

Chapter 7. Efficiency

Health care cost increases continue to outpace the rise in wages, inflation, and economic growth. One approach to containing the growth of health care costs is to improve the efficiency of the health care delivery system. This would allow finite health care resources to be used in ways that best support high-quality care. Recent work examining variations in Medicare spending and quality shows that higher cost providers do not necessarily provide higher quality care, illustrating the potential for improvement.¹ Improving efficiency in the Nation's health care system is an important component of the Department of Health and Human Services' (HHS) efforts to support a better health care system.

Measures

Part of the discussion about how to improve efficiency involves the question about how best to measure it. Varying perspectives and definitions of health care efficiency exist, and the lack of consensus on what constitutes appropriate measurement of efficiency has stymied efforts to report on this area. To improve understanding of efficiency measures, AHRQ commissioned the RAND Corporation to systematically review measures of efficiency and to assess their potential to be tracked and reported at various levels.² The RAND report provides a typology of efficiency measures that emphasizes the multiple perspectives on efficiency. It also points out that measures must be considered from the standpoint of the measuring organization and its goal in assessing efficiency. In considering efficiency measures, AHRQ also built on another report that examined the question of efficiency from the cost-of-waste point of view. In that report, the authors outline another common typology for efficiency measurement: the tracking of overuse, underuse, and misuse in the health care system.³

For 2010, this chapter has been realigned around the National Priorities Partnership's (NPP) concept of overuse (one of the six national priorities). The vision is a health care system that "promotes better health and more affordable care by continually and safely reducing the burden of unscientific, inappropriate, and excessive care, including tests, drugs, procedures, visits, and hospital stays." The primary goal is to have "healthcare organizations that continually strive to improve the delivery of appropriate patient care, and substantially and measurably reduce extraneous services and treatments."

The measures this year are presented in the following layout.

- Inappropriate medication use
 - Adults age 65 and over who received potentially inappropriate prescription medications.
- Preventable emergency department visits and hospitalizations
 - Potentially avoidable hospitalization rates for adults.
 - Total national costs associated with potentially avoidable hospitalizations.
 - Medicare home health patients with potentially avoidable hospitalizations.
 - Nursing home residents with potentially avoidable hospitalizations.

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- Potentially harmful preventive services with no benefit
 - Males age 75 and over who had a prostate-specific antigen (PSA) test or a digital rectal exam (DRE) within the last 12 months.

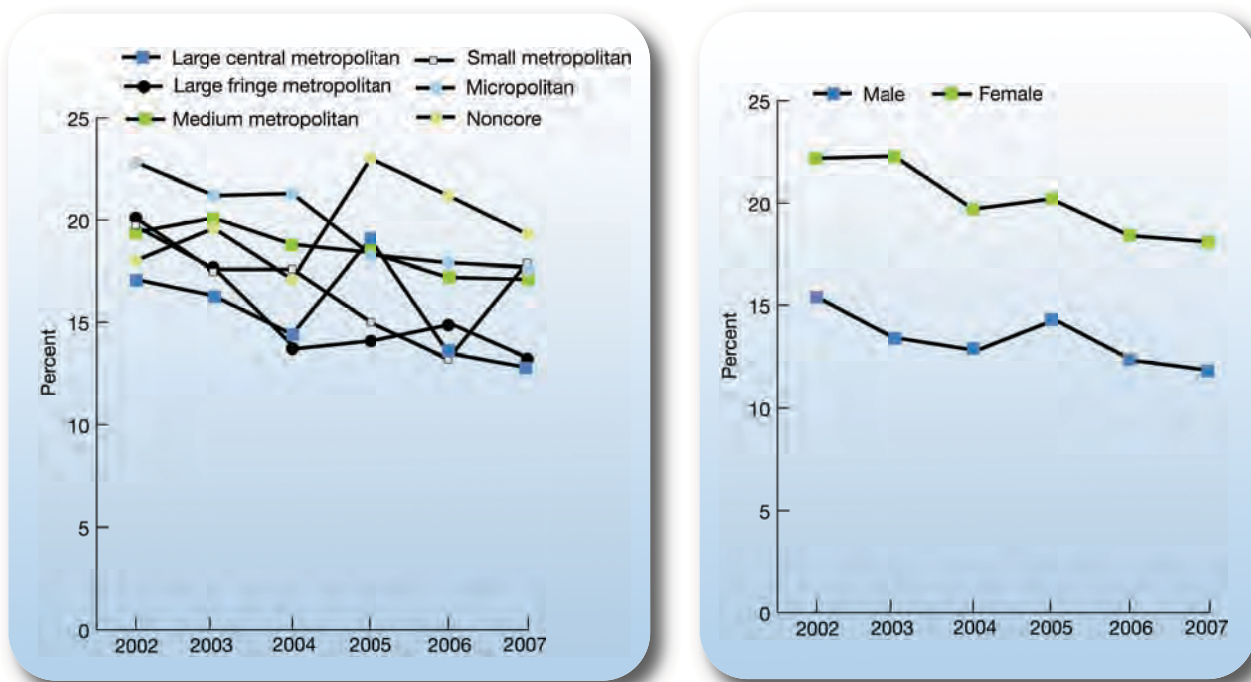
Consensus has yet to emerge about the appropriate framework and acceptable measures of efficiency, and the examples provided are designed to stimulate productive ongoing discussion about health care efficiency. We anticipate regularly reporting several measures in Efficiency chapters in future years. Notably, however, some of the measures that we are presenting in this year's chapter will appear only intermittently in the future.

Findings

Inappropriate Medication Use

Some drugs are potentially harmful for older patients but nevertheless are prescribed to them.^{4, i}

Figure 7.1. Adults age 65 and over who received potentially inappropriate prescription medications in the calendar year, by geographic area and gender, 2002-2007



Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2002-2007.

Denominator: Civilian noninstitutionalized population age 65 and over.

Note: Prescription medications received include all prescribed medications initially purchased or otherwise obtained, as well as any refills.

ⁱ Drugs that should always be avoided for older patients include barbiturates, flurazepam, meprobamate, chlorpropamide, meperidine, pentazocine, trimethobenzamide, belladonna alkaloids, dicyclomine, hyoscyamine, and propantheline. Drugs that should often or always be avoided for older patients include carisoprodol, chlorzoxazone, cyclobenzaprine, metaxalone, methocarbamol, amitriptyline, chlordiazepoxide, diazepam, doxepin, indomethacin, dipyridamol, ticlopidine, methyl dopa, reserpine, disopyramide, oxybutynin, chlorpheniramine, cyproheptadine, diphenhydramine, hydroxyzine, promethazine, and propoxyphene.

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- From 2002 to 2007, the percentage of older patients who received at least 1 of 33 potentially inappropriate drugs did not change significantly overall or for any geographic groups (Figure 7.1).
- In 2007, for those living in nonmetropolitan areas, the percentage of patients who received potentially inappropriate medications was significantly higher than for those living in metropolitan areas (18.2% compared with 14.7%; data not shown).
- In 2007, the percentage of female patients who received potentially inappropriate medications was significantly higher than for male patients (18.1% compared with 11.8%).

Also, in the NHDR:

- In 2007, the percentage of Asian patients who received potentially inappropriate medications was significantly lower than for Whites.

Trends in Potentially Avoidable Hospitalizations and Costs

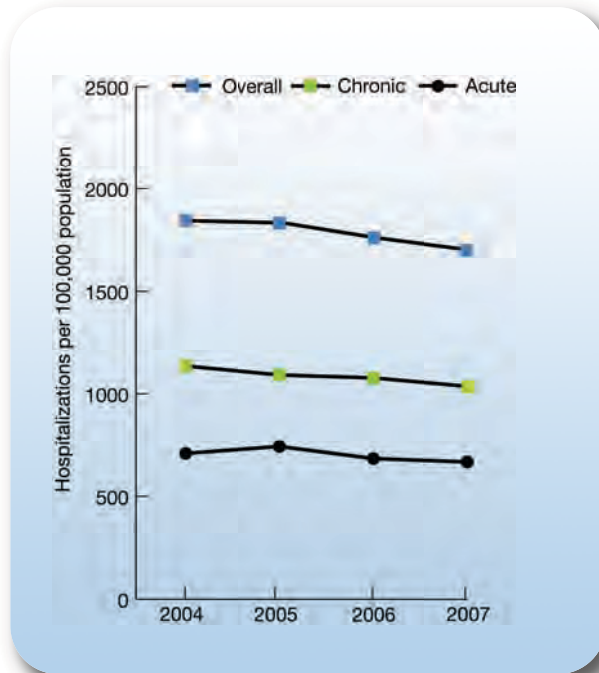
To address potentially avoidable hospitalizations and costs from the population perspective, data on ambulatory care-sensitive conditions are summarized here using the AHRQ Prevention Quality Indicators (PQIs). Not all hospitalizations that the AHRQ PQIs track are preventable. But ambulatory care-sensitive conditions are those for which good outpatient care can prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease. The AHRQ PQIs track these conditions using hospital discharge data. Hospitalizations for acute conditions, such as dehydration or pneumonia, are distinguished from hospitalizations for chronic conditions, such as diabetes or congestive heart failure.

For this analysis, total hospital charges were converted to costs using Healthcare Cost and Utilization Project (HCUP) cost-to-charge ratios based on hospital accounting reports from the Centers for Medicare & Medicaid Services. Therefore, cost estimates in this section refer to hospital costs for providing care, but do not include either payers' costs or costs for physician care that are billed separately.



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Figure 7.2. National trends in potentially avoidable hospitalization rates for adults, by type of hospitalization, 2004-2007



Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2004-2007.

Denominator: Civilian noninstitutionalized adults age 18 and over.

Note: Annual rates are adjusted for age and gender

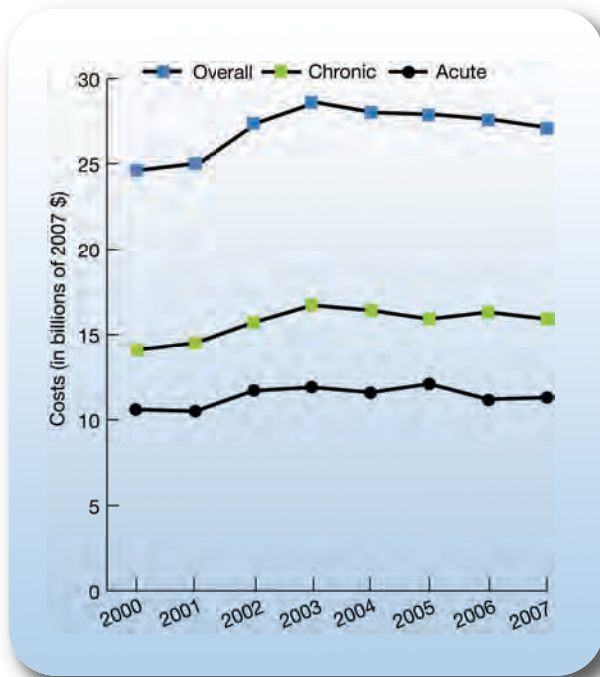
- From 2004 to 2007, overall rates of avoidable hospitalizations did not decrease significantly (Figure 7.2).
- Avoidable hospitalizations for acute conditions and chronic conditions did not change significantly from 2004 to 2007.
- In 2007, the top 4 State achievable benchmark for all potentially avoidable hospitalizations was 1,008 hospitalizations per 100,000.ⁱⁱ The overall achievable benchmark could be attained in 14 years.
- Also in 2007, the top 4 State achievable benchmark for acute potentially avoidable hospitalizations was 437 hospitalizations per 100,000.ⁱⁱⁱ The acute achievable benchmark could be attained within 12 years.
- The top 4 State achievable benchmark for chronic potentially avoidable hospitalizations was 552 hospitalizations per 100,000.^{iv} The chronic achievable benchmark could be attained in just under 16 years.

ⁱⁱ The top 4 States that contributed to the overall achievable benchmark are Hawaii, Oregon, Utah, and Washington.

ⁱⁱⁱ The top 4 States that contributed to the acute achievable benchmark are Hawaii, Oregon, Utah, and Washington.

^{iv} The top 4 States that contributed to the chronic achievable benchmark are Oregon, Utah, Vermont, and Washington.

Figure 7.3. Total national costs associated with potentially avoidable hospitalizations, 2000-2007



Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2000-2007.

Denominator: Civilian noninstitutionalized adults age 18 and over.

Note: Annual rates are adjusted for age and gender. Costs are adjusted for inflation and are represented in 2007 dollars.

- From 2000 to 2003, total national hospital costs associated with potentially avoidable hospitalizations^v increased from \$24.6 billion to \$28.6 billion. Since then, costs have been gradually declining, to \$27.1 billion in 2007 (Figure 7.3).
- These changes are largely attributable to avoidable hospitalizations for chronic conditions, with national hospital costs that increased from \$14.1 billion to \$16.7 billion between 2000 and 2003 and then declined to \$15.9 billion in 2007.
- From 2000 to 2007, there were no statistically significant changes in national hospital costs for avoidable hospitalizations for acute conditions.

^v Adjusted for inflation. The inflation adjustment was done using the gross domestic product implicit price deflator.

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Potentially Avoidable Hospitalizations Among Medicare Home Health and Nursing Home Patients

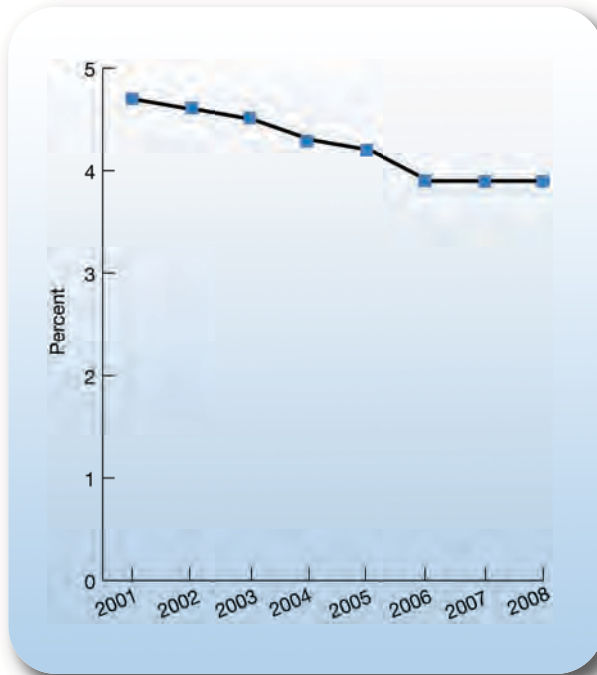
Many patients are hospitalized while receiving care from home health agencies and nursing homes, with resulting high costs and care transition problems. A number of these hospitalizations are appropriate. However, some hospital admissions could be prevented with better primary care and monitoring in these settings, or the patient could receive appropriate treatment in a less resource-intensive setting.

Using the AHRQ PQIs, we track potentially avoidable hospitalizations among Medicare patients occurring within 30 days of the start of home health or nursing home care. These patients may differ from patients discussed earlier in this chapter who are predominantly admitted for avoidable conditions from home. At home, some are receiving appropriate primary care and others have not visited a health care provider for years.

In contrast, Medicare home health and nursing home patients have regular contact with health providers, which should reduce rates of avoidable hospitalization. However, these patients are also more acutely ill, may become seriously ill when affected by a new illness, and may have multiple comorbidities. Medicare patients in these settings often have been hospitalized recently. Therefore, an avoidable hospitalization may represent a return to the hospital, perhaps against the expectation that the patient no longer needed acute care.

For application to home health and nursing home settings, the potentially avoidable stays are identified within a defined time period, 30 days, from the home health or nursing home admission date. If a patient is hospitalized more than once in that period, only the first stay is recognized for the measure. Data on home health patients come from Medicare fee-for-service (FFS) home health claims and Outcome and Assessment Information Set patient assessment information. Data on nursing home patients come from Medicare skilled nursing facility FFS claims and Minimum Data Set patient assessment information. These data are linked with Medicare Part A acute care hospital claims to determine hospitalizations for potentially avoidable conditions.

Figure 7.4. Medicare home health patients with potentially avoidable hospitalizations within 30 days of start of care, 2001-2008



Source: Centers for Medicare & Medicaid Services, Outcome and Assessment Information Set, 2001-2008, linked with Medicare Part A claims (100%).

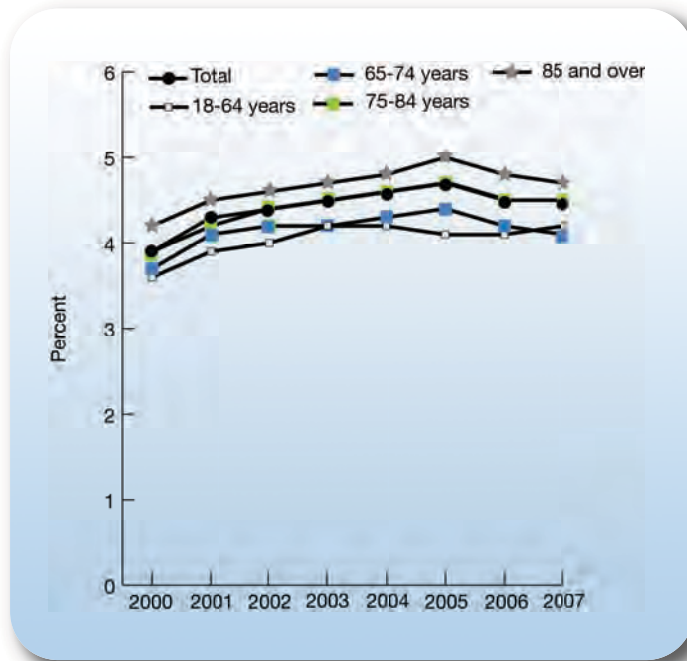
Denominator: Adult nonmaternity patients starting an episode of skilled home health care.

Note: Rates standardized to the 2006 patient population according to Medicare enrollment category.

- Between 2001 and 2008, hospitalizations within 30 days of home health episode start for potentially avoidable conditions declined from 4.7% to 3.8% (Figure 7.4).
- In 2001, the costs associated with hospitalizations for potentially avoidable conditions within 30 days of home health episode start were \$675.4 million; by 2008, the costs had risen to \$903.9 million.

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Figure 7.5. Residents of skilled nursing facilities with potentially avoidable hospitalizations within 30 days of admission, by age, 2000-2007



Source: Centers for Medicare & Medicaid Services, Minimum Data Set, 2000-2007, linked with Medicare Part A claims (100%).

Denominator: Residents who met the Medicare skilled nursing facility (SNF) criteria for nursing home admission.

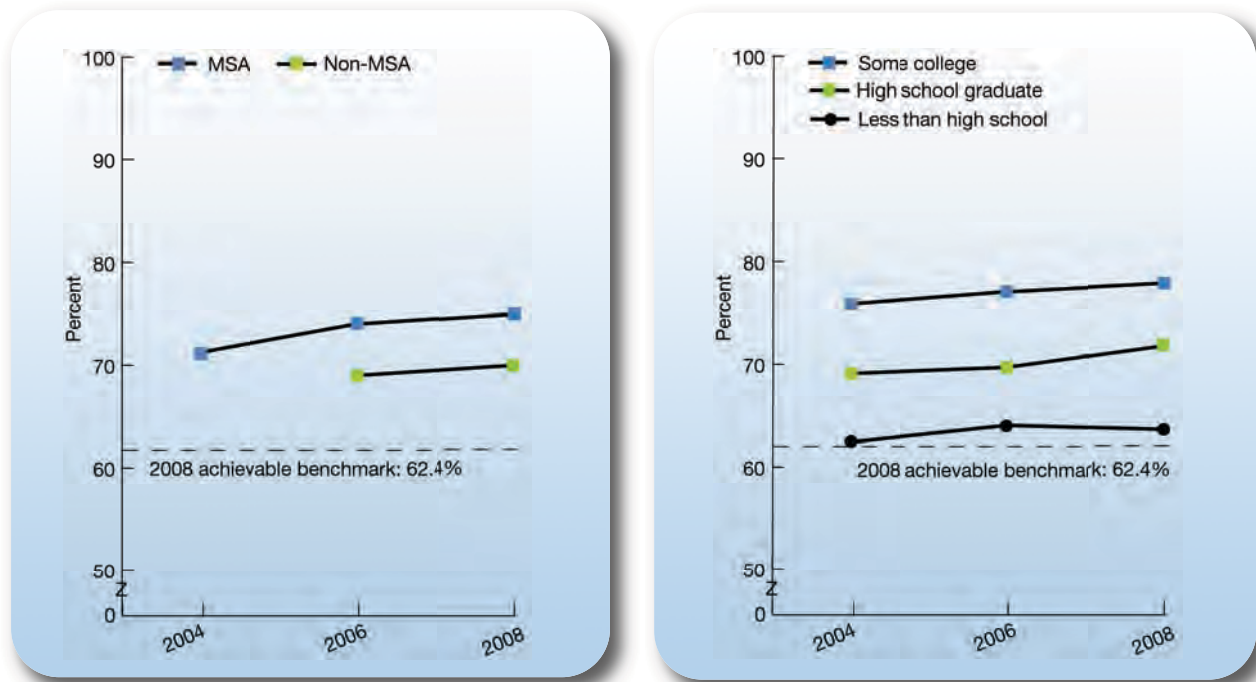
- Between 2000 and 2007, hospitalizations for potentially avoidable conditions within 30 days of skilled nursing home admission gradually increased overall and for all age groups observed (Figure 7.5).
- In 2000, the costs associated with hospitalizations for potentially avoidable conditions within 30 days of skilled nursing home episode start were \$343.7 million; by 2007, the costs had risen to \$724.4 million.

Potentially Harmful Preventive Services

This section highlights waste and opportunities to reduce unnecessary costs. Waste includes overuse, underuse, and misuse of health care services. As it is one of the NPP priorities, the focus of this section is on overuse. Nevertheless, underuse and misuse are addressed in various sections of this report. Many of the effectiveness measures relate to people not getting services they need, i.e., underuse. Many of the safety measures relate to people getting services in a hazardous manner, i.e., misuse.

An example of overuse that can be reduced through education is PSA screening or a DRE to check for prostate cancer among men age 75 and over. The U.S. Preventive Services Task Force recommended against these tests in 2008^v and there is continued concern that administration of the PSA test or DRE in men age 75 and over will lead to false positives and subsequent unnecessary treatments. Reductions in costs and improvements in quality should result from reductions in unnecessary PSA screening and DREs.

Figure 7.6. Males age 75 and over who reported having a prostate-specific antigen test or a digital rectal exam within the last 12 months, by geographic location and education, 2004, 2006, and 2008



Key: MSA = metropolitan statistical area.

Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2004, 2006, and 2008.

Denominator: Adult males age 75 and over with no history of prostate cancer.

Note: Data for 2004, 2006, and part of 2008 precede the U.S. Preventive Services Task Force recommendation against screening men age 75 and over. It should be noted that PSA tests and DREs are provided to this population for purposes unrelated to prostate cancer screening. Data to determine the purpose of these services were unavailable and all reported PSA tests and DREs are reflected in the data shown.

- In 2008, the overall percentage of males age 75 and over who had a PSA test or a DRE within the last 12 months was 73.7% (data not shown).
- In 2008, the percentage of males age 75 and over who had a PSA test or a DRE within the last 12 months who had less than a high school education was lower than for males who had some college education (63.6% compared with 77.9%).
- In 2008, the top 5 State benchmark for males age 75 and over who had a PSA test or a DRE in the last 12 months was 62.4%.^{vi} There was no clear evidence of movement toward achieving the benchmark for this measure.

Also, in the NHDR:

- The percentage of Black and Asian males age 75 and over who had a PSA test or a DRE within the last 12 months was lower than for White males.

^{vi} The Top 5 States that contributed to this benchmark are California, Hawaii, Louisiana, New Jersey, and Tennessee.

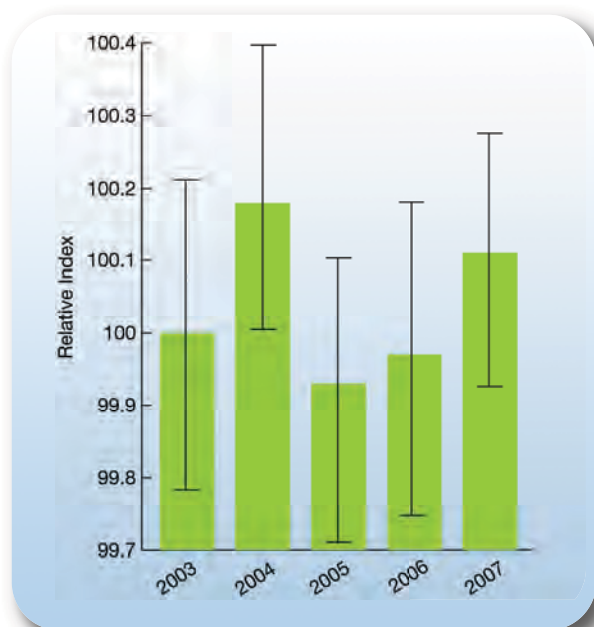
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Trends in Hospital Efficiency

Significant attention has been paid to cost variations across providers and across the country. Yet it is often difficult to separate out costs that reflect differences among providers in outputs, patient burden of illness, or care quality. To address the provider perspective, hospital cost efficiency is examined using a technique from the field of econometrics that can account for such differences.^{vii} This analysis uses data from the American Hospital Association Annual Survey and from Medicare Cost Reports, as well as data derived from the application of AHRQ Quality Indicators software to HCUP data and the application of HCUP's Comorbidity Software.^{viii}

Here, hospital efficiency is defined as the ratio of best practice costs to total observed costs. For example, given the types and quantities of outputs a hospital produces, the input prices it pays, its case mix, its quality, and its market characteristics, a theoretical best practice hospital might incur expenses amounting to \$90 million. A comparison hospital in an identical situation with total expenses of \$100 million would have an estimated cost efficiency of 90%. Cost-efficiency estimates have been converted to index numbers with a base of 100 for the year 2003 as a way to place less emphasis on the specific magnitude of estimated efficiency than on its general trend.⁶

Figure 7.7. Average estimated relative hospital cost-efficiency index for a selected sample of urban general community hospitals (includes confidence intervals), 2003-2007



Source: Agency for Healthcare Research and Quality. Analysis based on 1,483 urban general community hospitals with data in the Healthcare Cost and Utilization Project, State Inpatient Databases.

Note: Error bars designate the upper and lower limits of the confidence interval.

^{vii} Stochastic frontier analysis (SFA) is the technique used in this analysis. SFA can estimate best practice costs as the value total costs would be if full efficiency were attained. The hospital-level “cost efficiency” estimates SFA produces measure whether output is obtained using the fewest inputs (i.e., technical efficiency), as well as whether output is produced using the optimal mix of inputs, given prices (i.e., allocative efficiency), the size of a hospital’s operations (i.e., scale efficiency), and the range of a hospital’s operations (i.e., scope efficiency), including possible overspecialization or overdiversification.

^{viii} Additional information on the HCUP Comorbidity Software may be found at <http://www.hcup-us.ahrq.gov/toolssoftware/comorbidity/comorbidity.jsp>.

- Estimated urban hospital cost efficiency increased slightly from 2003 to 2004. In the other years, estimated urban hospital cost efficiency was not statistically different than it was in 2003 (Figure 7.7).
- The most cost-efficient hospitals (i.e., hospitals in the highest quartile of estimated cost efficiency) compared favorably with the least cost-efficient hospitals (i.e., hospitals in the lowest quartile of estimated cost efficiency) on a number of important variables. The most cost-efficient hospitals had lower costs and fewer full-time-equivalent employees per case-mix-adjusted admission, compared with the least cost-efficient hospitals. The most cost-efficient hospitals also had a shorter average length of stay, although the difference was not statistically significant. The most cost-efficient hospitals had a higher operating margin^{ix} than the least cost-efficient hospitals (Table 7.1).

Table 7.1. Correlates of hospital cost efficiency

Measure	Estimate	Standard deviation	Standard error mean
Cost per case-mix-adjusted admission			
Top quartile of hospital cost efficiency*	5,399.29	1,496.38	77.69
Bottom quartile of hospital cost efficiency	7,366.72	2,504.09	130.01
Full-time equivalent employees per case-mix-adjusted admission			
Top quartile of hospital cost efficiency	0.42	0.13	0.01
Bottom quartile of hospital cost efficiency	0.54	0.17	0.01
Average length of stay (days)			
Top quartile of hospital cost efficiency	5.20	1.96	0.10
Bottom quartile of hospital cost efficiency	5.30	2.38	0.12
Operating margin			
Top quartile of hospital cost efficiency	0.00	0.14	0.01
Bottom quartile of hospital cost efficiency	-0.08	0.26	0.01

Source: Agency for Healthcare Research and Quality. Analysis based on 2007 values for 1,483 urban general community hospitals.

Note: It is important to note that the figures reported above are not national estimates and no conclusions about national trends should be inferred. However, the hospitals in the analysis represent about 57% of all non-Federal urban general community hospitals and therefore provide an indication of the general trend that cost efficiency may be following.

^{ix} Operating margin is a commonly used measure of profitability from operations or the excess of revenue over expenses. It is calculated by the following formula: Operating margin = (total net patient revenue - total operating expenses)/total net patient revenue.

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