HealthCatalyst
ignite outcomes improvement™

Service Lines and Activity-Based Costing Reveal True Cost of Care for UPMC

UPMC
LIFE CHANGING MEDICINE

Activity-
Based
Costing

HEALTHCARE ORGANIZATION

Integrated Delivery Network

PRODUCTS

- Enterprise Data Warehouse
- Activity-Based Costing Data Mart

EXECUTIVE SUMMARY

Between 2007 and 2014, U.S. healthcare costs per capita increased by almost 25 percent. The way in which health systems are typically organized, managed, and budgeted (as departments and units within separate hospitals) works against them when they attempt to improve population health and decrease costs. The University of Pittsburgh Medical Center (UPMC), a large health system with more than 20 hospitals and 500 clinics, was keenly aware of this challenge as it embarked on population health and value-based care initiatives that spanned the entire organization.

The health system determined that it needed to break down the virtual walls between care centers and standardize service lines across the enterprise. By extension, this organizational change mandated the need for activity-based costing that would deliver the insight necessary to run a service line effectively. UPMC organized six service lines within the health system, each spearheaded by clinical and financial leadership. Each service line uses the health system's innovative, data-driven activity-based costing methodology to understand the true cost of care.

Notable, measurable results of UPMC's service lines and activity-based costing methodology to date include:

- $42 million of cost reduction opportunities (approximately 2 percent of targeted service line cost)
- $5.0 million in realized supplies savings
- Transparency toward identification of contribution margin variation for specific procedures
- Up to 97 percent improvement in time to access information

INACCURATE COSTING INHIBITS HEALTHCARE IMPROVEMENT GOALS

In 2012, healthcare costs per person averaged almost $9,000 (a significant increase from 2007, when per capita costs hovered around $7,600).[1] Two years later, that average had jumped to

$9,400.[2] With costs still rising, healthcare leaders throughout the United States are determined to put the brakes on cost increases while simultaneously improving quality.

One of the biggest challenges health systems face as they seek to improve quality and control costs is that neither they nor the individual care providers who work with them know how much it really costs to deliver patient care.[3] The reason for this surprising lack of visibility is that costing in U.S. healthcare has historically been based on charges or reimbursement rather than on the actual cost of providing care.

The traditional way in which healthcare organizations are structured—managed and budgeted according to departments and units—contributes to this problem. The departmental structure doesn't accurately reflect a patient's journey through the care-delivery system, because a patient being treated for a single condition crosses many departmental and organizational boundaries throughout the continuum.

The University of Pittsburgh Medical Center (UPMC), a large health system with more than 20 hospitals and 500 clinics, was keenly aware of this structural challenge. UPMC leaders recognized that in order to improve care and compete in today's healthcare market, they needed to change their paradigm: they needed to consider all of the services they offered from a patient perspective (rather than from a facility or departmental perspective). They decided to break down departmental silos and adopt a service-line approach to care delivery.

At the same time, these leaders understood that to successfully improve quality and lower costs in this service-line approach, they would have to solve the costing problem. They would have to devise new ways to accurately measure the cost of providing care across the continuum and to relate the true cost of care to patient outcomes. Through innovative organizational changes, an activity-based costing methodology, and data-driven decision-making, UPMC is achieving this goal.

POPULATION HEALTH REQUIRES ALIGNMENT ACROSS DEPARTMENTS AND HOSPITALS

When organized and administered as separate hospitals, health systems frequently find that each hospital or department's strategic priorities don't align with overall system priorities. Despite the positive intentions of administrators and providers, such misalignment often results in waste, unnecessary clinical variation, and operational inefficiencies.

> "Without the level of financial transparency that activity-based costing gives us, there is no way to hold anyone accountable for financial performance. Transparency creates a culture of accountability."
>
> Rob DeMichiei
> Executive Vice President
> and Chief Financial Officer
> UPMC

UPMC leaders found this to be the case in their large health system. Providers, budgeting, and care routines varied by location. Furthermore, hospitals and departments frequently made decisions without insight into how those decisions might affect the rest of the hospital or other hospitals in the system. And although UPMC offered similar clinical services across facilities, differences in billing and documentation systems and methodologies made it impossible to accurately compare and contrast the cost of those services among facilities—let alone to compare costs against competitors.

As the health system took on more risk and embarked on population health initiatives, UPMC leaders needed a flexible way to measure and track costs that would allow them to compare and contrast similar patient populations across care locations, providers, and services. They believed that gaining that level of transparency into utilization and cost would allow them to engage physicians in meaningful conversations that would help them understand cost drivers, identify operational and clinical variation, and create a culture of accountability and continuous improvement.

ORGANIZATIONAL CHANGES ENABLE IMPROVED CARE AND COST TRANSPARENCY

UPMC leaders recognized that in order to succeed in population health and value-based care, they needed to reorganize along service lines. Furthermore, they understood that in order to manage service lines effectively, they had to adopt activity-based costing.

Organizing along service lines

To establish the collaboration and systemwide perspective needed to make good decisions for patients and for the organization, UPMC set out to break down the virtual walls between separate care locations. It initiated this new journey by creating and standardizing service lines across the entire health system.

UPMC started by forming four new service lines including Women's Health, Orthopedics, Heart and Vascular, Neurology and Neurosurgery. In addition, it had various pre-existing service lines, Pediatrics, Cancer, and Psychiatric Services that were already organized with their own budgets, discrete units, and support staff.

However, deciding to expand service lines and getting providers to think in terms of service lines were two completely different propositions. UPMC discovered that relationship-building among service line providers from different care locations was key. To carry

> "Activity based cost management is something you have to have in your toolkit. Things are happening too quickly in today's environment. You need good information in a timely manner so that you know the whole story and can react quickly in a meaningful way.
>
> Susan Mammarella
> Director
> UPMC Corporate FP&A

out this critical work, each service line has a formal leadership structure with three components:

- The service line team, a collaborative group of UPMC clinicians and administrators from across the system serving as champions within the service line
- The executive team is typically comprised of an executive operational leader and a physician leader
- The financial lead, who serves as the primary contact for all financial matters for the assigned area and collaborates with other financial areas such as supply chain

By bringing together service line practitioners across the system, UPMC has removed the institutional barriers to effective collaboration and decision-making. This new structure allows for meaningful, data-supported discussions about the benefits of particular care routines and procedures and the cost of care. It fosters understanding and support so that practice changes can be made that have a positive impact on systemwide operations and patient outcomes in all care locations.

Launching an activity-based costing methodology

The Health Care Advisory Board has ascertained that to successfully organize around service lines, each service line must have a single, integrated financial statement and must measure and share its performance at both the facility and system levels.[4] Having reached the same conclusion, UPMC leaders determined that while moving to service lines, they would also revise their costing methodology and financial reporting structure.

These leaders knew that some costs in healthcare (pharmaceuticals, supplies, and blood, for example) are fairly easy to measure. Tracking these expenses to the patient level can usually be done through the billing system, provided the supply is charged directly to the patient account. UPMC's solution takes this concept to a more granular level, by including the costs of any supply documented on the patient account, regardless of whether it was charged for directly or not. These costs come under the heading of direct costs. But to accurately measure the full cost of providing care, UPMC needed a way to track not only these direct costs but also utilization of services - and the specific cost of providing that service—at the patient level.

To this end, UPMC adopted a new activity-based costing (ABC) methodology. The intent of this ABC model is to track expenses at a level of detail that will allow UPMC to differentiate the costs of providing the same services to different patients.

Using information and analytics to improve service line performance

To achieve the necessary level of granularity, UPMC aggregated data from clinical documentation, billing, and other systems into an electronic data warehouse (EDW). In addition to using this EDW to track direct costs, UPMC developed algorithms that use the length of time that the patient spends in each care location to allocate costs for staffing and service utilization. This effectively assigns a different cost to each patient. In instances when time isn't an applicable activity driver of cost, the system uses the best available activity data instead.

A key principle of this system is that every dollar of revenue and cost in the general ledger can be allocated to patients—no easy feat, but one that makes UPMC's approach unique. It drives a number of capabilities. Patients can be aggregated in multiple ways to provide costs by diagnosis, procedure, service line, and sub-service line. Patients can also be aggregated by provider so that each physician may see how much it costs to provide care to his/her patients relative to other similar patients.

UPMC also leverages the detailed data to identify the cost difference of providing a service from one facility to another (Figure 1). Because of the level of detail now available, leaders can see the effect that different staffing models and operational practices have on the average cost per case and can bring this to the attention of the individual facilities so that they can make changes.

> "We've been able to get more data a lot quicker. In the past, we'd have to go after specific costs and pull that cost detail from the system. We'd have to know where to look and how to use an allocation methodology. It's so much easier now to get the big picture of costs."
>
> Grace Fillman
> Senior Financial Analyst
> UPMC Corporate FP&A

Service Line P&L - Activity by Hospital

	Group 1		Group 2		Group 3	
	Cases	Margin	Cases	Margin	Cases	Margin
IP Visits						
Hospital 1	100	$ 180	40	$ 50	80	$ 260
Hospital 2	100	$ 300	-	$ -	5	$ 20
Hospital 3	10	$ 20	10	$ 10	10	$ 20
Hospital 4	11,000	$ 44,250	200	$ 240	1,450	$ 3,400
Hospital 5	2,020	$ 3,080	50	$ 30	250	$ 800
Total IP Visits	13,230	$ 47,830	300	$ 330	1,795	$ 4,500
OP Surgical						
Hospital 1	260	$ 460	140	$ 150	270	$ 400
Hospital 2	10	$ 10	-	$ -	-	$ -
Hospital 3	50	$ 5	-	$ -	10	$ (20)
Hospital 4	4,500	$ 4,500	5	$ (10)	330	$ 400
Hospital 5	1,690	$ 740	-	$ -	460	$ 390
Total OP Surgical	6,510	$ 5,715	145	$ 140	1,070	$ 1,170
OP Other Services						
Hospital 1	480	$ 50	1,190	$ 40	750	$ (10)
Hospital 2	200	$ 20	-	$ -	420	$ 40
Hospital 3	80	$ 10	-	$ -	20	$ (5)
Hospital 4	228,000	$ 25,000	550	$ 70	29,000	$ 3,500
Hospital 5	22,160	$ 2,990	30	$ 10	2,900	$ 65
Total OP Other Services	250,920	$ 28,070	1,770	$ 120	33,090	$ 3,590

Figure 1: Volume and margin data by hospital supports identification of unnecessary variation in operational processes and performance

However, since this difference in cost by facility is driven by factors outside the control of the physician, leaders found that to be effective in communicating to physicians, they also needed to be able to drill down into utilization data, rather than cost, and to present to physicians only the information about supplies and processes that are within their control. Thus, both facilities and individual practitioners are given consistent, accurate, and actionable data on which to base decisions, change behavior, and identify opportunities for improvement.

Additionally, each service line receives a quarterly service line financial packet. This includes an executive summary that trends service line performance compared to actual, projection, and (beginning in FY17) budget. They also receive service line and sub-service line margin reports (Figure 2), as well as physician variation reports.

> Instead of Finance coming up with ideas and putting them out there, we work with a group of physicians as a sounding board, to go through the data, understand it, and identify areas of opportunity. Then they go back and sell those ideas to the other physicians.
>
> Paula Lounder
> Director
> UPMC Payer Provider Programs

Example – Service Line Report

Patient Service Line Components

Service Center Costs

	Women's Health	Ortho	Cardiac	Cancer	Neuro	Sub-Total	Other Medical	Other Surgical	Total
Revenues	$100	$150	$200	$250	$150	$850	$900	$300	$2,050
Operating Expenses									
Direct (a)	10	40	40	100	30	220	90	40	350
Service Center (b)	50	40	50	80	40	260	300	80	640
Total Variable Expenses	60	80	90	180	70	480	390	120	990
Operating Income before Support and Indirect Expenses	$40	$70	$110	$70	$80	$370	$510	$180	$1,060
Support Expenses (c)	30	40	70	50	40	230	400	100	730
Operating Income before Indirect Expenses	$10	$30		$20	$40	$140	110	$80	$330
Indirect Expenses									300
Operating Income									$30

(a) Direct expenses include clinical
(b) Service centers represent funct...surgical, int...
(c) Support expenses represent cli...n costs, faci...

Variable Costing at Service Line Basis

Full Costing at Service Line Basis

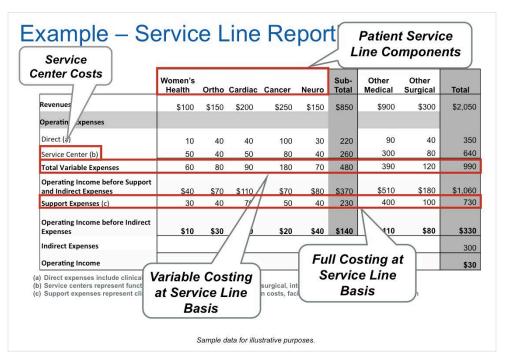*Sample data for illustrative purposes.*

Figure 2: High level service line report provides collective service line data for executive review

Service line leaders now depend on these reports to understand the contribution margin of procedures or sub-service lines within each service line. This in turn allows them to identify and analyze procedures or populations that indicate potential savings opportunity and, because of the new systemwide service lines, to engage the right stakeholders to effect practice changes, reduce costs, and improve outcomes across the system.

Activity-based costing in healthcare in action

Not every service line is the same. Size, clinical complexity, reimbursement models, and access to complete information influence each service line's ability to drive improvement. Orthopedics and neurology and neurosurgery, for example, have focused on supplies and implants as their first opportunity for improvement. Women's Health and Heart and Vascular, on the other hand, have looked at specific sub-service lines and procedures to change practice from open surgery to minimally invasive techniques or to shift toward or away from the use of robotic surgery. Each decision is based on clinical indications and outcomes, and further informed by cost.

For example, in Women's Health, a comparative analysis of the cost and outcomes of various ways to do a hysterectomy led the physicians to conclude that minimally invasive techniques resulted in the best outcomes for their patients at the lowest cost. Use of minimally invasive techniques subsequently trended up as a percent of hysterectomy procedures.

That said, sometimes cost reduction is as simple as showing physicians how much things actually cost. After one orthopedic physician was shown that a special light he liked cost $370 per use, he stopped using it—with no negative repercussions to patients and an immediate reduction in his cost per case. In a related move, some service lines developed menus of less expensive and clinically equivalent supply choices.

UPMC SEES MILLIONS IN SAVINGS

As result of organizing by service line, equipping decision-makers with the information they need to operate service lines effectively, and implementing an activity-based costing methodology UPMC has achieved notable and measurable results, and identified significant cost savings opportunities.

$5.0 million in realized supplies savings to date, with $42 million cost savings opportunities identified (approximately 2 percent of cost) for targeted service lines

> - Two specific examples included in the $5.0 million savings realized to date come from developing and incentivizing physicians to use a menu of supplies in neurology and neurosurgery which has translated to $1 million in cost savings, and a similar menu for orthopedics implants and supplies which has reaped $1.5 million in savings.

- UPMC has identified $42 million in net savings opportunities for the upcoming 2017 fiscal year representing changes in physician patterns of usage for supplies and implants, reductions in care variation and productivity improvements. The majority of these opportunities are resulting from increased physician engagement through targeted service line development and the use of activity-based costing data necessary to measure the opportunities.

Transparency in recognizing contribution margin variation for specific procedures

UPMC's ability to show cost and outcomes variation by specific procedures (sub-service lines) is causing practitioners to more rapidly adopt the use of the processes that demonstrate the best outcomes at the lowest cost.

Up to 97 percent improvement in time to access information

With the efficiencies realized through new analytic capabilities, orthopedics saved a full FTE by reducing the time to gather data for reports. Heart and Vascular can now obtain reports and information in a single hour instead of in the full week it used to take.

WHAT'S NEXT?

UPMC's initial success with identifying budget savings associated with targeted service lines will place even more emphasis on holding these service lines accountable to delivering the budgeted cost reduction. In addition, service line expansion and increased collaboration between service lines and the functional areas within the hospital structure will lead to incremental opportunities. The health system will also expand its data warehouse and analytics platform to further simplify the integration of quality outcomes and cost data.

REFERENCES

1. Herman, B. (2014). 9 Drivers of High Healthcare Costs in the U.S. *Becker's Hospital CFO*. Retrieved from http://www.beckershospitalreview.com/finance/9-drivers-of-high-healthcare-costs-in-the-u-s.html

2. The World Bank, Data. (2016). *Health expenditure per capita (current US$)*. Retrieved from http://data.worldbank.org/indicator/SH.XPD.PCAP

3. Kaplan, R. S., & Porter, M. E. (2011). The Big Idea: How to Solve the Cost Crisis in Health Care. *Harvard Business Review.* Retrieved from https://hbr.org/2011/09/how-to-solve-the-cost-crisis-in-health-care#

4. Umansky, B. (2016). The system approach to service line management: A guide to organizing service line structures to derive value from systems. *Health Care Advisory Board.* Retrieved from https://www.advisory.com/research/health-care-advisory-board/white-papers/2016/the-system-approach-to-service-line-management

RELATIONSHIP BETWEEN UPMC AND HEALTH CATALYST®

In January 2016, UPMC and Health Catalyst announced an agreement in which Health Catalyst licensed for commercial use an activity-based cost management system developed by UPMC as part of its effort to advance patient care while lowering costs. On February 29, 2016, Health Catalyst announced the close of a Series E capital raise that was co-led by UPMC, which is also a Health Catalyst customer.

ABOUT HEALTH CATALYST

Health Catalyst is a mission-driven data warehousing, analytics, and outcomes improvement company that helps healthcare organizations of all sizes perform the clinical, financial, and operational reporting and analysis needed for population health and accountable care. Our proven enterprise data warehouse (EDW) and analytics platform helps improve quality, add efficiency and lower costs in support of more than 50 million patients for organizations ranging from the largest US health system to forward-thinking physician practices.

For more information, visit www.healthcatalyst.com, and follow us on Twitter, LinkedIn, and Facebook.