Analytics in Support of Population Health Management:

Expanding Data Sources for Identification of Risk – Population Health Re-Imagined

This is the fourth article in the Analytics in Support of Population Health Management series. In our previous (third) article in this series on *Analytics in Support of Population Health Management ("Accounting for Health Risk and Disease Prevalence") – Article 3* we ended with an introductory discussion about how claim data (i.e., disease prevalence indicators) are not always sufficient when the objective is to establish a robust health risk classification for a population of interest. This becomes particularly important when the goal of population-based analytics is to identify opportunities for clinical interventions to improve health risk, beyond simply managing illness. Understanding what health risks exist within a population of interest and determining which clinical and/or wellness related interventions are best suited to address those risks proactively (prior to the onset of illness or medical conditions) requires a broader range of information.

As a case in point, consider that applying the right intervention to address pain management requires an understanding of a patient's experience of pain, beyond that which can be determined from claim data alone. In this regard, assessments about level of pain can be better obtained via patient and/or provider reported information.

Another example, many of today's disease management programs designed to address the risk of developing diabetes rely on information about individual lifestyle, socio-economic, and overall health indicators (weight, co-morbidities such as hypertension) to select good candidates for pre-emptive interventions aimed at reducing risk for developing type 2 diabetes.

Healthcare organizations are increasingly using additional sources of data to augment their understanding and insights into the populations they serve, for a variety of purposes – from forecasting health outcomes and future use of services to development of strategies for outreach and engagement.

As good fortune would have it, the advent of electronic medical records and other home monitoring devices opens up new possibilities for incorporating relevant data about individuals under review within the health program evaluation framework.

What Health Risks Exist → Use Data Sources to Identify → Develop Strategies for Outreach & Development → Apply Right Intervention
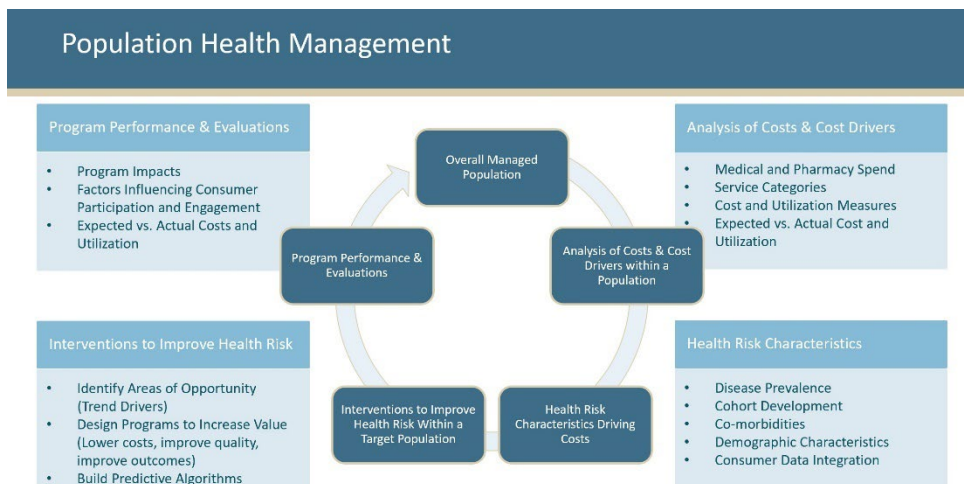
This type of consumer-generated data includes a wealth of information about individuals - including what they purchase, how they use social media, how many hours their wearable devices say they sleep at night, and other aspects of how and where they live and work. This information is invaluable when looking to design programs to outreach and engage consumers in improving their health and well-being. (Kaiser Family Foundation has compiled a useful summary of applicable consumer data elements, seen here.)

Identification of Population-Based Opportunities to Improve Health Risk

In this article, we will discuss alternative data sources helpful for identifying opportunities and designing interventions to improve health risk within a target population.

Along these lines, we will expand upon the use and source(s) of additional data **as well as** various assessment tools (both patient self-reported and provider reported).

Why the shift in focus from disease management to health risk avoidance?

Increasingly, the goal for health management programs has become more about slowing the health risk trajectory for a target population. In other words, avoidance rather than treating an illness once it has happened. Thus, when identifying opportunities for improvement, the evaluation framework becomes not just about current cost and utilization drivers but other topics of interest such as closing gaps in care and otherwise influencing health outcomes more broadly. It is all about increasing value for all stakeholders. After all, what most individuals want most from their health care is the ability to extend and maintain a feeling of well-being and quality of life, not to mention keeping out of pocket costs to a minimum.

Impetus for this change in focus for health care providers and population health managers includes:
➢ The shift to value-based healthcare (e.g., health care bundled payments, outcomes/pay for quality)
➢ Movement to greater personalization (messaging, outreach, engagement, intervention)
➢ Focus on Social Determinants of Health (SDOH) and advancing population health
➢ Availability of alternative therapies and locations for care (virtual/telehealth, self- guided care) and a renewed interest in integrated care models (e.g., Medicare coverage for massage therapies)

➢ A growing recognition that more value can be delivered when addressing the whole person, including the interplay between mental and physical health, and the importance of taking into account life circumstances (e.g., access to healthy food choices).

The ability to assemble the necessary information to support this change in focus has been enabled by:

➢ Data ubiquity (e.g., In the near future, it is forecast that 25% of medical data will be handled, shared, and collected by patients themselves)
➢ Digital transformation (wearable devices, biometrics)
➢ Technology advancements for data sharing across community and clinical settings
➢ Availability of provider reporting information (e.g., electronic assessment tools)

Overall, advances in "big data" and improved analytic and data management capabilities open additional avenues for data integration.

The reality is - Influencing consumers' actions and decisions cannot be optimally achieved in silos. It is about using and integrating data from a variety of domains and incorporating it all within an analytic framework that has clear and purposeful objectives. It is also about understanding the limitations of different sources of information, and how to best apply the right combination of elements, yielding insights that are reliably actionable.
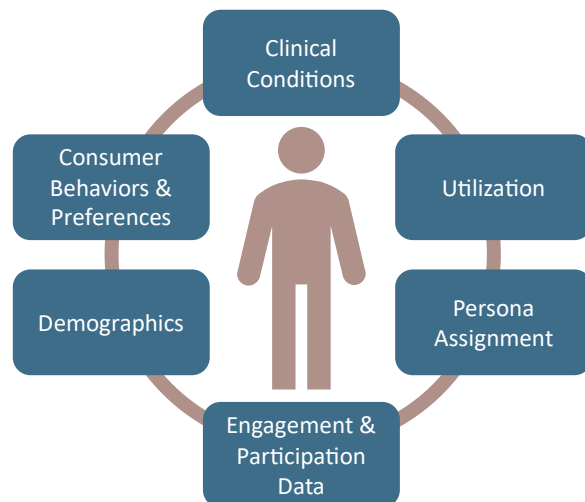
Overall, by leveraging a combination of claims, medical history, personal characteristics, and consumer attribute data, we can model and identify several different risk profiles, representing common patterns associated with people of interest – those who we are trying to proactively reach for participation in actions to address health risk and improve outcomes. This yields important and actionable insights about individuals who are more likely to engage in various programs and services and what is the best avenue for communication and outreach.

Consistent monitoring of how individuals use the health care system also provides important clues about patients' needs, as well as strong indicators of where they may be experiencing gaps in care and related opportunities for quality improvement. Sharing this data can help empower clinicians in prioritizing clinical actions.

Program Performance & Evaluations

Interventions to Improve Health Risk Within a Target Population / Program Performance & Evaluations	Identify Areas of Opportunity	Design Clinical Intervention & Program	Build Analytic Algorithm	Analyze Expected vs. Actual Measures	Review of Program Proof Points to Improve Performance
	Consumer psychographic and socio-economic characteristics (combined with medical and claim data)	Factors that influence engagement and participation	Algorithm output is stratified to inform the approach used to outreach and engage identified members	Applied, multivariate statistics to analyze impacts	Continuous improvement in approach to outreach and engage members
	Expand identification of at risk population / Potential to engage people	Expected engagement rates, participation	Trigger on likelihood to engage, participate	Applied, multivariate statistics to analyze impacts	Continuous improvement in approach to outreach and engage members

Maturity ↑   Cumulative work effort →

Of course, there needs to be recognition and caution related to how long a patient or health plan member will be under an organization's purview, in terms of ability to generate value in the short or near term sufficient to warrant the investment of time and resources. Selecting risk profiles and mitigation efforts that are more likely to generate near term improvements and return on investment is a good way to proceed, at least initially. In addition, expanding data collection to support measures of near-term benefits for individuals and target populations as a whole is critical as well.

Where Can Additional Data Be Sourced?

Personal Health Record or Health Risk Assessment	Administrative (prior auth, program participation, registration/enrollment)	Disease Registries	Environmental Data (geography)
Mobile, wearables and biometric sensors	Behavioral and social media	Consumer buying and purchasing patterns	Public health records (disease surveillance, immunization and vital statistics)
Lifestyle and socio-economic data	Patient generated, including perceived health status	Interests, attitudes, and beliefs - survey or inferred from other data	Life events and living circumstances

"Consumer data presents a sizable untapped opportunity in healthcare's transformation, primarily as a way to understand and engage with healthcare consumers proactively.

As new sources of data become available from the proliferation of smart devices and digitalization of consumer-facing processes and transactions, there will be a greater need to "know" healthcare consumers from an omni-channel perspective." Price Waterhouse Cooper, 2020

(adapted from presentation "Growing use of Consumer Analytics in Health Care," Pfizer Innovative Health)

Clinical and claim data provide a critical foundation, but population health managers and other health care providers need to incorporate more information to build a comprehensive picture of the individual and their health and health risks, unlocking the ability to predict health risks, measure and fill in gaps in health care and improve the overall health profile for a population being served.

Various public and private sector industries now generate, store, and analyze big data with an aim to improve the services they provide. These sources include hospital records, patient electronic medical records, and information from devices that are a part of the internet of things (e.g., mobile apps, home monitoring wearables and biometric sensors). Biomedical research also generates a significant portion of "big data" relevant to assessment of individual health risk.

Patient-Generated Data

Outcome Assessment Tools (OATS)

Perhaps some of the most valuable data is collected from the patients themselves. Outcome Assessment Tools (OATs) are assessments designed to collect specific information from providers or from patients. Some assessments cover a broad-ranging set of patient health concerns – including questions about the presence of chronic conditions, satisfaction with care, and activities of daily living. Other tools are more focused and assess care outcomes related to specific health conditions, such as changes in patient's level of pain, or changes in the patient's mood. The assessments are considered tools because they can help providers to refine care plans for patients, especially when the patient's feedback is combined with the provider's own assessment.

Assessment Scores

In aggregate, the assessment scores provide insights about overall outcomes across a population cohort. While the information is considered very valuable, the collection, scoring and aggregation of the assessment scores can be a lot of work for a busy provider practice to absorb. The assessment questions themselves can be time-consuming to complete. Effective use of assessments requires an understanding of the underlying logic of the scoring methodology so that the results are consistent across patients. Because of the time and complexity of the effort to implement assessments, many providers opt for simplified tools to collect information from their patients. The aggregate assessment scores are rarely used on their own as a measure; instead, assessment scores are part of an overall balanced view of patient outcomes that includes a number of measures.

Patient Engagement

Engagement of patients in decisions about their health has also changed the type of data collected as part of patient-driven decision-making processes. Once considered a tool to help patients choose between alternative care solutions (e.g., to wait a while or to have surgery now), patient-driven decision making has expanded to consider the patient's ability to do the self-care that is defined as part of care plans – especially when the patient has more than one provider. For example, people with multiple chronic conditions may be assigned daily routines to monitor health status, exercise, take medications, or eat at certain times. Some patients may want to prioritize care for some but not all aspects of their health – especially if some plans would limit overall mobility. Outcomes at the end of life are also difficult to assess and the patient may be able to prioritize care. There is increasing recognition that health care outcomes may be related to patient perceptions of quality of life, along with the patient's personal values.

All this data requires proper management and analysis to derive meaningful information. Otherwise, seeking solutions by analyzing big data quickly becomes comparable to finding a needle in a haystack. There are various challenges associated with each step of the data handling process which can only be surpassed by experienced relational database infrastructure and methods, as described in our previous article on this subject – linked here: *Analytics for Population Health Management Article 3.pdf*.

Nonetheless, with strong integration of biomedical research, social determinants of health, and information provided by patients, there are exciting opportunities that may lead to important transformations for personalized medicine and improvements in health risk.