Time-Driven Activity-Based Cost Accounting Methodology Employed to Transform Vascular Interventional Radiology Service at a Large University Academic Medical Center

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Background and Rationale

Unsustainable escalation of expenditures and new legislation has increased demand for innovative approaches to understand and control costs while improving the value and quality of health care.

Value is measured as health outcomes per dollar expended.[1] In order to measure patient outcomes, it is necessary to understand the true cost of delivering care.

$$\text{Value} = \frac{\text{Health Outcomes}}{\text{Cost of delivering the outcomes}}$$

What is TDABC?

Unlike current methodologies, which are department- instead of patient-based and designed for fee-for-service models, Time-driven Activity-Based Costing (TDABC) is a managerial accounting approach that measures the actual cost of delivering care to a patient.[2,3,4,5] It allows almost all resources (personnel, equipment, facility and indirect/support costs) to be directly attributed- not allocated- to the organization's output of patient care services.[6]

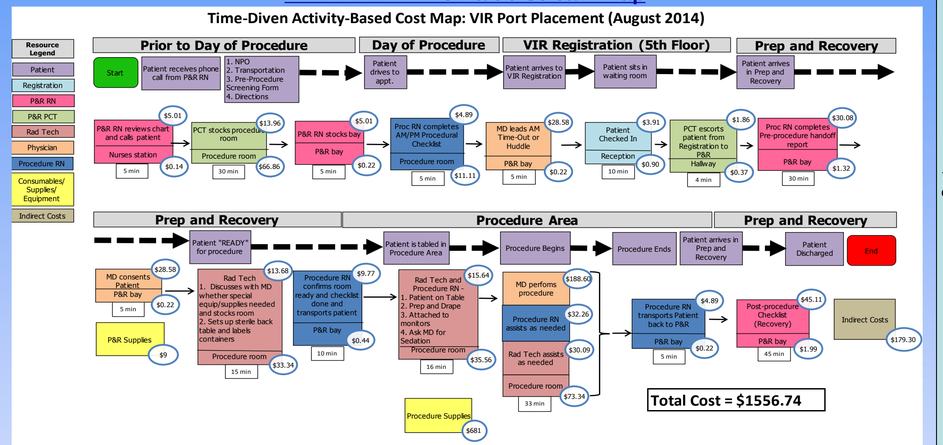
Methods

TDABC and RCC accounting methodologies for vascular interventional radiology (VIR) port placement procedures (PPP) were compared with the goal of improving the accuracy of cost information associated with patient care.

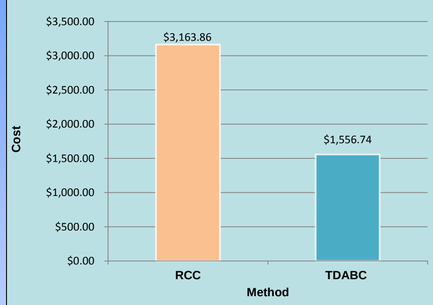
Value stream process maps were developed for VIR-PPP care cycles, including sequence and duration of clinical and administrative activities and corresponding resource usage. Capacity cost rates (cost per minute) for all resources (personnel, space & equipment, consumables and indirects) were calculated using organizational cost data.

Results

VIR–PPP TDABC Value Stream Map



RCC v. TDABC Cost Comparison



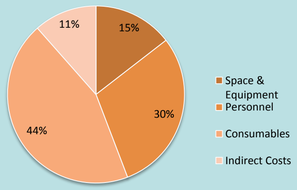
The TDABC process calculated costs for VIR-PPP to be 49% of current applied organizational costs using the RCC accounting methodology.

Total Cycle Cost using TDABC Methodology

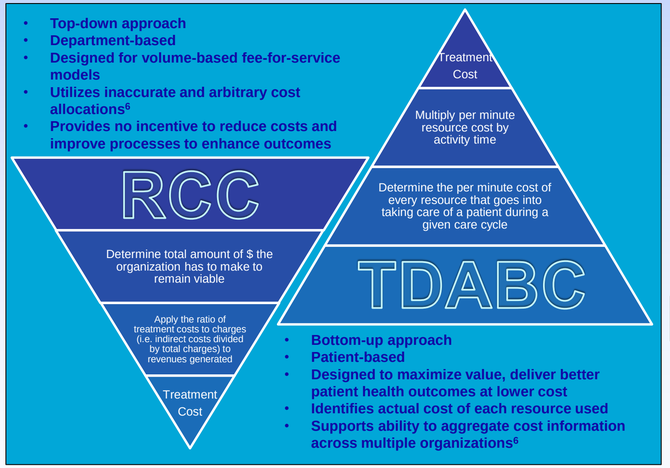
Port Placement Procedure Costs by Encounter Step

Clinical Pathway Encounter Step	Personnel Cost ($)	Space and Equipment Cost ($)	Consumable Costs ($)	Total Costs ($)
Prior to Day of Procedure	$23.99	$67.03	-	$91.02
Preoperative	$121.34	$47.92	$8.77	$178.03
Intraoperative	$266.58	$108.90	$680.70	$1,056.18
Postoperative Recovery	$50.00	$2.21	-	$52.21
Indirect Costs	-	-	-	$179.30
TOTALS	$461.91	$226.06	$689.47	$1,556.74

Major Cost Categories



- **Top-down approach**
- **Department-based**
- **Designed for volume-based fee-for-service models**
- **Utilizes inaccurate and arbitrary cost allocations[6]**
- **Provides no incentive to reduce costs and improve processes to enhance outcomes**



- **Bottom-up approach**
- **Patient-based**
- **Designed to maximize value, deliver better patient health outcomes at lower cost**
- **Identifies actual cost of each resource used**
- **Supports ability to aggregate cost information across multiple organizations[6]**

Conclusions

Through rapid deployment of this innovative methodology, we learned how to design, plan, and carry out the TDABC financial analysis process. The TDABC cost accounting approach allowed better understanding of true costs of the VIR-PPP healthcare service.

Future Application of TDABC

Health systems that embrace value-based delivery models will be better equipped to address challenges and opportunities in the new healthcare landscape. The TDABC process offers many potential advantages when approaching:

- Bundled payment implementation
- Negotiation of risk-adjusted managed care contracts with insurance payers and large employers in the local and regional market
- Population health management
- Process improvement, resource optimization, industry benchmarking and cost control and care standardization
- Recognition and promotion of specific unique services offered by our institution

We are commencing use of TDABC in other defined episodes of illness across our organization as well as in unique situations of long-term continuum of care for chronic conditions such as diabetes and mental illness.

References

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TDABC Process Overview

1. **Identify medical condition and patient population** to examine
2. **Define scope of the "patient care cycle," including time period and services provided**
3. **Develop process maps for each activity in care cycle; identify resources utilized in each step**
4. **Obtain time estimates for each process step using EHR time stamps and observation**
5. **Estimate cost of each resource**
6. **Determine the practical capacity of each resource and calculate capacity cost rate (CCR)**
7. **Multiply resource CCR by process time to compute total costs over care cycle**