WHITEPAPER

A guide to downstream analysis

Discovering value across your health system

Table of contents

The value of care

Recent health care mandates have only intensified the need for health care organizations to quantify the value of their services. To do so, health care organizations must have the ability to measure and quantify patient outcomes and total cost of care across the continuum of care.

Unfortunately, many health care organizations are finding this to be a seemingly impossible task. With obstacles such as data silos and integration inabilities on their minds, health care executives are scratching their heads trying to figure out just how to go about getting that comprehensive visibility essential to quantifying their organization's value.

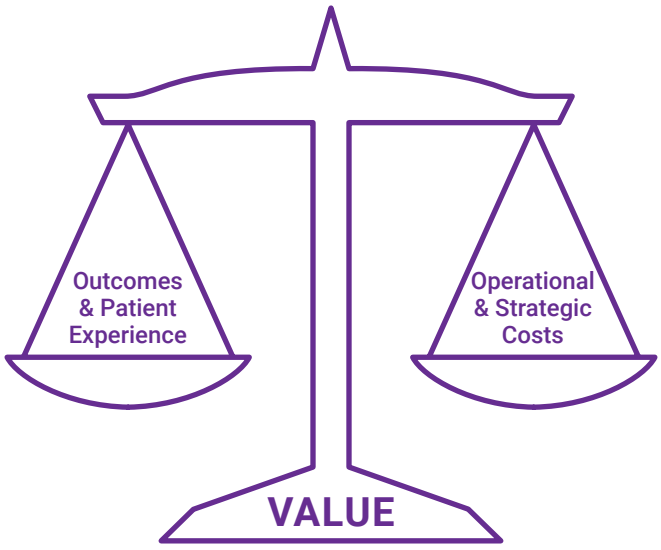
The solution to these issues can be resolved through downstream analysis. Downstream analysis gives health care organizations a full picture into the care rendered across their health system. The insights obtained have the power to effectively drive value into health care organizations.

Downstream analysis provides a practical way to assess value across the continuum of care by identifying the value created for a patient over the full cycle of care, including all provider interventions. This analysis measures, tracks and quantifies value down to the patient level. This patient-centric view provides visibility into outcomes relative to the costs associated with care.

Through downstream analysis, patient outcomes and costs can be tracked longitudinally, over various entry points and multiple time periods. It also allows you to accurately measure your physicians' total financial performance across the care continuum by integrating hospital and physician billing data at the patient level to construct a comprehensive longitudinal analysis.

This white paper will provide an in-depth look into the methodology of downstream analysis and the insights that can be gained through its implementation. Downstream analysis has the power to balance quality and care within health care by pushing the patient to the forefront.

The methodical measurement and quantification of downstream analysis identifies opportunities for improved patient outcomes resulting in increased patient satisfaction, streamlined referral processes, readmission reduction and revenue stability. By means of downstream analysis, health care organizations are able to identify potential opportunities to strengthen their value-based initiatives, leading to greater efficiency and quality of care at a reduced cost.



> When performance is measured, performance improves. When performance is measured and reported back, the rate of improvement accelerates."
>
> KARL PEARSON, BRITISH STATISTICIAN

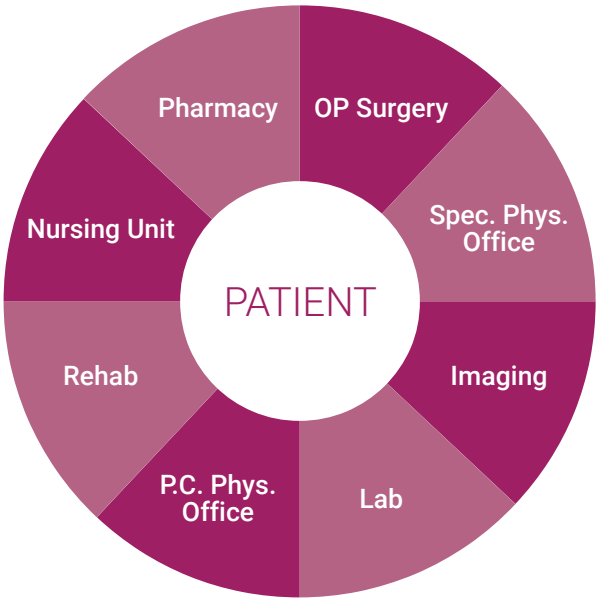
The whys and wherefores of downstream analysis

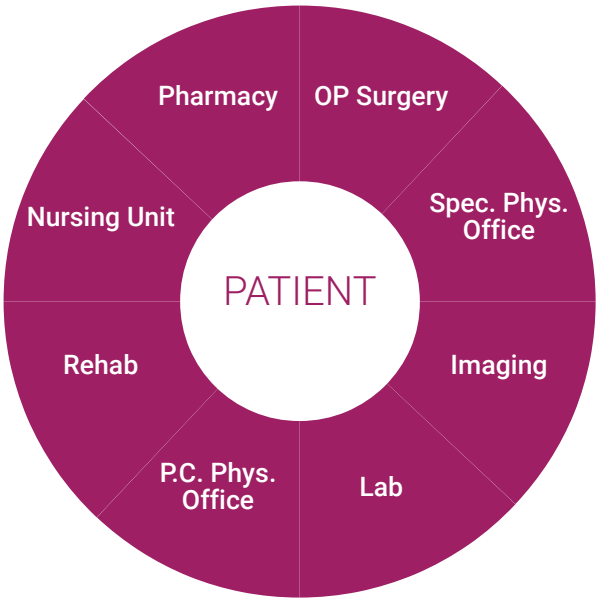
Today, most health systems look at a normal patient encounter through the eyes of the department where the care was rendered. As a result, each patient ends up getting divided into different pieces to reflect the financial performance across the department or place of care, as is generally reported. Unfortunately, this approach does not benefit the patient or the health system in today's health care reform environment, where value is king.

In order to attain true value-based care, the focus must be on the outcome or value of patient care not the input. With downstream analysis, the patient becomes the analytic point of focus, instead of the department or place of care.

Downstream analysis identifies the downstream value of a patient across the health system based on a defined entry point. Tracking is done at the patient level in order to understand how patients are traveling through the health care system in addition to the value of patients coming from various entry points.

This type of analysis identifies gaps and potential opportunities for health system improvement by identifying patient consumption patterns, physician referral patterns, as well as the total cost of an episode of care. Thus, the patient is the stimulus of outcomes improvement.





The benefits of downstream analysis

Downstream analysis provides health care organizations a clear, complete view into patient care across the continuum of care. It provides insights pertaining to operational and strategic planning initiatives of health care organizations.

At an operational level, downstream analysis can focus on clinical pathways, referral patterns and patient flow. Strategically, downstream analysis provides insight into the financial return on investments, potential growth opportunities, as well as the development of service lines and risk-based payment models.

Downstream analysis delivers the deepest insights possible into how patients are being treated and what treatments are most effective. Furthermore, it informs physician acquisition, alignment and performance management initiatives.

It also allows for the accurate measurement of a physician's impact on cross-continuum revenue, the identification of opportunities for improvement, and the development and implementation of changes to improve physician-hospital alignment.

Case study: **Return of physician investment**

Chart 1 below illustrates how downstream analysis can be utilized to determine the return of physician investment for primary care practice.

CHART 1

INITIAL VISIT	Month 0							Total
Encounters	$5,174							$5,174
Charges	$840,749							$840,749
Payments Expected	$470,679							$470,679
Direct Costs	$806,872							$806,872
Direct Margin	($336,192)							($336,192)
Total Costs	$944,620							$944,620
Profit Margin	$473,941							$473,941
DOWNSTREAM ACTIVITY	**Month 0**	**Month 1**	**Month 2**	**Month 3**	**Month 4**	**Month 5**	**Month 6**	**Total**
Encounters	$3,630	$3,034	$1,664	$1,223	$1,111	$1,040	$999	$12,701
Charges	$6,794,065	$5,437,621	$2,777,408	$1,771,990	$1,523,613	$1,186,860	$1,066,303	$20,557,860
Payments Expected	$3,124,866	$2,561,507	$1,288,808	$851,462	$740,675	$518,467	$483,392	$9,569,177
Direct Costs	$1,961,609	$1,733,615	$909,712	$584,115	$504,061	$428,162	$351,148	$6,472,422
Direct Margin	$1,163,257	$827,892	$379,096	$267,346	$236,614	$90,305	$132,245	$3,096,755
Total Costs	$2,726,656	$2,357,280	$1,212,611	$793,972	$695,305	$548,496	$461,846	$8,796,165
Profit Margin	$398,210	$204,227	$76,197	$57,490	$45,371	$30,029	$21,546	$773,012

For the specified primary care group, the analysis shows there were 5,174 initial encounters within a 6-month time period. The initial visits resulted in 12,701 downstream encounters created. Although there was a physician group loss of $473,971, the downstream analysis showed a $773,012 offset for the loss. The analysis clearly identified the value of the physician group to the health system.

Downstream analysis can be done not only at the group level as illustrated in Chart 1 but can be broken out by service line, even down to the charge code level. It provides a deep view into what is happening with patients as they flow through the health system.

Case study: **Population health management**

Chart 2 below illustrates how downstream analysis can be utilized to see what types of patients have the highest level of cost across a population.

CHART 2

% of Pop.	% of Total Expenditures	Health care Expenditures	Count of Patients	Exp per Patient
1%	26.19%	$249,908,568	1,776	$140,714
5%	54.45%	$519,574,267	8,883	$58,491
10%	6841%	$652,742,069	17,767	$36,739
15%	76.49%	$729,848,399	26,651	$27,385
20%	81.9%	$781,441,649	35,535	$21,991
25%	85.83%	$818,922,859	44,419	$18,436
30%	88.79%	$847,182,927	53,303	$15,894
40%	92.9%	$886,364,150	71,070	$12,472
50%	95.54%	$911,563,499	88,838	$10,261
60%	97.29%	$928,319,444	106,606	$8,708
70%	98.49%	$939,713,868	124,373	$7,556
80%	99.3%	$947,421,308	142,141	$6,665
90%	99.79%	$952,121,114	159,909	$5,954
100%	100%	$954,143,340	177,677	$5,370

% of Pop.	Count of Patients	Health care Expenditures	Exp per Patient	% of Patients	% of Exp
0-1%	1,776	$249,908,568	$140,714	1%	26.2%
2-5%	7,107	$269,665,698	$37,944	4%	28.3%
6-10%	8,884	$133,167,802	$14,990	5%	14%
11-15%	8,884	$77,106,330	$8,679	5%	8.1%
16-20%	8,884	$51,593,250	$5,807	5%	5.4%
21-25%	8,884	$37,481,210	$4,219	5%	3.9%
26-30%	8,884	$28,260,068	$3,181	5%	3%
31-40%	17,767	$39,181,223	$2,205	10%	4.1%
41-50%	17,768	$25,199,349	$1,418	10%	2.6%
51-60%	17,768	$16,755,945	$943	10%	1.8%
61-70%	17,767	$11,394,424	$641	10%	1.2%
71-80%	17,768	$7,707,440	$434	10%	0.8%
81-90%	17,768	$4,699,806	$265	10%	0.5%
91-100%	17,768	$2,022,226	$114	10%	0.2%

In this chart, the analysis shows 1% of the patients account for 26.2% of expenses. In addition, 5% of the patients account for 28.3% of expenses. With this knowledge, the health system now knows where to focus its efforts.

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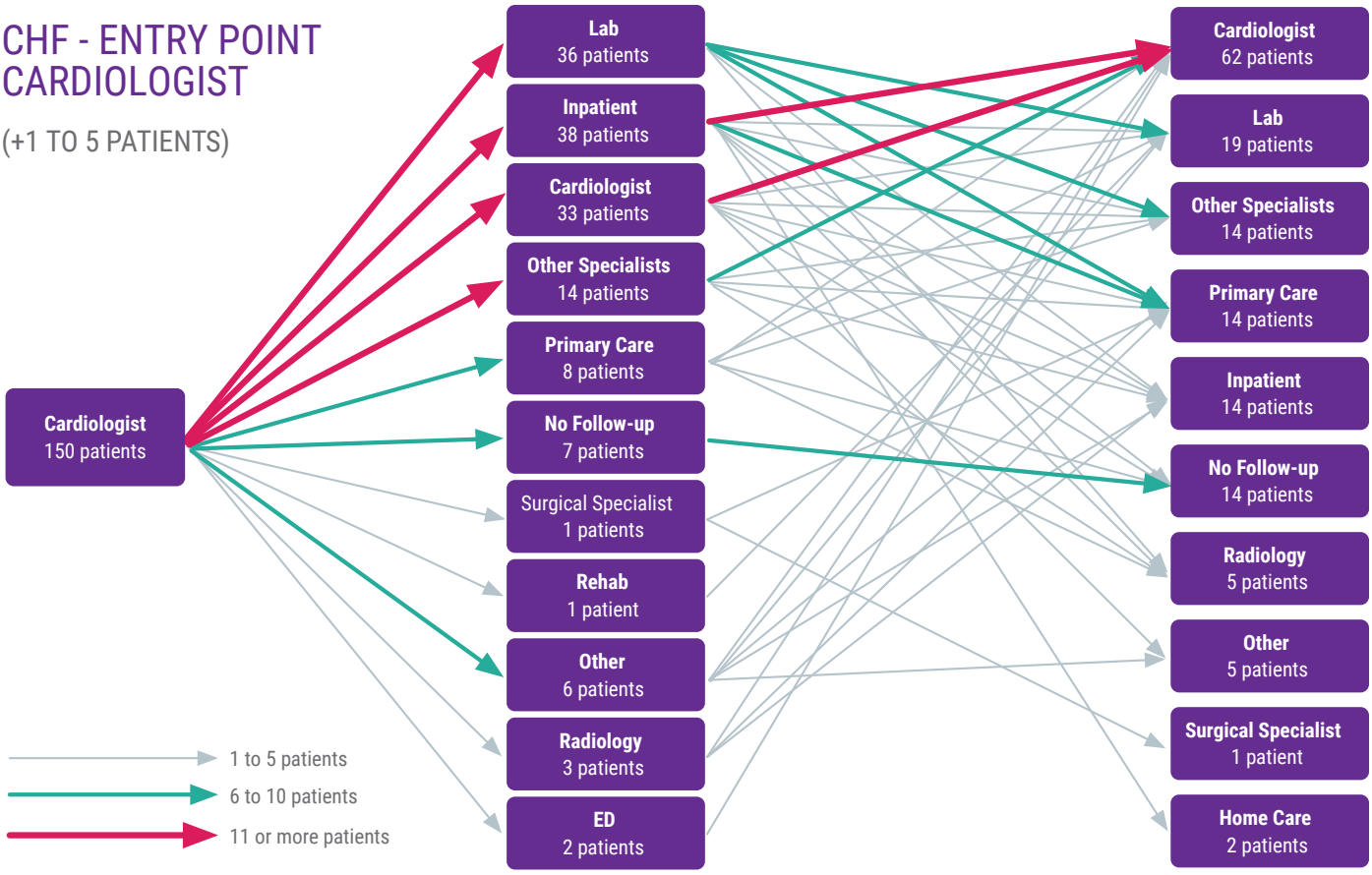
Next, further analysis was completed to better understand the specifics of the care of these patients.



In this diagram, the analysis shows all patients with a congestive heart failure (CHF) diagnosis who received that diagnosis at an initial cardiologist visit. From this analysis the system learned the most common pathway after the initial visit was: 1) lab, 2) inpatient care, 3) additional cardiologist visit and 4) specialist. Thus, indicating the current clinical pathways were not too consistent.

This insight was then shared with the cardiologist and a model of what should happen was built for that patient type scenario.

To take this a step further, additional tracking criteria can be instituted to better understand care management interventions.

Thus, questions such as:

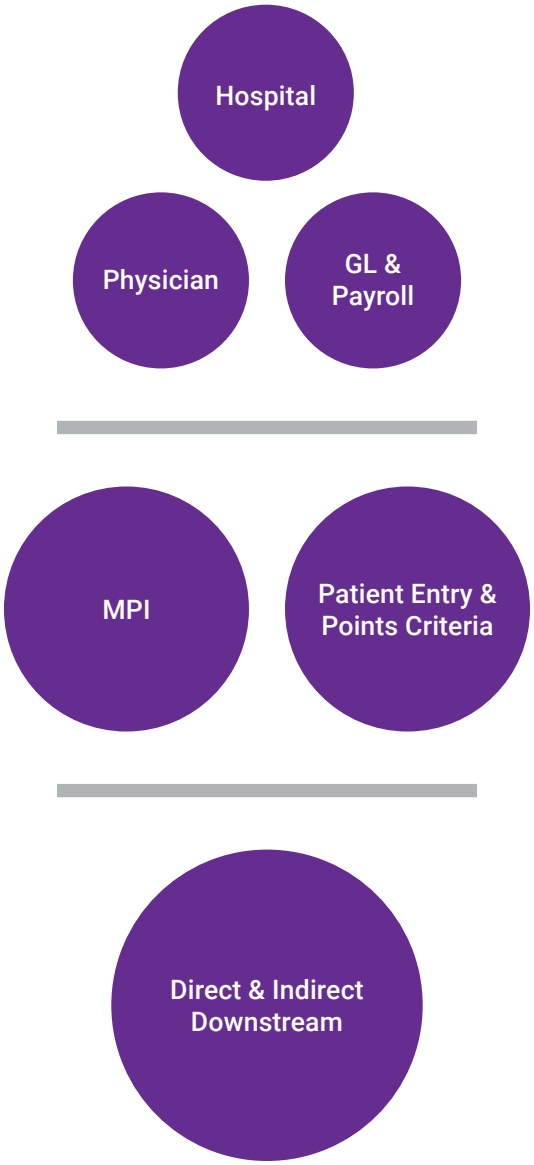
- Do we see better outcomes in patients with interventions than those without?
- Can we demonstrate both a clinical and financial benefit to a specific intervention?

This patient-centric tracking allows health care providers to see how patient care is progressing and whether or not the interventions implemented are yielding positive outcomes.

Downstream insight is invaluable for making informed strategic decisions impacting not only patient care but the health system's growth and financial livelihood.

Downstream analysis process

The process of downstream analysis can be broken down into three main phases. The first phase is integration of system data. The second phase includes creating a Master Patient Index (MPI) and defining patient entry points and criteria. The third and final phase is defining and measuring the downstream value discovered as a result of the analysis.



Integrating data

Analyzing data from disparate billing systems with varied levels of complexity can doom a downstream initiative before it even starts. Therefore, inpatient and outpatient hospital and clinical data must be integrated before downstream value discovery can begin.

A holistic approach must be taken when integrating health system data. This means all data must be cleaned, consolidated and standardized into a single data set, across billing systems and throughout all areas of the organization.

Data integration provides the ability to drill down into data by multiple metrics. A holistic view of value, cost and patient consumption patterns can only occur when data is fully integrated.

Mapping and tracking

Once health system data is fully integrated, financial and clinical analytics can be utilized to map, track and forecast cost and revenue flow.

First, a unique patient identifier is created to track patients as they flow through the health system. For health systems that already have a single data warehouse, the patient MRN can be used for patient tracking. For all others, a Master Patient Index (MPI) is created, assigning a unique identifier for each patient.

The MPI is created by referencing 15-20 different patient record fields to ensure patient identification is accurate. This is done as a double check, noting human errors such as keying inaccuracies can lead to inaccurate patient matching between system records.

The MPI provides an accurate and consistent view of the patients who receive care and are managed within the system's various locations. The MPI is used to track clinical care pathways of patients including patient entry points, tracking groups and clinical service line assignments.

Defining the patient entry point

Once the MPI has been created, a determination is made of what should be analyzed. For instance, you may want to know about the patient flow for those seen at a specific practice or for a certain diagnosis and/or comorbidity. Or you may want to learn which patients were seen at a specific location as a result of community outreach program. These types of questions will help to define the patient entry point to be tracked.

Master Patient Index (MPI)

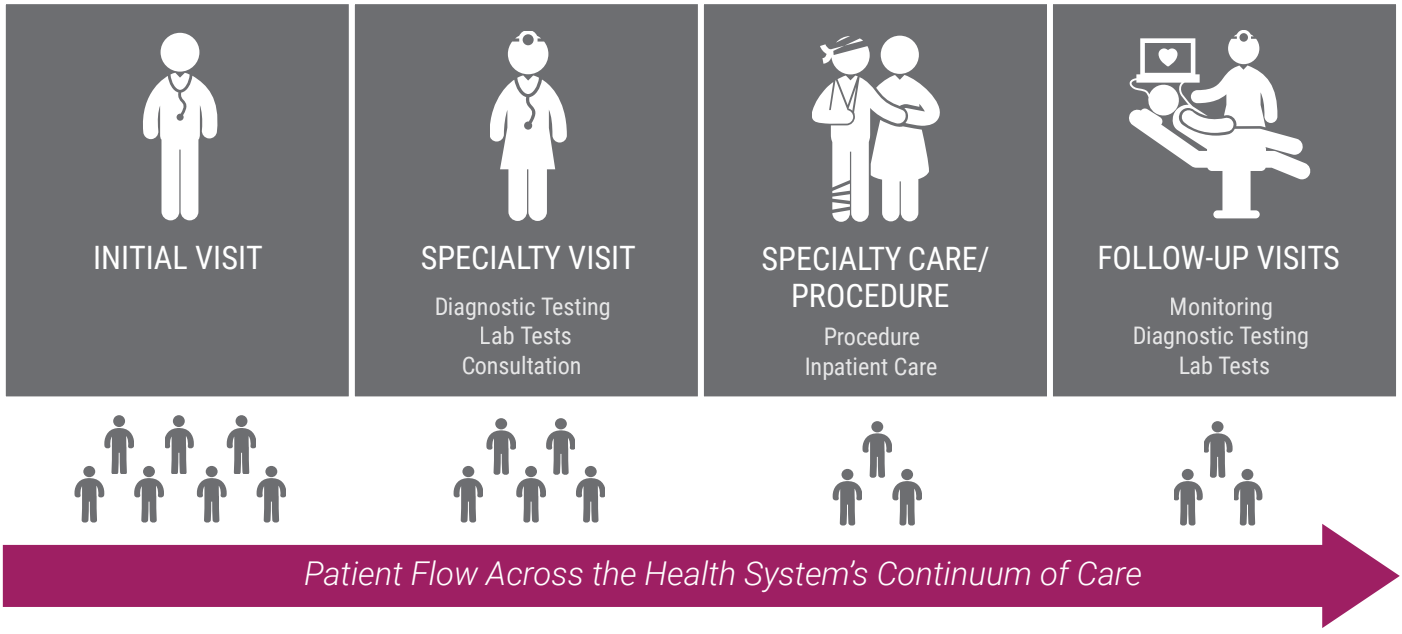
is an electronic database that stores information on every patient registered at a health care organization.

Defining the time period

Next, you will need to define the criteria for which that entry point will be tracked. To do so, the time period for tracking patient flow must be defined. In other words, determining how far down the road do you want to observe the patient flow.

By tracking patient flow, the differences in volume levels can be measured and compared for each patient along their care journey. Furthermore, various snapshot timeframes along the patient journey can be used to pinpoint gaps and opportunities within the patient flow.

When determining the time period for which the tracking will occur, it is important to define a reasonable time period for the type of episode of care. The time period will differ based on the entry point of focus. For instance, when observing an obstetrician practice it would not be useful to look at encounters after the initial visit for only 2 months. Instead, the time period should include 10-12 months after the initial encounter.



ENTRY POINT	DOWNSTREAM
Dr. Zahn's practice cost XYZ Health System $50K in April 2015	However, with downstream analysis, XYZ Health System learned that Dr. Zahn's practice led to 2,000 additional patient encounters across the system over the month of April, which accounted for a $3.4 million profit for XYZ Health System.

Identifying exclusions

Identifying exclusions is another factor that must be considered carefully. It is important to exclude data that shouldn't be tied together. For example, if you were analyzing the downstream for cardiologist patients, you would not want to include a visit to an orthopedic surgeon due to a broken leg. However, it is important to include cardiac service lines and other service lines that are related, such as pulmonology for this example.

Downstream analysis can help to identify certain specialties or service lines that may not have a logical connection to each other. This type of illogical connection is known as the halo effect. An example of the halo effect is often seen in women's services. Instead of running an analysis on a particular patient, you can see the halo effect by looking at the family as a whole. This analysis can indicate if women who are receiving services are directing their family's care within the same health system. Thus, an indication of the perception of value of care by the patient within the health system.

Framing up the results

Once the downstream analysis is complete, it is essential to put context to the results. A contextual framework including comparisons, trending, targets and internal or external benchmarks must be created in order to understand where opportunities for improvement lie.

Even if you can see the 10 downstream visits that came as a result of the initial visit, without context this information may not necessarily be helpful. For instance, if you learned from the downstream analysis that a cardiology group had a five-time multiple on revenue inside their downstream, without context you won't know whether to consider the result as a positive or negative. By putting context to the data in this example, you may learn the growth rate had been steadily declining for the last 6 months.

By identifying entry points and criterion, health care executives gain micro-level visibility into patient care and consumption as they utilize different services at multiple locations within the health system.

The benefits of downstream analysis

- Review physician longitudinal utilization, volume, revenue, direct & indirect cost and margin
- Analyze referral patterns
- Evaluate service line profit and losses
- Determine current treatment paths for key diagnoses by physician; create the most efficient, quality care paths using actual outcomes in your facility; easily monitor adherence to the treatment paths
- Quickly determine the right answer for reimbursement for bundled payments, fee-for-value and other risk programs
- Provide the perfect data to clinically integrate employed and non-employed physicians and to prepare for ACO's when your market is ready
- View year-over-year trends
- Benchmark individual physicians within the health system

Defining and measuring downstream value

To calculate the exact downstream value, the difference between direct and indirect downstream must be defined and quantified.

Direct downstream includes those patients who received care in the hospital where the volume is directly attributable to the physician. An example of this is when the patient receives care by the attending or ordering physician at the hospital. Indirect downstream includes all the other clinical services a patient will receive within the health system. This could include laboratory, imaging services, pharmacy services, etc.

Once direct and indirect are defined, downstream volume can be measured in terms of encounters, gross charges, net revenue, direct cost and direct margin.

For example, the downstream volume of a location can be compared through comparative ratios to see the individual value of each. This allows for the measurement of the precise differences between multiple physician locations including the total profitability of a patient over a specific timeframe and/or the life of a patient.

The process of measuring the downstream volume not only provides insight into the volume of those patients from a practice perspective, but also an understanding into what the downstream contribution from a specific physician group is from a patient seeking care at that location.

Another important fact to point out is that downstream analysis has the flexibility to also measure and track physician, point-of-care, service area or any other patient point of entry.

Summing up

Downstream analysis is a stimulus for increasing quality of care and reducing patient cost. Discovering the downstream value across the health care continuum through deep-dive data analysis provides health systems the insights necessary to not only survive but to flourish in this value-driven health care environment.

By integrating clinical and financial data at the patient level, health systems can construct an accurate and comprehensive longitudinal analysis across the continuum of care.

Instead of relying on anecdotal evidence to make strategic decisions, downstream analysis provides an objective, data-driven view into the value of care. This unique visibility makes it possible for health systems and hospitals to focus on efficiency, cost effectiveness and quality that will inevitably bring about true value-based care.

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