

**Time-Driven Activity-Based Costing:
A Solution for Integrating Institutional
Health Care Processes and Costs**



Scouting Health

Summary

Historically the United States has consistently lead other high-income industrialized nations in health care spending,¹ with many believing that increased spending results in improved health outcomes. However, research over the last decade has shown that increased health care spending in the United States is not related to improved outcomes. Further, domestic and foreign economists have warned that health care spending in the United States has reached unsustainable levels, accounting for 17.5 percent of GDP.²

Of notable concern is that what it costs to deliver a specific health care service at a specific location is often a mystery to patients, clinicians, payers and administrators. This is due to the complex relationship involved in delivering health care services, with many individuals and resources involved to carry out a single task, such as preparing a patient for, performing and interpreting the results of, an MRI.

At the Harvard University School of Business, professors Robert Kaplan, PhD and Michael Porter, PhD have developed a novel approach to capture the true cost of delivering health care, and in the process, reduce costs. Recognizing that in the United States health care is a business, Kaplan and Porter have adapted a traditional business costing process called Activity Based Costing (ABC) to the health care setting. The model, called Time-Driven Activity-Based Costing (TDABC) has been found to more accurately capture health care costs than traditional health care costing models.³

¹ <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/HistoricalNHEPaper.pdf>

² <http://www.oecd.org/health/healthcarecostsunsustainableinadvancedeconomieswithoutreform.htm>

³ <https://www.ncbi.nlm.nih.gov/pubmed/25721575>

TDABC tracks the seven steps a patient takes throughout a health care encounter, and individually accounts for the cost of not only the resources, but the time the patient spends with each resource, including clinical and administrative staff. The model not only creates awareness in all staff of the time involved in a clinical encounter, but also identifies areas where efficiencies can be made. Several health care systems including, the University of Texas MD Andersen Cancer Center, UCLA Health and the University of Utah Health Science Center, have implemented TDABC to varying degrees and have had success in reducing costs through identifying efficiencies and raising staff awareness.

Overview

Both patients and providers understandably view billing charges as an accurate itemized receipt for the cost of delivering the health care received. However, billing charges are inaccurate estimates of the actual costs incurred and often reflect lower negotiated insurance rates. Efforts to track and reduce institutional health care costs have been traditionally treated as managerial or administrative tasks and unimportant to the clinical delivery of health care. Further these efforts have often been led by individuals removed from the clinical process and have limited understanding about the realities of frontline patient care. This suggests that a solution to health care cost containment may be as straightforward as developing and implementing new – or simply better – approaches to accurately measure what it costs to deliver patient care. Key to this approach is the role of engaging clinicians in the process.

In response to this, Kaplan and Porter have developed the time-driven activity-based costing (TDABC) model,⁴ which emphasizes understanding of the clinical and administrative process that a patient takes from start to finish. The model tracks the seven steps a patient takes throughout an episode of care for a medical complaint and then assesses two cost determinants at each step in the process: 1. the cost of each of the resources used in the process and 2. the quantity of time the patient spends with each resource. TDABC consists of seven steps that are designed to accurately estimate the total costs of treating patient populations.

1. Identifying the medical complaint to be costed and defining the time period that constitutes the patient care cycle for the condition.
2. Defining the principal activities involved in a patient's care for a medical

⁴ <https://hbr.org/2004/11/time-driven-activity-based-costing>

TDABC in Health Care

- condition along with their locations – referred to as the “care delivery value chain” in the TDABC model.
3. Developing a process map of each activity in the care delivery value chain.
 4. Estimating how much time the patient spends with each provider or other resource at each step in the process care delivery value chain.
 5. Estimating the direct cost of each resource involved in caring for the patient.
 6. Estimating the capacity of each resource and calculating how much it costs, per hour or per minute, for a resource to be available for patient-related work by dividing this estimate into the direct cost estimates determined in step. This is referred to as “the capacity cost rate” in the TDABC model.
 7. Calculating the total cost of patient care by multiplying the capacity cost rates (including associated support costs) for each resource used in each patient process by the amounts of time the patient spent with the resource (step 4) and then adding all the costs across all the processes used during the patient’s complete cycle of care.

TDABC is not a novel costing method, but its application to the health care industry by Kaplan and Porter is new. Applying TDABC to health care settings can be time consuming, due to the complex mapping and cost estimation processes, early examples throughout the U.S. indicate the model has proven useful as it not only produces reliable cost information but also engages clinicians and medical leadership in the costs process. A handful of health care systems have piloted or adopted TDABC and found that it generates more nuanced and accurate cost information, especially when clinician leadership and

frontline staff are involved in the mapping and cost estimation activities. Use of TDABC also better positions the health care system to move toward value-based health care delivery, which complements the trend toward value-based payment for health care services.

Several health care systems have implemented the TDABC, to leverage the knowledge and expertise of their clinicians and subsequently improve their operations, cost control strategies, and care delivery. with varying degrees of success. Three of these health care systems are profiled below in detail:

University of Texas MD Andersen Cancer Center, UCLA Health, and University of Utah Health Science Center.

A few of these models offering a more unique TDABC-supported process are the latest named Trends to Watch.

**Trend Watch:
Using TDABC to
Measure Cost
Impacts of Process
Improvement**

University of Texas MD Anderson Cancer Center (UTMDACC). After recognizing that its traditional charge-based cost accounting system had limitations in accurately capturing its current cost allocations, UTMDACC decided to pilot TDABC in its Head and Neck Center. UTMDACC established a team of clinicians and finance staff who were responsible for defining and executing the TDABC process steps in full. All process steps and time estimates were validated by the frontline providers who regularly performed the tasks.

The team at UTMDACC noted that while there was a significant time investment to develop process maps for all care areas, they realized additional benefits than what was initially expected when they implemented TDABC. These

benefits included the ability to set priorities for targeted process improvements and measure their cost impact. For example, UTMDACC used process maps and TDABC model costs to track the cost impact of two performance improvement initiatives in its Anesthesia Assessment Center. One initiative focused on implementing new clinical guidelines for preoperative diagnostic testing and the other involved reorganizing personnel tasks to optimize use of different staff members. The TDABC model provided visibility into cost savings associated with process improvements that UTMDACC's previous costing system could not, and thus, UTMDACC could demonstrate a 36 percent per-patient cost reduction resulting from the initiatives. UTMDACC has also undertaken other applications of TDABC to improve workflow in radiation oncology, improve prostate brachytherapy processes of care, and measure value for low-risk prostate cancer interventions.

Related Information:

- https://www.regonline.com/custImages/260000/268589/HeidiAlbright-2012_04_19_BBRT_TDABC_v3.pdf
- <https://www.regonline.com/custImages/260000/268589/BBConference061715Incalcaterra-2.pdf>

UCLA Health. UCLA Health piloted TDABC in two areas, viewing it not only as a promising approach for providing accurate, actionable process and cost data, but also as a strategy to meaningfully engage health care providers in cost measurement and management. UCLA Health piloted TDABC in its neurosurgery and urology departments. The pilots included teams of clinicians, administrative staff, and other health care providers who were led by a physician sponsor and an administrative sponsor with detailed knowledge about the department's finances and ready access to financial data. These two sponsors were paired with a TDABC coach who provided support and assistance with key TDABC activities.

Trend Watch: Engaging Providers in Process Assessment and Costing Activities

Consistent with the TDABC methodology, the two pilot teams developed detailed process maps, which covered process steps but also incorporated potential variability from both the staff members' and patients' perspectives. Key stakeholders, including frontline staff, department managers, and unit directors, reviewed and validated the process maps. After reviewing the finalized process maps, the pilot teams learned that over 60 different types of personnel were involved in the delivery of care, far exceeding their initial expectations, and they used personnel costing templates to calculate each care provider's capacity cost. The pilot teams found notable variation in physician capacity costs, and in response, developed a checklist of key questions to help physicians more consistently estimate their clinical capacities. The pilot teams also held a work session involving all clinical champions, department or service chairs, and their financial administrators to review personnel capacity-cost calculations for physicians, which was critical to ensure buy-in from all specialties involved in both pilot programs.

UCLA Health reported that using TDABC enabled the organization to 1. assess variability in care delivery among health care providers throughout an entire episode of care; 2. identify duplicative and unnecessary steps, sources of delays, and role ambiguity and; 3. provide clarity regarding unused, underused, and overused personnel, space, and equipment. UCLA used the integrated process and cost data generated from the TDABC pilot to design cost-efficient care delivery redesign strategies. These strategies included engaging medical assistants and nurse practitioners to work at the highest level of their role in the preoperative clinic setting; redesigning care around pain management, urination, and mobilization in the hospital; and evaluating alternative follow-up

**Trend Watch:
Incorporating TDABC
Principles into
Enterprise-Wide Cost
Transparency Efforts**

approaches (such as nurse telephone clinics, telemedicine, and electronically monitored patient-reported symptom scores) in post-operative clinic settings. UCLA Health also noted, importantly, that deploying TDABC served as an opportunity to help providers understand how their specific actions influence cost.

Related Information:

- <http://www.ncbi.nlm.nih.gov/pubmed/25363431>
- <http://thejns.org/doi/full/10.3171/2014.8.FOCUS14381>

University of Utah Health Sciences Center. The University of Utah Health Science Center (UUHSC)'s concerted efforts to create institutional cost transparency began with the inability to answer a seemingly straightforward question – what did the goods and services provided by UUHSC actually cost? This inquiry prompted an enterprise-wide effort to provide access to real-time, accurate provider- and patient-level cost data that has since propelled UUHSC to become an exemplar for how health systems can understand their costs. After sequestering a group of senior leaders from finance, decision support, quality improvement, biomedical informatics, and information technology and charging them with the task of creating an actionable framework for understanding and enhancing health care value, UUHSC emerged with the Value Driven Outcomes (VDO) tool, a nimble software that harnesses data from disparate data sources and allocates care costs to individual patient encounters. With the VDO approach to costing, certain groups of costs, such as space, equipment, labor, and professional time, are allocated based on a patient's estimated use of those resources, like the TDABC approach; however, costs are not anchored to specific conditions. Costs for supplies, medications, and contracted services are based on the UUHSC's actual acquisition costs, and physician costs are allocated per

work relative value units (wRVUs). The VDO tool enables UUHSC to analyze system costs and outcomes at various levels – including individual encounters and by department, physician, diagnosis, and procedure. The VDO also integrates patient satisfaction scores and other quality metrics.

UUHSC leaders have credited the institution’s ability to slow the growth of annual operational costs in part to the ability to more closely monitor costs through the VDO tool. While costs at other nearby academic medical centers increased an average of 2.9 percent a year over the past few years, UUHSC’s declined by 0.5 percent a year. In a recently published article, UUHSC discussed concrete examples of how the VDO tool achieved value by reducing costs and improving quality.⁵ UUHSC used the VDO tool to identify the overall cost per unit or cost per case, the components of that cost, and cost variability for every MS-DRG (Medicare Severity-Diagnosis Related Group). UUHSC then isolated the most highly variable, high-cost conditions as potential areas for improvement. UUHSC formed multi-disciplinary value improvement teams consisting of clinicians, administrative leaders, and process engineers that focused on three of these highly variable, high-cost conditions: total joint replacement of the lower extremities, hospitalist utilization of laboratory testing, and sepsis management. The teams identified and implemented strategies to reduce practice variation in these three areas, established key quality metrics, and viewed and monitored care costs and quality metrics using the VDO tool. These data were then used to provide monthly feedback to clinicians. Across all three conditions, UUHSC saw significant improvements in the value of care delivered. For total joint replacement, a composite quality index increased while costs were 7 to 11 percent lower. The initiative to reduce hospitalist laboratory testing

⁵ <http://jama.jamanetwork.com/article.aspx?articleid=2552208>

was associated with 11 percent lower costs (representing cost savings of more than \$250,000 per year) with no significant change in length of stay and a lower 30-day readmission rate, and the sepsis intervention was associated with reduced times to anti-infective administration when appropriate.

UUHSC continues to explore opportunities to improve the costing methodologies that underlie the VDO tool. For example, UUHSC has collaborated with Dr. Kaplan to build on the VDO tool and incorporate TDABC methods to enable better assessment of unused capacity. UUHSC is also developing an overlay of patient reported outcomes for the VDO. This connection is part of a system-wide effort to better understand and measure the health outcomes that matter most to patients.

Related Information:

- <http://healthsciences.utah.edu/innovation/algorithms/2013/two/index.php>
- http://www.nytimes.com/2015/09/08/health/what-are-a-hospitals-costs-utah-system-is-trying-to-learn.html?_r=0