

Optimizing Value: A Time-Driven Activity-Based Costing and Workflow Study in Three Different Primary Care Models

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Background

The University of Virginia Family Medicine Department, in collaboration with the Harvard Business School, initiated a project to increase the value of care we provide to our patients. Lowering costs is an essential part of the value equation and requires knowing the true costs of providing care. We aim to compare the costs associated with three different primary care delivery models in order to find ways to decrease costs while maintaining high-quality care and improving the work life of clinicians and staff.



Three Primary Care Delivery Models

- Standard Practice Delivery:** Conventional method of practice. No population outreach and minimal standard pre-visit chart preparation or workflow.
- PCMH Team Care:** Residency training program with 13 faculty, 22 residents, and 5 nurse practitioners working as three quasi-independent teams. Marked by standard pre-visit chart preparation, population health outreach, and integrated quality improvement initiatives.
- Family Team Care:** LPN gathers and documents HPI based on protocols specific to the patient's chief complaint prior to provider entering the exam room.

$$\text{Value} = \frac{\text{Quality}}{\text{Cost}} + \text{JOY}$$

Key Participants for Project's Success

- Department Chair
- Medical Director
- Dept. Administrator
- Project Manager
- Medical Center Finance Analyst
- Operations and Systems Engineer

Methods

Time-driven activity-based costing (TDABC) is a comprehensive method that accounts for total cost of the resources used by the patient throughout a defined care cycle including:

- What activities are performed
 - Who is responsible for doing each activity
 - The amount of time dedicated to each activity
 - Associated costs including salaries, benefits and administrative support, labs, medical supplies, and physical space
- Complete a TDABC costing tool for each delivery model to calculate a cost per unit of time for each type of personnel
 - Perform direct observations and time studies
 - Create process maps and value stream maps
 - Use medical record and scheduling reports to analyze patient outcomes and clinical utilization

Example of Observation Data:

Our Team's Innovative Addition to the Model

Cost analysis should also account for clinical efficiency and missed appointments (No Show Rate).

$$\text{Clinical Efficiency} = \frac{\text{Scheduled Hours Per Year}}{\text{Clinical Operating Capacity}}$$

Clinical Operating Capacity Defined: Space capacity divided by the number of rooms assigned to each provider.

Our Clinical Efficiency = 53.01%

Opportunity!

Conclusions

The TDABC model gives us the ability to calculate, compare, and predict the cost impacts of workflow and process change at three different levels: discrete patient encounters, the continuum of care for a patient over a care cycle, or at the business level as a tool to evaluate and predict clinic operational outcomes.

Validating the Model

We used the TDABC model to predict costs which were **within 3% of the operational expenses** for the PCMH Team Care clinic.

- Calculate the TDABC cost per visit for six different visit types.
- Multiply TDABC cost per visit by clinic volume. Account for encounter provider (see below).
- Compare results to operational expenses.

2016 PCMH Team Care Clinic Utilization			Encounter Provider by Visit Type				
Visit Type	# of Visits	% of Total Visits	Attending	Nurse Practitioner	PGY1	PGY2	PGY3
Establish Care	745	4.53%	33.03%	16.28%	10.55%	13.76%	26.38%
Follow-Up	7,498	45.47%	33.90%	24.92%	3.38%	12.71%	25.08%
Preventive Care	2,526	15.32%	34.94%	24.63%	7.73%	11.53%	21.17%
Urgent	5,053	30.64%	29.01%	26.06%	4.99%	13.98%	25.96%
Procedure/Injection	264	1.60%	35.06%	39.61%	7.14%	3.90%	14.29%
Transitional Care	386	2.43%	19.23%	42.31%	6.41%	11.54%	20.51%

Next Steps

- Use of automated simulation modeling in conjunction with TDABC costing to predict operational outcomes of trialing a new delivery model to increase value.
- Identify scheduling opportunities to improve clinical efficiency.
- Evaluate outcomes of patient cohort at each of the primary care clinics.
- Determine appropriateness of rooming time and scheduled visit time to address patient needs.
- Decrease costs and improve efficiency and joy in practice while maintaining high-quality care thus increasing value for our patients and improving morale of our work force

Results: Follow-up Visit Cost Comparison

Primary Care Delivery Model	# of Exam Rooms Assigned to Each Provider	Clinical Efficiency	Clinic No Show Rate	Lab Costs Per Follow-up Visit	Physical Space Costs Per Follow-up Visit	Clinician Capacity Cost Rate (per minute)	Follow-up Visit Durations	Observed Average Clinician Time with Patient at Follow-up Visit*	TDABC Cost Per Follow-up Visit
Standard Practice Delivery	1.5	67.75%	6.6%	\$7.22	\$6.18	\$2.23	20 min	21 min	\$148.87
PCMH Team Care	2	53.01%	16.1%	\$2.27	\$29.91	\$2.27 Attending MD \$1.39 NP \$0.62 PGY1 \$0.63 PGY2 \$0.66 PGY3	30 min**	34 min	\$177.93
Family Team Care	3	67.00%	7%	\$7.71	\$42.95***	\$2.33	30 min	14 min	\$183.57
Predictive – PCMH Team Care Clinic with Family Team Care Delivery Model	2	81.20%	16.1%	\$2.27	\$29.91	\$2.27 Attending MD \$1.39 NP \$0.62 PGY1 \$0.63 PGY2 \$0.66 PGY3	20 min	10 min	\$142.95

* Added 30 more minutes of clinician time to each visit for total cost evaluation. 10 minutes for pre-visit preparation and 20 minutes for post-visit needs including charting, care coordination, and result follow-up. Time additions derived from interviews.

** Variable. Visit lengths are function of clinician training, patient age, and patient language.

*** Leased building with lower patient volumes