

Driving Cost Effective Care through Intervention Optimization

Matching the right therapy to the right patient at the right time

According to the National Health Expenditure Accounts, total healthcare spending in the U. S. reached \$3.3 trillion in 2016. That amounts to over \$10,000 per person and makes up almost 18 percent of the nation's gross domestic product.¹

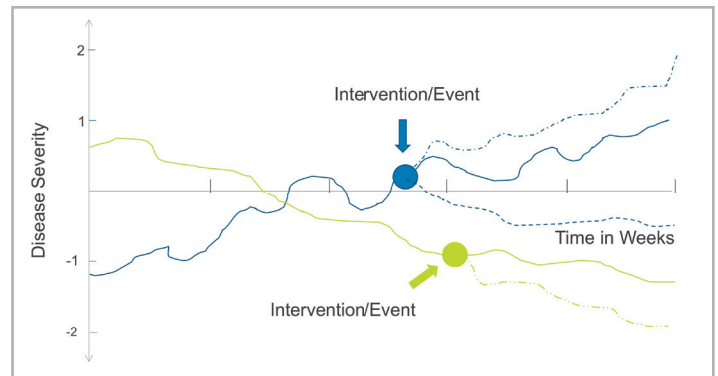
A major step in controlling these costs and meeting the demands of value-based compensation requires a change in mindset in how we deliver and manage care. Healthcare stakeholders need to understand which treatment therapies are most effective for each patient and determine the optimal time to deliver them to provide the most effective patient care. This requires going beyond data analytics and instead leveraging the power of causal machine learning.

The Power of Intervention Optimization

The key to effective healthcare is determining the optimum intervention along the disease trajectory specific to individual patients. GNS Healthcare's causal machine learning platform, REFS™ (Reverse Engineering Forward Simulation) defines points of initiation and targets patients best suited for an intervention strategy at key "inflection" points. The models are then used to match targeted patients to the optimized interventions thereby matching the right patient, with the right therapy, at the right time.

Intervention Optimization is distinctly different from population health. Instead of predicting patterns, our platform discovers causal relationships using iterative simulations to determine what works for whom and why.

¹ National Health Expenditure Data, CMS.gov web site.



GNS REFS platform allows you to select the optimal intervention at the most effective time in a member's disease trajectory based on simulations. The platform allows you to continually probe and run additional simulations to determine cost and patient outcomes for an infinite number of interventions, like comparing one drug to another, what happens if treatment is delayed by a certain time period or what happens if member is admitted to a skilled nursing facility.

GNS Intervention Optimization solution provides:

- A platform that targets the most costly areas
- Discovery of focused areas by either evaluating co-morbidities or just one disease at a time
- Cost savings by optimizing across suite of interventions and engagements
- Improved health for patients based on targeted individual interventions
- Greater transparency across the organization
- Ability to identify the underlying drivers of success for interventions

The ability to simulate hundreds of thousands of "what if?" scenarios allows for intervention by intervention as well as individual member by member discovery of optimal therapy matching. This process can be applied to multiple diseases and conditions. Adding data types and incorporating intervention response "data exhaust" greatly improves the accuracy of the results of the process.

The GNS Healthcare REFS Advantage

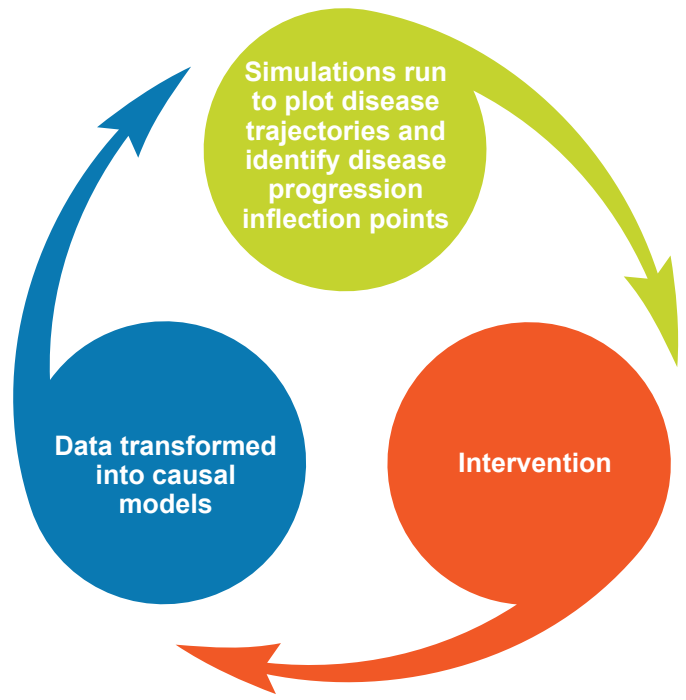
Machine learning that converts patient data into predictions in healthcare isn't new, but it doesn't go far enough. The GNS platform is different as it goes beyond analytical approaches that rely solely on data correlations to match treatments to patients.

Rigorous Math, Powerful Science

REFS uses Bayesian network inference to learn models directly from data. In doing this instead of trying to learn a single or 'best' model, REFS learns how trillions of small sets of variables can be connected, and evaluates how these sets of variables may be assembled together into network models, across thousands of these models simultaneously. The platform then evolves these models, rapidly iterating through trillions of possible configurations, to discover which configurations better describe a process or underlying structure that is consistent with the data. The final ensemble of network models is used as "one model" to run hundreds of thousands of simulations and make predictions. For example, parameters in the "model" could be set to those of a particular patient's values and used to predict the outcomes for a specific patient under alternative treatment scenarios.

The REFS platform runs hundreds of thousands of simulations to plot disease trajectories for individual patients directly from vast data pools including EMR/EHR, medical and prescription claims, genetics, lab, genomics and demographics.

GNS delivers precision medicine at the "n of one," not only looking at the population level, but also examining specific patients to determine what treatment works at what time. It also enables you to accurately view how patient non-compliance affects the disease trajectory, compare drugs or what would happen if treatment were delayed.



The dynamic REFS engine:

- Enables you to make inferences from causal mechanisms to develop "what if?" simulations to determine which therapies will produce the best outcomes for each patient.
- Is a continuous learning platform that gets smarter – particularly effective in altering transitions to deal with patient non-compliance
- Is an agnostic platform capable of processing all types of healthcare data
- Highlights interactions between and progressions of disease states
- Identifies optimal points of intervention
- Identifies the optimal interventions for each member

About GNS Healthcare

GNS Healthcare solves healthcare's matching problem for leading health plans, biopharma companies, and health systems. We transform massive and diverse data streams to precisely match therapeutics, procedures, and care management interventions to individuals, improving health outcomes and saving billions of dollars. Our causal learning and simulation platform, REFS, accelerates the discovery of what works for whom and why.

To learn how GNS Healthcare can help support your initiatives, email us at info@gnshealthcare.com.