The State of the Data Warehouse & Analytics Marketplace

A Report for Employers and Other Health Care Purchasers Using Data to Support High-Value Health Care Strategies

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Note: *Contributors did not have direct editorial input into the content presented here within.*

"Self-funded employers require new standards in data warehousing and analytics to support next generation health care strategies."

INTRODUCTION

Employers and other health care purchasers, along with consumers, have reached an inflection point. Years of annual health care cost increases above the Consumer Price Index (CPI)[1] have adversely impacted U.S. businesses. This challenge has filtered down to employee pocketbooks, stagnating wage increases and increasing out-of-pocket health care costs, including premiums, deductibles, and co-pays.[2] More than ever, employers and other health care purchasers want to experiment with implementing new health care strategies that produce better value. However, they need the right data to know which strategies to consider and which are working.

Catalyst for Payment Reform (CPR) is fortunate to work with some of the country's most progressive purchasers to drive systemic, positive change in health care. Despite the high level of sophistication, even CPR members face challenges when it comes to having the right health and other data at their fingertips to make informed decisions about health care programs and strategies. Most of these purchasers turn to data warehouse and analytics vendors (referred to throughout the report as "vendors") to help them understand the health and health care experiences of their plan members.

In 2019, with input from an advisory committee and CPR's broader membership, including AT&T, The Boeing Company, City & County of San Francisco, Compassion International, TennCare, and US Foods, CPR sought to understand how best to evaluate these vendors, including which reports and analytics purchasers need to support high-value purchasing. The group defined four priority areas:

- Providing purchasers with advanced data management & security
- Offering a satisfactory user experience
- Equipping purchasers with actionable reporting & visualization
- Targeting opportunities with specific analytics

The final output of this effort is a hands-on toolkit with standard evaluation questions and specifications that purchasers can use to assess vendors regarding their ability to address these areas. CPR has piloted using this tool in an evaluation of the leading companies in today's data warehouse and analytics space.

This report provides background on the state of the data warehouse and analytics marketplace from the purchaser perspective and explores the four areas for which it is a priority for purchasers to move vendors

[1] Mercer (2019). National Survey of Employer-Sponsored Health Plans. Available at: https://www.mercer.us/what-we-do/health-and-benefits/strategy-and-transformation/mercer-national-survey-benefit-trends.html
[2] Kaiser Family Foundation (2019). Employer Health Benefits Survey. Available at: https://www.kff.org/report-section/ehbs-2019-summary-of-findings/

in the right direction. The report incorporates CPR's learnings and includes perspectives from purchasers, experts, and innovators working in this area.

THE EVOLULTION OF THE HEALTH CARE SYSTEM AND CORRESPONDING DATA USAGE BY PURCHASERS

Health care purchasers have more data than ever at their fingertips. It wasn't always this way, nor did purchasers always need as much data. Prior to the 1990s, many purchasers offered indemnity plans, which covered various services at a percentage of the reasonable and customary charge.

The 1990s gave rise to managed care, primarily health maintenance organizations (HMOs), and it was not uncommon for a purchaser to contract with different HMOs in different geographies. Since each of these contracts only delivered insights into a slice of a purchaser's population, progressive purchasers began to bring the data about their population together in one place - a data warehouse - so they could gauge their overall costs and trends in health status, health care utilization, and health care quality.

> "We've seen employer analytic needs evolve. In the past, progressive employers wanted to check the box by having some analytic capabilities. **Today, analytics is a necessity.** Progressive employers are highly focused on affordability for both the business and their employees as consumers."
>
> **Rich Moyer, Principal & Chief Product Officer, Milliman MedInsight**

In the 2000s, with emerging understanding of the variation in health care quality,[3] and health care becoming more unaffordable, health insurance options and strategies became increasingly complex. Purchasers began exploring account-based high-deductible health plans, price and quality transparency tools, wellness programs, and other strategies. Implementing these new strategies meant purchasers needed more data and the ability to integrate data from disparate sources.

2020 DATA NEEDS TO SUPPORT 2020 (AND BEYOND) STRATEGIES

Today, purchasers grapple with rising health care costs, uneven quality, and a consolidated provider market. Purchasers are pursuing a variety of strategies, including encouraging plan members to use accountable care organizations (ACOs), direct contracting, tiered network designs, reference-based pricing and contracting, on-site or near-site clinics, value-based insurance design and prioritizing the analysis of total cost of care over network discounts. More than ever, purchasers need to be able to slice and dice their data to support these new strategies.

While it's important for purchasers to understand the demographics and health care conditions in their population, as well as how their plan members use the health care system, it is also important to purchasers that potential vendors can measure risk factors so purchasers and their other partners can engage members before they become high-risk. Today's health care purchasers recognize the importance of not looking at health care in a silo – they evaluate health care expenditures alongside employee productivity and consider physical health, emotional health, and financial health all to be a part of

> "People's expectations for the timeliness of health care data and analytics mirror other experiences in their life. **I call that the 'microwave syndrome,'** because once there were microwaves, people didn't want to spend an hour cooking dinner."
>
> **Bobbi Coluni, Leader – Large Employer, Payer, and Provider Offering, IBM Watson Health**

[3] Institute of Medicine (2000), To Err is Human: Building a Safer Health System. National Academies Press. Available at: https://www.ncbi.nlm.nih.gov/pubmed/25077248

their wellness strategy, and thus, part of their data strategy. These efforts begin with recognizing the data as the purchaser's asset and protecting its security beyond minimum industry-standards.

PROVIDING PURCHASERS WITH ADVANCED DATA MANAGEMENT & SECURITY

Before taking the plunge into integrating data elements from various sources, purchasers want to know their data will be both secure and appropriately accessible. Data management and security is of utmost importance to purchasers - the high-profile data breaches across industries over the last several years make this priority understandable. A data breach comes with the cost of fines, figuring out how to resolve the breach and preventing a recurrence, negative press and damage to reputation. Additionally, consumers are rightly sensitive to how their protected health information (PHI) is used by their employers or others in their health care ecosystem.

Data ownership and use. Going into any relationship with a vendor who will conduct analytics, purchasers must understand who owns what data. While many vendors state that the purchaser owns the data about its population, CPR found nuance in its evaluation of seven vendors. First, vendors indicated that some of their data suppliers (e.g., health plans or pharmacy benefit managers, etc.) may consider certain data to be confidential and proprietary, and therefore not owned by the purchaser. Second, purchasers must consider what happens to the data if the contract with the vendor terminates. Some vendors indicate they would return certain data to the data supplier, so the purchaser would have to re-negotiate release to a new vendor. Finally, while vendors generally do not lease aggregate data to external parties, they may wish to use it for internal benchmarking purposes. If the purchaser declines the use of its data for benchmarking by others, they may not be able to take advantage of the vendor's benchmarking capabilities for themselves. Purchasers considering a new vendor or re-negotiating a contract will want to review closely, and possibly negotiate, these contract provisions to ensure that their data remains theirs and is accessible.

Experience with unique data feeds. Vendors must have relationships with those who provide traditional types of data feeds, such as medical, prescription drug, dental, vision, disability, etc., but they also must combine data elements not commonplace in the past, like data on 401(k) participation. Knowing that health care has become increasingly unaffordable, and given the research linking indebtedness to serious health effects,[4] purchasers may evaluate salary data in conjunction with 401(k) savings data and use of health care services to project employee medical debt.

Purchasers are also interested in evaluating the effectiveness of the various point solutions they implement or are considering, such as expert medical opinion vendors, patient navigation vendors, or vendors who manage behavioral health, diabetes, or other conditions. CPR found that while most vendors demonstrate extensive experience importing traditional types of data, vendors have a shorter track record importing data from point solutions. Purchasers who want their vendor to import these new data elements

[4] Turunen, E., & Hiilamo, H. (2014). Health effects of indebtedness: a systematic review. BMC public health, Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4060868/

should think about what they want to analyze and by when to allow for lead time to implement these new feeds.

Employers are prioritizing different data feeds.

"**What we're seeing is employers using traditional data feeds differently.** Customers are asking us to develop reference-based pricing, or other new incentive payment models to drive site-of-service or other benefit designs."

Bernadette Kelleher, CEO, High Line Health

"**One feed a lot of prospects ask about is the intake of 401(k) savings data.** Employers want to understand how savings patterns and financial health impact emotional health. They also want to know if the people who contribute less or take out hardship loans are at higher physical health risk."

Grant Gordon, CEO & Founder, Artemis Health

"Employers are interested in having a data integration partner who can **identify which individuals are participating in untraditional voluntary benefits** such as expert medical opinion, 401k, on-site clinics and fitness centers to name a few, and provide cohort analyses on those who participate versus those who don't across the spectrum of benefit experience."

Deb Alexander, Director of Product & Analytics, Optum Benefits Analytic Manager

Data accuracy, platform, and retrieval. Purchasers expect imported data to be accurate, complete, and readily available. Vendors ensure data is accurate by having both stringent automated and manual checks in place. Looking forward, vendors noted that data importing processes may shift as more vendors and other partners expand their use of Application Programming Interfaces (APIs).

The type of platform a vendor uses to store data may impact how many years of data the vendor has available for immediate analysis versus archiving or automatically destroying old data. In addition, the time it takes to process a query and the ability to combine disparate data elements can vary by type. Common platform types are relational and non-relational; each has its advantages and disadvantages (refer to the Appendix for a summary of the two types).

"In the next five years, I believe we will see an **incredible push towards readily accessible data via APIs** into the various vendors, which will allow the speed of information transfer to accelerate in a way we've never seen."

Rod Reasen, CEO & Co-founder, Springbuk

Purchasers can evaluate the power and limitations of each vendor's platform by viewing the timeliness of complex data querying as part of a vendor demo or by experiencing it first-hand by using a dummy login. In addition, purchasers should evaluate for how long vendors store data for immediate analysis and at what point it archives or auto-purges data – CPR uncovered differences across vendors in its analysis.

Data security certifications. Purchasers want to know their data is protected, and certifications are a way to validate each vendor's approach to data security. Under the Health Insurance Portability and Accountability Act (HIPAA), vendors serve in a business associate capacity and must appropriately safeguard the PHI they handle or create. Not surprisingly, vendors that CPR evaluated take data privacy and security very seriously. Other external reports or certifications purchasers want from a vendor include Health Information Trust Alliance (HITRUST) Common Security Framework compliance, SOC 2® reporting,

Federal Risk and Authorization Management Program (FedRAMP) authorization, and Federal Information Security Management Act (FISMA) compliance. CPR's assessment found that some vendors prioritize becoming HITRUST compliant over FedRAMP authorized and FISMA compliant, especially if they have not sought government business. Some reported that while they are not FedRAMP authorized, their cloud service provider is. CPR encourages purchasers to know their information security requirements early, as it could streamline the vendor selection process.

Purchaser audit rights. Like with any other vendor relationship, the purchaser or a designated third-party should have the right to conduct an on-site audit of the data warehouse and analytics vendor. Priority areas to audit include data storage and security, HIPAA compliance, and meeting with vendor staff assigned to the purchaser's account to review competency and processes. Audit rights should survive termination of the contract so that the purchaser can ensure its data is purged according to best practices. CPR's assessment found that most vendors include standard audit rights in the purchaser-vendor contract. Purchasers should closely review the contract language that specifies its audit rights and negotiate the language as needed.

OFFERING A SATISFACTORY USER EXPERIENCE

A satisfactory user experience could mean something different to each user. And each vendor has a different approach to the service it supports, whether hands-on or self-service. On one extreme, some vendors lead with a high-touch user experience in which the data warehouse staff assigned to the purchaser does most of the querying of and reporting on the data. On the other side, some vendors function mainly as Software-as-a-Service (SaaS) with most features being available through user self-service. Some vendors offer engaging displays and the ability to drill down to the service or member-level, while others have limitations. These variations shape not only the look and feel of the product, but also its utility for everyone from an executive to benefits staff.

Users and their needs are unique.

"**The most popular features of High Line Health's platform depend on the type of user.** Our clients with limited analytical resources like our dashboards and custom quarterly reports. Our clients with dedicated analytical teams benefit by using our Power platform where they can quickly go from an aggregate view and drill down into the detail."

Bernadette Kelleher, CEO, High Line Health

"With analytic interfaces today, there's often one interface that all users see regularly. But **each user has different needs when it comes to interacting with health data,** whether you are the benefits analyst, wellness director or CFO. In the future, I see a system that learns over time and personalizes the experience for each user by surfacing insights based on their persona, historic use and interactions."

Bobbi Coluni, Leader – Large Employer, Payer, and Provider Offering, IBM Watson Health

User tiering. Generally, vendors offer different levels of interface with their services and platform to accommodate the needs of different users within a purchaser's organization. For example, an executive might only need to see summary reports, while a health care benefits manager or analyst needs to drill down at a plan member or health care provider level, such as to investigate price and quality variation across different procedures or sites of service. This creates efficiency for the executive, while allowing others to investigate, create and save their reports, and develop data-driven strategies. Before selecting a

vendor, the purchaser should carefully compare the current and future needs and expertise of their team against the structure of the vendor's user tiers.

Three levels of user experience. A good way to evaluate the user experience is to understand what reporting and analytics is fully self-service, which require some vendor support, and for which the user must fully rely on the vendor. Some vendor solutions are centered on a self-service model and others include professional support hours in the standard contract. To support self-service, vendors offer features like chat functionality, pop-up help icons, or explanatory text within reports. A purchaser should consider its internal analytics skills, staff bandwidth, and how intensely it plans to analyze the data. In addition, the purchaser should consider the extent of the vendor's account management and data analytics support. Finally, the purchaser should also project how much other external analytical support (e.g., from consultants or other partners) it will need and budget accordingly.

Vendor support to the rescue.

"There are a lot of routine analytics that are fairly straight forward and are very actionable that people should be able to do for themselves. We really want them to be **using consultants when there's high value to it and it requires a level of expertise that they might not have in-house**."

Rich Moyer, Principal & Chief Product Officer, Milliman MedInsight

"When a customer calls us up with a problem, we always want to be able to **respond to the problem within the tool itself in real time** rather than kick something back internally for development and take two months to turnaround. If we've done our job right, we should be able to do everything in real time."

Edward Hausman, Vice President of Product, Deerwalk

Sharing and collaboration. By considering how staff currently use data and want to use it in the future, the purchaser can evaluate the user experience and depth of support it will need from the vendor. When it comes to collaboration, vendors typically allow users within a purchaser organization to share reports or analyses with each other. Some forward-looking vendors even allow users at different purchaser organizations to share reporting templates, helping spread innovation in the marketplace. Purchasers should review how users can work together on the platform and ask about collaboration features on the vendor's product roadmap.

Vendor performance. While delays due to data sharing agreements and/or establishing an accurate data feed are common implementation hurdles, purchasers are looking for vendors that have a track record managing the heavy lifting of that process. Once the database is fully functional, purchasers should ensure the vendor meets their expectations for response time to requests, the percent of time the database is functioning (database uptime), and timing to complete critical and non-critical database repairs. Purchasers should negotiate performance guarantees and their specifics during the process of selecting and contracting with the vendor.

"I hope there will be greater transparency in this industry. Historically, there have been stakeholders that have taken advantage of the market distortions and asymmetry of information that exists in healthcare. Springbuk, as an agnostic objective party, can bring that to light and allow employers to get to the real information of their true opportunities so they can act effectively and ethically on behalf of their employees."

Amy Brown, Vice President of Product, Springbuk

"To transform the user experience, we are incorporating an AI assistant into our solution using Watson conversation capabilities. We have built an ontology for health care analytics, served up through a natural language interface to answer user questions. Through this self-service model, we are able to support the more casual user and eliminate the time they would have spent foraging through details and documentation to quickly get the answers they need."

Bobbi Coluni, Leader – Large Employer, Payer, and Provider Offering, IBM Watson Health

User experience and support continues to evolve. The future of customer support and the user experience revolves around two axes: security and technology. The more detailed plan member data that purchasers can access, the more important it is to protect PHI and non-aggregated personal information. Vendors not only have to maintain secure databases and data transfers, but carefully and proactively monitor account access levels, especially as both in-house staff and purchaser users change roles or organizations re-structure. Additionally, as technologies like machine learning (ML), a subset of artificial intelligence (AI), become more widespread, they could refresh the user experience by making interaction with the platform more like having a conversation. Virtual chat boxes – either with a human or a computer – also set new expectations for response time.

EQUIPPING PURCHASERS WITH ACTIONABLE REPORTING & VISUALIZATION

Analysis paralysis is real. Purchasers experience a constant overload of new information, and knowing which information warrants concrete action can be a challenge. Data warehouse vendors integrate data from multiple third-party administrators, pharmacy benefit managers (PBMs), and other vendors across the benefits ecosystem to give purchasers a single source of truth on their population's health care costs and trends. There are myriad ways these vendors can provide the actionable information benefits staff need to do their work effectively without bombarding them with unnecessary information.

What data are "actionable?" Actionable data help purchasers work with their contracted health plan(s) and communicate with plan members to ensure successful implementation of their high-value health care strategies. Purchasers may also want data to support contracting with a point solution to serve a specific health benefits need or to join forces with other purchasers to enhance the responsiveness of other players in the health care ecosystem, among other reasons.

Data as the springboard for action.

"Our job is to build the bridge between data science, including AI and machine learning, and do it in a way that curates toward solving the problem, which goes back to the user experience. **If we're not solving a problem, all we're doing is creating noise.** It's not just putting out tons of dashboards – we want to give you answers."

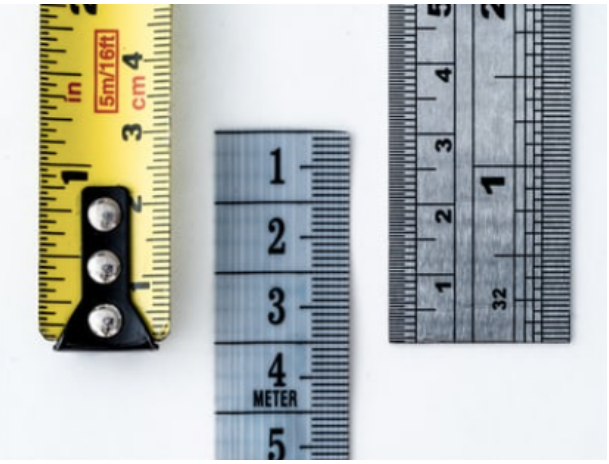
Rod Reasen, CEO & Co-founder, Springbuk

"**Increasingly, employers want to roll up their sleeves with network optimization through direct contracting.** At High Line Health, we take in the self-funded employer's data, analyze it and identify opportunities for Centers of Excellence or other targeted clinical areas. We've supported these efforts from analysis to contract—to tracking and reporting for both the employer and the provider organization."

Bernadette Kelleher, CEO, High Line Health

Once a purchaser poses a question to the vendor, the vendor should deliver clean data in an easy-to-understand format in a secure, timely fashion that enables the purchaser to determine and evaluate its strategies. CPR found that most of the vendors it evaluated said they report on the indicators in the Health Care Cost Institute's (HCCI) Health Care Cost and Utilization Report – a de facto industry standard. However, vendors are not yet adept at combining quality and cost data. For example, few vendors could display provider data in a map view that includes provider quality and cost information to allow benefit managers to understand the health care marketplace geographically. Purchasers should push the vendors to enhance their ability to combine quality and cost data.

Benchmarking. Purchasers also expect robust and detailed benchmarking from their data warehouse. Beyond what the purchaser's own data can reveal, how does their experience compare to that of other organizations in the same industry, in the same geography, or using the same types of health care benefits strategies? CPR's Data Warehouse and Analytics Toolkit offers a breakdown of the specific benchmarking capabilities that purchasers should expect, such as the ability to benchmark not only cost but also volume of services and quality performance. Additionally, data cuts should be available by industry, purchaser size, and other dimensions.



To enhance benchmarking, purchasers should convince vendors to import data from publicly-available sources, such as state all-payer claims databases (APCDs) or the Healthcare Cost and Utilization Project (HCUP)'s family of data sets on hospital care in the U.S. Additionally, CPR recommends benchmarking data sets be updated at least bi-annually to keep up to date with new CPT codes and other data elements that are continually evolving, and that purchasers demand regular recalibration of the risk-adjustment algorithm.

Visualization as the springboard for action.

"**Ask first: what is within a benefits team's power to address?** When we're thinking about creating actionable visualizations, we start by looking at the actions benefits leaders might be considering. If adjusting a formulary is one of the actions on the table, then they need to know which drugs on their formulary are a problem. Our clients use our Actionable Overspending metrics to quickly identify this type of waste."

Grant Gordon, CEO & Founder, Artemis Health

"**Because an employer is not able to act on every single data point that is put in front of them, we drive toward finding the few nuggets** – in a visual image – where there is action to be taken and guiding them in the process. From a visualization perspective, online tools can only go so far, but complementing that with PowerPoint, Excel or other mechanisms to visualize information enables Optum to focus in on key points that we want the purchaser to understand and have them say, 'I want to know more."

Deb Alexander, Director of Product & Analytics, Optum Benefits Analytic Manager

Telling stories with data. Vendors highlighted the need to be able to tell a story with the data, making patterns, outliers, and problems easily identifiable by the user. Heat maps and people maps (i.e. using stick figures instead of dots) can make data easier to interpret. Certain vendors display complex data in a narrative-like format, such as a timeline chart, to build a story around a patient's utilization history. Some of the vendors noted that visualization software has vastly improved. Purchasers also want it to be easy to download the visualization into Excel or PowerPoint to take the problem from analysis to action, such as making a pitch to executive leadership. Every data warehouse that CPR evaluated had the ability to turn a custom analysis into a recurring report.

As mentioned earlier, vendors are actively investing in machine learning and other AI technologies. Some vendors are already using ML to structure data that is otherwise unstructured, like electronic medical records, or to identify opportunities that present potential return-on-investment (ROI). All vendors agree that ML applications in the health care benefits space are expanding, although some applications currently face obstacles. After all, insights that an algorithm can find are only as good as the data on which the algorithm is trained.

Unveiling the Hype: A Closer Look at Emerging Technologies

"I do think blockchain will become very relevant in healthcare, I think probably more due to its ability to facilitate payments in ways that wouldn't have been traditionally possible. **I don't know that we're really going to see blockchain take hold within the analytics themselves to the same degree."**

Jeff Gasser, CEO & Co-founder, Deerwalk

"Blockchain is another area we are investing in and see as being transformative. Our first blockchain development is a bundled payment application that leverages a shared ledger to provide transparent views of contracts and allow for faster, efficient payment to the providers. **Mass adoption of this blockchain technology is a bit further out than AI and machine learning; however, we have seen tremendous interest** within the last year."

Bobbi Coluni, Leader – Large Employer, Payer, and Provider Offering, IBM Watson Health

"**In five years, you won't hear machine learning talked about since everyone will be doing it.** One of our predictive model approaches is the Event Detection Algorithm that uses data science and probabilistic models to find people who are very likely to have a diagnosis, tackling some of the most underdiagnosed conditions like hypothyroidism. For a patient with un-diagnosed hypothyroidism, the patient's life can change by receiving the correct $10 medication. They're more productive at work, they lose weight, their whole trajectory can change. We are trying to take these techniques and apply them to the business questions that are actually useful for customers, which has been a deficiency in how these technologies and data have been used historically."

Rod Reasen, CEO & Co-founder, Springbuk

"**All these terms are super over-hyped right now. I would encourage every employer to be extremely skeptical of any vendors pushing these buzz words on them.** Blockchain describes an immutable data structure that can be written to by multiple entities, and there's no obvious application for it in health benefits right now, so I would just take that off the table. AI and machine learning are actually very valuable tools when applied appropriately, but the term "artificial intelligence" implies a lot more capability than what is possible now. We don't hype our applications of AI or Machine Learning because they're kind of a workhorse for us. We use it for unglamorous (but important) tasks like member matching, for example."

Grant Gordon, CEO & Founder, Artemis Health

TARGETING OPPORTUNITIES WITH SPECIFIC ANALYTICS

Data warehouse vendors need to offer specific analytics in priority areas to meet purchasers' needs. Purchasers often want to know whether a solution that has been proven or is being tested by others could be a good fit for their own benefits strategy. To support the shared agenda of CPR members, CPR evaluated data warehouse vendors on their ability to provide specific analytics to track the use of low- and high-value care, evaluate the performance of provider networks, and support high-value purchasing strategies, such as alternative payment arrangements with health care providers.

Tracking use of low- and high-value services. The surging popularity of value-based insurance design, which creates benefits differentials to decrease use of low-value care and increase use of high-value care, requires population-level analysis of utilization. Vendors are able to report on usage of high-value preventative care, such as appropriate cervical cancer screening for women and blood glucose testing for patients with diabetes, using the Healthcare Effectiveness Data and Information Set (HEDIS) developed and maintained by the National Committee for Quality Assurance (NCQA). Gaps in care analyses, which may utilize other measure sets from the National Quality Forum or the Agency for Health Care Research and Quality (AHRQ), provide immediate value to purchasers by identifying where they need to encourage their employees to seek services. Some vendors can also analyze spending on services that don't provide significant value and may even harm patients, such as those identified by Choosing Wisely.

> "On the functionality side, we have developed a waste calculator product, which uses a Choosing Wisely algorithm that pretty much everybody's agreed identifies low-value care. We've gotten some very tangible results for those clients."
>
> **Rich Moyer, Principal & Chief Product Officer, Milliman MedInsight**

Purchasers want vendors to be proactive in building relationships with care management teams and other point solutions they use by establishing secure data sharing. To make analyses about gaps in care or overuse of low-value services actionable, vendors need to coordinate with the clinical team responsible for care management to facilitate outreach to identified plan members. CPR found that most data warehouse vendors integrate manually with care management solutions. However, some vendors have developed APIs that automate data sharing between the vendor and the care management team.

Gauging the performance of provider networks. While appropriate provision of high- and low-value services is one lens through which to gauge provider quality, there are more aspects of health care quality to measure and more vendors could do in this area. To understand the performance of provider networks, purchasers would ideally have quality measurement at the individual physician level, the physician group level, and the ACO level. For hospitals, quality measurement by line of service is most useful because quality varies within hospitals by service – for example, a hospital that excels in cardiac surgery may perform poorly in neurosurgery.

In reality, data sharing limitations hinder what information vendors receive and can incorporate into their analytics for purchasers. For example, a vendor can automatically extract the National Provider Identifier (NPI) from a claims file but may need a manual process to capture whether the provider is part of an ACO. This may impede whether the vendor can provide apples-to-apples comparison of ACO performance across dimensions like unit cost, total cost of care (TCoC), gaps in care, quality of care, and delivery of low-value care, such as the performance measures in CPR's Standard Plan ACO Report. Access to this type of information could make the difference in whether a purchaser puts effort into boosting employee enrollment in ACO-focused insurance products, for example.

> "As often as not, what people are seeing when they get into the quality data is that the assumed reputations of hospitals are not backed by data. Those are not data-driven insights, and in fact, the numbers will very often tell the opposite story. Having such a potentially squishy and qualitative term like "quality" all of a sudden be measurable, be data-driven - I think that's a really exciting prospect for a lot of people."
>
> **Jeff Gasser, CEO & Co-founder, Deerwalk**

Measuring quality at the level of the provider and service line requires adequate sample sizes; many vendors use outside sources to secure this. Purchasers should inquire about the quality comparison tool the vendor licenses. The vendor should be willing to report on the quality measures that are top-of-mind for purchasers, where the necessary data exist. Such measures can be found in Quality Measures that Matter, a CPR-curated list of 30 nationally recognized quality measures highly relevant to employers and other health care purchasers. If purchasers wish to pursue and maintain a direct contract with a health care provider, enable clinicians at onsite or nearsite clinics to make informed referrals to providers in the community, or curate a high-performance network, access to these data will be critical.

As patient reported outcomes data become more widely available, vendors will need to adapt quickly and integrate them into their reporting and analyses. Purchasers should continue to push their health plans to measure and share patient reported outcomes.

Zeroing in on quality.

"There are multiple approaches to look at quality, including **looking at it from an outcome perspective, which is at the heart of what the employer is looking to do.** Most benefit managers want to know - Are my employees healthy and well, given the medical conditions they may have? Are we providing the right level of support and benefits to them to ensure they are empowered to make the best decisions possible for their health and wellness?"

Deb Alexander, Director of Product & Analytics, Optum Benefits Analytic Manager

"There are a ton of vendors that are selling products on provider quality right now, and we are evaluating those with one of our customers to create a quality index for providers & procedures. That customer is creating tools for their members and the doctors in their on-site clinics to make recommendations for where to refer patients. **We are creating a solution to address the challenge that you can't measure a provider's quality globally, you have to measure it on a service-by-service or episode-by-episode basis.** The volume of data you need to have statistical significance to measure quality is a practical impediment, especially for making the provider ratings work for a commercially-insured population."

Grant Gordon, CEO & Founder, Artemis Health

"Rather than reviewing a static report, some of our clients want to actively use data to establish reference-based pricing or bundled payments to drive site-of-service. Our tool, Lumineer®, allows employers to better understand utilization and pricing variation. If you look at a procedure that varies in price from $25K-$45K, Lumineer® allows clients to calculate, 'If I set the price at $35K, what would that yield in savings? As I adjust the price point, what's the impact based on utilization trends?' "

Bernadette Kelleher, CEO, High Line Health

Evaluating success. To evaluate a benefits program, purchasers will need a pre- and post-analysis on the quality of care received by participating plan members. For example, if a purchaser pilots a diabetes intervention, the vendor could identify the percentage of participants who have their blood sugar levels under control six months and one year into the program. Going further, a purchaser may want to create a matched control group that resembles the intervention cohort in as many dimensions as possible to compare the two groups to each other. For example, the employer may have a different population of employees with similar job functions but in a different location. CPR found data warehouse vendors eager to help purchasers conduct these types of evaluations, and some vendors have even created specific applications to facilitate cohort analysis. Purchaser should take advantage of these features to evaluate benefit programs.

Supporting high-value strategies, including payment reform. Many health care purchasers are eager to reform how they pay health care providers by adding financial incentives to hold providers accountable for the quality and affordability of their care. CPR found vendors willing and able to provide analytics to purchasers on payment reform strategies, but their work in this area is nascent. Vendors are primarily developing models to help purchasers assess whether a payment reform arrangement would be beneficial, such as vendor tools that re-price services to what Medicare would have paid or demonstrate potential savings of a bundled payment program. These models can help a purchaser make the case to leadership to pursue payment reform. Vendors that can evaluate both the opportunities and programs post-launch can help purchasers with data they need to implement payment reform arrangements. As payment reform continues to gain traction, purchasers should stay informed about their data warehouse vendors' offerings in this space, including the specific capabilities listed in CPR's toolkit for evaluating vendors.

FINAL STATEMENTS

Looking to the future, CPR asked the data warehouse vendors who contributed to the project to comment on one area that might be a ticking time bomb where employers should be paying more attention. CPR heard a variety of responses from the slow but continuous growth of diabetes, to the emerging issue of personalized medicine offering promising treatment options with hefty price tags, to high and rising unit prices. Vendors say they are ready to help purchasers confront these challenges with up-to-date price comparisons and predictive analytics to ascertain the potential impact of various strategies. Some vendors focused on their ability to support the relationship the benefits staff have with the covered population, including help for plan members navigating information about the quality of care offered by different health care providers and their varying prices.

These areas require attention, and a strong data warehouse and analytics vendor can help.

"The ticking time bomb is that there's not more attention being paid to the fact that **pricing is being driven by unregulated monopolies**. There are monopolies inside each hospital. In some towns, the hospital itself is a monopoly. I'm not trying to be critical of health systems; I have a lot of gratitude for what they do. It's just that the prices being paid are not sustainable and it's only going to get worse, because of the nature and the structure of the way health care is in this country. I can't think of a bigger problem than that."

Jeff Gasser, CEO & Co-founder, Deerwalk

"I think **the ticking time bomb in health care is price per unit.** Our drugs cost, in some cases, ten times more than in any other place in the world, our doctors make in some cases twice as much, in some cases ten times as much as any place in the world, and our hospitals cost far more, and there are so many people that are vested in keeping it as it is."

Rich Moyer, Principal & Chief Product Officer, Milliman MedInsight

"Putting all your eggs into AI, Machine Learning, or algorithms that look at data and tell a human what to do, without human intervention, could lead to a ticking time bomb of unanticipated problems. **Health care requires human intervention and knowledge amassed through treating patients. Each patient is unique and health care providers aren't looking at algorithms to determine diagnosis** - they're truly trying to understand their patients holistically. Data and technology have purpose, but should not be the end-all be-all for managing patient care, defining health benefits, or identifying opportunities for cost savings."

Deb Alexander, Director of Product & Analytics, Optum Benefits Analytic Manager

NEXT STEPS FOR EMPLOYERS AND OTHER HEALTH CARE PURCHASERS

Data is not useful if it is not actionable. Employer-purchasers, begin taking immediate action:

- **Download CPR's Toolkit for Evaluating Data Warehouse & Analytics Vendors** and field the evaluation questions to an existing or potential vendor. CPR's toolkit helps make the evaluation a little less daunting.

- **Would you like a head start by previewing CPR's Summary Scorecards?** CPR has released the summary scorecards of each participating vendor to CPR member organizations as a members-only benefit. To gain access to these scorecards and future evaluation findings in other topics of interest, inquire about CPR membership by contacting Ryan Olmstead, CPR's director of member services.

PURCHASER CHECKLIST: KEY CONSIDERATIONS

Here are key considerations when selecting or working with a data warehouse and analytics vendor. Where applicable, we include reference to specific items from CPR's Evaluating High-Value Data Warehouse and Analytics Solutions Toolkit in parentheses.

1 Data management & security:

- ☐ Review and negotiate contract provisions to understand your audit rights and ensure data belongs to you, the self-funded purchaser (A-1 & D-20)
- ☐ Check the speed of complex data querying as part of a demo or product testing (C-9)
- ☐ Check how long vendors store data for immediate analysis and at what point they archive or auto-purge data (C-10)
- ☐ Know your company's data security certification requirements early in the process (D-14)

2 User experience:

- ☐ Establish a plan for which staff will access the data warehouse and which level of access ("tier level") each staff member will require (A-3)
- ☐ Consider your staff's analytics skills, needs, and bandwidth alongside the vendor's account management style and professional support availability (A-4)
- ☐ Review how users can collaborate and get help on the platform; conduct regular check-ins to learn about new features on the vendor's product roadmap (A-4)
- ☐ Review and negotiate performance guarantees (e.g., database uptime) into your vendor contract (B-6)

3 Reporting & visualization:

- ☐ Check if vendor can connect to and report data from point solutions of interest (A-7)
- ☐ Ask vendor to demonstrate how they use graphs and other visualizations to make data actionable and engaging to different audiences (B-12)
- ☐ Push vendors to import data from publicly-available sources, such as APCDs (C-13)
- ☐ Confirm that benchmarking data sets are updated at least bi-annually (C-17)

4 Specific analytics:

- ☐ Ask vendors how they identify high-risk members; ensure vendors regularly recalibrate their risk-adjustment algorithms (A-1 & A-4)
- ☐ Think about which provider quality measures you want to evaluate and ensure vendor can report prices paid as a percentage relative to what Medicare pays (B-9)
- ☐ Leverage the ability of vendors to evaluate payment reform arrangements with a pre-post intervention analysis, looking at both cost and quality results (C-12 & C-15)
- ☐ Ensure all your health care partners, including health plans and vendors, incorporate patient-reported outcomes

APPENDIX: KEY TERMINOLOGY

All-Payer Claims Database (APCD): An APCD is a large-scale database that systematically collects medical claims, pharmacy claims, dental claims (typically, but not always), and eligibility and provider files from private and public payers. APCD data are reported directly by insurers to States, usually as part of a State mandate.[5]

Application Programming Interface (API): An API is the code that governs the access point(s) for a server holding information, allowing applications to communicate with one another and get data to/from outside sources.[6]

Artificial intelligence: AI is the theory and development of computer systems that can perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.[7]

Benchmark: A benchmark is a standardized metric made up of compiled data. An organization can use a benchmark to compare their own results to that of a broader group of purchasers.

Cloud: The cloud describes a global network of servers, each with a unique function. The cloud is not a physical entity, but instead is a vast network of remote servers around the globe which are connected and meant to operate as a single ecosystem. These servers are designed to either store and manage data, run applications, or deliver content or a service such as streaming videos, web mail, office productivity software, or social media.[8]

Consumer Price Index (CPI): The Consumer Price Index (CPI) is a measure of the change over time in the price paid by urban consumers for a market basket of selected consumer goods and services.[9]

Data warehouse: A data warehouse is a system that stores data from multiple sources (i.e., feeds) to be used for reporting and analysis.

Drill down: Drilling down is the action that takes the user from summary level data to more detailed data.

Gaps in care: A gap in care is the discrepancy between best practice and the care that is actually provided (or not provided).

Health Insurance Portability and Accountability Act (HIPAA): HIPAA was passed by Congress in 1996. HIPAA does the following: provides the ability to transfer and continue health insurance coverage for millions of American workers and their families when they change or lose their jobs; reduces health care fraud and abuse; mandates industry-wide standards for health care information on electronic billing and other processes; and requires the protection and confidential handling of protected health information.[10]

High-performance network: A high-performance network is made of a small or select number of physicians, hospitals or other health care professionals who have been identified as high quality, cost effective providers.[11]

High-value care: Services that are considered high-value care balance clinical benefit with costs and harms with the goal of improving patient outcomes.[12]

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[5] AHRQ
[6] Medium
[7] Lexico
[8] Microsoft Azure
[9] Bureau of Labor Statistics
[10] CA Department of Health Care Services
[11] Business Group on Health
[12] NEJM Resident 360

Low-value care: Services that are considered low-value offer little to no clinical value, can expose patients to unnecessary harm, and can contribute to wasteful health spending.[13]

Machine learning: Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.[14]

National Provider Identifier (NPI): The NPI is a unique identification number for covered health care providers and a Health Insurance Portability and Accountability Act (HIPAA) Administrative Simplification Standard.[15]

Non-relational databases: Databases that store data as files, offering flexibility and speed for creating and maintaining the database. There is a risk of data inconsistency in the less structured environment. Also known as NoSQL databases.

Predictive analytics: A subset of analytics that uses past data and trends to make predictions about the future.

Protected health information (PHI): Under HIPAA, protected health information is considered to be individually identifiable information relating to the past, present, or future health status of an individual that is created, collected, or transmitted, or maintained by a HIPAA-covered entity in relation to the provision of healthcare, payment for healthcare services, or use in healthcare operations.[16]

Purchaser: CPR defines a purchaser as someone who buys health care benefits on behalf of their organization and a population of health plan members, such as public and private employers, state Medicaid agencies, or multi-employer union health trust funds.

Relational databases: Models that store data in a highly structured format for easy querying and data retrieval. Users may experience performance issues when comparing complex data sets, performing advanced queries, or adding new data elements that require support. Also known as Structured Query Language (SQL) databases.

Total cost of care (TCoC): A measurement of 100% of the costs (direct and indirect) of the services a patient receives over a defined period.

[13] VBID Center
[14] SAS
[15] CMS
[16] HIPAA Journal

CONTACT INFORMATION

If you are an employer or other health care purchaser interested in learning about CPR's data warehouse & analytics evaluation process, seeking support with data warehouse & analytics strategies, or inquiring about CPR membership:

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