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# Transforming Patient Value: Comparison of Hospital, Surgical, and General Surgery Patients



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- BACKGROUND:** Patient value (V) is enhanced when quality (Q) is increased and cost (C) is diminished ( $V = Q/C$ ). However, calculating value has been inhibited by a lack of risk-adjusted cost data. The aim of this analysis was to measure patient value before and after implementation of quality improvement and cost reduction programs.
- STUDY DESIGN:** Multidisciplinary efforts to improve patient value were initiated at a safety-net hospital in 2012. Quality improvement focused on adoption of multiple best practices, and minimizing practice variation was the strategy to control cost. University HealthSystem Consortium (UHC) risk-adjusted quality (patient mortality + safety + satisfaction + effectiveness) and cost (length of stay + direct cost) data were used to calculate patient value over 3 fiscal years. Normalized ranks in the UHC Quality and Accountability Scorecard were used in the value equation.
- RESULTS:** For all hospital patients, quality scores improved from 50.3 to 66.5, with most of the change occurring in decreased mortality. Similar trends were observed for all surgery patients (42.6 to 48.4) and for general surgery patients (30.9 to 64.6). For all hospital patients, cost scores improved from 71.0 to 2.9. Similar changes were noted for all surgical (71.6 to 27.1) and general surgery (85.7 to 23.0) patients. Therefore, value increased more than 30-fold for all patients, 3-fold for all surgical patients, and almost 8-fold for general surgery patients.
- CONCLUSIONS:** Multidisciplinary quality and cost efforts resulted in significant improvements in value for all hospitalized patients as well as general surgery patients. Mortality improved the most in general surgery patients, and satisfaction was highest among surgical patients. (J Am Coll Surg 2016;222:568–575. © 2016 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)
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In 1999, the Institute of Medicine reported that quality and safety in American hospitals was a major health care issue.<sup>1</sup> The fact that human error was resulting in tens of thousands of deaths annually was rapidly accepted as a call to action for improvement. Three years later, the Institute of Medicine outlined a framework for measuring quality and safety in hospitals.<sup>2</sup> Its domains for improvement included Safety, Timeliness, Effectiveness, Efficiency,

Equity, and Patient Centeredness (STEEP). In 2005, the University HealthSystem Consortium (UHC) adopted the Institute of Medicine's domains in their Quality and Accountability Study. Since then, the majority of academic medical centers in the United States have submitted data to UHC to measure, monitor, and compare their quality and safety. Over the past 5 years, since passage of the Affordable Care Act, another major health care focus has been a shift in payment models from volume (reimbursement related to the number of procedures performed) to value (reimbursement related to quality outcomes.)

In this framework, patient value (V) is enhanced when quality (Q) is increased and cost (C) is diminished ( $V = Q/C$ ). However, calculating patient value has been inhibited by lack of reliable risk-adjusted cost data. In addition, recent efforts to measure cost by researchers<sup>3,4</sup> and the government<sup>5</sup> in the value-based purchasing program have focused on Medicare patients. However,

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### Abbreviations and Acronyms

|        |   |
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| EH     | = Episcopal Hospital  |
| FY     | = fiscal year   |
| HCAHPS | = Hospital Consumer Assessment of Healthcare Providers and Systems            |
| LOS    | = length of stay  |
| PSI    | = patient safety indicator  |
| Q&A    | = Quality and Accountability  |
| STEEP  | = Safety, Timeliness, Effectiveness, Efficiency, Equity, Patient Centeredness |
| TUH    | = Temple University Hospital  |
| UHC    | = University HealthSystem Consortium  |

Medicare spending per beneficiary applies only to a minority of hospitalized patients and is not highly risk-adjusted.<sup>6</sup> In comparison, for the last few years, the UHC Quality and Accountability (Q&A) Scorecard has reported highly risk-adjusted length of stay and cost data on all hospitalized patients. Therefore, the aims of this analysis were to measure value in all hospital, all surgical, and general surgery patients at an academic medical center before and after implementation of programs to improve quality and reduce cost.

## METHODS

### Temple University Hospital

Temple University Hospital (TUH) is a 722-bed academic medical center in north Philadelphia. Temple University Hospital, Incorporated also includes Episcopal Hospital (EH), which focuses on behavioral health. These 2 hospitals are located in a federally designated, medically underserved area, and are designated as safety-net hospitals for the City of Philadelphia by the Commonwealth of Pennsylvania. A third of the local population lives below the federal poverty level, and the disease burden exceeds state and federal averages.<sup>7</sup> During the study period (July 2012 to June 2015), the percentage of Medicaid and Medical Assistance patients at TUH, Inc. was 45% to 50%. Both TUH and EH have busy emergency departments that assist in the health care of the local population. For many years, TUH inpatients were primarily from the local impoverished population, with a large percentage of admissions coming through the emergency department. Like most AMCs, TUH also provides multiple high technology services, has multiple ICUs, including a burn center, has a level I trauma center, and provides labor and delivery services as well as a level 3 neonatal care unit.

In 2012, new health system leadership recruited multiple medical and surgical specialists and subspecialists. As a result, from 2012 to 2015, the case mix index at TUH

increased from 1.58 in fiscal year (FY) 2012 to 1.79 in FY 2015. In 2013, TUH also began to participate in the American College of Surgeons-National Surgical Quality Improvement Program and in the UHC.

### University HealthSystem Consortium

The UHC was established nearly 30 years ago. In 2005, UHC developed a Q&A Scorecard, fashioned after the Institute of Medicine's STEEP design, with the goal to improve patient outcomes across 6 major domains. Over the next decade, UHC's goal has been achieved; scores on the Q&A Scorecard have improved significantly on a national level. During the time period of this analysis, approximately 130 US academic medical centers were members of UHC. Temple University Hospital joined UHC in July 2013 and submitted 2 fiscal years (FYs 2012 and 2013) of data for analysis. As a result, TUH was one of the 104 AMCs to be ranked when the 2013 UHC Q&A Scorecard was released in October, 2013.

### Quality and Accountability Scorecard

For FYs 2013, 2014, and 2015 (all July to June), the UHC Q&A Scorecard contained 6 domains: mortality, effectiveness, safety, equity, patient centeredness, and efficiency. Over 3 years, minor changes were made in the mortality, effectiveness and safety domains. In the mortality domain, no change was made between FYs 2013 and 2014, but in FY 2015, the relative weight of 8 major service lines increased from 50% to 80%; the "aggregate mortality" decreased from 27 to 15 service lines, and the weight decreased to 20%.

In the effectiveness domain in FY 2013, elements included the overall, all-cause, 30-day readmission rate as well as 7 Joint Commission Hospital Core Measures. In FYs 2014 and 2015, composite core measures for stroke and venous thromboembolism were added to this domain. In FY 2013, 5 patient safety indicators (PSIs 6, 7, 9, 11, and 12) believed to be reliable by UHC were included in the safety domain. In FY 2014, 4 PSIs (3, 6, 9, and 11); 3 infection metrics for central-line associated bloodstream infections, catheter-associated urinary tract infection, and surgical site infections for colectomy and hysterectomy; as well as VTE-6 comprised the safety domain. In FY 2015, a fifth PSI (13) and a fourth infection metric, *Clostridia difficile*, were added to this domain.

For each FY, equity was defined as differences in sex, race, and socioeconomic status in each core measure composite. In FYs 2013 and 2014, in the patient centeredness domain, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores included 10 questions in 8 categories. In FY 2015, 13 HCAHPS

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