Redefining the "Honor Roll:" do hospital rankings predict surgical outcomes or receipt of quality surgical care?

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ABSTRACT

Background: Hospital ranking systems are often used by individuals to inform choice around which healthcare system may be best equipped to manage their care.
Methods: The 2013—2015 100% Medicare Inpatient and Outpatient SAFs was utilized to identify patients who underwent surgery (AAA repair, CABG, THA, TKA and lung resection) at one of the top-20 hospitals ranked by USNWR.
Results: On multivariable linear regression analysis, after controlling for clinical and hospital level factors, rank position among the top 20 USNWR hospitals was not associated with the proportion of patients who experienced a complication ($\beta = 0.167$), failure-to-rescue ($\beta = 0.277$), 90-day readmission ($\beta = 0.186$) and 90-day mortality ($\beta = 0.033$)(all $p > 0.05$). Similar trends were observed among each surgical procedure type, as well as even among all top 50 USNWR ranked hospitals (all $p > 0.05$).
Conclusion: Rank position among hospitals within the USNWR "honor roll" was not associated with differences in patient outcomes following surgical intervention. Patients and hospitals need to exercise caution when placing weight on rank-position among hospitals as a means to discriminate clinical outcomes and quality of actual patient care.

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In 2014, more than 17.2 million hospital visits were related to invasive therapeutic surgery. Many procedures are associated with increased risk of morbidity that may be due to age, comorbid conditions, existing physical conditions and hospital level factors. Patient decision-making around choosing a provider or health system for surgical care is often complex. To this end, hospital ranking systems are often used by individuals to inform choice around which healthcare system may be best equipped to manage their care. While often playing an important role in decision-making, the association of ranking systems with quality patient-centered metrics has not been well-defined. Broad application of hospital rating systems across different disciplines may be problematic, not track with patient outcomes, and misrepresent perceived differences in patient quality metrics in the healthcare marketplace.

Consumers versus patients: equipping patients to make the "best decision"

In 2001, the Institute of Medicine (IOM) published "Crossing the Quality Chasm" that focused on the need to improve the provision of quality and safe healthcare to all patients. The IOM emphasized the importance of transparency in sharing quality of care data with patients. In turn, organizations such as the Agency for Healthcare Research and Quality have provided patients with tools to empower them to be more active participants in their healthcare decisions. With an increased focus on the patient as an "informed consumer" who actively engages in choosing where to seek care, hospitals have leveraged national ratings and "reputation" as a means to attract patients away from competing health care systems. Prior research has demonstrated that consumers' perception of hospital reputation significantly impacts choice of hospital.[1] Additionally, consumers often equate reputation with health care quality, which may be problematic as reputation may not align with outcomes.[1]

Different methodologies have been used to develop national hospital reporting systems to facilitate dissemination of information regarding relative "quality" of different healthcare

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systems to consumers. For example, U.S. News and World Report (USNWR), Centers for Medicare and Medicaid Services (CMS), Leapfrog, Healthgrades and Consumer reports have each created rating systems based on unique methodologies to rank hospitals in various facets of care. USNWR reports an overall score that incorporates hospital structure, process and outcomes.[2] The process component of the overall USNWR score is derived from hospital reputation that is based on a physician-focused survey. While primary patient outcomes such as 30-day mortality, discharge volume, and patient safety are included in the overall score, these factors are based on data from the Standard Analytical Files (SAFs), which are maintained by CMS and therefore largely represent an elderly population. Leapfrog's hospital safety grade also uses information provided by CMS, but additionally abstracts information from the Leapfrog Hospital Survey and supplemental data sources such as American Hospital Association survey.[3] The Leapfrog score is derived from 28 weighted variables that were deemed by an expert panel to be measures of patient safety in general acute care hospitals.[3] CMS has yet another "star-ratings" metric based on feedback from a panel of experts. Similar to other rating systems, CMS star ratings incorporate mortality and readmission data, as well as factors such as patient experience, effectiveness and timeliness of care.[4] The methodologies of these various rating systems vary widely and the weight each score assigns to key factors such as mortality and readmission differ significantly. As more hospitals set benchmarking goals to achieve higher rankings based on these various systems, the implications on patient care are not clear. Specifically, whether obtaining a "higher score" on one of these rating systems actually translates into better patient care at a given hospital remains ill-defined. To this end, we examined the USNWR hospital rankings since it is most frequently used by hospitals in the marketplace in direct advertisements to patients. Specifically, the relationship between clinical outcomes among patients undergoing abdominal aortic aneurysm (AAA) repair, coronary artery bypass graft (CABG), colectomy, total hip arthroplasty (THA), total knee arthroplasty (TKA), or lung resection at a hospital within the top 20 ranked hospitals based on the USWNR was examined.

Exploring surgical outcomes among top 20 hospital by USNWR

The 2013–2015 100% Medicare Inpatient and Outpatient SAFs was utilized to identify patients who underwent surgery (AAA repair, CABG, colectomy, THA, TKA and lung resection) at one of the top-20 hospitals ranked by USNWR. Only a very weak linear association existed between post-operative outcomes and rank among the top 20 USNWR hospitals (correlation coefficient - Failure to Rescue: 0.377; Complications: 0.003; 90-day readmission: 0.062; 90-day mortality: 0.140; all p > 0.05) (Fig. 1). On multivariable linear regression analysis, after controlling for clinical and hospital level factors, rank position among the top 20 USNWR hospitals was not associated with the proportion of patients who experienced a complication ($\beta = 0.167$), failure-to-rescue ($\beta = 0.277$), 90-day readmission ($\beta = 0.186$) and 90-day mortality ($\beta = 0.033$)(all p > 0.05). Similar trends were observed among each surgical procedure type (all p > 0.05), as well as even among all top 50 USNWR ranked hospitals (all p > 0.05). The data highlight how position on the USNWR list was not related to improved patient-centered surgical outcomes. As such, USNWR rankings may not serve as a uniform measure of quality patient care and, therefore, may not be an appropriate tool for consumers to differentiate which hospital may be "best" to receive surgical care.

Confusion more than precision among different healthcare systems

Several authors have reported discordance among various healthcare rating systems and clinical outcomes. In comparing four
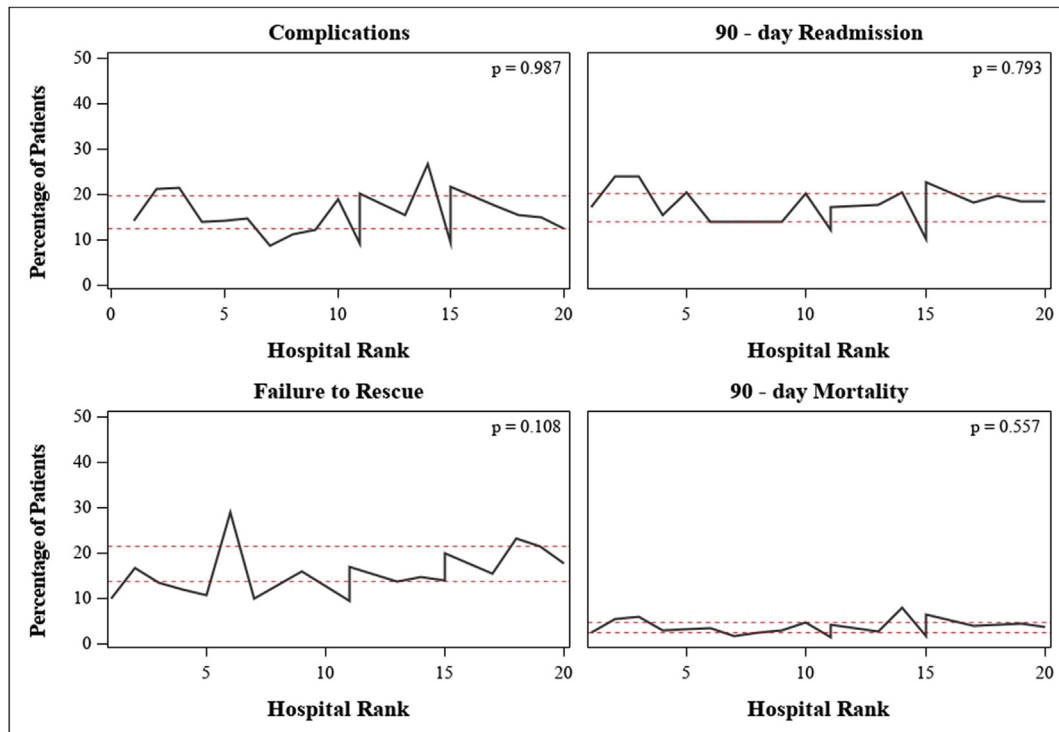

Fig. 1. Postoperative outcomes of patients undergoing surgery at the top 20 USNWR ranked hospitals.
*p-value indicates non-significant correlation between Hospital ranking and clinical outcomes.

national rating systems, Austin and colleagues noted that no hospital was consistently rated as a high performer across all ratings systems.[5] Furthermore, among hospitals rated as a high performer by one rating system, only 10% were similarly rated as a high performer by any of the other rating systems. The discordance among ratings highlights the heterogeneity with "rating" methodology and the difficulty a consumer could face with extrapolating these rankings as a means to assess delivery of quality care. In a separate study, Mulvey and colleagues reported that hospitals ranked by USNWR as "America's Best Hospitals" in "Heart and Heart Surgery" had lower 30-day mortality, yet 30-day readmission was similar among ranked and nonranked hospitals.[6] In a different study, CMS skilled nursing facility star ratings did not correlate with readmissions among patients discharged to a SNF with acute decompensated heart failure, yet star ratings were associated with risk of readmission among patients undergoing pancreatectomy.[7,8] As such, ranking systems may not be applicable across all surgical subspecialties, nor universally reflect quality metrics. In fact, hospital ranking systems may be more a reflection of research productivity and reputation, rather than clinical outcomes. To this end, Hayes et al. noted a significant correlation between USNWR top 10 ranking and number of publications/amount of National Institute of Health funding among children hospitals.[9] This same relationship of "reputation" and research productivity with rank position has been reported for cancer hospitals.[10] Collectively, these data call into question the applicability and use of ranking systems to differentiate patient clinical outcomes among hospitals. Given the ubiquitous nature of how hospitals use the USNWR and other ranking systems to "signal" to patients their "quality" or "status," there is a need to increase the transparency around how data on quality of healthcare services are reported and shared with patients.

Future directions

While utilizing different methodologies, available rating systems have been created with a similar rationale – to inform patients about the "quality" of various healthcare centers. Data in this brief report, as well as previous literature, demonstrate, however, that rankings such as the USNWR may not reflect differences in quality metrics or surgical outcomes. The inability of ranking systems to differentiate patient outcomes among different hospitals may be related to deficiencies in current methodologies. One possible strategy to improve the design of a ranking system may be the use of more advanced techniques such as machine learning and artificial intelligence to help design algorithms using "big data" in the electronic medical records and other data repositories. The use of machine-based learning algorithms may allow for creation of statistical models to identify implicit, data-derived pattern-based inferences to define quality-based metrics to differentiate hospitals, rather than relying on simple binary outcomes (e.g. 90-day mortality, readmission, etc.). In addition, the incorporation of patient-reported outcomes, as well as cost considerations, may also be important to better define the true value of care being delivered at various hospitals.

In conclusion, rank position among hospitals within the USNWR was not associated with differences in patient outcomes following surgical intervention. Patients and hospitals need to exercise caution when placing weight on rank-position among hospitals as a means to discriminate clinical outcomes and quality of actual patient care. Further studies should investigate improved methodologies for the design of rating systems to ensure that patients have the data needed to make informed decisions about where to seek care.

Declaration of competing interest

All authors declare that they have no disclosures to report.

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