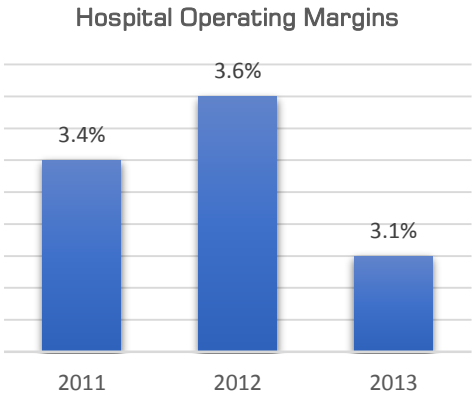
How Much Does That Cost?
Measuring True Costs in Healthcare

Using Time Based Costing to Measure Actual Costs at the Patient Level | Fall 2014

3.9%

Revenue Growth at not-for-profit hospitals in 2013

An All-Time Low



Source: Modern Healthcare Financial Database

$300B

Reductions to Medicare payments through 2019 as part of healthcare reform

Source: Moody's Investors Service

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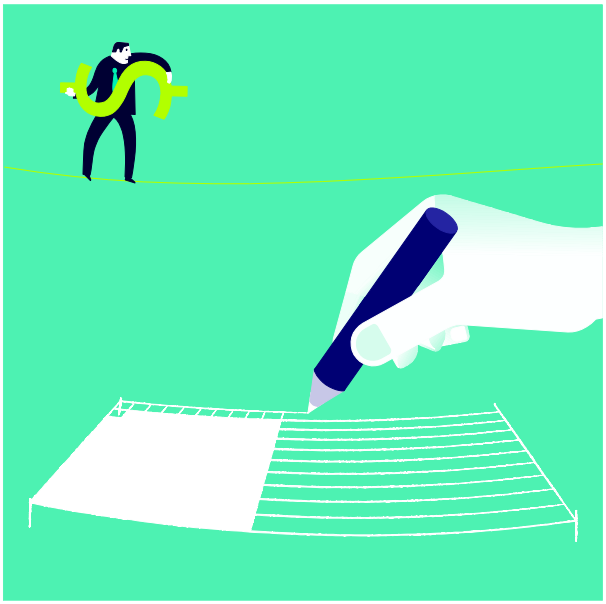
Introduction:

A step towards cost transparency and value-based care

With payment reforms rapidly approaching, the traditional business model of care delivery is changing. In an environment with so much change, rising costs – projected to reach nearly one-fifth of the United States' GDP by 2021 – are one of the few constants. Coupled with the reality that costs to provide services are largely unknown, healthcare is presented with a potentially crippling problem for all parties involved in the care cycle, especially when it comes to value.



In an effort to understand and drive change to this problem, Ellis & Adams began research on Time-Driven Activity Based Costing (TDABC) and its application in healthcare. TDABC is a method of cost accounting that has helped resurrect many organizations across diverse industries by assigning resource costs directly to cost objects (those that consume them). This method creates an elegant framework of time equations and cost drivers, requiring only two sets of estimates that can easily and objectively be obtained. The quantity of time that each employee provides service to a patient, and the price incurred by the organization for each employee to provide service.

Pilot projects conducted by more than two dozen healthcare organizations are demonstrating the power of time-driven activity-based costing (TDABC) to improve value. The empirical data can be transformative – providing an accurate cost measurement system that enables workflow optimization and process standardization. The data can also be used to establish performance baselines, helping to gauge efficiency, forecast returns on potential process changes, and improve operational performance in both meaningful and strategic ways.

Objective & Method:

Use TDABC to Assign Costs Directly to Patients – understand how and where costs are incurred

Part 1: Determining the quantity of service provided:

1. Define Macro Workflow & Process Roles

After arriving onsite, business analysts meet with the clinic manager to create a staff roster. Working together with the staff, workflows are identified and processes mapped into diagrams. If text based workflows were provided, they are analyzed, verified and converted into process diagrams. Depending on the nature of the care environment, workflows can be broad (for example, covering a primary care check-up visit) or more narrowly focused (covering something as specific as a surgical procedure). The important thing is that the workflows and employee roles involved are representative of the process that actually occurs.

2. Capture process times

After defining the workflows and depth of information to capture, data collection occurs during normal hours of operation. Analysts use tracking tools to capture the time of and between processes. Depending on what is available, the data includes start and stop times for each process, patient gender, and which physicians and medical assistants were involved in treating the patients. Time where the patient is at the clinic but not receiving care or interacting with staff are also recorded.

3. Identify Practical Capacity

Practical capacity is defined to be "the quantity of minutes or hours that employees are available to perform the actual work". In this case, interacting with patients and providing care. To identify the practical capacity of each resource, we first needed to calculate theoretical (total) capacity. Using the clinic's hours of operation as a baseline, we approximated an employee's theoretical capacity on average to be 160 hours per month (The clinic operates for 8 hours per day, 5 days per week, and 4 hours per month). Using the arbitrary approach to practical capacity estimation, we assumed an employee's practical capacity to be 80% of their total capacity. This calculation revealed that an employee has a practical capacity of 128 hours (7,680 minutes) available per month in which they could be involved with or provide care to a patient. There are also more specific ways to estimate practical capacity, such as observation or interview, but the arbitrary approach can also be modified to reflect specific working environments.

Part 2: Determining the price of supplying care:

1. Identify Cost of Supplying Capacity – Operating Cost/Month

Identifying the cost of supplying capacity can be challenging depending on the depth and specificity of financial information that the organization supplies. Once the analyst team receives the data from the finance staff, it is broken down and attributed to employees. If the information is already comprehensive and specific, the analysts can easily attribute costs to employees. If it is less detailed, analysts work to break the data down and approximate attribution using resources such as wage data from the BLS as a means of comparison based on the same geographic area as the clinic. Using percentage of total salaries as a baseline for "consumption rate on resources" expenses such as supplies, benefits, utilities, etc. are allocated at the same rate. This information is later validated by the finance department, but initial estimates are likely to be less costly than actual as a result.

2. Determining the Capacity Cost Rate (CCR):

The capacity cost rate (CCR) is a metric that assigns resource costs (total cost of an employee) directly to the cost objects (patients) that use them. Using the information computed above, and the CCR equation, we are able to easily estimate a cost rate for each employee that interacts with a patient.

The CCR allows us to quickly and accurately determine the total cost of a patient interaction and visit, based on the specific employees they are engaged with. Once interaction times are captured, we multiply the CCR of the given employee by the interaction time for the respective step in the visit. Summing together the cost of each step of the visit, we are able to determine the total cost incurred by the clinic for a specific patient visit. We can then create a time equation for the entire visit, where the only variable is the amount of time a patient spends with a given employee.

3. Create Time Equations

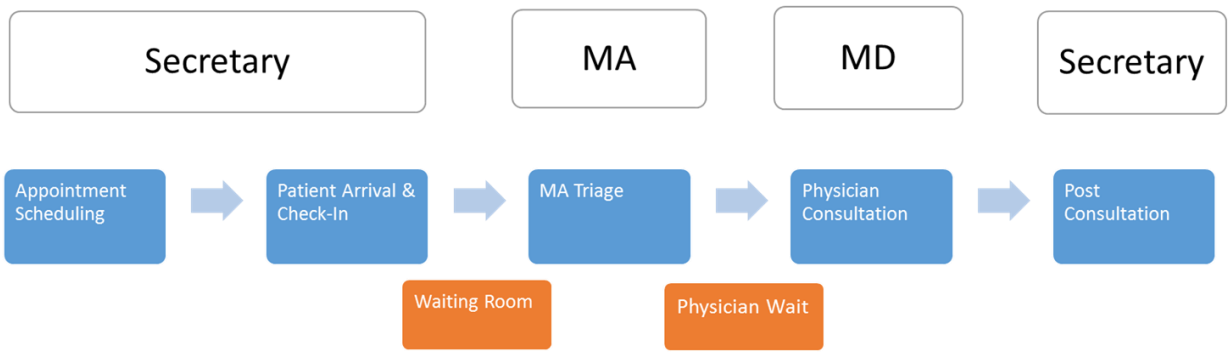
Time equations can incorporate a lot of variability (e.g. new vs. existing patient, yes or no for a specific test, etc.), but in its most simplistic form, it is a summation of the fundamental cost accounting equation:

Resource cost (Ci) = Quantity of resource units (QT) x Price per unit of the resource (Pi)

Where Ci represents a given employee, QT represents the amount of time the employee spends with the patient, and Pi represents the capacity cost rate for the given employee to supply time to a patient.

The Theory in Practice:

Our pilot took place at an Endocrinology and Diabetes clinic in South-Central Texas. Our shared objective: Use TDABC to determine the cost to treat a patient, and understand how and where costs are incurred by the clinic. After meeting with the clinic manager and observing normal operations, we decided to track the average patient visit at the clinic. Given that the clinic was relatively new and data was relatively limited, we determined this was the best course of action. Before tracking process times and employees, we mapped the following workflow and time equation:



$$Apt_T SEC_{CCR} + CheckIn_T SEC_{CCR} + Wait_T Room_{CCR} + Triage_T MA_{CCR} + PhysicianWait_T + Consultation_T MD_{CCR} + CheckOut_T SEC_{CCR} + Charting_T MD_{CCR}$$

(Note: Physician Wait is included as a time-only variable because we included the resource costs of the room into the MD CCR as the MDs use the resources to provide their services)

The time equation shows each part of the workflow where time would be captured, noted with subscript T, multiplied by the CCR of the of the employee type who is interacting with the patient. Modifications to both to the workflow and time equation, like those listed earlier, can easily be incorporated to the time equation in order to include a higher degree of detail.

Over the course of the next two weeks - the shortest amount of time that a patient could have a follow-up visit scheduled for - we captured data on the process times and actors. See below for statistics on information collected:

	Appointment Scheduling	Patient Check-in	Waiting Room	MA Triage	Physician Wait	Physician Consultation	Post Consultation
Mean	0:04:55	0:01:15	0:19:14	0:14:19	0:10:55	0:24:25	0:04:13
Standard Error	0:00:48	0:00:09	0:01:15	0:00:51	0:01:01	0:01:26	0:00:20
Median	0:03:22	0:00:38	0:16:54	0:12:20	0:09:36	0:22:24	0:03:13
Mode	0:04:12	0:00:31	0:08:50	0:17:29	0:00:00	0:26:14	0:01:24
Standard Deviation	0:05:19	0:01:28	0:12:46	0:08:26	0:09:16	0:14:00	0:03:06
Range	0:31:59	0:07:54	1:02:22	0:43:42	0:41:27	1:05:01	0:14:30
Count	45	105	105	100	83	95	90

To calculate theoretical and practical capacity we used the arbitrary approach described above. Estimated at 80% of theoretical capacity, the calculation revealed that an employee has a practical capacity of 128 hours (7,680 minutes) available per month in which they could be involved with or provide care to a patient.

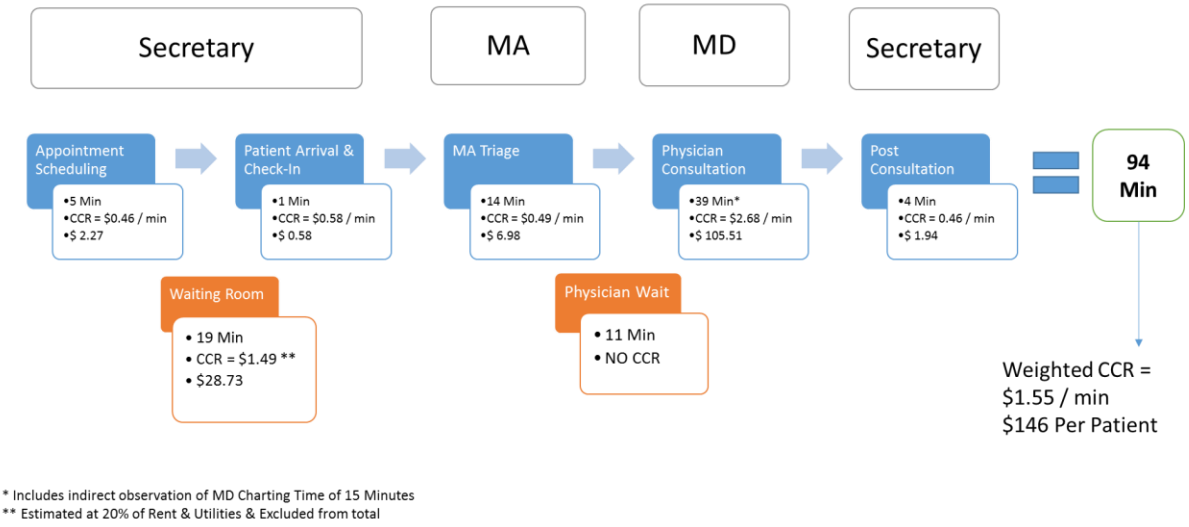
Once the process time data was collected, we began breaking down the financial information we received into a usable form. We received the information in a very general form and had to use BLS data from the same geographic area in order to approximate consumption percentages for percentage of employee salaries out of the total. We then used those same consumption percentages to attribute the use of resources to employees in the clinic. We also applied the same consumption percentages to the manager's salary. While the manager does not directly interact with patients, they supervise the employees that do. Their cost must be accounted for when determining the CCR of an employee because they are considered a resource an employee requires as a part of their role.

Determining the allocation of rent expense presented us with a challenge. We assumed that 80% of the total square footage of the clinic was used to provide patient care. We then allocated 80% of the rent expense to the employees based on their consumption percentages. The remaining 20% of square footage was determined to be the waiting room which still incurred a cost to the clinic. To assign a cost rate to the waiting room we assumed the same practical capacity of 7,680 minutes and divided the cost by the practical capacity to approximate a figure for the cost rate of a patient sitting in the waiting room. A patient in the waiting room acted as an opportunity cost. Once CCRs were determined, we plugged the average process times and CCRs into the time equation.

Findings:

Our analysis revealed that on average, the clinic incurs a cost of $146 to treat a patient. We were able to identify key cost drivers in the care cycle that process redesign and other tools could help steer in a more efficient and effective direction.

For instance, MDs spent at least 10 minutes longer than average in patient visits, causing them to see fewer patients in a day. With both doctors seeing a combined average of about 12 patients per day, the cost of excess capacity (the amount of time MDs could use to see patients if patient visits were operating at the average visit time of 15 minutes per patient) is more than $6,400 per month, not including the additional time and cost of $40 per patient incurred for visit documentation.



* Includes indirect observation of MD Charting Time of 15 Minutes
** Estimated at 20% of Rent & Utilities & Excluded from total

We also identified opportunities for savings with MA and secretarial operations. By decreasing average patient triage times, implementing an automated appointment reminder system, and evaluating the need for a time consuming pre-screening tool, we identified opportunities for savings of more than $5000 per month.

Conclusion:

Healthcare organizations can use data provided from a TDABC study to identify and understand their cost structures. With this information, workflows can be monetized and examined under a microscope, looking for bottle necks and high cost processes as areas for potential redesign & shifting work assignments to ensure clinicians are practicing at the top of their licenses. The costing information can also be used to aid organizations in forecasting return on investments when considering potential changes to workflow, or the addition of new equipment in the care environment.

As risk-based reimbursement models become a reality, TDABC can help to increase value for both patients and providers – revealing ways that care can be delivered more efficiently and effectively, all at a lower cost. TDABC provides organizations with tools to establish benchmarks and define key performance indicators. Armed with information, organizations can measure and track future performance, enabling them to set goals for operational performance and redefine the future of healthcare delivery.

References

Demeere, N., Stouthuysen, K., & Roodhooft, F. (2009). Time-driven activity-based costing in an outpatient clinic environment: Development, relevance and managerial impact. *Health Policy*.

Donovan, C. J., Hopkins, M., Kimmel, B. M., Koberna, S., & Montie, C. A. (2014). How Cleveland Clinic Used TDABC to Improve Value. *HFM Magazine*, 84-88.

Henry J. Kaiser Family Foundation. (2014, August 26). *Health Care Costs To Reach Nearly One-Fifth Of GDP By 2021 - Kaiser Health News*. Retrieved from http://www.kaiserhealthnews.org: http://www.kaiserhealthnews.org/Daily-Reports/2012/June/13/health-care-costs.aspx

Kaplan, R. S. (2014, June). Improving Value with TDABC. *HFM Magazine*.

Kaplan, R. S., & Anderson, S. R. (2007). *Time-Driven Activity-Based Costing.* Boston, MA: Harvard Business School Publishing Corporation.

Kaplan, R. S., & Porter, M. E. (September, 2011). How to Solve the Cost Crisis in Healthcare. *Harvard Business Review*.

Porter, M. E., & Lee, T. H. (October, 2013). The Strategy That Will Fix Health Care. *Harvard Business Review*.

Porter, M. E., & Teisberg, E. O. (2006). *Redefining Healthcare.* Boston, MA: Harvard Business School Press.

Tai-Seale, M., McGuire, T. G., & Zhang, W. (2007). Time Allocation in Primary Care Office Visits. *Health Services Research*, 1871-1894.

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