

Clinical Variation Management with Advanced Analytics

White paper

Focus on Value Based Care

Healthcare is undergoing a transformation. Federal mandates combined with consumer demands are changing the way healthcare is delivered, consumed, and reimbursed. The implementation of EMR systems and wearables are digitizing the patient.

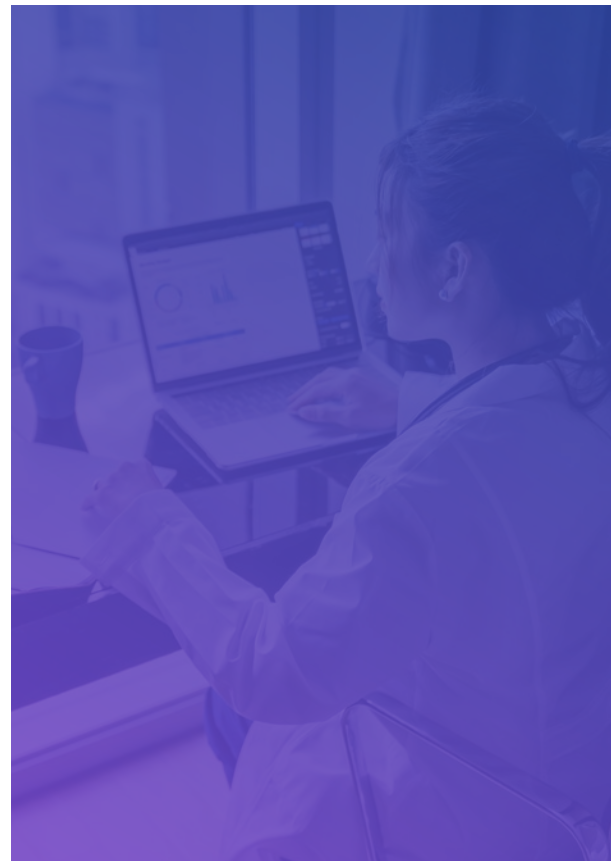
Healthcare exchanges have created both transparency and competition, while shifting risks onto providers. With pressure to decrease cost and improve care delivery, providers face new reimbursement initiatives to transition from volumebased models into value- based models.

The good news is that within this changing landscape, there is a tremendous amount of data captured in EMR systems that can fuel game-changing initiatives to provide better care while reducing hospital costs. There are numerous insights that could be hidden within the thousands of data points captured per patient and are impossible to surface without intelligent analytics.

Studies have shown a large percentage of hospital costs are put towards care that does not positively affect patient outcomes. Therefore, it is imperative for hospitals to use their data to understand what's happening within their four walls. This way they can correctly identify areas of unwarranted and wasteful variation.

Typically, managing variation is highly manual and labor intensive, however, new technological advances using machine learning have simplified clinical variation management.

They are done manually and separately for customer data and transaction data and have trouble effectively capturing the complex feature interactions.



Technological Challenges

To combat clinical variation, there needs to be a strong alignment of people, processes and technology. With the exponential increase of the amount of clinical and financial data, it's imperative for hospitals to have efficient technology in place analyze the data to make informed data-driven decisions.

However, there are many challenges imposed with current methodologies to eliminate wasteful variation:

- **Identifying the causes is complex.** Each treatment a patient undergoes is a collection of linking events from nursing orders, to drugs taken, and devices used. By comparing the high-level utilization reports within a specific treatment, it is easy to conclude that variation is apparent. But with the numerous variables that contribute to the differences in patient outcome, it is difficult to accurately pinpoint which prescriptions, order sets, patient comorbidities or a combination of the inputs cause the greatest discrepancies in care.
- **Finding your best practice is manual and time consuming.** The basic approach to creating clinical pathways tends to involve combing through various clinical studies for findings that can infer best practices within a hospital. Creating these pathways can take months due to constant edit and review cycles within a hospital committee. Furthermore, these studies are and are based on research that are not geared to a hospital's own patient population. Even after implementing a pathway built on consensus, it's difficult to determine the efficacy of the pathway to measure improvement. Often times, relying on published standards can be slow to adapt new drugs or procedures and can sometimes be controversial due to contracting outcomes.
- **Each patient is an individual.** Patients may receive different care as each person is different and has different comorbidities. It's then difficult to determine if the variations in care for the same procedure were necessary or superfluous. Published clinical standards also address the average of the population and it's challenging and time consuming to tailor pathways for sub populations.

Strong leadership from all cross-functional teams champions the initiative to drive the correct operational changes.

The right incentives are implemented to garner adoption across all relevant players. Even technology should be re-evaluated.

Data-Driven Technology to Manage Clinical Variation

With the implementation of EMR systems, hospitals can rely more heavily on technology to deliver data-driven solutions.

Physicians can provide improved evidenced-based care by reducing unwarranted variation. Each patient visit, laboratory test, and x-ray, adds to the growing collection of patient records a hospital can leverage to make actionable insights in improving care delivery.

However, with the amount of patient data growing at an unprecedented rate causing the number of relationships between each variable to scale exponentially, the ability to recognize new trends and patterns becomes increasingly difficult.

Hospitals can take the next step and use advanced analytics to manage clinical variation to:

- Discover what's going on in the hospital
- Identify best care practices
- Build new care paths defined for different patient groups
- Implement care paths into care coordination systems
- Continuously improve care



New advances in data analytics simplify the methodology to extract meaningful information from complex data sets. These techniques, such as machine learning and statistical algorithms, have made it possible to systematically comb through the millions of variables and quickly uncover patterns that are beyond what a human mind can accomplish.

Discover What's Going in Your Hospital

To discover variation in a hospital, it needs to know all the executed care events for a specified treatment. Using machine learning, hospitals can mine through the thousands of data points in their EMR that represent unique events for each procedure. These data points are sequenced by time and presented in a simplified visual form so it's easily consumable by clinicians.

Merging the claims data with clinical data provides an added benefit as it associates the costs with each step in care. A clinician can easily identify which care events consume the majority of the dollars and if those dollars translate into positive patient outcomes.

By leveraging advanced algorithms to sort through your hospital data, hospitals can identify the pathways are the most common inside the hospital, the efficacy of the pathways based on patient outcomes and cost, and the statistically significant differences between the pathways.

Surfaces Your Best Practices

Mathematical algorithms can be used to calculate an optimal clinical pathway based on the group of patients who have the most desirable outcomes. Each hospital can define which metrics should be measured, for example, low length of stay and low hospital costs.

As the pathways are generated, doctors and nurses can easily compare them to surface the significant differences and how those differences impact patient outcome. They can then apply their domain knowledge to determine if the variation is unwarranted, therefore eliminated from the care path, or correlated with positive patient outcome, therefore built into a best practice. The benefit of advanced analytics reveals new best practices to improve patient outcomes that may have been previously overlooked.

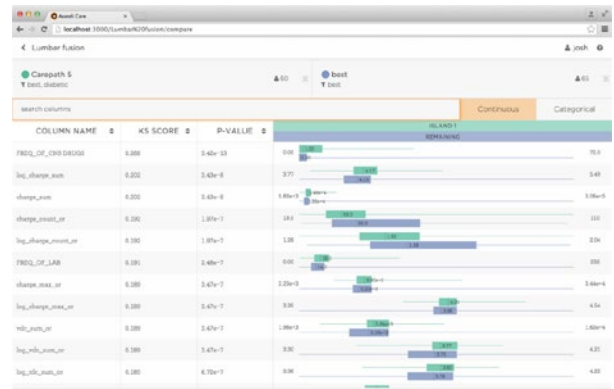


Figure 1: A list of statistically significant events between pathways.



Figure 2: A computed clinical pathway in a patient group.

Build New Care Paths for Different Patient Groups

The identified best practices serve as a care path template to be leveraged across the hospital. Physicians have the power to build on this pathway by adding and subtracting events based on their own clinical knowledge, but are given this data-driven recommendation as a starting point to inform their course of care.

Because there is no one-size-fits-all for patient care, generating targeted care paths based on patient comorbidities and other defined metrics is key. Each patient group can surface a new best practice targeted to that patient population. Using technology to automate these data-driven care paths reduces the time that clinicians spend on manually reviewing and evaluating third party studies and increases time to provide better, tailored patient care.

Implement Best Practices into Care Coordination Systems

New best practices need to be implemented into existing care coordination systems. Physicians will be alerted with reliable recommendations to provide the right care to the right patients at the right time. Patients will receive better care to achieve better outcomes. Adopting the new care paths helps standardize care and reduce unwarranted clinical variation.

Provide Continuous Improvement

With each data import, hospitals can continuously uncover new best practices that may not have been widely adopted throughout the hospital. Providers also can gauge the performance of new pathways by measuring the variations that occur after implementation. As physicians incorporate new medical treatments, physicians can immediately determine if these techniques are indeed improving patient outcomes.

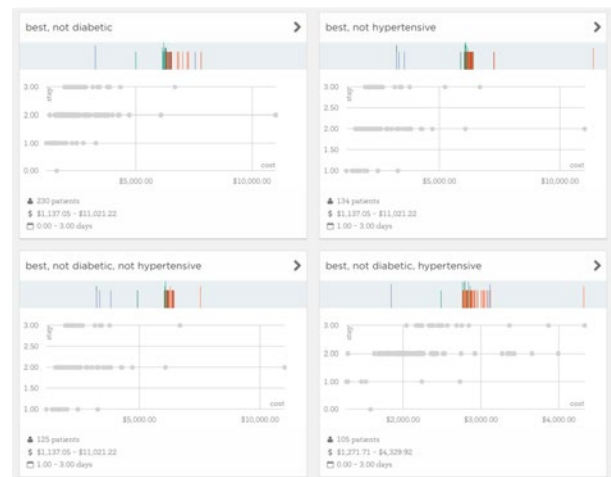


Figure 3: Clinical pathways for patient subgroups.

Summary

There is a tremendous opportunity for healthcare providers to use their own clinical and financial data to uncover insights to improve patient care and control costs. New advances in data analytics using machine learning can allow healthcare providers to leverage their large amounts of data for both operational excellence and optimal patient care. Giving providers access to the full view care paths in their hospital allows them to not only identify areas of unwarranted variation but also surfaces new best practices.

Integrating new best practices into care coordination systems, physicians can open up a patient chart and simultaneously compare their disease state to that of the local patient population, and have a prescribed best practice at their fingertips. Utilizing patient data to manage clinical variation has the potential to revolutionize the way we think about care quality and patient satisfaction.

About SymphonyAI

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SAI is backed by a \$1 billion commitment from Dr. Romesh Wadhvani, a successful entrepreneur and philanthropist. Since its founding in 2017, SymphonyAI has grown rapidly to a combined revenue run rate of more than \$300 million and over 2,200 talented leaders, data scientists, and other professionals.



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