers to

Table 3. System Quality Performance and Rankings*

Top Five Systems: Combined Quality Measure

System	Region	Owner Type	AMI	CHF	PNEU	SIP	Combined	Overall Rank
Alegent Health	Midwest	Religious	97%	90%	95%	95%	94%	1
Novant Health	South	Nonprofit	99%	90%	93%	89%	93%	2
Baylor Health Care System	South	Nonprofit	98%	91%	90%	89%	92%	3
PeaceHealth	West	Religious	96%	88%	88%	94%	91%	4
Catholic Healthcare Partners	Multi Region	Religious	97%	94%	91%	82%	91%	5

Bottom Five Systems: Combined Quality Measure

System	Region	Owner Type	AMI	CHF	PNEU	SIP	Combined	Overall Rank
Community Health Systems, Inc.	Multi Region	For-Profit	87%	73%	82%	61%	76%	69
Brim Healthcare, Inc.	Multi Region	For-Profit	86%	72%	77%	64%	75%	70
LifePoint Hospitals, Inc.	Multi Region	For-Profit	85%	76%	81%	56%	74%	71
Resurrection Health Care Corp.	Midwest	Religious	84%	72%	72%	69%	74%	72
Covenant Health System	South	Religious	88%	63%	76%	54%	70%	73

* AMI, acute myocardial infarction; CHF, congestive heart failure; PNEU, pneumonia; SIP, surgical infection prevention. A listing of all 73 health systems can be obtained by e-mail request to mjoshi@nrhi.org.

these questions is essential to ensure that quality is accurately measured and that payers are rewarding quality rather than the random variation that is inevitable in small samples.

Our second major aim was to assess the amount of variability in quality observed across systems. We found substantial variability across all clinical conditions, particularly for SIP. Perhaps this measure has the most variability because it is one of the newest measure areas, but even the most established measure sets reflect an enormous gap between the highest- and lowest-performing systems. Although the low levels of performance in some very large health systems are a clear cause of concern, the ability of some systems to achieve very high levels of performance across multiple clinical areas over an extended period of time also needs to be recognized. Whereas some top-performing systems have national reputations for high-quality care, others are relatively small and less well known. Understanding how these systems are consistently providing high-quality care may benefit others seeking to improve.

Our examination of the relationships between system characteristics and the quality measures—to address our third major aim—provides a starting point for understanding how systems may be able to advance quality. System size, geographic region, and the presence or absence of teaching hospitals within a system do not appear to be related to quality. Yet, systems operated by for-profit organizations had appreciably lower quality in every clinical area. Further research is needed to understand the reason for this gap. We also found that more centralized systems had 5% higher overall quality scores. We do not know whether such systems are more active in promoting improvement activities, whether they have invested more in a quality infrastructure, or whether other factors explain this association.

Multihospital health systems are major organizational structures in today's environment, and are growing.[1] Given that it is a common health care delivery structure, understanding how such health systems differ in their degree of centralization and in some quality dimensions is critical in improving health care overall. For health systems, understanding this information can guide how they can best be structured and function to achieve better quality.

This study, which has shown that significant differences do exist between health systems on multiple quality measures, warrants further study of how differences in health systems' performance affect the public. We know that consumers are starting to, albeit slowly, use quality information in their health care decision-making process.[14] Does an individual hospital's affiliation with a specific health system make a difference in consumer choice, and do consumers recognize the linkage of hospitals with health systems?

A final implication of our study directly relates to the use of performance data by system leaders. Systems' ability to compare overall system performance to that of their peers has been limited by lack of access to systemwide benchmarking data.

Particularly when systems have some small hospitals with rates that are unreportable or very unstable because of small sample sizes, the lack of such performance information is a significant limitation. This article provides a basis for measuring system-wide performance; efforts to make such data available on a continuing basis should be encouraged.

Limitations

Our study has several significant limitations. First, although we included 73 systems, our analyses excluded many other, smaller systems. Understanding and improving the care that these smaller systems provide is vital but not addressed in this project. Second, although we reported on the relationships of several characteristics of systems to quality, we recognize the enormous variety in system composition and the need to consider many other factors. We do not know how systems support (or undermine) improvement efforts or even how they measure them. We suspect that this study will provide many systems with a first glimpse of their overall system quality and how it compares with that of other systems. How system leaders set improvement priorities, reward staff for high quality, fund initiatives related to quality, and so on, are potentially important issues about which very little is known. A third limitation relates to the ongoing challenges associated with validly assessing quality of care hospitals provide. Although each of the measures we used has been extensively reviewed and endorsed by professional societies and leaders in quality measurement, it is clear that they capture only dimensions of quality, not the entirety of quality for even these four clinical areas. Finally, whereas the measures we report assess performance on important processes, relationships between these processes and relevant outcomes are unknown.

Conclusions

Hospital systems may play a vital role in improving the quality of care received by their patients. Additional investigation of high-performing health systems provide opportunities to better understand how to strengthen processes of care and ensure high-quality care for each patient they serve. J

Steve Hines, Ph.D., is Principal, The Lewin Group, Falls Church, Virginia. **Maulik S. Joshi, Dr.P.H.,** is President and Chief Executive Officer, Network for Regional Healthcare Improvement, Easton, Maryland. He is also a member of the Board Quality and Safety Committee of Catholic Healthcare Partners, whose performance and ranking are provided in the article. Please address correspondence to Maulik S. Joshi, mjoshi@nrhi.org.

References

1. Cuellar A.E., Gertler P.J.: Trends in hospital consolidation: The formation of local systems. *Health Aff* 22:77–87, Nov.–Dec. 2003.
2. Bazzoli G.J., Manheim L.M., Waters T.M.: U.S. hospital industry restructuring and the hospital safety net. *Inquiry* 40:6–24, Spring 2003.
3. American Hospital Association (AHA): *Trendwatch Chartbook 2006*. Washington, DC: AHA Press, 2006.
4. Dartmouth Atlas of Health Care: *Hospital Performance Reports by System*. http://www.dartmouthatlas.org/data/download.shtm (last accessed Apr. 10, 2008).
5. Jha A.K., et al.: Care in U.S. hospitals: The Hospital Quality Alliance program. *N Engl J Med* 353:265–274, Jul. 2005.
6. Dubbs N.L., et al.: Reexamining organizational configurations: An update, validation, and expansion of the taxonomy of health networks and systems. *Health Serv Res* 39:207–220, Feb. 2004.
7. Luke R.: Taxonomy of health networks and systems: A reassessment. *Health Serv Res* 41:618–628, Jun. 2006.
8. Bazzoli G.J., Shortell S.M., Dubbs N.L.: Rejoinder to taxonomy of health networks and systems: A reassessment. *Health Serv Res* 41:629–639, Jun. 2006.
9. Bradley E.H., et al.: Hospital quality for acute myocardial infarction: Correlation among process measures and relationship with short-term mortality. *JAMA* 296:72–78, Jul. 2006.
10. Centers for Medicare & Medicaid Services, The Joint Commission: *Specifications Manual for National Hospital Quality Measures*. http://www.qualitynet.org/dcs/ContentServer?cid=1163010419895&pagename=QnetPublic%2FPage%2FQnetTier3&c=Page (accessed Apr. 1, 2007).
11. Centers for Medicare & Medicaid Services: *Hospital Compare*. http://www.cms.hhs.gov/HospitalQualityInits/25_HospitalCompare.asp#TopOfPage (last accessed Apr. 10, 2008).
12. Schlesinger M., Gray B.: How nonprofits matter in American medicine, and what to do about it. *Health Aff* W288–W333, Jul.–Aug. 2006.
13. Thornlow D., Stukenborg G.: The association between hospital characteristics and rates of preventable complications and adverse events. *Med Care* 44:265–269, Mar. 2006.
14. WebMD Quality Services Issue Brief: *Consumers Needing Hospital Care Arm Themselves With Quality Data.* Jul. 2005. http://www.healthshare.com/docs/QualityDataJul05.pdf (last accessed Apr. 10, 2008).