Measuring and Communicating Health Care Value with Charts

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Some leading proponents of health care reform have argued that the goal of any health care system should be to deliver the most value to patients: the outcomes achieved for treating a medical condition relative to the costs incurred over a complete care cycle. But how do you calculate the value of care when, as is typically the case, a medical condition has many relevant outcomes, each measured in different ways? And how do you communicate that information in a way that is accessible and actionable?

We have found that a radar chart is an effective means to visually depict outcome and cost data simultaneously. It provides clinicians, managers, patients, regulators, and policy makers with a readily understandable snapshot of the value being delivered for a specific medical condition and allows them to compare that value across alternative treatments, clinicians, and facilities.

The radar chart addresses the deficiencies of other approaches that have been used to communicate value. Medical outcomes and comparative data are usually communicated in tables. While such a presentation isolates the performance of individual metrics, it does not allow a simultaneous comparison across the multiple relevant outcome dimensions and certainly does not incorporate costs. The costs of treating any medical condition over a complete care cycle cannot be attributed to any individual outcome metric.

Some attempt to construct an aggregate index, such as a Quality Adjusted Life Year (QALY) by weighting multiple outcomes. But no theory exists to guide the selection of weights, and the aggregated index often disguises more than it reveals, especially when patients have different preferences for performance along the condition’s multiple outcome dimensions.

The radar chart — a common visualization function readily available within Excel — overcomes these shortcomings. Examples from treating two medical conditions illustrate its power.

Brachytherapy for prostate cancer. This treatment involves implanting radioactive “seeds” in patients. The process for creating a radar chart starts by selecting the relevant outcome dimensions for the medical condition. In this case, we adopted the outcome metrics of the International Consortium for Health Outcomes (ICHOM), a nonprofit organization that forms working groups of physician leaders, patient advocacy members, registry leaders, and patients to develop global standard sets of outcome measures for medical conditions. The data for many of ICHOM’s outcome metrics are available from the Expanded Prostate Cancer Index Composite (EPIC) survey instrument. The outcome data points are graphed on separate axes, all of which are scaled from 0 to 100. (See the graphic “Radar Chart of the Value of Brachytherapy for Prostate Cancer,” which comes from the MD Anderson Cancer Center.) We recommend scaling the raw-outcomes data so that the worst national or international performance equals “0” and the perfect or ideal performance is “100.” The EPIC metrics didn’t have to be converted because they were already on a 0-to-100 scale. (To protect confidentiality, the information depicted in all four exhibits in this article are modified versions of the actual data.)

Total direct costs (personnel, equipment, and supplies) to the provider for a medical treatment are measured using time-driven activity-based costing (TDABC). We plot the reciprocal of actual costs on the radar chart (“1/Relative Cost”), scaled so that 100 represents the lowest (TDABC) treatment cost in the study. For example, if treatment approach A costs $200 and treatment approach B costs $250, approach A would be indexed to a value of 100 since it is the lowest cost, and approach B would be set at 80 since $200 is 80% of $250. Using the cost reciprocal on the chart allows for points farther from the chart’s center to always represent better value.

As the graphic “Radar Chart Comparing the Value of Three Alternative Prostate-Cancer Treatments” shows, the chart can be used to compare the values of alternative treatments. In this case, the values for three ways to treat low-risk prostate cancer — brachytherapy, robotic prostatectomy, and proton therapy — are shown.

This example suggests that proton radiation may have the best results in terms of performance for sexual function and urinary continence. (It is not definitive because the data used in the radar chart were retrospective and patients were not randomized prior to treatment.) But its cost to the provider is nearly four times that of brachytherapy.

These diagrams can inform fact-based discussions between a physician and patient about the benefits and costs associated with alternative treatments when the cost is measured as the fees that will be paid by the patient over the course of the treatment. For example, sexual function may be more important to a younger patient diagnosed with prostate cancer than urinary continence, while an older patient may feel the reverse. The amount that a patient would have to pay out of pocket for each type of treatment is not readily available today throughout the United States, but it soon will be: States are beginning to mandate that insurers offer individual patients information about the prices that they have negotiated with various providers and the portion that a patient would have to pay out of pocket.

Now, let’s consider an office of three bariatric surgeons at Scottsdale Healthcare (now part of HonorHealth) in Scottsdale, Arizona, who perform two kinds of weight-loss operations: gastric bypass surgery and the laparoscopic sleeve gastrectomy. The office, which already had been collecting outcome measures, pro-
The same approach can be used to compare the performance of multiple facilities that treat the same medical condition in similar ways. This entails: defining the relevant outcomes for that medical condition, calculating the costs incurred in a consistent and valid way at each facility, and comparing the value delivered by each institution by plotting its outcomes and cost on a radar chart. The value differences among the facilities become immediately apparent. For instance, the Centers for Medicare and Medicaid Services could use the radar chart as part of its Hospital Compare website to show how a particular hospital compares to the national averages on a range of dimensions.

The value for treating diverse patients with complex medical conditions cannot be summarized by a single number, especially one obtained by using arbitrary weights across multiple outcome dimensions. Value-based analysis, however, does require a standardized, generalizable framework to measure and display the dimensions of health care that matter most to patients. Having organizations such as ICHOM create standardized outcome metrics for more medical conditions and applying a standardized costing methodology such as TDABC will allow all providers to measure outcomes and costs in a consistent and comprehensive way. By communicating this information in a manner that is accessible to all stakeholders, the radar chart will promote better decision making and will aid in the continual effort to deliver better value to patients.

ceed to conduct a TDABC analysis of the costs incurred for both types of surgeries. Most costs in the care cycle were the same for the two procedures. The exceptions were those for operating-room personnel and supplies, which were much greater for gastric bypass surgeries. Overall, the laparoscopic sleeve approach had 11% lower costs and yet had similar outcomes (see the graphic “Radar Chart Comparing the Value of Alternative Bariatric-Surgical Procedures Performed at One Hospital”). One of the ways the director of the office anticipated Scottsdale Healthcare would use these data was to negotiate bundled, value-based payments with payers. (Bundled payments are single payments that cover all the care for a patient’s medical condition or treatment over a specified time frame.)

The radar chart can also be used to compare the performance of multiple clinicians treating the same medical condition for similar populations of patients, which can prompt clinicians to identify and adopt best practices. The director of the Scottsdale Healthcare office extended the study to compare the outcomes and costs across the three surgeons (see the exhibit “Radar Charts Comparing the Value of Delivered by Three Surgeons for Two Alternative Bariatric Procedures”). The three surgeons saw that they had somewhat different costs and outcomes across the two procedures — and that they could learn from each other. For instance, the surgeon who was highest cost for the gastric bypass approach was lowest cost for the laparoscopic sleeve approach.
We live in a world where our personal devices—whether they’re in our pocket, car or home—can seamlessly share real-time data with each other. But the same cannot be said for a much more important area of our lives—healthcare. That’s because many of the systems that record and store healthcare data across the care continuum are not integrated. Erasing this so-called integration deficit is a critical next step in healthcare’s evolution as we transition to value-based healthcare.

While many stakeholders see the potential for improved collaboration, the misaligned incentives of many healthcare systems make the prospects for integration a significant challenge. Repeated tests, recurring readmissions, and an incomplete picture of a patient’s overall health are often the result. By working together to manage patient care holistically, the healthcare industry can improve clinical and financial outcomes.

So if the lack of integration is the problem, how do we start working toward a solution? More connected medical technologies—implanted and otherwise—can and should play a crucial role, as will better use of data to help healthcare professionals see a broader view of their patients. Today, many of Medtronic’s technologies are actively generating data, and we are working with the global healthcare community to take our technology, services, and insights and fashion them into solutions that either augment the delivery of care through better patient care management or improve overall system efficiency.

In the spirit of progress and partnership, our work includes:

- Utilizing insulin pump technology, sensors and mobile applications to better manage patients outside of the hospital setting in the Netherlands,
- Combining implanted heart failure technologies, diagnostic sensors, and nursing support to keep heart failure patients out of VA hospitals,
- Collaborating with IBM Watson to identify better care management for diabetes patients by using the patient’s own data,
- Working with hospitals to allow quicker patient discharges by giving doctors and nurses the ability to monitor patient care and progress remotely,
- Partnering with hospitals to manage their cath labs for better patient throughput and outcomes, and
- Working on-site at hospitals to drive improvements in efficiency, quality, clinical outcomes, and patient experience, all within an outcomes-based payment model.

As we’ve seen in our efforts, the successful integration of patient care will require collaboration between providers, suppliers, physicians and payers. At Medtronic, we believe we have an important role to play in the integration of healthcare. There’s an opportunity to harness the data and insights our technologies produce to create a more integrated, patient-centered healthcare system—one that ultimately is set up to achieve and reward the long-term outcomes that are central to a value-based healthcare system.

Learn more about our perspective on integrating care and value-based healthcare here.