

Living on the Edge

Graph-Powered Analytics to Solve Accountable Care Organization Cost and Quality Challenges

A CLEARPRISM WHITE PAPER

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Introduction

As U.S. healthcare attempts to shift to a value-based delivery model, one of the industry's seemingly "impossible" challenges is how to achieve the trifecta of improving the health of the population, lowering the cost of care and maintaining returns and value for industry participants, all at the same time. Moreover, failure to specifically achieve profitability goals presents a significant hurdle in efforts to achieve the other two goals given the natural tendency of physicians, providers and investors to retreat to the financial safety of traditional fee-for-service delivery – where costs are often separated from quality of care – when revenue stability is threatened.

Integrated health systems, particularly those structured as value-based accountable care organizations, or ACOs, know this struggle all too well. ACOs by design are financially incentivized to attain cost savings and at the same time meet high quality care standards. When savings and/or qualitative goals aren't met, shared savings revenue is lower (in the downside risk model) and there is always the potential for financial penalties to be incurred (in the upside risk model).

Advanced quantitative analytics are increasingly playing a critical role in helping value-based care organizations meet their agreed targets. Augmenting traditional population health management analytics tools that provide risk segmentation capabilities that help identify, track and measure the most vulnerable patients, more sophisticated mathematical models offer even more insight possibilities for better forecasting of potential adverse patient events and cost leakage. And, not only do such advanced quantitative capabilities enable the means of delivering more focused patient or disease state-specific appropriate care, but they also allow for delivery of those services in a more cost-effective manner.

Complex objectives demand new capabilities delivered by ClearPrism

Today's reality is that value-based healthcare organizations seeking to concurrently optimize financial performance and quality cannot rely on traditional business intelligence and analytics solutions to identify hidden, high-cost patient-physician-provider relationships and interactions that yield little to no improvement in health outcomes. Finding these areas of financial leakage within the crevices of the healthcare system requires the use of a different class of tools – ones that can model unexpected community or clustered relationships and

also identify high-cost care interactions and provider behaviors that define patient journeys within those otherwise “invisible” groupings.

At ClearPrism, we are tackling this problem head on by borrowing from our experience in supply chain analytics and financial fraud, where relationships between participants in a highly interconnected system often reveal the characteristics of the participants themselves as valuable information. Applied to healthcare, the same approach can cast an intense light on a provider organization’s key network relationships and the interactions of its patients, physicians and other related service providers – supplementing traditional segmentation solutions and enabling care systems to more effectively and proactively manage complexities, behaviors and practices that drive up network-wide costs without concomitant improvement in outcomes (see Figure 1 below).

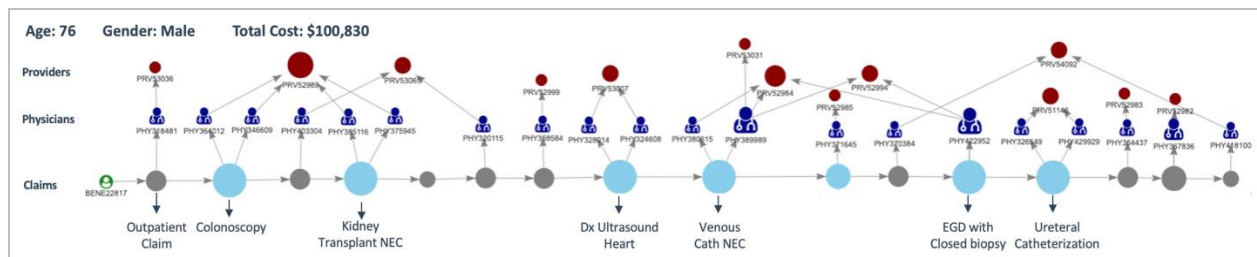


Figure 1. Integrated patient-physician-provider journey.

Our approach includes the leveraging of innovative, graph-powered population health modeling techniques and time series-based data sets that are uniquely capable of making “the invisible” visible for healthcare system managers (see Figure 1 and Figure 2 below for examples). For example, in concert with industry partners, we are now addressing such critical challenges as identifying:

- “Latent” network activity that is driving up costs of care delivery;
- Physicians and providers who are exceeding expected costs due to the level, nature or patterns of inpatient/outpatient activity and referral practices; and
- Instances of inefficient management of high-risk and/or complex patients that are leading to increased expenditures without a material improvement in quality.



Figure 2. Graph view of high-risk patient distribution across network.

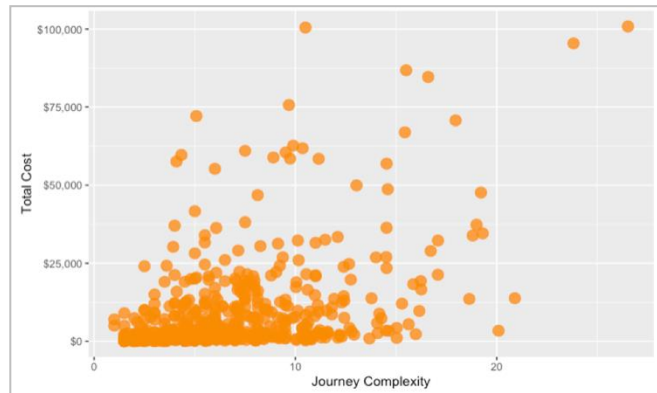


Figure 3. Graph view of patient population complexity vs. cost.

How do advanced graph analytics power us towards these insights? The answer lies in the ability of a graph model to physically store and explicitly represent relationships and interactions among and across an array of actors and data elements that cannot be readily grouped or modeled by more traditional data schema. Data modeled in a graph is much more amenable to graph theory-based analytical methods – *such as community detection, centrality and entropy ratio* – that drive actionable insights into hidden sub-networks, impacts of particular nodes on the healthcare system, and patient complexity. Moreover, graph data models provide considerable flexibility to expand and enrich healthcare data to be examined. For example, they enable the ready integration of social and economic factors of health derived from community-level data, as well as the enrichment of the analytical database through automated feeds of electronic medical/health records (assuming health IT and data interoperability hurdles have been cleared).

ClearPrism’s team of 50+ PhDs, data scientists, quants, epidemiologists, industry-knowledgeable analysts and innovation-focus data technologists are squarely focused on enabling our healthcare industry clients to quantitatively see, understand and proactively make decisions regarding high-impact care management inefficiencies, complex high-risk patient journeys requiring long and expensive treatments, and high-cost interactions buried within the crevices of their complex delivery systems.

Our analytical tools and data sources are powerful, multi-dimensional and specifically architected to make metric-based assessments and comparisons that result in otherwise undisclosed insights that warrant closer attention and potential intervention to assure that the highest quality of care is being consistently delivered at the lowest possible cost and risk. For example, graph-based journey metrics, such as “complexity,” can be calculated to

identify in a single metric those patients having encounter histories that are potentially uncoordinated, inefficient and involve multiple physicians and providers.

In short, our ability to cast a bright light on the “unseen” – be it underperforming “communities” or “clusters,” outlier high-cost providers, or inpatient procedures that could have been performed on an outpatient basis at a much lower cost with the same or better outcome efficacy, or other areas of possible leakage – translates directly into new opportunities for needed intervention and ultimately enhanced financial performance... and, as importantly, better quality of healthcare for your system’s trusting beneficiaries.

We welcome the opportunity to introduce you to the insight power of our firm. For more information, please contact **Marc Zimmerman at marc.zimmerman@clearprism.com** or **Kris Kroona at kris.kroona@clearprism.com**. We look forward to speaking with you.

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Previously founder and principal consult of Vis-à-Vis Information Visualization and Analytics. Prior to founding Vis-à-Vis, Hemanth managed data visualization product development for the Strategic Innovation Group at Booz Allen Hamilton. Previously, he worked as an epidemiologist for New York City Department of Health and as an Epidemic Intelligence Service officer for the Centers for Disease Control and Prevention.

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Marc has more than 35 years of experience as a domain expert, data strategist and senior practice / business unit executive in management consulting/system integration and investment technology development firms serving all segments and tiers of the global financial services market. Prior employment relationships have included global data & analytics practice leadership roles with Deloitte Consulting and Capgemini Financial Services, global financial services business unit managing principal responsibilities for Unisys Corporation, and investment software global sales and marketing executive leadership positions with SS&C Technologies, Inc. and Princeton Financial Services (co-founder / acquired by State Street Bank). Marc is keenly focused on leveraging innovative technical and consultative solutions in such areas as data strategy, analytics and risk management to help clients resolve complex business challenges and drive profitable growth.

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