The Road to Value-Based Health Care
Revolutionizing Payment and Delivery Through Episode Analytics
Contents

Executive Summary .......................................................... 1
Value-Based Care: The Shifting Incentive and Its Adoption ................................................................. 1
Why Episode Analytics? .......................................................... 2
Constructing an Episode of Care ............................................... 2
  What Constitutes an Episode of Care? .............................. 2
  Calculating the Cost of an Episode ...................................... 3
  Patient and Population: Analyzing Costs and Outcomes .......... 3
The Holistic View of a Patient .................................................... 5
Additional Analytics for Value-Based Care .................. 7
  PACs and Provider Performance ........................................ 7
  Predictive Analytics ............................................................ 9
Conclusion ............................................................................. 9
Endnotes .............................................................................. 10

About the Author
This paper was written by Krisa Tailor, a Product Manager in SAS’ Health and Life Sciences Global Practice responsible for the development of new health care offerings and global health care strategy. Her current work is focused on creating a product portfolio utilizing SAS® Visual Analytics for both the public and private health care industry. Tailor is passionate about the economics and politics of health services delivery and has engaged with US state governments extensively on data analytics needs pertaining to health reform. Her research interests include health care transparency, policy diffusion, payment reform and health data visualization.

You can read Tailor’s blog at blogs.sas.com/content/hls/author/krisatailor, or contact her on Twitter at @krisatailor and LinkedIn at linkedin.com/in/krisatailor.
Executive Summary

Rising health care costs in the US and around the world continue to be a critical issue for global economies. The facts that health care costs are unsustainably high and health outcomes are suboptimal raise concerns for the entire health care ecosystem. Whether it is a provider trying to remain profitable while delivering the best patient care, or a payer needing to manage services for new patient populations, increasing costs and inadequate quality have affected financial and clinical decision-making across all health care organizations.

Health care decision makers and policy makers have attempted improvements such as tackling fraud, waste and abuse, reducing readmissions, and, most recently, promoting improved consumerism within health care. While these incremental measures have typically generated positive change, they have not created the systemic change necessary to drive value. In other words, achieving the best health outcomes per dollar spent has not materialized across the health care system.

New incentives to create high value have begun to surface across global health systems and in the US, a transformation that has been supercharged by the Affordable Care Act. However, while the recognition of value-based care has been established and embraced by some, how to achieve this ambiguous goal remains a question.

Addressing cost and quality effectively – often two conflicting goals – is a work in progress. And although some of the work requires a culture shift within organizations and individuals, much of it will rely on the appropriate tools to enable patient-centric, value-based care. This paper describes the transformative tools that use advanced analytics to assist health care organizations achieve this goal.

Value-Based Care: The Shifting Incentive and Its Adoption

Health care systems’ performance incentives have historically been driven by the volume of services provided to patients and not the coordination of patient care, particularly when multiple providers are involved. But incentives are changing drastically, creating opportunities to gain a more patient-centric focus on value. As commercial and government payers move away from a pay-for-volume system toward pay-for-value, financial risk is transferred to the provider(s) managing care. This changes incentives across the board for care and reimbursement as providers must focus on better patient outcomes. It means that providers need to monitor the total path of care – for both cost and quality – and make necessary modifications such as treating patients holistically, reducing unwarranted admissions and readmissions, decreasing length of stays, improving cost-effective prescribing and reducing variation in care. In other words, the implication for providers is achieving better patient outcomes using fewer resources.

Efforts in payment and delivery reform, while nascent, will move rapidly. In fact, 75 percent of providers surveyed in the 2013 Accountable Payment Survey expect to be engaged in a total cost of care (TCC) contract by 2017 – a significant boost from the 35 percent that are currently under a TCC contract. Further, a March 2014 study by KPMG found that 44 percent of surveyed providers said they are “already working with bundled payments” – up from 38 percent in KPMG’s October poll. Meanwhile, 20 percent said that they are not there yet but plan to be.1

Headway on the accountable care and shared-savings side has moved swiftly as well, despite mixed performance and results. The CMS Innovation Center’s Pioneer ACO model, launched in 2012, saw nine of 32 organizations exit the program after its first year, and nine of the remaining 23 organizations saved money, according to an independent audit.2 Similarly, Medicare’s Shared Savings Program has experienced uneven progress. Some of the 114 enrolled organizations have failed to reduce health spending, while others – such as Heartland Regional Medical Center, which was recently awarded with $2.9 million for its success in accountable care3 – have fared better. Last but not least, commercial payers and providers are not the only stakeholders approaching value-based care: State governments and Medicaid are getting on board, too, through CMS State Innovation Model grants. Arkansas, for example, is making waves nationally with its Medicaid bundled payment initiative.

Balancing both goals of cost reduction and quality improvement is complex, and while financial incentives for high value are critical, it is important to safeguard against inadvertent consequences. For example, reducing readmissions without understanding the holistic view of a patient’s care is ineffective and does not consider impacts on patient outcomes. In general, cost reduction without regard to the outcomes achieved is dangerous and self-defeating, leading to false “savings” and potentially limiting effective care.4 Thus, new payment and delivery models such as such accountable care, patient-centered medical homes, bundled payments and other shared-savings models must be analyzed with the right tools to understand and measure value and patient outcomes.
While payers and providers alike are still investigating new methods for value-based care, perhaps the biggest challenge for these organizations, aside from cultural acceptance, is the lack of the right tools to understand patient data holistically. A recent survey by NAACOS found that learning to access and process data has been a significant challenge in ACOs achieving their goals. More specifically, ACOs have been challenged with finding suitable software and translating data into useful information for care managers and providers.

Fortunately, new methods and tools have emerged that can drive the success of new payment and delivery models.

Why Episode Analytics?

All health care organizations, from standalone practices to integrated delivery networks, have historically struggled with understanding how all of the moving parts of patient care work together. Typically known as a bundle of care, clinical episodes define all of the services that could be provided around a significant number of health events and conditions. To help organizations understand and analyze care that is being delivered, a new unit of analysis has been developed – episode analytics.

This more advanced method of looking at clinical episodes has distinct advantages over traditional methods such as bundles of care and groupers. The older methods bundled payments but were very limited in scope. New analytic innovations in episodes of care aim to identify total cost of care at the patient level, provide flexibility to payers and providers in defining clinical episodes, enable providers to identify variations in care and opportunities for improvement, and allow organizations to assess and predict their financial risk and savings in value-based reimbursement agreements. These tools are necessary to obtain a variety of insights that value-based models need.

Constructing an Episode of Care

An episode of care is defined as a series of temporally contiguous health care services related to the treatment of a given spell of illness or provided in response to a specific request by the patient or other relevant entity. In simpler terms, it is a collection of care provided to treat a particular condition for a given length of time. Episodes of care are the foundation for any assessment of efficiency and are necessary in determining if a delivery system is achieving its intended purpose. This is because it allows for care to be analyzed over time and offers a better assessment of the patient’s resultant health status.

Subsequently, well-constructed episodes of care are instrumental to understanding and managing both cost and quality.

What Constitutes an Episode of Care?

Episode construction is a complex, multistep process in which many thousands of clinical rules must work together to identify what constitutes an episode. The construction of an episode is initiated by a trigger event, such as an inpatient hospital admission or a diagnosis, which signals that a patient has a condition or procedure taking place. Utilizing a patient’s claim and service-level data, all of the claims that are relevant to a particular episode are then grouped together. This grouping is done with clinical rules that identify a defined time period to capture all of the events that are related to the episode.

While each episode of care has unique rules for associating relevant events, there are some standards that exist. For example, chronic conditions, once triggered, do not terminate. Procedures, like a knee replacement, are triggered by the procedure itself and have a look-back and look-forward period. Finally, acute medical events, like a heart attack, start with the event (typically a hospitalization) and then look forward 30 days post-discharge.

Figure 1: New episode analytic tools generate a variety of insights on payment and delivery.
Let’s use the example of John Doe’s knee replacement to illustrate episode construction. In Figure 2, we see a trigger in John’s claim data that lets us know that a knee replacement episode has begun. Subsequently, all of the events related to the knee replacement are grouped together. Identifying which events are relevant entails three time periods. First, there is the period leading up to the procedure – which can be referred to as the pre-operative (pre-op) or look-back period. The look-back period for a knee replacement is 30 days, and for John’s knee replacement, this period may include events such as office visits, lab work and some imaging.

Then there is the procedure itself bounded by an inpatient or overnight stay. This includes the hospitalization and all professional services during that stay.

Finally, upon discharge, the postoperative (post-op) period begins and it concludes when the patient has fully recovered and no longer needs treatment. For knee replacements, we look forward 90 days. In this stage of John’s episode, there may be prescription medications, therapy and more office visits.

**Calculating the Cost of an Episode**

The next step is to calculate the cost of the knee replacement episode by identifying which costs gets allocated to the “bundle.” Costs are broken up into categories: typical, potentially avoidable and unrelated. All of John’s aforementioned events, such as the labs, office visits and therapy can be clinically categorized as “typical” costs – because they are typical in treating this procedure.

Within the group of claims, there may also be claims for other events that were not actually relevant to his knee replacement. In other words, John may have had other services that were not expected. For example, John has pain and swelling, goes to the emergency room, and gets admitted and treated for a wound infection. These events are unexpected, and clinically, infections are considered preventable with good clinical practice and follow-up care. Thus, these events are included in the total cost, but are differentiated as “potentially avoidable costs” (PACs).

Finally, during the time period of John’s knee replacement episode, other services may have occurred, such as a primary care visit for a cold. These services might be related to a different episode or simply other services unrelated to this procedure. These costs do not get assigned to the cost of the knee replacement and are simply identified as “unrelated” costs.

**Patient and Population: Analyzing Costs and Outcomes**

This methodology of episode construction and cost allocation lets us see the entirety of patient treatment as reflected in their claims data. Further, it provides an accurate measurement of total cost of care, as cost must be measured at the condition or procedural level, not at the individual service level, for optimal accuracy. And because value for the patient is created by providers’ combined efforts over the full cycle of care, it structures patient data to allow us to track patient costs and outcomes across this full cycle.
Once this data is captured in claims, based on episode creation we can analyze a variety of factors across a patient population and can facilitate bundled payment models, measurement of variation in care and the increase of efficiencies amongst providers. For example, looking at the output represented in Figure 3, we can identify what clinical groups are represented in the patient population and how efficiently they are being treated.

This report shows the total cost of treating a variety of episodes across a patient population. The top left pie chart shows total cost divided into the five classes of episodes – acute, procedural, chronic, system-related failures and other. Meanwhile the other two graphs display the total cost of each episode across the population and the collective, potentially avoidable costs for each episode. Another view of the total cost of conditions can be seen in Figure 4, with the ability to view again by condition class.

![Figure 3: Episode summary report](image1)

![Figure 4: Total cost by condition](image2)
With the distinct visualizations, we can easily see the episodes that contribute to the highest costs, as well those conditions that present the most potentially avoidable costs. In this particular example, it is evident that there are several million dollars of PACs in many of these episodes, with chronic conditions like diabetes and hypertension having some of the greatest amounts. Armed with this information, providers and payers can easily detect which patient populations are being treated and, based on the ratio of PAC to total cost, how efficiently they are being treated.

The Holistic View of a Patient

As you can imagine, a single patient may have many episodes taking place concurrently or in series. For example, John may have a continuous diabetes episode in addition to his knee replacement. The previous reports show how we are treating individual episodes, but to analyze how we are treating individual patients, we need a holistic view of the patient, which is gained through associating episodes to each other, based on distinct, clinical relationships. This creation of hierarchal relationships allows us to associate episodes to one another in a manner that “rolls up” episodes to different levels.

Episodes are constructed individually and independently, based on the specific condition’s rules and the codes used on the patient’s claims. After they’ve all been constructed for each patient, there is a process for all episodes to build hierarchical relationships between them. The results show you which episodes are typical and which ones exist because of another episode, such as with a complication. The rules around what episodes are associated with other episodes, at what level in the hierarchy, and of what type of association (complication versus typical) are provided in the episode definitions.

A relationship between two episodes is called an association. In an association, two related conditions with overlapping episode time periods coexist, with one episode being subsidiary to the other. The subsidiary episode and assigned services can be viewed on their own or as part of the primary episode. At the highest level, the episodes are consolidated wherever possible. Associations can occur in chains at multiple levels (for example, PCI is subsidiary to AMI and AMI is subsidiary to CAD).

For example, in Figure 5, we can see episodes grouped by Major Diagnostic Category, represented at their most granular level – Level 1 – across a population.

![Figure 5: Episode patient breakdown](image-url)
At levels 2-5, the episodes can begin to "roll up," and episodes are combined, with each subsidiary rolling into its primary episode based on the specific combination. It is important to note that at whatever level you view the patient, the costs always add up to the same amount. There is no double counting or loss of cost through the holistic view and the distribution of costs. Figure 6 shows a view of level 5 chronic condition costs, with the ability to drill into patient-level costs at the bottom of the report.

The hierarchical leveling approach enables a variety of options for managing and contracting within populations. Moreover, from a population management perspective, understanding the downstream clinical experience of chronic conditions is extremely valuable in managing chronic care.

Figure 6: Episode patient breakdown drilled
Additional Analytics for Value-Based Care

Constructing episodes, calculating total cost of care and analyzing both at the population and patient level introduces a plethora of opportunities for additional analytics that can assist both payers and providers with value-based payment and delivery models. The next few visual reports highlight some of these opportunities.

PACs and Provider Performance

As discussed earlier, potentially avoidable costs – or PACs – are those costs that were unexpected during an episode and can possibly be prevented. For value-based models, efficiency and effectiveness are key goals, and reducing preventable events and costs are fundamental elements.

The chart in Figure 7 shows an analysis of PACs for various procedures at the individual provider level, such as a knee replacement. These costs can be analyzed further at the individual claim line to see the reasons behind these numbers. Knowing what the main complications are among a group of providers can help shape both care-coordination efforts and cost-containment efforts.
Here you can see the variation in both total costs and PACs and quickly identify the outliers. With this information, a payer or provider can better decide on which providers to contract with for bundled payments. Additionally, with accuracy in provider attribution, accountable care and patient-centered medical homes can easily recognize the owning or “conducting” providers of the episode.

This also allows us to examine the performance of providers, which is another critical piece to value-based payment models, specifically bundled payments. In order for a provider to confidently participate in a bundled payment contract, it needs to have some level of confidence in its performance. Figure 8 compares providers against total potentially avoidable and total typical costs for knee replacement and knee revision.

**Figure 8: Provider episode details**

<table>
<thead>
<tr>
<th>Provider ID</th>
<th>Provider Group</th>
<th>Condition</th>
<th>Episode ID</th>
<th>Member ID</th>
<th>Total Cost</th>
<th>Total Typical Cost</th>
<th>PAC Cost</th>
<th>Episode PAC Cost</th>
<th>Trigger Claim T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1487054414</td>
<td>KNIRPL</td>
<td>15278</td>
<td>0000135223</td>
<td>$100.37</td>
<td>$143.079.13</td>
<td>$17,292.10</td>
<td>127</td>
<td>PB</td>
<td></td>
</tr>
</tbody>
</table>
Predictive Analytics

With sophisticated analytical tools, health care organizations are now able to look ahead to forecast trends and scenarios within their population health and their operations. This is particularly beneficial with value-based payment models to understand the potential gains in shared savings and weighing provider investment against those gains.

For instance, providers can use predictive modeling to identify a reasonable level of shared savings for the upcoming year through “what-if” scenarios; such as, what if we decreased PACs by 5 percent? Or, what would be the cost of doing nothing? See Figure 9 for a sample view of this scenario.

These types of predictive models can assist both payers and providers with budgeting and performance and can facilitate success with ACO and other shared-savings models.

Conclusion

Utilizing episode analytics to enable value-based payment strategy, operations and improvement is a significant step for payers and providers alike. While the road to value-based health care will require the ideas and collaboration of all health care stakeholders, the right tools can help organizations achieve success by gaining a patient-centric focus. Episodes of care are a critical piece to transforming the system and optimizing the use of data to achieve better patient outcomes using fewer resources.
Endnotes


