Business Intelligence Strategy in the Community Health Environment

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The National Association of Community Health Centers (NACHC) promotes the provision of high quality, comprehensive health care that is accessible, coordinated, culturally and linguistically competent, and community-directed for all underserved populations.

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I. Introduction

The purpose of this document is to provide health centers and their primary care associations, health center controlled networks and networks with guidance for business intelligence strategy. The desire is to prepare these organizations to be informed decision makers when it comes to determining how to provide this business intelligence for their organizations. Data sources, tools and partnerships will be discussed.

What is Business Intelligence?

For the purposes of this paper, business intelligence will be defined as a set of data analysis and visualization tools that collect data from a variety of sources and arrange and display the information optimally for analytics.

Most important is the data collection and storage level; the data warehouse. The best tools transform and arrange data so that data from different sources can be combined or compared. Without this normalization process, data from disparate sources may not be valuable together. The most effective business intelligence tools also contain data down to the patient level of detail, as this level of data is often the connection point among different data sources. For example, if an organization wants to combine clinical data from its electronic health record, with claims data from one of its payers, it will need to find the common data elements between the clinical patient data and the payer member detail. Two different sources of aggregate data that do not share common data elements cannot be combined.

Once you have access to good data, the next layer of functionality is the visualization aspect of the toolset, which is the layer with which most users will interact. This interface contains reports, graphs, dashboards, tables, charts, trends, and patient level detail with the intention of making the data actionable. The capacity for business intelligence tools to show patient level detail is a critical aspect of any organization using aggregate data to make an operational difference at the patient level via outreach, care planning and coordination.

Having high quality data is the most essential part of the strategy, as no amount of sensational graphic or report generation functionality can make up for poor data input.

Why Business Intelligence Now?

Health centers and the organizations who support them- PCAs, HCCNs, Networks, IPAs (see definitions in the Audience section below), need data to maintain control of their destiny in the shifting landscape of reimbursement reform and value-focused care delivery. At the same time, these entities also have a clear charter to redesign and refine the ways in which patients receive care to maximize the goals of the Quadruple Aim. Initially coined by Don Berwick as the Triple Aim, this set of goals “is an approach to optimizing health system performance, proposing that health care institutions simultaneously pursue 3 dimensions of performance: improving the health of populations, enhancing the patient experience of care, and reducing the per capita cost of health care” (Thomas Bodenheimer). Though it helped drive quite a bit of change and a move to more patient-centered care, Dr. Bodenheimer and Dr. Christine Sinsky proposed that the “Triple Aim be expanded to the Quadruple Aim, adding the goal of improving the work life of health care providers, including clinicians and staff” (Thomas Bodenheimer). They realized we must also care for the staff delivering services to patients in order to make our system sustainable. The pressure care
delivery teams face daily is high, and they need efficient tools to support their work, along with the right mix of staff to meet the needs of the safety net population with complex medical, behavioral, and socio-economic needs.

Business intelligence will play a key role in assisting practices to better support their care delivery teams, manage and deliver care at high performance levels, and measure the efficacy of the care delivered. The goal is to use the evidence of data to determine how we affordably and effectively enable and pay for health care services in the future as a society. Community health centers need to act now to have time to implement tools, find the right staff, and make sure the data coming from systems is accurate.

Health centers and related organizations like primary care associations, health center controlled networks, networks independent practice associations, or organizations running an ACO (see definitions in the Audience section below), need a clear strategy for selecting, acquiring, and using business intelligence tools. These innovators need to be ready to provide data for themselves and others, not only to prove, but to improve the quality of care they deliver. It will also be important as this data is pulled together to understand its intended purpose. This paper will discuss the key areas to consider when assessing tools, as well as possible ways to partner with other organizations in your region to get the data and tools you need at an affordable cost.

What are the Challenges?

Organizations considering their business intelligence strategy must consider several areas: their prioritized goals, the data sources they need to meet those goals, the tools and outputs required to meet those goals, and the business intelligence model they believe would be most beneficial. This paper will discuss these areas in depth, and suggest methods for clarification in each of the four areas.

It will be challenging to cultivate agreement on cost and governance, particularly in larger groups. Leadership is critical, and it may make the most sense to elect a small committee to consider and make the decision. Often, trying to decide with each health center weighing in can lead to less robust decision-making. It tends to yield the lowest common denominator of agreement, which is unlikely to also be a strategic dynamic system. This is because needs may be diverse, especially considering different sized health centers and geographical region. Legacy systems may also play a role in influencing the decision. It can be tempting to simply adopt what is already in use by some health centers, regardless of the efficacy, because of reduced cause and quicker implementation. Existing systems may be the right tool for the group, but weigh the functionality against the needs of now and the future to be sure the solution has long-term viability.

Regardless of which role your organization inhabits, it is important to include the needs of the smaller entity (the health center) and the larger entity (primary care association, health center controlled network, and network or independent practice association) in any business intelligence strategy. Ideally, there is one product or service that can serve both using the same data, as there are economies of scale to be gained in cost and effort.

The business intelligence tool must also fit the people intended to use it. Some organizations include plans to add staff members specifically to work with business intelligence tools. Hiring staff to be internal experts on the BI tools and analyze data can be very effective, but sometimes it can take time to find the right people to fulfill the roles you envisioned. It is important to be able to still get value out of the business intelligence tools even without them;
this also lessens your dependency on staff members you may have challenges retaining because of competitive technology markets.

**Who is the Audience for this Publication?**

The goal is to provide information and guidance with special relevance for the following types of organizations:

**Community Health Center (CHC)** – community-based and patient-directed organizations that deliver comprehensive, culturally competent, high-quality primary health care services, and receive grants under the Health Center Program, as authorized under section 330 of the Public Health Service Act, as amended. Health centers often integrate access to pharmacy, mental health, substance abuse, and oral health services in areas where economic, geographic, or cultural barriers limit access to affordable health care services. Health centers deliver care to the most vulnerable individuals and families, including people experiencing homelessness, agricultural workers, residents of public housing, and veterans. We will use the terms community health center, health center and the abbreviation CHC to designate community health centers throughout the publication.

**Look-Alike** – a health care delivery organization that operates and provides services consistent with Health Center Program requirements, for underserved communities and vulnerable populations, regardless of ability to pay. While not funded by the Health Center Program, they are eligible to apply to the Centers for Medicare and Medicaid Services (CMS) for reimbursement under Federally Qualified Health Center, Medicare and Medicaid payment methodologies. Look-alikes are also eligible to purchase discounted drugs through the 340B Federal Drug Pricing Program, receive automatic Health Professional Shortage Area designation, and may access National Health Service Corps providers. We will use the term look-alike to designate look-alikes throughout the publication.

**Primary Care Association (PCA)** – a private, nonprofit organization that operates at a state or regional level and provides advocacy, training and technical assistance to health centers and other safety-net providers. Primary care associations also support the development of health centers in their state and enhance the operations and performance of health centers. PCAs sometimes partner with health centers to form health center control networks (see below) within their states and/or regions, or they may be the recipients of HRSA (Health Resources and Services Administration) health center controlled network funding themselves. We will use the term primary care association and the abbreviation PCA to designate primary care associations throughout the publication.

**Health Center Controlled Network (HCCN)** - a group of health centers working together to address operational and clinical challenges related to the use of health information technology (HIT), controlled by and acting on behalf of health centers, as defined and funded under Section 330(e)(1)(C) of the Public Health Service Act, as amended. The term “controlled” means that health centers are required to collectively appoint a minimum of 51 percent of the network’s board members. The HRSA HCCN designation is reserved for organizations that serve a minimum of 10 individual health centers. Health centers may participate in only one HRSA-funded HCCN for the purposes of receiving support in the areas described in the current HCCN grant goals. Health centers may work with both HRSA-funded and other networks for any service outside of the current grant goals. We will use the term health center controlled network and the abbreviation HCCN to designate health center controlled networks throughout the publication.
Network – a group of health centers working together to address operational and clinical challenges related to the use of health information technology, acting on behalf of health centers. Networks may be controlled by health centers, and not be funded by HRSA under the current grant, but may be past recipients of HRSA Health Center Controlled Network grant funds. Unlike HCCNs, they are not obligated to serve a minimum of ten health centers. We will use the term network to designate networks throughout the publication.

Members of community health centers, in addition to the primary care associations, health center controlled networks or networks who provide support or services to them, may be participants, leaders or board members of the following entities, which may be an important consideration of a chosen strategy:

Independent Practice Association (IPA) - is a separate business entity organized and owned by independent physician practices for use of the group’s greater leverage to negotiate more favorable contracts with payers, employers, accountable care organizations (ACO) and/or managed care organizations (MCOs), and may include group purchasing of supplies, staff, software or other resources. We will use the term independent practice association and the abbreviation IPA to designate independent practice associations throughout the publication.

Accountable Care Organization (ACO) – a voluntary group of providers, hospitals, and other health care delivery organizations, who coordinate high quality care to their patients, for the reward of a portion of the cost savings achieved by the group, as long as their quality of care still meets or exceeds measure performance standards. The idea of grouping these entities together is to align their desires to save cost by promising shared rewards. Without the alignment, hospitals might be more likely to keep treating ambulatory sensitive conditions in the emergency room because it benefits their bottom line. We will use the term accountable care association and the abbreviation ACO to designate accountable care organizations throughout the publication.

Given the typical percentage of patients who make up the health center payer mix with Medicaid as a component of their health coverage, it made sense to define the following type of organization as well, particularly as these entities may be the organizations who are most likely to provide claims data as a component of the business intelligence available to a health center.

Managed Care Organization (MCO) – an organization that contracts with state Medicaid agencies to provide health benefits and other services for Medicaid patients. These entities receive set per member per month (capitation) payments in exchange for managing the cost, utilization, and quality of health care for Medicaid patients. We will use the term managed care organization or managed care and the abbreviation MCO to designate managed care organizations throughout the publication.

Other safety-net-affiliated care practices may also find this information pertinent, given similarities in their missions and goals.
II. Data Sources and Tools

Data Sources

Practice Management and Electronic Health Records - Clinical Data Systems

Community health center practices tend to be most familiar with data sourced from their own systems; the electronic health record (EHR) or the practice management system (PM). Initially, these two systems were sold as separate tools. The PM was focused on scheduling, patient demographics, billing, and accounts receivable. The EHR was focused on patient demographics, and transactional and longitudinal clinical data. It was arranged to serve as an improved version of the former paper medical record, with better patient safety features regarding drug interactions, allergies, and a problem list. Most systems were originally designed for point of care services and were designed to revolve around the provider as the center of care provision.

As these electronic data tools were adopted by more and more primary care practices, medical software companies began to combine the two, arranging the tools around a centralized database. With this shift, patient billing began to fall more and more to the responsibility of the medical provider, as the former billing encounter that used to be captured on paper became a by-product of clinical documentation. Suddenly, the billing staff, who had become trained experts in coding and claims submission, were at the mercy of a clinical staff whose main goal was good patient care, not justifying claims. Now providers, untrained in the art of maximizing procedure and evaluation and management coding (especially in community health which has long enjoyed the spoils of encounter rate billing that ensures a base payment) were asked to perform coding tasks in addition to their increasingly documentation-heavy clinical roles.

In 2009, the federal enactment of the American Reinvestment and Recovery Act (ARRA), and the Health Information Technology for Economic and Clinical Health (HITECH), dramatically heightened the marketplace for health information software by providing significant incentives for Meaningful Use of the technology. It was intended to inject funding into provider practices to encourage the installation, adoption or upgrade of EHRs for the future goal of more robust data collection to promote patient safety, increase the use of evidence-based medicine, and create healthcare system savings. Meaningful Use brought with it reporting requirements to prove providers were consistently collecting and using data in their EHR/PM systems. These reporting requirements led to additional documentation for providers and their support staff, along with increased scrutiny of providers’ performance.

As part of their Public Health Service Act Section 330 grant requirements, health centers were already accustomed to illustrating the depth of patient services via annual Uniform Data System reports. This pre-existing skill-set for reporting gave health centers an advantage over private practices, but many community health centers still had a lot to learn when it came to clinical quality measure reporting, which combines data elements from the PM and the EHR in the measure logic to calculate the denominator (the qualifying population of patients) and the numerator (the number of patients in the denominator who were in compliance with the measure requirements).
Figure 1: Anatomy of a Measure

The significance of the combined data elements from two separate tools, even when they share the same data base, is that neither of these two systems was designed to provide the kind of business intelligence needed by health centers today. EHRs and practice management systems excel at collecting transactional data for individual patients, and organizing a patient’s information for safety (e.g., medication and problem lists). They are not well suited for arranging the patient data as a whole for effective team based care for population management that enables data-driven chronic disease management or preventive care.

Before the UDS (Uniform Data System) clinical quality measures were added, health centers did have some experience with early clinical quality measure reporting. In 2000, HRSA's Health Disparities Collaboratives (HDC) focused on quality improvement in a shared-learning environment to identify disparities in care or quality that could be the result of race, ethnicity, language, education, insurance status, or other characteristics or socio-economic circumstances. Along with UDS and Meaningful Use clinical quality measures, and the clinical quality reporting required by various Patient Centered Medical Home recognition processes, community health centers are well-prepared for the era of reimbursement reform and the risk adjustment that will accompany it. Understanding these disparities as well as health centers already do, enables them to turn that knowledge into better collection and documentation practices for the demographic and clinical data elements of Social Determinants of Health, (previously referred to as disparities), which will hopefully become key aspects of community health related risk adjustment practices.

To be successful in the market today, health centers need three things: 1) sophisticated tools to extract data from the EHRs and generate the reports they need 2) tools that help to visualize data in a usable and actionable form and 3) knowledge on how to maximize data – informed by their organizational goals. Some of these reporting tools may be on premise reporting tools sourcing only one health center’s data, while other tools may be purchased and service all the member centers while also providing the network, health center controlled network (HCCN), or primary care association (PCA) the data it needs for advocacy, grant and other needs. The current challenge for community health centers and their advocacy organizations is mastering ways to combine their valuable clinical quality data with other sources that magnify their existing assets.
The ability to turn data into information and to use it appropriately can be a difficult to accomplish. In 2010, Robert Lloyd, the Executive Director of Performance Improvement for the Institute for Healthcare Improvement (IHI) highlighted that data for improvement (or other reasons put forth here), needs to be analyzed in the context of how it will be used – accountability, research or improvement. Lloyd highlights that health care data is messy and if we are to make improvements we must determine what we are measuring and be able to turn that data into information – which can be used to drive our actions. If we fail to analyze data in the correct context we risk coming to the wrong conclusion by ‘thin slicing’. Malcolm Gladwell, in his book Blink, described thin-slicing as when we find meaning in data by using only very small slices of the data (Lloyd)(Healthcare Executive, July/Aug 2010 ACHE.org).

**Figure 2: Clinical System Data Reporting Hierarchy at Community Health Centers**

**Operational Data**

Operational data refers to the data needed to support clinical care activities and is a subset of data most commonly found in PMs and EHRs. Basic data regarding provider visit volumes and appointment types, no show and cancellation rates, peak call volumes and response times, helps guide the provision of care, which can be chaotic and wasteful. In the past, when Practice Management Systems were more robust and in comparison, EHRs less mature, this was often the only data that was easily available to practices to help make changes to care processes. A classic example of using PM data for operational improvement is the examination of possible seasonality of no-shows, to help plan scheduling practices to potentially offset peaks in the no show pattern.

However, with the proper integration, operational data can be embellished with clinical data to help identify focus areas for improvements. An example would be looking at no show rates to see if they vary across chronic condition, or looking at the frequency of visits for patients with newly diagnosed hypertension. Operational data can provide...
insight into the patient experience, increase staff satisfaction, and help identify and minimize issues related to patient safety.

Financial Data

Financial data is used to assess the viability of the organization and is determined by expenses needed to provide care, as well as revenue from fee for service, in-kind service and grant funding. The comprehensive nature of services provided and allocation of resources associated to funding can make it difficult to understand the actual cost of care based on the patient population. HRSA looks at total cost per patient, medical cost per visit and grant cost per total patient, but there are other indicator measures (e.g., days in AR (Accounts Receivable), charges per visit, days to submit charges, days to submit claims, adjustments and rejections) that have historically been used to assure the center is capturing and maximizing revenues related to care delivery. Fee for service based payment is strongly driven by these measures and is heavily tied to provider volume and dependent on medical coding associated with that visit.

The prospective payment system (PPS) enables health centers to be less rigorous in their coding practices because most of their patient visits are reimbursed with encounter rate billing today. Complete coding of all billable aspects of care provided is considered “nice to have” but given the other pressures on providers, has not been required. Now, a focus on improving coding support for providers and making it easier for them to code appropriately is essential. The transition to a value based approach requires a paradigm shift, one which expands the focus of revenue being driven by provider (the main billing unit) vs a team care based approach. And in this case, the team includes any staff member who might be involved in patient care. Education on coding best practices and regulations is needed more than ever to assure that a patient’s conditions are accurately addressed and captured via billing procedures to accurately reflect risk, which impacts payment. As with the operational data, the ability to assess the costs with patient condition increases the value of the data and allows for greater breadth of interpretation. While there has long been a debate regarding the assessment of patient risk based solely on claims data. Unfortunately, it is the only centralized format by which the data about patients and their care is consistently reported.

Combined with payer cost data, practice level data can be used to calculate what is known as total medical expense (TME), defined as: the “total medical spending for a member population based on allowed claims (payer paid amount plus patient cost sharing) for all categories of medical expenses, as well as all non-claims related payments to providers” (CHIA Center for Health Information and Analysis).

Total medical expense is the window into the possibility of change, and ultimately, change that can positively impact healthcare spending. In 2007, it was reported that primary care represents an estimated 6 to 8 percent of national health care spending (Allan H. Goroll). While that is a rather small percent of overall spending, in 2010, primary care visits accounted for 55 percent of the 1 billion physician office visits each year in the United States (National Ambulatory Medical Care Survey). These statistics provide a glimpse of the opportunity for health centers to impact change by better understanding the care their patients receive outside of their walls. Extended hours and access is one area where medical home initiatives have accelerated change. By staying open later and on weekends, patients can avoid the added costs of the emergency room, and receive care from a team who already knows them. When ER visits do occur, centers can use ADT (Admissions Discharge and Transfer) data to optimize the care transition, provide patient support to prevent additional ER visits or hospitalization.
As new programs and approaches are put into place, expect to see cost shifts versus just reductions. Take for example, the complex chronic care patient with multiple emergency room visits (e.g., two to three times a month), and multiple hospital admissions. When connected to a care manager who made twice weekly contact and a home visit on Fridays, his ER visits and admissions dropped significantly. Many of these visits had been driven by anxiety and fears, complicated by his medical conditions. So, while his complex chronic conditions did not go away and costs have stayed stable, he and the care team were much more satisfied with the results (and more hospital beds were available for those who really needed them).

**Human Resources Management Data**

Human Resource Management Labor data allows for the comparison of employee hours worked to the care provided. In the past this has been done manually by taking very basic full time equivalent (FTE) information regarding support staff and revenue generating providers, and superficially connecting it to patient visit volumes and revenues. When you are able to integrate the labor data with clinical systems, various supporting FTE hours can more easily be attributed to providers, and those ratios can be attributed to specific locations, service areas or programs within an organization. Total labor expenses based on those who provide care can be quantified and connected to visits and/or specific patient conditions, helping one to evaluate what supports are truly needed to provide care to patients who are seen in the center. It will also allow an organization to look more closely at the costs associated with patient ‘interactions’ such as phone calls, secure messaging, advocacy roles, care managers and other enabling services for programs and or specific patient populations.

**Hospital Admit, Transfer or Discharge Data**

One of the next obvious sources of valuable data outside the walls of the health center is Admit, Transfer or Discharge (ADT) data. There has been steady focus on savings to the overall healthcare system and avoiding use of the emergency room for ambulatory sensitive conditions. Preventing unnecessary admissions or re-admissions are some of the more prominent areas of this effort because they comprise a significant portion of needless cost. The historical challenge for community health centers has been a lack of consistent information or notification about utilization of the emergency room or admission/discharge/transfer from the hospital. Care transitions from the ER or hospital are notoriously risky for patient safety and quality of life because of possible changes in medication or needed follow-up care that may not be attended to if the primary health care team is not aware.

Information about these patient care transitions is traditionally handled by faxing lists of discharges or transfers to the triage nurse at the health center. Sometimes even identifying a patient belonged to a particular health center or provider is challenging because patients do not always remember who their primary care provider or organization is at the time of an emergency or hospital admission. This makes it difficult to know who to notify, and with appropriate fears of violating HIPAA and incorrectly notifying a provider who is not the patient’s provider, organizations err on the side of conservatism. For health centers, this has generally led to a lack of information, and thus less ability to care for patients who are experiencing care transitions they are not expecting.

When considering integrating an ADT feed into your data warehouse, focus on hospitals who see the highest percentage of your patients, as this will yield the largest amount of relevant data for care coordination purposes. However, if the hospital with fewer admissions or ER services for your patients is willing to provide the ADT feed, use the opportunity to integrate information into the appropriate system. If it is possible to connect an ADT feed for a whole PCA/ HCCN/ or Network of centers, the conversation with a hospital becomes much easier because they
have the opportunity to provide this critical information to a large number of health centers, with the work effort of building only one connection to a data warehouse.

In addition to volume, consider the frequency of ADT data sharing. Ideally, ADT feeds should be daily in order to maximize a health center’s ability to care for patients with care transitions as quickly as possible. If receiving the information daily is not an option, take the next smallest increment of frequency available, such as a weekly feed, and continue to advocate for more frequent feeds. Increasing the frequency often becomes an option with the cultivation of a relationship between the health center and the IT team at the hospital, building trust over time. Once the hospital IT department is comfortable, the process is not too great of a burden for them, they may be willing to support sending the data more frequently. Similarly, if a PCA/HCCN/Network requests the ADT feed for all of its constituent health centers, there is also additional leverage for receiving the ADT feeds at the optimal frequency for intervention. At that volume of impact, it becomes much easier for the hospital to justify the effort.

For states who took advantage of the Section 2703 of the Affordable Care Act, a provision for states to implement Medicaid State Plan Amendments (SPAs) to create health homes, there is particular value in getting the ADT feed. The health home program’s focus, in part, is on care coordination and care transitions for the highest risk, highest need patients in health centers’ populations. In these programs:

A health home is a Medicaid State Plan Option that provides a comprehensive system of care coordination for Medicaid individuals with chronic conditions. Health home providers will integrate and coordinate all primary, acute, behavioral health and long term services and supports to treat the “whole-person” across the lifespan (Centers for Medicare and Medicaid Services).

An ADT feed shared or connected at the PCA or HCCN/Network level would enable timely ability to arrange follow up primary care visits, and perform the requisite medication reconciliations that ensure a comprehensive medication list. There is a health center controlled network in the Midwest that receives per member per month incentive payments for the SPA health home patients of its community health centers, and one of the required measures for reporting evaluates timeliness of care transitions and care coordination. Access to ADT information would greatly simplify the work it takes team members to access and coordinate information about care transitions for their health home population.

Another option for an ADT feed to either a health center or PCA/HCCN/Network would be a feed from the Health Information Exchange (HIE). HIEs will be discussed in greater detail below, but the benefit of an ADT feed from an HIE is that it can supply all participating hospital’s ADT data using a single point of connection to the data warehouse of the health center or the PCA/HCCN/Network. This method is the most efficient and effective, but depends on the HIE environment and the level of participation of the hospital’s in the region.

Health Information Exchange Data

Health Information Exchange (HIE) is, “a network, intermediary, or service organization that helps route information among various participating providers and allows them to share and access patient health information” (Pritts). There is little question of the potential value a Health Information Exchange can offer, but in most regions, its full value has not yet been realized. Interoperable exchange of health data can provide much greater levels of patient safety and quality of care delivered, and also tremendous cost savings for the health system as a whole by streamlining the cost of making information available, preventing errors and avoiding duplicate tests. If we con-
Consider the value proposition of lab tests alone, according to Partners Healthcare, “Both freestanding and hospital-based outpatient clinicians use external laboratories. Interoperability between these organizations would enable computer-assisted reduction of redundant tests, and it would reduce delays and costs associated with paper-based ordering and reporting of results” (Jan Walker). The promise of improvements is quite large, but there have been numerous barriers to reaching those results.

Interoperability between HIEs, its suppliers and consumers has not been as easy as envisioned. Even now, in most states and regions, “variation in health IT standards implementation has required providers to rely on alternative methods for exchanging health information (e.g., direct secure messaging), which are not viable solutions to true interoperability” (Kyle Murphy). Not only are interoperability standards surprisingly subject to interpretation when being implemented between two entities, but the cost of integration can be prohibitive for many organizations. This can be especially true for community health centers who may not have extra funds to build the connection. “EHR vendors charge between $15,000 and $70,000 for provider interfaces”, (Kyle Murphy) which makes the case even stronger for connecting HIEs to shared data warehouses of PCAs/HCCNs/Networks. In that model, one interface serves data to multiple practices and spreads the cost too, making the whole enterprise more manageable.

Consent models can have a significant impact on the completeness of data shared through an HIE. Providers are often concerned that information from an HIE is incomplete, depending on what a patient has agreed to share, and state-specific laws on confidentiality and data-sharing. Incomplete data from a health care provider’s perspective can lead to patient safety issues if a decision-altering piece of information has been excluded from the patient’s shared records. On the other hand, patients are understandably concerned about their privacy. They also worry about who may have access to data in an HIE, “particularly information that is related to health conditions considered “sensitive” by most people, including information related to substance abuse treatment, mental health, and HIV/AIDS status” (Pritts). Two consent models were developed in order to document and facilitate patients’ preferences. One model is called “Opt-In” and requires a patient to fill out a form and choose which data he or she would like to share through the HIE. The other model is called “Opt-Out” in which a practice starts with the assumption that all patients prefer to share their data with the HIE, and requires a patient to sign a form that revokes their permission for the provider or health care delivery organization to share their data with the HIE. If a patient does not consent to share his or her information with the HIE at all, then no information will appear in the HIE, but if a patient chooses not to share certain pieces of data for privacy reasons, a provider working with the shared data cannot know that some information has been excluded, and could make care decisions that endanger the patient’s life.

HIE comes in many different flavors, and it is a good idea to understand the complete landscape of HIE offerings in the region your patient population inhabits. If your EHR has the capacity to share data among the same EHR users, and many health care organizations in your area use the same EHR, you may want to take advantage of this functionality. Due to innate interoperability, it is relatively easy and cheap to access health information on episodes of care that occurred outside your health center because they are available right in your EHR with the click of a button. Consent concerns are manageable as patients choose their level of consent to share data among practices when they become a patient of the practice. This is usually an opt-in consent model, but it is built into the process of becoming a new patient, causing the rates of consent to share to be fairly high. In addition, the density and consistency of data in these sources tend to be high quality, accurate, and easier to integrate into your system, because it is in the same format, supplied by the same EHR. Conversely, if you have this capacity in your EHR, but you are one of the only users of a particular EHR platform in your area, you may not get the full benefit of the functionality. Without the volume of same EHR platform users, your area will not offer a wealth of shareable data; consider this as you evaluate methods of HIE data access.
For HIE beyond the EHR itself, health centers will likely need to evaluate several health information exchange organizations in their region. Multiple hubs for information sharing can create unhealthy competition and fractionation of the information sources in a state or region, but can also serve to inspire better technology and service from competing HIEs in a region. Depending on the HIE environment, it may make sense to connect to all, and for some it may make sense to focus on the one that offers the greatest value – usually the one with the highest volume of patient data that is relevant to your patient population. There might be an HIE that focuses on one particular type of data, has a high volume, and is regarded as highly successful, but as that type of data may not be relevant to most of your patients, it may not be worth the effort to connect. However, there may be compelling reasons to connect to two or even more. This leads to the need for multiple interfaces to HIEs and managing multiple relationships which can be confusing and burdensome for health centers and other primary care delivery organizations. Health centers are used to being aware of the political environment associated with any initiative, and in this case, they need to consider the political implications of their HIE partner choices; they want to be careful not to offend an entity that will someday be in a position to negatively impact their practice.

When considering HIE partners, be aware there are differences between state or publicly funded HIEs and their privately funded counterparts. According to Dr. J Marc Overhage, the former Chief Executive Officer of the Indiana Health Information Exchange and Director of Medical Informatics at the Regenstrief Institute:

In general, privately funded HIEs are growing at a much faster rate than publicly funded HIEs. From 2010 to 2011, the number of live public HIEs in the United States rose from 37 to 67, whereas the number of live private HIEs more than tripled from 52 to 161. Most statewide HIEs have been slow to mature. One common problem is that health care markets are not limited to State borders (Innovations Exchange Team based on interview with J. Marc Overhage).

Based on the numbers reflected above, it seems that privately funded HIEs may have an edge on publicly-funded HIEs (especially in the early growth phases), but as the surviving public and state funded HIEs mature, and realize their more robust data collection and sharing capacities, they may dwarf the privately funded health information exchanges. State funded HIEs may also be more likely to get access to Medicaid claims data due to their relationships with their state stakeholders. Medicaid claims information is highly valuable to health center affiliated organizations given the high percentage of Medicaid insured patients in the health center patient population. On the other hand, state funded HIEs are sometimes dependent on grant funding. Until they can create a financially profitable value proposition for the use of their data, they may be less financially stable than privately funded HIEs.

Finally, all HIEs sign data sharing agreements with the practices they partner with. Be sure to read these carefully and consult your attorney. It is important to understand the liability and indemnification agreements within these documents, and ensure that your organization is protected to the greatest extent possible.

**Payer Data**

Payer data comes directly from the health plan or insurer, and while there has been some increase in transparency, it remains somewhat elusive and has largely been unavailable to health centers. When available, the depth of detail and the manner in which payer data is shared can make its ingestion very complicated. The underlying power struggle of who the data belongs to and how it is used to measure performance has created more barriers than goodwill. Below is a description of the key challenges associated with payer data.
Payer type and plan administration

While health center patients are largely State Medicaid, the centers will also have federal Medicare, commercial plans, third-party administrators for other health services, and MCO’s for specific population subsets. Each of these will have varying guidelines for the types of codes used for billing, with significant variation for new services such as nutrition, diabetes education, telemedicine, group visits, and care management services, which makes coding and administration complicated. Add to that, differences in credentialing of providers (e.g., NP, PA, Nutritionists) and residents creating confusion around assigned billing and rendering provider information.

Data Access and Usability

Interactions between payer and health centers in the past have been limited to referrals and authorizations for individual patients. Additionally, the center might be provided quality measures that they were asked to supplement with clinical information to rate provider performance. This data would then be used to set quality incentives and/or to negotiate payment rates, with health centers having little control over what data they received, when they received it, or how they might use it. Data access ranges from individual patient level data accessed telephonically or by logging into a member portal to receive direct data feeds from the payer. An ongoing challenge for health centers is understanding the members assigned to them; especially when they have never been seen at their health center.

Payer data can be divided into two components – enrollment/attribution data and cost data. While the cost data is important, it can be more difficult to decipher and require additional resources. Enrollment data has historically been available as a download in PDF, CSV or Excel files; it was labor intensive to manage member churn and identification of those patients with the greatest needs. Integrated enrollment/attribution eliminates the need to do manual matching. Centers should start with a two-pronged approach by allocating resources to first conduct outreach to attributed members that have never been seen at the center, and second to contact members that are patients at the center, but have not been seen recently and have no scheduled appointment. The second prong can further be prioritized by cost or assigned risk.

Claims data is dependent on timely submission and adjudication and processing by the payer. By the time data is received it is often two to three months old, limiting its usage for actionable change. In addition, the information in the summaries can be limited due to transparency and proprietary concerns regarding sharing actual cost and instead only getting billable amount costs. The sheer volume makes the analysis of the data complicated and time consuming. Not to mention the need for skilled data analysts/managers to render it actionable. If one is able to get direct feeds or file feeds regularly, there is opportunity to create efficiencies in the use of the data to support care improvement processes. All-Payer Claims Databases are available in at least 16 states and were designed to inform cost containment and quality improvement efforts (National Converence of State Legislature). All-Payer claims data is a collection of enrollment, benefits, diagnosis, claims and cost data provided at the service level. It is usually presented at an aggregated level and identifiable patient data is not available. So, while you will learn about the center’s population, you will not be able to use it to treat specific patients.
Service Categorization and Risk Classification

The other challenge with payer data is a lack of consistency in how the data is aggregated – what services are put into what categories for summarization and the use of algorithms to calculate risk. Risk algorithms will vary based on the goals of the payer program, with many focusing on the reduction of hospitalizations, reduction in high cost patients, identification of risk/utilization or focused improvement in quality metrics for a specific high risk population. These risk algorithms are often proprietary, complicated and primarily driven by the data which is available to the payer – claims (not clinical data). Examples of such risk algorithms include but are not limited to Hierarchical Condition Categories (HCCs), Delivery System Reform Incentive Payment (DSRIP), Adjusted Clinical Groups (ACGs).

Claims based risk information, while complicated, can be extremely powerful when combined with clinical EHR data.

Independent Practice Association Data and Accountable Care Organization

An Independent Practice Association (IPA) is considered a Clinically Integrated Network, and is comprised of independent providers who are working together to provide high quality care in an efficient manner while the ACO is a more formalized entity which takes on financial risk through agreements with payers (PYAPC). While there are multiple legal requirements related to the fraud and abuse laws (e.g., Stark Law, Anti-Kickback and Civil Monetary Penalties Act) for both, the less formal IPA entity is specifically required to demonstrate clinical integration compliance. One primary requirement for this is the ability to demonstrate clinical integration via data driven goals aimed to improve the health of their population using evidence based guidelines, management and governance. This cannot be done without data technology tools.

With data from all the aforementioned types, IPAs and ACOs will have their ‘own’ set of data to analyze and distribute to their members. The data both in aggregate and broken down by provider and/or organization will help the ACO/IPA demonstrate adherence to quality protocols, performance and variation that identifies opportunities for improvement. This aggregated data is extremely rich, as it represents the larger population and can help health centers negotiate contract rates, create partnerships with community agencies and solicit grant funding.

Patient Survey Data

Over the past twenty years, there has been an ongoing paradigm shift towards patient centered care as a core component of care redesign to improve health outcomes. To support and guide how that shift is accomplished and its impact, data is collected from and/or by the patient regarding their perception of their health, treatment, learning preference and overall experience of care. Surveys and tools are often organized using the six domains of care, safety, patient-centeredness, effectiveness, timeliness, efficiency and equitability, and have been incorporated into important demonstration projects to assess program and tool effectiveness. (Agency for Healthcare Research and Quality) The standardization of such tools facilitates the ability of an organization or network to interpret and implement interventions across networks. Tools used to evaluate patient experience, such as the Consumer Assessment of Healthcare Providers and Systems (CAHPS) tool, remain most common, and are often used as part of a Patient Centered Medical Home recognition program or as an evaluation component of other programs.
In the patient survey data realm, there are other tools that are being used to evaluate self-health:

![Patient Survey Tool Table](https://via.placeholder.com/150)

<table>
<thead>
<tr>
<th>Type of Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activation</td>
<td>A patient's knowledge, skills, ability, and willingness to manage his or her own health and care and readiness of the patient to engage in their healthcare (James).</td>
</tr>
<tr>
<td>Social Determinants of Health</td>
<td>The availability of resources to meet daily needs (e.g., safe housing and local food markets), Access to educational, economic, and job opportunities and access to health care services. Preferences — information regarding language, learning and communication as well those that compare a patients' sense of their health and well-being with that of their provider (Healthy People 2020).</td>
</tr>
<tr>
<td>Shared Decision Making</td>
<td>Understanding what is important to the patient and its impact on treatment decisions.</td>
</tr>
</tbody>
</table>

**Figure 3: Patient Survey Tool Table**

These tools can better help the care team understand their patients’ needs, and some will help illustrate the gap between the patient and his/her team’s perception. While these tools are less consistent in their use due to the current level of acceptance, degree of electronic access/administration and cost, as the paradigm continues to shift, it will be important for this data to be available to understand individual patient care and the programmatic health and needs of the larger health center or network.

One other type of data to consider is biometric data i.e., blood glucose monitoring, blood pressure, weight, and activity. It is not yet clear how that data should be integrated and used, but expect to see more on this in the near future. Kiosks, online and mobile applications and recognition and acceptance of ‘patient’ report data (vs that vetted by the medical professional) will also advance the use of patient survey data. Most importantly, when able to use this information electronically with other healthcare data, we have a more robust picture of the needs of the individual patient and the larger population.

**Patient Portals**

A patient portal is a secure online website that gives patients convenient 24-hour access to personal health information from anywhere with an Internet connection (HealthIT.Gov). Patient portals look very different across organizations but are designed to put the patient’s health information in their hands, helping to improve the patient/provider relationship, and increase engagement around positive health outcomes. Despite regulatory mandates to use portals, many providers continue to have reservations. Some organizations implement the more straightforward aspects of patient portals such as appointment request/scheduling, prescription refills, viewing of clinical summary, meds, allergies. More mature organizations allow secure messaging, collection of patient administrative and survey data, viewing of notes, labs, the ability to update their own information, payments and educational resources in their portals. Organizations that have succeeded in the use of portals have been at it for over ten years and have now achieved adoption rates higher than banking systems e.g., 70% vs 51% (Terhilda Garrido).
Map of Key Data Sources in the Community Health Center Environment

The following diagram is an illustration of an idealized business intelligence system, where the most important data sources feed into one central data warehouse that normalizes the data to make it usable for analysis and comparison. The diagram identifies data sources which are "internal", or sourced from within the community health center's own systems, as dark blue database cylinders. Data sources which are "external", or sourced from systems outside of the health center's systems are pictured as orange database cylinders.

To evaluate which of these data sources are most essential in helping your health center achieve its organizational goals, see the Data Assessment chart under the Strategic Assessments section below. It is important to remember that some of these data sources overlap, and it may not be necessary to go after all of these data sources individually. For example, an organization may decide that ADT data is one of the most critical sources of data needed to properly coordinate care transitions for its patients. An organization could choose to pursue one or more ADT feeds directly from the hospital, or it could pursue integration with an HIE that offers both of the ADT feeds from target hospitals. One strategy may not be superior to the other, even though there are economies of scale offered in the HIE solution. Another key aspect of strategic data acquisition is the accessibility of the data. For example, if there is not a robust relationship with the HIE that offers the two ADT feeds, it may make sense to build one. However, if the existing relationship is not likely to improve, but relationships with key executives at the two hospitals are good, the quicker path to higher value may be to build the two individual ADT interfaces.

![Figure 4: Data Sources](image-url)
Data Tools Needed for Health Center Business Intelligence

Having identified the critical data sources to create additional value in community health center settings, it is time to consider the necessary outputs of those data sources. What tools will help health centers be most successful in the ever-shifting environment of reimbursement reform, value based care, and shared savings incentive programs like ACOs?

Population Health Management and Performance/ Regulatory Reporting Tools

Population health management is a suite of reports and analysis that helps a health center manage care needs and gaps for a patient population. Usually there are registries, which display the patients who meet the criteria of the report. Age, gender, preventative care and chronic disease are typically the most important characteristics for being included in a registry, but sometimes medications and risk levels are included. Registries contain the patients who need care, but also list the screenings, labs, education, vitals, and other salient aspects of the patients’ medical care to help care managers and others plan for care coordination and outreach as needed. Usually considered together, all health centers also need regulatory compliance reports that calculate and display measure performance for reporting requirements like UDS and Meaningful Use. Performance/Regulatory reports usually contain measures, and may provide visual display of performance with graphs charts and trends, as well as tables and the ability to drill into location, provider, and patient level of detail. Patient level detail makes it possible to see which patients comprise the denominator of a measure and why, along with which patients meet the criteria of the numerator and why/why not. This is essential for data validation and troubleshooting. Performance reports may also be used for quality improvement evaluation, planning, and intervention, and for sharing performance with staff, or tracking quality performance for provider and staff incentive payments.

There are several options for population health management and compliance reporting tools because these are the most mature of the business intelligence available for health centers. Most practice management and electronic health records contain native reporting tools for population health and compliance reporting, as they were required for electronic health certification under Meaningful Use. As these systems are designed for transactional data collection, reports from the electronic health record and practice management system are more limited, may or may not provide patient level detail, and may not be able to provide comprehensive visit planning reports to prepare for patients coming to the health center for an appointment. Instead, they often provide a list of alerts in the patient’s chart, making the operational use of these for huddling purposes a barrier. On the other hand, some providers and care team staff prefer the integration of these reports or lists with the EHR because it is the tool they already use every day.

Some practices have chosen to build their own population health reporting tools internally with report writing software or using a database with their PM/EHR data. Often the teams building these reports are incredibly diligent and talented, but they struggle to keep up with the frequent changes to measure definitions and requirements. Teams tend to be overwhelmed with requests for data queries and new report builds, and find it challenging to recruit and retain staff due to competition with the tech industry in more urban areas, or less talent to choose from in rural areas. Most health centers have some internally built reporting, or the capacity for one-off querying or data analysis because there are always requests for data for grant applications that do not align with existing reports. Further, there are newly emerging reporting needs that must be addressed immediately; while they wait for the reporting from a product or solution to catch up.
The next method is to use a custom solution or consulting company to collect requirements and build the data warehouse and reports, or just the reports needed by the health center. This can be expensive to maintain, but also gives the health center the greatest control over the aggregation of their data and the reports produced. They can get adjustments or changes more quickly because they do not have to wait for the roadmap of a product to add a new piece of functionality.

Finally, health centers have the option to choose a product to help with their population health management reporting needs. They could choose a product that contains a data warehouse, along with the visual display layers. This means the product would extract the data from the practice’s systems, normalize and optimize the data for analysis, and then display the data as reports and graphics. Many community health centers choose to go with a product for reporting because they can outsource the work and be able to spend more time on other projects, making better use of their talent and knowledge. Products handle all the stress of regulatory changes and updates, but requesting new functionality can take some patience as these companies have to consider the needs of a variety of health centers (or perhaps non-health center clientele). They may not have the as much flexibility either. For example, changing a report for one health center, could have a negative impact on another health center’s data without proper consideration. Another option is for a health center to purchase a visualization reporting tool which lays on top of the existing PM/EHR data at a health center. It can produce graphics like charts and graphs with trend lines. Often additional reports can also be written in them. These products do not usually remove the stress of the regulatory updates, because the tool has to be updated by the health center; updates are not being made for them. More often, they are purchased with the idea of producing fancy sophisticated graphics from a data warehouse that is already doing most of the heavy lifting of the calculations and reporting. The visual layer simply takes that data and displays it.

**Patient Engagement: Patient Point of Care Devices and Inter-Visit Communication**

In today’s rapidly evolving world of wearables and ‘smart’ handheld technologies, the ability for patients and care teams to communicate electronically is rapidly expanding. In 2013, it was reported that one in five report using technology to track their health data, slightly less than those who track their health on paper (DUGGAN). When patients spend only a very small fraction of their time ‘in’ a health care setting, using biometric data such as blood pressure and glucose readings for at risk patients could indicate the appropriate need for an office visit and help to avoid unnecessary emergency room visits. One simple remote monitoring tool is the technology available that indicates whether a patient has taken their medications, a challenge for many elderly patients with multiple medications. While the value is obvious, health care providers have concerns about the amount and management of such information. Biometric information can be integrated into the EHR, connected through a patient portal or integrated with multiple technologies that provide analysis and interpretation to enhance use.

Another important patient engagement tool is the application designed to assist patients with self-management and being more actively engaged in their care when not in the provider’s office. Using a simple app on their cell phone, patients can collaborate with a health coach to set goals, monitor interventions, receive reminders, get progress updates and ask questions to support their self-care (think FitBit, AppleWatch with a coach). The coach can engage with and monitor a large group of patients efficiently through electronic outreach.
Care Management Software

The definition of care management is “a set of activities designed to assist patients and their support systems in managing medical conditions and related psychosocial problems more effectively, with the aims of improving patients’ functional health status, enhancing the coordination of care, eliminating the duplication of services, and reducing the need for expensive medical services” (Bodenheimer T). Where population health tools help the health center identify populations at risk using performance and compliance tools, care management solutions assist with the management of those patients identified as high risk that can be impacted by the services provided through care management.

Care management activities and tools needed will vary across organizations and often depend on the goals of the organization and available resources. Care management programs for a smaller center may be locally managed, while organizations with multiple sites may share resources and distribute activities based on the complexity and or risk of the patient. Clarity in approach is crucial to the selection of the tools needed to be successful. A comprehensive care management tool provides for the following:

- Aggregated patient data across multiple systems.
- Integration of evidence based guidelines and care protocols to create care plans.
- Ability to assign patients to specific programs or care managers.
- Care Coordination capabilities to facilitate documentation and communication with patient, health care team and community providers.
- Patient engagement and outreach tools that facilitate the use of care plans and goal setting for the patient and monitoring of those activities.
- Operations / evaluation tools to understand program effectiveness.

An ideal care management tool and or interface allows for bi-directionality of data to support a comprehensive care record without duplication of efforts. A smaller program may start out customizing templates in their EHR and soon identify that to be effective, additional tools are needed.

Operations Reports

Operations data are mostly process measures that help you understand the core functionality of the organization. Identifying the core set of operational measures that align with your overall goals and monitoring them on a regular basis allows for early identification of opportunities for improvement. Operational measures become even more meaningful when they are evaluated through the lens of social determinants of health, disease conditions or risk, so interventions for improvement can be more targeted. Below is a list of operational measures an organization might use:

Appointment Statistics

- Visit Volume
- Access/3rd next available appointment
- Cycle time
Panel Management
- Panel Size
- Continuity with PCP and/or PCP team

Medication Management
- Refills
- Pharmacy Calls

Communications
- Phone and/or secure messaging volume and response times
- Analysis of reason for communication
- Time to answer calls

Referral Management
- Open referrals (all stages)
- Referral patterns

In this changing world of reimbursement, it is important that leadership use caution in how the data is used. An organization that talks about issues regarding volume and access as provider driven issues only is going counter to the shift toward value based reimbursement where engaging the full team in the solution is important.

Cost of Care/Labor Reports: Community Health Center Finance Reports – Getting Paid

Understanding the various costs associated with providing care is another area organizations should pay close attention to. When looking at how an organization is paid, look at these three buckets – claims, coding and labor expense. The ability to identify issues that are preventing the organization from getting a clean charge out the door quickly and back in with minimal intervention reduces staff costs and is a good indicator of financial health. Additionally, recognizing over or under coding can not only prevent the triggering of an external audit, but it can also identify opportunities to appropriately identify risks and assure per member rates are set appropriately. If an organization integrates labor expenses with charges, provider staffing ratios become easier to evaluate, and labor expense per visit can more easily look at staff that have more direct roles in the provision of patient care. Below is a list of commonly used reports:

Claims Processes
- Days to file a claim
- Denials/adjustments
- Charges per encounter
- Days in AR
**Coding Distributions**

- Distribution of coding levels
- Use of secondary codes with primary billing codes

**Labor Expenses**

- Total labor expenses
- Total labor expense/visit
- Support staff to provider ratio

**Claims Integration or Payer Data Reports**

Integrated claims data has many benefits, the first being that understanding who you are responsible for in an ACO or other payer based programs is greatly simplified. Using electronic algorithms, member data from the payer is matched to patients in the EHR. Reports that analyze matched vs not matched members can be used to prioritize outreach efforts for members that have never been seen at the center, or those that have been seen and are overdue for care.

Additional data that can now be used includes enrollment dates, site/PCP assignment, cost, payer risk, predictive scoring if available, emergency and inpatient utilization, care gaps, and costs associated with high risk procedures, pharmacy, behavioral health or long term care services. When negotiating for data, the organization should advocate for detailed claims to facilitate the level of analysis and information available to understand the source of costs. Claims data will also allow an organization to see gaps in information such as important admission or procedural data (e.g., colonoscopy, eye exam, mammogram) that is available in claims data, but not in the EHR. Just as important is the EHR data such as social determinants of health or other risk factors that might not be evident in the claims data available.

Payers may provide their own risk algorithm, which an organization may use as a part of a custom algorithm based on both EHR and payer data. The payer may also provide predictive analytics data based on claims that identifies members who are likely to get sick or require additional services (based on past claims history). There is also some caution that should be taken when interpreting claims data. Claims received are not raw data and must first be adjudicated resulting in up to a 90-day lag to see all payments associated with a date of service. There are two caveats to remember when using claims data. The first is that claims history is only reflective of the services that the member has utilized while under that specific payer program. The second is that some patient events, such as cancer treatment or an auto accident, may be time limited and/or unavoidable. In these circumstances, you may want to exclude them when deciding where to spend staff resources for outreach and intervention. Costs associated with these patients are much less prone to influence. Reports below are common for payer data and as mentioned above may be ‘sliced’ by other key data points from the EHR.

- Member match – by age, recent encounters, cost, diagnosis
- Newly eligible and ineligible members
- Member churn rate
- High risk patients – based on either payer or internal algorithms calculations
- Integrated claims / EHR data to complete care gaps
- HEDIS quality measures - EHR and enrollment based
- Emergency and inpatient utilization rates
- Total cost of care
- Distribution of cost – to identify high cost categories

**Epidemiology and Evidence-Based Medicine Research**

Some health centers or their PCAs, HCCNs/Networks may have already partnered with local departments of health to use data feeds of symptoms, diagnoses, vital signs, and other data elements to predict and track disease outbreaks. There is also great promise in the possibility of using community health center data to do research to better understand medication or lifestyle recommendation treatment efficacy, trends, and patterns that may offer new insight in care management to establish better evidence-based medicine. Some of this work is being done by pharmaceutical companies who value the data of the community health center population. Usually, the data needed for this kind of research is an output of a data warehouse, sent to an outside entity for analysis, rather than being an expected analytic capacity of a standard data warehouse today.

One PCA in the northeast has been sending a subset of its patient data to a disease surveillance software system for a few years, to analyze it and discover events of public health importance as early as possible, as well as study specific health indicators of the population.

**Predictive Analytics**

Predictive Analytics tools are still emerging in the marketplace but are positioned to offer valuable information for potentially preventing episodes of care for high risk patients, where intervention would be effective. Usually this information comes from actuarial evaluation of claims data, and is purely cost predictive. But this data may be able to be translated into action. There may be certain patient behavior patterns that could be indicative of a likely trip to the emergency room and subsequent admission unless the patient gets a particular kind of care. Becoming successful in this area could be a game-changer in the world of care delivery, but we are still in the very early stages of fully understanding the application and efficacy of this potentially powerful output of data.

For health centers, and even most IPAs, these reports hold a lot of promise, but may not be immediately necessary. Practices need to master caring for patients who are already sick and needy, as proactively as possible. Staffing levels in health centers are not yet at the levels to be able to address the concerns raised by predictive analytics. However, they could be very useful in helping to plan to have the right levels of staff when the predicted patients do become ill. And for some patients, threatening to develop diabetes for example, predictive analytics could help prevent them from ever becoming ill with the right educational intervention to address eating and exercise habits.

At the moment, the entities with the greatest likelihood of having these predictive analytic tools are the health insurance payers because they have a long-standing vested interest studying risks in order to prevent cost. Whether developed in-house or purchased from companies that specialize in this sort of analysis, predictive analysis of various sets of data can be very powerful. Historically, payer attempts to intervene in patient care or care management have not been particularly successful, with the exception of some capitated health systems. Therefore, the
opportunity with predictive analytics is to study what the most important indicators are, and then find a way to operationalize their use in community health centers. Payers should consider providing funds for care management at health centers who could make use of the predictive reports, and make decisions about which patient actually could benefit from intervention. Payers already stand to benefit enormously if their patients are better managed with the help of data. They prefer to have very high performance on their Healthcare Effectiveness Data and Information Set (HEDIS) scores since prospective employers choose plans based on these indicators.
III. Building Your Strategy

Business Intelligence can be overwhelming given all the available options and data sources. To be successful, it helps to have a clear process for putting together a strategy that aligns with the most important needs of your organization.

1. Define Organizational Goals
   a. List out all the goals you have for the next 1-5 years.

2. Prioritize Your Goals
   a. Assign each one a ranking without using any number twice.

3. Identify Key Data Sources and Tools/Outputs Needed to Meet the Priority Goals
   a. For each goal, map out the data needed as well as the tools and reports or outputs you will need to produce.

4. Create Your Blueprint
   a. Evaluate the BI models and select the one that works best for your needs.
   b. Put the four decisions together in your blueprint. (See the latter section on Blueprint).

Figure 5: Business Intelligence Strategy Steps

Organization Goals

The goals of the various organizations considering their business intelligence strategy are the largest drivers for decision-making and planning. Clarifying and prioritizing your goals will help guide the order in which you acquire tools, seek data sources beyond your present reach, and create a coordinated staffing plan.

Below is a list of potential sample goals for the use of business intelligence tools in an organization. Some of the goals below will resonate with identified needs, and there may be other goals that are important for your organization and are not listed here. This table is not intended to be exhaustive; it is intended to help an organization create its own table of goals and then assign a priority to each goal.
<table>
<thead>
<tr>
<th>Organization</th>
<th>Sample Goal</th>
<th>Priority Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHC</td>
<td>Receive UDS HRSA quality award incentive</td>
<td></td>
</tr>
<tr>
<td>CHC</td>
<td>Reduce no-show rate</td>
<td></td>
</tr>
<tr>
<td>CHC</td>
<td>Reduce days in AR</td>
<td></td>
</tr>
<tr>
<td>CHC</td>
<td>Improve % of claims paid on first submission</td>
<td></td>
</tr>
<tr>
<td>PCA</td>
<td>Partner with Department of Health or other agencies to use state community health center data to predict and track disease outbreaks</td>
<td></td>
</tr>
<tr>
<td>PCA, HCCN</td>
<td>Advocate for state health centers using data for grant money to support greatest needs</td>
<td></td>
</tr>
<tr>
<td>PCA, HCCN, Network, IPA</td>
<td>Supply premier reporting tools for practices</td>
<td></td>
</tr>
<tr>
<td>PCA, HCCN, Network, IPA</td>
<td>Provide technical assistance and training on data quality</td>
<td></td>
</tr>
<tr>
<td>PCA, CHC, IPA</td>
<td>Understand role of social determinants of health (SDOH) in patient population to design better care and community programs to meet needs</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Data-Driven confidence to embark on share or at risk savings contract</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Quantify difference between health plan member attribution and actual patient population at CHCs (and which unseen members create greatest risk)</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Prove and maintain the quality of care delivered</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Improve HEDIS scores on Pay for Performance or Contract Measures</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Achieve ACO targets of quality and cost savings</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Understand total cost of care and largest cost saving actions in delivery</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Target high risk/high cost patients who can benefit from intervention</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Predict which patients will get sick next for outreach and preventative care</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Negotiate the most favorable contract with payers based on high quality outcomes data</td>
<td></td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Design and support new care models (e.g., Patient Centered Medical Home)</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 6: Table of Sample Organization Goals**
IV. Needs Assessment

Data Assessment Chart

The purpose of the Data Assessment Chart is to assist you in formulating a strategy for getting access to data sources of most importance for an organization. The chart evaluates data sources that are outside the immediate grasp of most health centers and their PCAs, HCCNs/Networks, or IPAs according to four categories of importance – value, urgency, accessibility and ease of integration. In certain cases, the category needs to be evaluated, in other cases like HIE, there may be multiple HIE providers in your region; you should consider and score them separately. The bold data sources going down the left-most column, are the summary categories. Common examples have been provided, but it may be necessary to create a chart specific to an organization’s circumstances.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>The level of importance to your organization in terms of programs you are participating in or in achieving certain goals you may have. What role in achieving those things does this data source play?</td>
</tr>
<tr>
<td>Urgency</td>
<td>How quickly is the data needed for programs and initiatives the organization is engaged in?</td>
</tr>
<tr>
<td>Access</td>
<td>How easy or difficult it will be to gain access to this data source? Is there a relationship with the governing entity which may help smooth the path to getting the data? Is there any negative history that could pose a barrier?</td>
</tr>
<tr>
<td>Integration</td>
<td>How easy will this data be to integrate into your system? Does it require outside resources? Can it be done by the existing team? Will integration require collaboration with the organization providing it?</td>
</tr>
</tbody>
</table>

Figure 7: Data Source Assessment Value Descriptions
Using the Data Assessment Chart:

Assign a value from of 1, 3, or 5, with 5 being the most valuable, urgent, accessible or easiest to integrate. In the spreadsheet, the summary formula for the score is a cumulative sum. The higher the score, the higher priority the data source represents. (See sample rows which have been filled out as examples.)

- Looking at the totals in the Score column will give you a better sense of which data to pursue first. If any of the four categories are more important to you than another- such as having a grant deadline to integrate claims data by X date, you might choose to weigh the values in that column more. You can adjust the formula in the spreadsheet to multiply that column by whatever factor is appropriate.

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Value</th>
<th>Time</th>
<th>Urgency</th>
<th>Ability to Access</th>
<th>Ease of Integration</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources Database</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Health Information Exchange (HIE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIE A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIE B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Satisfaction Data</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Financial (General Ledger)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admit Transfer Discharge (ADT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Claims Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payer A</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>Payer B</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Medicare ACO Patient Claims Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Portal (if not EHR-integrated)</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

Figure 8: Data Assessment Chart

Leverage for Getting Data Sources You Need

On completing this exercise, there may be a data source which is critical to the success of the organization and scored very high, but access to the data seems highly unlikely, at least in the near term. The first thing to consider is: what is something the other party might want from our organization? Often times negotiating with something the other party wants will make it much more likely to find an agreement that represents a win for both sides. For example, payers want better care for their members (that can be proven via the HEDIS Scores they are evaluated by) and health centers or IPCAs can do that if they have the data to make a difference in the way they deliver care, intervene, etc. It is essential that health centers have access to this data such that they can use it efficiently. Often, payers will be very proud of the portals they have developed and ask teams to log into their portal to retrieve information. If an organization has six payers, there may be six portals for staff to log into. This is not an efficient process, nor can the data be integrated with your clinical data in this form. Be sure to ask for a data feed, which will create a much better chance of integration with the business analytics tool chosen. Sometimes getting access to data can involve a cost as well. If there is an interface from one entity to another, there is usually some technical cost. In the case of the payer, it may be necessary to consider asking them to cover the cost of the integration.
Health centers should not have to pay for payer data, especially since most of the value of delivering better care to patients and preventing cost, still benefits the payer, not the care delivery organization.

### Tool and Report / Output Assessment

What tools are actually needed now? There are many tools to provide value from data, but health centers and PCAs/HCCN/Networks, and ACO/IPAs need to consider what tools will make a difference toward their current goals. Is all the data to make certain tools work available now? Can the team take action with the outputs of the tool to make a difference in lowering cost, improving quality, or increasing patient satisfaction?

Below is a chart that combines the sample goals from an earlier section with the needed data sources, tools, and reports or outputs to be able to achieve the goal. This list is not intended to be exhaustive, but it does touch on all the different tools, and represents possible goals of different organization types. If you fill this out for your organization, feel free to add anything that honors its unique needs.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Sample Goal</th>
<th>Data Source(s)</th>
<th>Tool(s)</th>
<th>Report(s) or Output(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHC</td>
<td>Receive UDS HRSA quality award incentive</td>
<td>PM/EHR</td>
<td>Population Health Management, Care Management</td>
<td>UDS Compliance</td>
</tr>
<tr>
<td>CHC</td>
<td>Reduce no-show rate</td>
<td>PM/EHR</td>
<td>Operations Management</td>
<td>No-Show Report</td>
</tr>
<tr>
<td>CHC</td>
<td>Reduce days in AR</td>
<td>Finance and PM/EHR</td>
<td>Financial Management</td>
<td>AR Report, Denials Report, Clean vs. Dirty Claims</td>
</tr>
<tr>
<td>CHC</td>
<td>Improve % of claims paid on first submission</td>
<td>Finance and PM/EHR</td>
<td>Financial Management</td>
<td>Denials Report, Clean vs. Dirty Claims</td>
</tr>
<tr>
<td>PCA</td>
<td>Partner with Department of Health or other agencies to use state community health center data to predict and track disease outbreaks</td>
<td>PM/EHR</td>
<td>Epidemiology and EBM Research</td>
<td>Diagnosis and Symptom Frequency</td>
</tr>
<tr>
<td>PCA, HCCN</td>
<td>Advocate for state health centers using data for grant money to support greatest needs</td>
<td>PM/EHR and Claims</td>
<td>Claims Integration, Population Health Management</td>
<td>Compliance Reports</td>
</tr>
<tr>
<td>PCA, HCCN, Network, IPA</td>
<td>Supply premier reporting tools for practices</td>
<td>All</td>
<td>Claims Integration, Population Health Management, Financial and Operations Management</td>
<td>HEDIS Performance, Compliance Reports, Total Cost of Care, Utilization, Patient Level Measure Performance</td>
</tr>
<tr>
<td>PCA, HCCN, Network, IPA</td>
<td>Provide technical assistance and training on data quality</td>
<td>PM/EHR</td>
<td>Population Health Management</td>
<td>Patient Level Measure Performance</td>
</tr>
<tr>
<td>PCA, CHC, IPA</td>
<td>Understand role of social determinants of health (SDOH) in patient population to design better care and community programs to meet needs</td>
<td>PM/EHR and Claims</td>
<td>Operations Management, and Population Health Management</td>
<td>Panel Management with SDOH and Measure Performance Grouped by SDOH</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Data-Driven confidence to embark on share or at risk savings contract</td>
<td>PM/EHR</td>
<td>Claims Integration</td>
<td>HEDIS Performance, Patient Risk Analysis</td>
</tr>
<tr>
<td>Organization</td>
<td>Sample Goal</td>
<td>Data Source(s)</td>
<td>Tool(s)</td>
<td>Report(s) or Output(s)</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Quantify difference between health plan member attribution and actual patient population at CHCs, and which unseen members create greatest risk</td>
<td>PM/EHR and Claims</td>
<td>Claims Integration</td>
<td>Attribution Reports</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Prove and maintain the quality of care delivered</td>
<td>PM/EHR</td>
<td>Population Health Management, Care Management</td>
<td>Compliance Reports, Visit Planning</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Improve HEDIS scores on Pay for Performance or Contract Measures</td>
<td>PM/EHR and Claims</td>
<td>Claims Integration, Population Health Management, Care Management</td>
<td>HEDIS Performance, Registries, Visit Planning</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Achieve ACO targets of quality and cost savings</td>
<td>PM/EHR and Claims, ADT</td>
<td>Claims Integration, Population Health Management, Care Management</td>
<td>HEDIS Performance, Registries, Visit Planning</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Understand total cost of care and largest cost saving actions in delivery</td>
<td>Finance, HR, PM/EHR, and Claims</td>
<td>Claims Integration, Cost of Care</td>
<td>Utilization, Total Cost of Care Reports</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Target high risk/high cost patients who can benefit from intervention</td>
<td>Finance, PM/EHR, and Claims</td>
<td>Claims Integration, Care Management</td>
<td>Utilization, Total Cost of Care Reports, Care Coordination</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Target high risk/high cost patients who can benefit from intervention</td>
<td>Finance, PM/EHR, and Claims</td>
<td>Claims Integration, Care Management</td>
<td>Utilization, Total Cost of Care Reports, Care Coordination</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Predict which patients will get sick next for outreach and preventative care</td>
<td>PM/EHR and Claims</td>
<td>Claims Integration, Care Management, and Predictive Analytics</td>
<td>Risk Prediction Reports, Care Coordination</td>
</tr>
<tr>
<td>CHC and IPA</td>
<td>Negotiate the most favorable contract with payers based on high quality outcomes data</td>
<td>PM/EHR and Claims</td>
<td>Claims Integration, Population Health Management, Financial and Operations Management</td>
<td>HEDIS Performance, Compliance Reports, Total Cost of Care, Utilization</td>
</tr>
</tbody>
</table>

Figure 9: Tool and Report/Output Assessment Table
V. Putting It All Together – Business Intelligence MODEL Selection

Common Business Intelligence Models

This section discusses common models for data integration and reporting and visualization tools to help health centers, primary care associations, health center controlled networks, networks and independent practice associations determine what model appeals most to them. The models are discussed below:

- Use native PM/EHR vendor to provide most or all integration and reporting
- Best of Breed - Individual Tools to Meet Priority Goals
- Build Your Warehouse Internally
- Custom Data Warehouse - Consulting Solution Architects
- Buy On-Premise Data Warehouse
- Buy SAAS Data Warehouse
- Hybrid - Partner with ACO/HCCN/PCA/Network/Other

Use native PM/EHR vendor to provide most or all integration and reporting

This is the simplest of all the models, and assumes a practice management and electronic health record with reasonably robust reporting such as Meaningful Use and UDS reports. If additional data sources like the ones shown below (especially those in orange which are typically not part of the health center’s native data) can be obtained, they would need to be interfaced with the PM and EHR in order to be integrated into the PM/EHR reporting system. EHR companies are adding more and more tools to their products, especially as the sales of new EHRs are waning, and there is a need for other sources of revenue. The simplicity of this model is its greatest asset as everything is contained in one system. However, it confines users to the limitations of the system they are using.
Best of Breed - Individual Tools to Meet Priority Goals

This is the most complicated model when there are a lot of different components because there are so many interfaces needed to connect the data to the right tool. Best of breed tools are usually on the expensive end because they specialize in one particular area and execute well. Individual tools tend to work well, but trying to tie them together and interface can be troublesome. You may need expert help to do so.
Build Your Warehouse Internally

Investing in building your own data warehouse internally gives you maximum control over the functionality of the tool, but may take a long time to realize the full value depending on the talent and time the team you have has to devote to the project. The complexity of some of the EHR data and the clinical quality measures that go with it can be enough to cause a lot of confusion, and adding in the probable need to integrate claims data in the not too distant future adds a whole other element of complexity. The other challenge many health centers face when building and maintaining their own internal tools is staff retention. If your organization is in a rural setting, recruiting talent for the Information Technology department can be very difficult. If you are in an urban setting, you are likely competing for the same talent that tech start-ups and other tech jobs in the area are seeking. Both of these scenarios can lead to losing staff unexpectedly, and then being unable to support the product the team built.

Figure 12: Internally Built Data Warehouse

Custom Data Warehouse – Consulting Solution Architects

The next model is a custom data warehouse built by consultants or solution architects to meet your organization’s individual needs. This is one of the more expensive methods typically because the build of the project itself is at the most expensive end of the spectrum. It can be faster than many of the other options, but ongoing changes can be costly, as each one represents a change order or new statement of work to be done on the custom data warehouse. This means all measure changes and report additions you may want in the future need to have an assigned budget. This model does offer the most flexibility, but with a price tag to match.
Buy On-Premise Data Warehouse

The On-Premise model can be very useful if your needs are relatively narrow and predominantly related to PM and EHR data. These tools are installed on premise (on a server in your organization’s environment) and usually the client does all the mapping of the data for reports, without much support for the vendor. This can be a great way to learn about where your data is sourced from, as well as the myriad of ways data may be documented at your organization. In general, these tools are not set up to do a lot of integration of other data sources, so the model shown below represents more tools that you would typically get with this solution. Some claims data has been integrated with PM and EHR data with this kind of analytics tool.
**Buy SAAS Data Warehouse**

This is a particular version of a software as a service (SAAS) model, where the organization accesses its data via the web and upgrades to the software happen automatically (although the clinic may still choose to validate the data). This model is very efficient because it can integrate all the different data elements, as well as produce the necessary reporting and analytics outcomes. This model is low effort for support, medium in cost, and the degree of flexibility in adding features varies, but can be good, especially if it is a BI product provider who focuses solely on community health. This maximizes the commonality among the requests likely to be submitted for enhancements.

![Figure 15: Software as a Service Data Warehouse](image)

**Hybrid - Partner with ACO/HCCN/PCA/Network/IPA/Other**

Many primary care associations, health center controlled networks, networks, and independent practice associations need a hybrid model to enable the use of one tool that takes care of most of the reporting needs of its member community health centers. Additionally, they include the addition of one or more bolt-on products to be sure to be able to meet all their prioritized goals, especially if some of the members are participating in something like ACO, which requires more robust reporting and has more penalties for not performing well.

In the first of these two hybrid models, the PCA/HCCN has bought a warehouse that interfaces with the individual EHR data, and pulls the data in nightly. The health center can produce its own population health reporting, and has patient engagement software as well, but utilizes the tools in the PCA/HCCN’s software as a service data warehouse and reporting tools for many other needs, including claims data integration.
In the second hybrid model, the PCA/HCCN is supplying the central data warehouse and most of the reporting tools with a SAAS warehouse, but because there is also an IPA which is participating in an ACO, they have bolted on some additional reporting tools from a different product to help them manage their highest risk patients, as well as planning who is likely to be sick or hospitalized next.
Your Preferred BI Model

Use the chart below to identify which BI model works best for your organization. For ease of visualization, along with the words, green represents the best, yellow is in the middle, and red represents the lowest valuation of the three. Note that each row represents a key attribute and each column represents a business intelligence model. A column with more green evaluations of key attributes indicates it is better than columns with less green. However, this does not account for the individual circumstances of each community health entity. An organization should evaluate each of the attributes as they relate to their specific needs. Also, many successful health centers, PCAs, HCCNs, Networks and IPAs have chosen the hybrid model because they cannot get everything they need from one system. It was impossible to assign valuation to this model due to the variation of implementation, but this does not detract from its value as an option. It is more common when there are strong partnerships between health centers and their regional PCA, HCCN or network, or if there is an IPA or ACO.

<table>
<thead>
<tr>
<th>Key Attributes</th>
<th>EHR / PM</th>
<th>Best of Breed Individual Tools</th>
<th>Build Data Warehouse Internally</th>
<th>Custom Data Warehouse</th>
<th>Data Warehouse On-Premise</th>
<th>Data Warehouse SAAS</th>
<th>Hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrates Multi Systems &amp; Sources</td>
<td>No</td>
<td>No</td>
<td>Varies</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Varies</td>
</tr>
<tr>
<td>Displays Multi Systems &amp; Sources</td>
<td>Medium</td>
<td>No</td>
<td>Varies</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Varies</td>
</tr>
<tr>
<td>Time to Value</td>
<td>Long</td>
<td>Varies</td>
<td>Long</td>
<td>Varies</td>
<td>Medium</td>
<td>Short</td>
<td>Varies</td>
</tr>
<tr>
<td>Up-Front Cost</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Varies</td>
</tr>
<tr>
<td>On-Going Cost</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Varies</td>
</tr>
<tr>
<td>On-Going Internal Effort</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Varies</td>
</tr>
<tr>
<td>Degree of Control</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>Varies</td>
</tr>
</tbody>
</table>

**Figure 18: Business Intelligence Model Matrix**

Please note in the table above, the green color correlates with the most positive rating, the yellow with the most neutral rating, and the red with the least positive rating. Gray is undetermined because there is too much variability to make a judgment of what is typical.
Define Your Business Intelligence Blue Print

Assemble all the conclusions you came to using the goal chart, needs assessments, and models to create your own blueprint for selecting the methods and products or solutions that best address the holistic needs of your organization. Use the lines below each category in each of the circles in the Venn diagram to record your findings.

Once you have all your findings documented, the Venn diagram for your organization can act as the guiding set of principles for your business intelligence acquisition process. For many organizations, the process will not be a standard selection process, either because there are some pre-existing tools, or because there are good partner organizations in the region who can make existing or planned tools available for a more affordable cost. Knowing what your prioritized goals are, the needed data and key tools and outputs to make those manifest, and your preferences for a business intelligence model to bring it all together and make it available to users, are the first steps toward going to seek it. As opportunities arise to partner, or to give or receive data, this diagram can be used to assess how closely the opportunity aligns with your plans, or does not.

![Figure 19: Business Intelligence Blueprint](image)
A sample of how a health center might fill out the Venn diagram’s four decision quadrants illustrates how to use the assessment tools provided earlier to build a blueprint for your business intelligence strategy. Notice the BI model is a hybrid model combining a SAAS Data Warehouse through a PCA partnership, with bolted on Best of Breed Care Management and Predictive Analytics software from the IPA. This model really emphasizes partnership. The value of using the SAAS Data Warehouse as the base for practice management, electronic health record, and claims integration, is that data validation is less burdensome. It is still necessary to check the bolted on tools, but if the data from the base level is regularly validated, the potential for trust in the whole model is higher, with less work to support it.

Figure 20: Sample Completed Business Intelligence Blueprint
VI. Conclusion

To be successful in the future, health centers will need a system of tools that work for all members of the care team, administrators and executives, community-based care givers, and the patient. Business intelligence tools will help community health centers prove they are already serving, and well-positioned to care for complex populations facing a variety of socioeconomic challenges. Health centers need data to show they are caring for safety net populations who comprise a significant percentage of the highest risk, highest cost patients in our health system at a lower cost, while achieving better outcomes and increasing patient satisfaction. Hopefully, they also consider the needs of their providers and other staff, and also use business intelligence tools to empower the care team and share the work across all team members as appropriate.

There are many needs across the spectrum of potential users, and these needs have a high potential of continuing to evolve. Regardless of the goals and priorities of today, business intelligence strategy should be structured to allow for flexibility and change. As you consider vendors, ask them to describe their near term and future state product roadmap, and to discuss their vision for supporting the community health center marketplace. Community health is not the right market for all vendors because of the typical size of the clients, and the funding models, but some do specialize in this market. Be sure to choose a vendor who has a long and positive history with community health center clients, and whose reputation with its clients is one of integrity. Additionally, look for proof that possible vendors have prioritized primary care and community health specific functionality in the past. Past behavior is one of the best predictors of future behavior.

Partnerships with PCAs, HCCNs, Networks and IPAs can assist with the variable of evolving functional needs. Shared purchase provides more leverage with vendors, which translates to a higher likelihood of success in getting tools, reports, or functionality that becomes a need, added.

Other benefits of shared tools usually come in the form of peer comparisons, which facilitate the harvest and sharing of best practices, as well as cross center targets, which enable a group of health centers to work together on a common measure goal. Initiatives might be tied to group grant measure goals, and improvement cycles might be led by the PCA, HCCN, Network or IPA, or may be worked on individually by participating health centers. With either method, the group goals can be shared among all the practices so that their staff also understands the targets.

Another reason to seriously consider partnerships with these organizations is that PCAs, HCCNs, Networks, and IPAs generally have staff dedicated to technical assistance with information systems and quality. These two areas become essential support for health centers as they venture further into business intelligence. So often a health center cannot afford the size of the technology expert team they actually need. This is where shared technology experts from the partner organization can be invaluable, not only if the same BI tools are shared across the group of health center members they serve, but especially if this is the case.

Larger health centers with significant sized technology staff may not face these same challenges, but the risk of recruitment and retention of technical staff knows no size boundaries. The sophistication level needed to support and maintain complicated information and business intelligence systems has health centers competing for the same staff technology companies with more resources for compensation. This is a challenging risk to mitigate.
As health centers, PCAs, HCCNs, Networks, and IPAs continue to build systems to help them make data-driven decisions across the spectrum of functional areas in their organizations, the idea of one tool alone to meet all these needs seems less and less possible. The most successful business intelligence strategy models will likely include two or more systems to accommodate the breadth of requirements, and at least one partnership with another organization to share the cost and ongoing burden of support and growth. A structure like this will also more likely allow for the provision of new functionality that will be needed as the environment of new reimbursement models becomes clearer.
Works Cited


National Conference of State Legislature.