Hospital Performance Differences by Size and Teaching Status

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Summary
This research study had two objectives:
1. To evaluate whether a hospital’s size and teaching status is associated with different levels of performance based on the Truven Health 100 Top Hospitals® program measures, and
2. To determine whether the 100 Top Hospitals program methodology requires adjustment to provide more actionable benchmarks for balanced excellence.

Overall, the study results show there is no consistent pattern of performance differences among hospitals of different size or teaching status. No single hospital-size class demonstrates the “best” or “worst” performance in all areas across a balanced scorecard.

The results, however, do illustrate the specific challenges faced by different-sized hospitals and the significantly different strengths and weaknesses that must be weighed by the hospital leadership triumvirate — the board, executive team, and medical staff leadership — to achieve balanced excellence while providing maximum community value. More research is recommended to better understand those underlying clinical best practices and weaknesses across hospital-size classes.

The study also assessed the 100 Top Hospitals program methodologies to ensure actionable benchmarks across both patient- and facility-level data. The current 100 Top Hospitals National Balanced Scorecard methodology, in place for 18 years, divides hospitals into five separate classes, based on teaching status and size. Given that facilities with different characteristics (size, teaching, etc.) have, in the Donabedian sense of “structure,” different challenges in achieving overall performance, we recognized that facilities should be able to compare with peer organizations to ensure that within any given group, the challenges faced are similar. In other words, our rankings by class were designed to minimize bias that would otherwise occur in comparing facilities with meaningfully different advantages and disadvantages. Thus, the classes enable us to create more meaningful and actionable...
benchmarks and medians for leadership teams. The class structure is, in many ways, a gross proxy for the differences in complexity of services and role of the hospitals play in their communities.

The results suggest that the 100 Top Hospitals class structure continues to be a valuable way to provide management guidance for decision-making.

**Methodology**

**Data Sources**

We used the study database for the 100 Top Hospitals 2013 study. These data are comprised of Centers for Medicare & Medicaid Services (CMS) Medicare Provider Analysis and Review (MEDPAR) public use files for federal fiscal years 2010 and 2011 for mortality, complications, and patient safety measures. Other measures, such as length of stay, are based on the most recent single year of MEDPAR data, which was 2011. Other measures are derived from the CMS Hospital Compare database or the Medicare Cost Reports filed by hospitals.

**The Classes**

To create the five classes, the 100 Top Hospitals study uses cost report and residency program information to classify hospitals into groups by bed size and teaching status. The sources of residency program information are the American Medical Association (for Accreditation Council for Graduate Medical Education-accredited programs) and the American Osteopathic Association. Class definitions and methodology details can be found in the 100 Top Hospitals study\(^1\). In the 100 Top Hospitals 2013 study, the classes and the number of hospitals in each class are:

- Major Teaching Hospitals (198)
- Teaching Hospitals (424)
- Large Community Hospitals (337)
- Medium Community Hospitals (1,020)
- Small Community Hospitals (943)

**Measures and Performance Calculation**

We computed measure-specific means, along with 95-percent confidence intervals, for each of the ownership groups for each of the 100 Top Hospitals measures. We evaluated the following balanced scorecard of measures, as defined in the 100 Top Hospitals study:

- Risk-adjusted mortality (in hospital)
- Risk-adjusted complications
- Risk-adjusted patient safety
- Core measures mean percent
- 30-day risk-adjusted mortality rate for acute myocardial infarction (AMI), heart failure, and pneumonia
- 30-day risk-adjusted readmission rate for AMI, heart failure, and pneumonia
- Severity-adjusted average length of stay
- Case mix- and wage-adjusted inpatient expense per discharge

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• Adjusted operating profit margin
• Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) score (patient rating of overall hospital performance)

For each hospital class, we calculated average performance and 95-percent confidence intervals for each measure.

Results

Classes demonstrate significant differences, but the performance of any one class was not superior to another on all metrics. The variation among the classes represents differences in management challenges to the leadership teams (board, executive team, and medical staff leadership) in each class.

The differences in the performance may represent differences in mission and the perceived roles of the hospital in the community, as well as differences in the focus of the leadership teams. These statistically significant variances are substantial and require further investigation to determine cause and corrective action to assure consistency of treatment for all patients.

Inpatient Mortality

The three classes with the largest hospitals (major teaching, teaching, and large community) have significantly lower mortality rates than the small and medium community hospitals (Figure 1).

While there are a number of reasonable causes for small and medium community hospitals to have significantly higher mortality rates for matched patients, the higher mortality rate may be related to the absence of investment in hospice services. In smaller communities, investment in hospice services may not reflect the most pressing community needs; leadership teams in small and medium community hospitals may have higher priorities for investment, such as electronic medical records, telemedicine equipment, and further development of outpatient services. Management decisions to invest in hospice services may be more feasible in the larger hospitals with a large service area, because these three larger classes are often destinations for severely ill patients who require the specialty care and higher technology of the larger hospitals.

Regardless of the possible causes of these differences, the results require further in-depth analysis to determine why patients are more likely to have better survival rates in larger hospitals. More specifically, if there are sharp differences in the services provided for specific illnesses, it is important to understand and correct them to ensure consistent outcomes across communities, particularly within health systems, accountable care organizations (ACOs), and insurance networks. It is also important to examine causes for similar patterns in the 30-day mortality results.
**30-Day Mortality**

The results for 30-day mortality (Figure 2) are somewhat similar to the inpatient mortality results. There are three tiers of performance: small and medium hospitals with significantly higher mortality, large community and teaching classes with significantly lower mortality than small and medium hospitals, and major teaching hospitals with the lowest inpatient mortality of all. The pattern is comparable to inpatient mortality in that the larger and more sophisticated the hospital, the better the performance on mortality; and the smaller the hospital, the worse the performance on mortality.

The 100 Top Hospitals mortality methodology shows results that are highly consistent with the CMS 30-day mortality methodology.
Patient Complications and Patient Safety

A very different pattern of management and clinical challenges emerges with performance on complications (Figure 3) and patient safety (Figure 4). The community and teaching hospitals had significantly lower incidence of adverse patient safety events for matched patients than the major teaching hospitals. And while the teaching hospitals had higher complications than other classes, only major teaching hospitals exhibited highly significant performance scores showing higher complications and greater patient safety problems than all other hospital classes. This finding is not surprising given the size and complexity of major teaching hospitals. But it does suggest that leadership at major teaching hospitals need to make increasing patient safety and reducing complications higher priorities.

Figure 3: Risk-Adjusted Patient Complications

Figure 4: Risk-Adjusted Patient Safety
Core Measure Compliance

Again, a different pattern emerges across classes when reviewing core measure compliance. All classes perform between the 95th and 97th percentile, meaning that more than 95 percent of all patients are treated with evidence-based levels of care for the explicit metrics. Although the small community hospitals have the lowest percentage of compliance, the incidence of failure to comply on any one metric may represent only one or two patients (Figure 5).

Figure 5: Core Measures Mean Percent

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Small Community</th>
<th>Medium Community</th>
<th>Large Community</th>
<th>Teaching</th>
<th>Major Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>95.6%</td>
<td></td>
<td>96.2%</td>
<td>96.6%</td>
<td>96.4%</td>
<td>96.1%</td>
</tr>
</tbody>
</table>

Length of Hospital Stay

Patient average length of stay increases steadily with facility size (Figure 6). Major teaching hospitals have significantly longer lengths of stay. This may be due to increasing severity of illness of the patients treated beyond the limits of severity and risk adjustment. This could also be related to higher complications and higher incidence of patient safety adverse events.

Figure 6: Severity-Adjusted Average Length of Stay
Expenses

Academic teaching facilities have significantly higher inpatient expenses than all other comparison groups (Figure 7). Again, this finding is not unanticipated, given the mission of major teaching hospitals — to treat the most severe and most complex cases. That mission requires highly specialized physicians, diagnostic and treatment technologies, and healthcare professional education. However, the small community hospitals also demonstrate significantly higher inpatient expense per discharge than medium, large, and teaching hospitals. Small community hospital expenses per discharge has been rising rapidly for the past three years.1-3

These counterintuitive results may suggest the changing role of small hospitals in their communities. The leaders of small community hospitals, more than any other class, have transitioned to a model using a much-higher percentage of outpatient care. While inpatient populations have declined, the executives of small hospitals have often bolstered diagnostic services and rapid transfer services for very severely ill patients, and installed telemedicine and the other technologies to bring higher levels of expertise and quality to patients. Many have invested in electronic medical records systems, especially those within health systems. The higher cost for inpatients may reflect the costs of this transition combined with what may be the standby cost of inpatient care as the inpatient populations shrink.

Figure 7: Case Mix- and Wage-Adjusted Inpatient Expense per Discharge

![Chart showing inpatient expense per discharge for different types of hospitals]

<table>
<thead>
<tr>
<th>Type</th>
<th>Expense per Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Community</td>
<td>$6,428</td>
</tr>
<tr>
<td>Medium Community</td>
<td>$6,109</td>
</tr>
<tr>
<td>Large Community</td>
<td>$6,092</td>
</tr>
<tr>
<td>Teaching</td>
<td>$6,123</td>
</tr>
<tr>
<td>Major Teaching</td>
<td>$7,303</td>
</tr>
</tbody>
</table>

Profitability
While no class of hospital has significantly different operating profit margins, small community hospitals clearly have the lowest margins (Figure 8).

Figure 8: Operating Profit Margin

HCAHPS — Patient Perception of Care
The HCAHPS score in this study displays patient willingness to recommend the hospital to others. There are no significantly different scores among major teaching, teaching, large community, and medium community hospitals (Figure 9). However, the medium community hospitals have a significantly lower score than the small, large, and teaching hospitals.

Figure 9: HCAHPS Score
**Conclusion**

The study results show no consistent pattern of differences across the classes by performance measure, meaning that no single hospital class demonstrates the “worst performance” or has the most severe management challenges. Rather, the results demonstrate the different challenges faced by hospital leadership triumvirates — the board, executive team, and medical staff — to achieve balanced excellence and provide the highest levels of value for the communities they serve.

The results also suggest that the 100 Top Hospitals classification method does not require adjustment for more actionable benchmarks; it continues to provide valuable management guidance for decision-making.

Perhaps most importantly, the study results suggest a critical need for further analytic research in relation to mortality variation across the hospital-size classes. Although reasons for the variation can be suggested, the results show significant differences that require a better understanding of performance. Further, while the major teaching hospitals demonstrate significantly higher survival rates, these hospitals also have significantly higher complication rates and patient-safety adverse events. While the three outcomes could result from the complexity of managing these very large, sophisticated organizations, leadership teams in the major teaching categories should take heed and target solutions.

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