



# **Business Intelligence of the future: Learning from health care organisations in the United States**

**A report by ICF for the Strategy Unit**

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# 1 Introduction

In December 2017, the Strategy Unit asked ICF to conduct case studies of US-based Accountable Care Organisations (ACOs) to explore best practices in the use of data – including clinical, financial, and operational data, as well as data from outside the healthcare sector – to make decisions about improving health system performance. The findings will contribute to a wider Strategy Unit project that aims to set out key principles for the design of health systems that are driven by intelligence.

Because of ICF's history of working across the health sector in the US, ICF was asked to use these case studies to find out more about what learning might be potentially transferable to the NHS in England, by examining US-based ACOs' approaches to the use of data, evidence analysis and business intelligence.

ICF undertook five case studies of integrated health systems across the US: Baylor Scott White Quality Alliance, in Texas; Henry Ford Accountable Care Organisation, in Michigan; Wilmington Health in North Carolina; OneCare Vermont; and Aledade, a new start-up that operates across the US. The case studies involved speaking to experts in population health, health information technology (HIT), and strategic data analysis. These portraits of different organisations and networks illustrate different journeys towards establishing an impactful population health management model and, in spite of the differences between the US and UK health systems, point to transferable learning that can be applied to developing better, data-driven health systems in the NHS too.

This report is the conclusion of this work, and is structured as follows:

- Background to the study, its goals and method;
- Case studies on health systems in the US; and
- Discussion and conclusions for the NHS.

## 1.1 Background to the study

***“Our aim is to use the next several years to make the biggest national move to integrated care of any major western country.”***

***NHS England, Next Steps on the NHS Five Year Forward View, March 2017***

### **Delivering integrated care is a core aim of the NHS in England; realising its promise depends on the intelligent use of data**

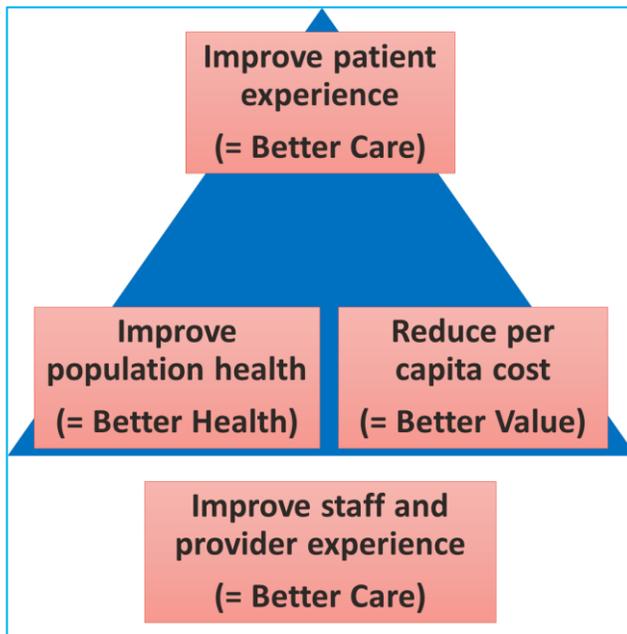
In 2014, the NHS Five Year Forward View (FYFV) argued that without fundamental change to the hospital-based model of care, structured around providing single, unconnected 'episodes', it would be impossible to meet the rising demand for health from a growing and ageing population, while operating in a constrained financial environment. The traditional divides between primary care and hospitals had to be broken down in order to provide the personalised, coordinated health services that patients need – especially for people with (multiple) long-term conditions.

The FYFV set out a consensus view that the NHS had to focus on managing systems, rather than organisations – coordinating the work of community services and hospitals,

integrating services around the needs of the patient, focusing attention on the social determinants of health and prevention of ill health and, above all, bringing more care into people's homes and communities.

This approach to improving outcomes, value and care across a health system is often summarised as the 'Triple Aim' popularised by the Institute for Health Improvement (IHI). The model that is familiar to policymakers in both the UK and US. A fourth aim of improving staff and provider experience is often added, as their satisfaction and wellbeing is often critical to reducing medical errors, increasing patient satisfaction and improving productivity.

Figure 1.1 The IHI Triple (Quadruple) Aim



*adapted from IHI (2018)<sup>1</sup>*

Four years on from the FYFV, and integration is the 'only game in town'. Building on the experience of bringing together primary care and hospital services as part of the NHS Vanguards, the local NHS in England is being pushed by the centre to develop into a variety of more integrated local systems. These include the New Care Models, Sustainability and Transformation Partnerships, and the development of some of these into Integrated Care Systems (ICSs), which aim to bring together NHS providers, commissioners and local authorities to improve health and social care in their locality (Kings Fund, 2018<sup>2</sup>).

In addition, Accountable Care Organisations (ACOs) (now called Integrated Care Partnerships or Integrated Care Organisations) are also in development in the NHS. The ACO is a concept from the US which is now being adopted in England, to describe a new form of integrated provider spanning acute and primary care. Under this model, a long-term contract will be awarded to an organisation which provides the whole range

<sup>1</sup> See <http://www.ihl.org/Engage/Initiatives/TripleAim/Pages/default.aspx>

<sup>2</sup> See [www.kingsfund.org.uk/publications/making-sense-integrated-care-systems](http://www.kingsfund.org.uk/publications/making-sense-integrated-care-systems)

of health and care services in their area to the local population, and which in turn manages a network of local partners working together to manage people's health.

In tandem with these changes, new approaches to financing health care are being developed – replacing tariffs or payments for each episode of care, with a single 'control total' or a number of 'bundled payments' to cover the health needs of each local population, adjusted for risk. These approaches are sometimes referred to as 'capitation' or 'capitated payments' and are designed to give networks of providers an incentive to design approaches that focus on outcomes, prevent ill health and keep patients from needing more expensive (hospital-based) interventions.

This new environment implies that the focus of health data analysis and business intelligence must change too – and not only because of the potential of new technologies in people's homes or on people's smartphones to generate usable health data. Rather than managing data to record and track individual episodes of care, the business intelligence of the future needs to focus on providing insights to clinicians, managers and policymakers about where to focus preventative efforts so they yield the best outcomes and reduce the costs of unplanned hospital admissions. It also needs to be built on an infrastructure that allows those insights to be generated by pulling together data from different sources – from both GP and hospital systems, and data that lies outside of the NHS.

Policymakers designing the new Integrated Care Systems need to understand where to invest and the challenges involved in developing more data-driven approaches to managing health services, payments and making decisions across a system, as well as focusing on their own organisations. That is where this study aims to bring additional insights, to complement the experiences of NHS staff already on this journey.

## **Accountable Care Organisations are one of the main vehicles for delivering more integrated care in the US**

The concept of ACOs emerged in the US as part of a wider move towards what is usually referred to as 'value-based healthcare', which aims to pay for patient outcomes, rather than activity. Although they build on a longer history of managed care and similar initiatives, ACOs have become a feature of the US healthcare landscape since the 2012 Affordable Care Act (ACA) and the expansion of the federal Medicaid programme, which provides health insurance for people and families in the US on low incomes and people with disabilities who would otherwise be unable to afford private health insurance.

Taken as a whole, the ACA had the effect of expanding the number of individuals in both Medicaid and private healthcare plans. While ACOs were first developed in the commercial market, they quickly expanded into publicly-funded healthcare under the ACA with the introduction of the Medicaid Shared Savings Program (MSSP) by the federal agency that manages the programme on behalf of the government, the Centers for Medicare and Medicaid<sup>3</sup> Services (CMS) (Matulis and Lloyd 2018<sup>4</sup>). There are high

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<sup>3</sup> Medicaid provides payment for health services for low-income people and families and is administered by US states; Medicare is a federal insurance programme for the over-65s and certain people with disabilities.

<sup>4</sup> Matulis, R. and Lloyd, J. (2018) The history, evolution, and future of Medicaid Accountable Care Organizations. Center for Health Care Strategies

expectations of the new model: CMS predicted that federal savings from the initiative could be up to \$940 million over four years.

Many ACOs are networks of hospitals and primary / community-based care providers, led or managed by an entity (usually called an 'integrated health system' centred on one or more hospitals in the network, as in the case in three of our case studies here, but sometimes a third party or private company) responsible for data analysis on behalf of the integrated system. With their focus on value-based care and population health, ACOs are 'accountable' for a given population agreed with the state Medicaid administration (or an insurance company), but those individuals also have the option to see physicians outside of the ACO network too, which makes them different from traditional 'managed care' or gatekeeper models.

### **ACOs operate within a financial and quality framework that gives them incentives to pursue the Triple Aim**

In order to monitor the performance of ACOs and, in essence, to regulate them for quality, CMS has established 33 [quality measures](#). These measures encompass care coordination and patient safety, effective use of preventative health services, strengthening care management for populations at-risk, and improving care experience.

The way that ACOs are incentivised varies considerably between US States, but generally they follow either:

- The shared savings model, where providers participating in an ACO network can keep a share of the savings if they use a less-costly set of resources to manage their patients than a baseline – and in some cases, pay a share of the cost if they exceed the baseline. This is the most common model.
- The global budget model, where the ACO receives a capitated payment and assumes all the risk. This model is less commonly used.

The quality metrics are also key, and ACOs may not get their full share of savings if those quality benchmarks are not met (CHCS, 2018). As well as Medicaid, some ACOs simultaneously contract with both private payers (insurance companies) and / or provide services for their own employees. Their parent organisations almost always provide fee-for-service work too.

### **There is a sense that improvements in business intelligence are already making a difference to health systems in the US**

As the five case studies presented in this report show, developing better business intelligence has been key to implementing change and showing the potential that value based healthcare has to improve population health and reduce costs.

Data analysis and health information technology are critical to ACO operations, as timely and accurate data collection is needed not only to support the monitoring of quality, but also to track patients' use of health services and costs throughout the system. This is essential so that the right incentives for transforming the system can be built into the partnership between the different member organisations of an ACO.

In some places, ACOs are also expected to cover patients' mental health needs, drugs and services that would be considered social care in the UK (from domiciliary care to food aid). As such, insights from the data need to serve a wide variety of clinical and managerial purposes. Health information technology and business intelligence are also needed to risk stratify patients, target interventions such as case management or alternatives to hospital admission, and understand where improvements to services or increased access to primary care might be needed.

These are all relevant considerations in the NHS too, and are shared challenges faced in both the English and US systems. In spite of being two very different health systems, the building blocks for seeking to target better outcomes for people with long-term conditions, and reducing costs that could have been avoided, are much the same.

There are important contextual differences to consider as well, which can be seen in the case studies. Firstly, there seems to be a much greater variety of electronic medical records (EMR) systems used by providers in the US. Secondly, US patients do not need to coordinate their care via a primary care 'gatekeeper' as people do in the UK. Moreover, primary care is relatively underdeveloped in the US. Patients may see multiple primary care providers, and patients are not usually required to seek referrals to access secondary care. In the case of the un-/under-insured population, emergency rooms (ER, i.e. Accident & Emergency) may often be the initial access point for primary and secondary care. This means that data needs to be pulled together and matched from a wide variety of different sources and organisations, some of it focused on insurance companies' needs (claims data) and some focused on clinical observations and outcomes (medical records). Lastly, there are some wider system differences that play out in some of the case studies, notably the much greater cost in the US and differences in data protection / data sharing legislation. These issues are expanded on in section 7 of this report.

## 1.2 Method

### Identifying ACOs for inclusion

ICF used a purposive sampling approach to identify case study ACOs that combined identifying a diverse mix of ACOs that met our requirements (focusing on those that were widely recognised in the relevant literature as being high performing) along with personal connections to help facilitate introductions with gatekeepers at potential organisations.

We aimed for a geographic spread of ACOs in different states of the US. We also included ACOs that differ in the size of population covered. We also examined ACOs that included major hospitals in their networks as well as those without. Lastly, we looked at ACOs that had developed bespoke or proprietary solutions to health analytics, as well as those that have employed 'off the shelf' BI products to good effect.

### Conducting interviews

The Strategy Unit identified four broad questions of interest, which guided our selection of interviewees for each case study:

- How can Integrated Health Systems use 'broader' data sets to inform place-based care and population health management?
- How can clinical teams use data more effectively?
- How do organisations and teams use data to improve the way they operate?
- What needs to be done to support organisations to make best use of data?

These questions were also used as the basis for an interview schedule (see Annex 1).

The case studies were conducted both through key informant interviews and group discussions with senior staff leading on population health or value based care, and health analytics or health information technology leads in each of the selected ACOs. We started by asking about the context for working on population health in each ACO and the general approach to developing more 'value-based' healthcare delivery. The interviews also explored specific applications of HIT that provide actionable insights for different internal and external clients of the ACO, such as:

- Identifying patients for whom complex care management will yield the greatest benefit;
- Predicting current and future health care needs;
- Sharing health records across providers; and
- Encouraging value-based payment over volume-based payments / fee for service.

We also asked about the staffing, skills and resource implications of making improvements to their BI.

In addition to interviews, additional desk research was also carried out to further substantiate, and expand upon the issues and tools mentioned in the interviews.

## **Structure of the case studies**

The case studies follow a common structure, focusing on:

- Introduction to the organisation / ACO
- Approach to population health
- Challenges encountered and how these were overcome
- Skills and Competencies

## 2 Case study 1: Baylor Scott & White Quality Alliance, Texas

**Interviewees:** Director of Analytics; System Vice President, Comprehensive Care Management

Baylor Scott White Quality Alliance (BSWQA) is a large ACO based in Texas. Its investment in value-based care has focused on the data analytics and infrastructure needed to drive a care management programme. There are multiple primary care practices and hospitals that are also part of the ACO, and a locality-based infrastructure supports BSWQA to implement care management into primary care and care coordination.

BSWQA uses analytics to stratify patients so those at risk of incurring costly admissions can be targeted for outreach and reminders to attend appointments. For those at higher risk, support with self-management is offered. For the highest risk patients, care management with a nurse is offered. Intervention can be (near) instantaneous, as real-time alerts allow care managers to contact patients presenting in emergency rooms, so they can be diverted from an admission, if appropriate.

According to respondents, it can be challenging to understand where to focus resources with risk stratification and predictive modelling: the selection of specific measures (e.g. costs incurred) is necessary. Other challenges include the variety of electronic medical record (EMR) systems being used, unrealistic expectations of new purchases, and the time taken to link disparate sources of data together and then refine the outputs to make them useful for clinicians. At the strategic level, a new CEO has proved instrumental in shifting the priorities of the organisation towards value based care, emphasising the alternatives to admitting patients to hospital for their care.

In looking for analysts, BSWQA values communication skills and the ability to generate questions to ask of the data. Building relationships between analysts and clinicians is also felt to be important and regular meetings are held to encourage this.

### 2.1 Background

Dallas-based Baylor Scott & White Quality Alliance, hereafter referred to as BSWQA, is an ACO affiliated with the largest non-profit health system in Texas, Baylor Scott & White Health (BSWH). BSWH became the largest not-for-profit health care system in Texas after a merger in 2013 between Baylor Health Care System and Scott & White Healthcare and has total assets of \$8.6 billion.

The BSWQA, which began operations in 2011, includes over 4,600 primary and specialty care physicians, 36,000 employees, 49 hospitals and post-acute care facilities and other health care stakeholders. BSWQA began with managing the lives of 34,000 individuals through the BSW North Texas Division employee health plan and has grown to caring for over 450,000 lives as of May 2018.

BSWQA is accredited by the National Committee for Quality Assurance (NCQA) as a level-2 ACO<sup>5</sup>, meaning that BSWQA demonstrates a broad range of ACO capabilities and has the capacity and motivation to collaboratively and accountably improve quality, reduce costs and improve patient care across all its sites of care (hospitals, clinics, post-acute care facilities, etc.). NCQA ACO accreditation also recognizes BSWQA for its success in collecting, integrating and using data to provide quality, well-coordinated patient-centred care. The main functional teams of the ACO cover care management, network management, quality, analytics, and finance.

BSWQA utilises a number of strategies for population health management including: comprehensive care coordination, evidence-based medicine, protocol-driven disease management, Patient-centred medical homes (PCMHs), and data analytics. BSWQA claims that these approaches have consistently led to improved care and reduced costs, and throughout its first 2 years of operation, BSWQA states that it met or exceeded all quality metrics set out in all of its managed care contracts. Additionally, according to respondents, in its first two years of managing its employee health plan, the ACO lowered costs by approximately \$14 million for its members, representing a saving of 7% from baseline. Over that same period, hospital admissions were reduced by 4.3%, three-day hospital readmissions went down 15%, and the prescribing rate for generic medicines increased.

## 2.2 Improving Population Health

When asked about how BSWQA works to improve population health and achieve the Triple Aim, the conversation turned to the Quadruple Aim, adding a fourth element of improving the experience of providing care. As demands are increasing on primary care providers, BSWQA places a priority on provider satisfaction in its guiding principles and reframes its work to focus on the Quadruple Aim.

The BSWQA approach consists of key elements that include:

- Patient Centred Medical Home: Patients have a dedicated primary care team that provides preventive health services and chronic disease management.
- Care Coordination: described as an important and integral part of BSWQA's work to improve population health. The care management team employs over 100 staff including registered nurse care managers, licensed social workers, and health coordinators. Care management at BSWQA includes a variety of services including patient outreach, 'traditional' disease management and monitoring, support for wellbeing, care navigation, identifying gaps in care, and providing transitional support (i.e. moving from inpatient services to outpatient services).

*"We talk about the Quadruple Aim, which is the Triple Aim plus restoring joy to the practice of medicine. Some of the way that healthcare has evolved over time, has put an increasing burden on physicians, especially primary care providers, and we want to use the tools and resources that we developed in a way that really feels supportive and doesn't just shift the burden from one group to another group"*

<sup>5</sup> For additional information on NCQA ACO Accreditation, see [www.ncqa.org/Portals/0/ACO/ACO-web.pdf?ver=2016-01-06-215341-213%27](http://www.ncqa.org/Portals/0/ACO/ACO-web.pdf?ver=2016-01-06-215341-213%27)

- Data Analytics: to allow for proactive patient engagement, algorithms are applied to integrated data from multiple sources, to predict patients at risk of poor health and who need preventative measures.

Care coordination and care management is tailored to patients' needs and risk. Respondents described three levels of risk that correspond to escalating levels of intervention:

- At a basic level, care management may simply include outreach to 'average' risk patients who might have unmet health care needs. In this context, the goal might be to identify patients with gaps in their care (i.e. needing a repeat prescription, or due for a vaccine) or to identify those patients who are due for a physician visit. It was explained that, "*for those patients that don't see a doctor regularly, the first step is to get them to see their physician.*"
- For patients at the next level of risk, or what was referred to as 'rising risk', the goal is to identify individuals that need some additional support to manage their care needs and who could benefit from more intensive care management, either to engage with their primary care providers or get preventative / chronic disease care services. These are patients who were described as "*just needing a little nudge.*" It was explained how care managers provide a little extra support to these patients so they can then take good care of themselves. The importance of being able to provide just the right amount of support for them to take care of themselves long term without intervening too much was also discussed.
- The next level of care management, which is reserved for their highest risk patients, includes intervening with patients who have a need for more intensive care management. This might include helping patients with multiple chronic conditions navigate their complex health care needs or help transition patients who have had an inpatient or emergency room encounter into the management of a primary care physician. Typically intensive care management runs for about 2-3 months at a time and each care manager is a registered nurse.

Despite the importance of care management at BSWQA, it was acknowledged that care management programmes alone do not work in isolation. Analytics and automated workflows are key: it would not be as cost effective if the care managers needed to spend a great deal of time reviewing patient records to categorise them. Therefore the analytics team helps them to work more efficiently by telling them who to call.

Additionally, it was explained that "*if we didn't have the network that we have of really high quality physicians, I don't know if we would be as effective as we are.*" The quality of the network of independent primary care physicians and smaller community hospitals is supported by infrastructure: multidisciplinary teams (the Patient Centred Medical Home or PCMH approach<sup>6</sup>) and Regional Pods, the name given to teams of field advisors who meet regularly with the primary care physicians to develop contract management strategies, share best practices and communicate BSWQA initiatives to each practice within a smaller locality in the BSWQA 'patch'. Therefore all of these various pieces work in tandem to foster a learning culture (see Figure 2.1). Shared

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<sup>6</sup> See <https://www.acponline.org/practice-resources/business-resources/payment/models/patient-centered-medical-home/understanding-the-patient-centered-medical-home/what-is-the-patient-centered-medical-home>

metrics for quality, a move towards standardising EHR systems, and transparency of data help to coordinate efforts across the ACO network.

Figure 2.1 The BSWQA care management approach



Another piece that was mentioned as part of BSWQA’s population health work was the ability to keep patients in the BSWQA network as much as possible. Within the network, patients and the ACO benefit from a common approach to care and incur lower costs. While patients can still visit physicians outside of the ACO network, the ACO are still accountable for the costs incurred. In the words of the VP of Comprehensive Care Management, *“as we move network utilisation up, meaning as we bring more and more care within our network, rather than going all over the place, we see big changes in costs because the care within our network is just overall less expensive.”*

## 2.3 Role of Health Information Technology

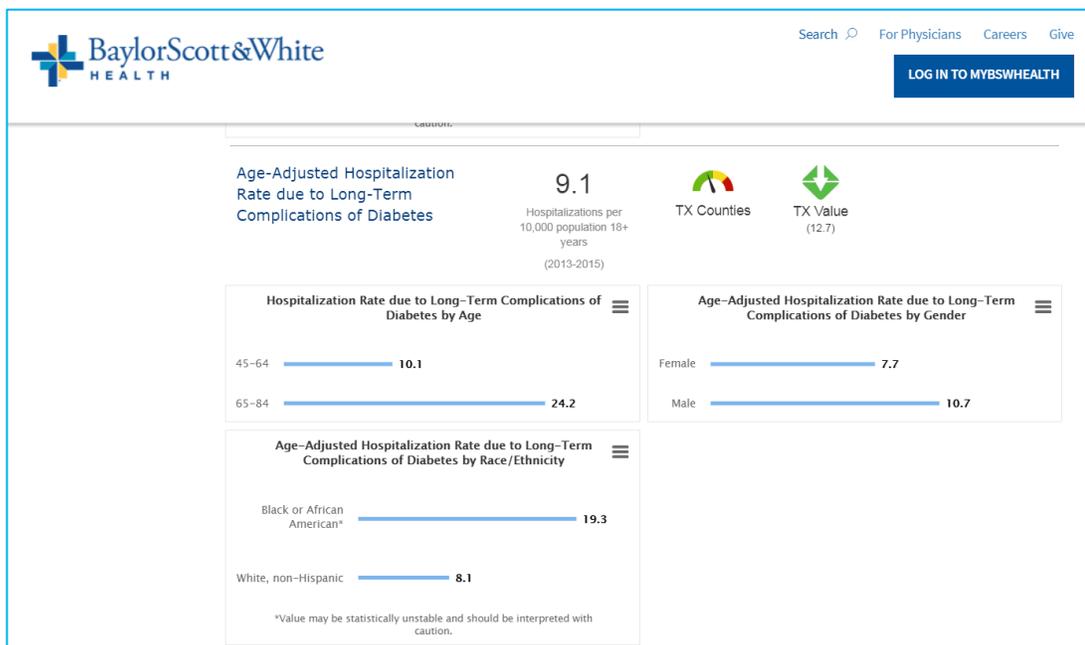
Health information technology (HIT) and data analytics is an important part of BSWQA’s work. It was explained that data analytics helps them *“get to know”* their patient population. This often starts with risk stratification to identify which patients are at the highest risk of an unplanned deterioration in their health. Risk stratification is also used to predict spending for the coming 12 months and to rank patients from most expensive to least expensive in terms of health care utilisation. The data is then used to identify which patients might need coordinated care management and outreach.

When describing risk stratification and predictive modelling, it was explained that there is often an *“interveneable moment”* – for instance, deciding whether a patient needs to go to the emergency room, or whether a patient needs a “nudge” to take care of themselves. The data makes it possible for the ACO to identify high risk patients and intervene – by getting them into care management, see a primary care physician, or get their gaps in care filled – it can improve their health.

As the volume of data about patients increases, BSWQA expected that there will be an “*explosion of predictive models*”. However, a potential challenge that this poses is the ability to understand which risk predictions are going to be the most helpful, especially given the limited resources of most organisations. For example, if there are only ten care managers, would it be better to outreach to ten patients who are at highest risk of an emergency room (ER) visit, or ten patients at risk of an avoidable hospital admission? So the challenge will be in knowing which risks to focus on. It was also described how risk scores can often be difficult to articulate and interpret. So rather than just assigning risk scores to patients (i.e. risk scores from 1 to 10), it is better to focus on specific measures, such as predicting patients’ cost of medical utilisation or whether patients are at risk to be hospitalized or use the ER.

*“In the last five years it has been more about getting the data organised to come up with algorithms to make predictions. But in the next five years we will have a ton of predictions and the challenge will be knowing which predictions will be the most helpful for us.”*

Figure 2.2 Example of a BSWQA county-level health profile, part of a suite of analytics to help prioritise care management



When describing how they use HIT to coordinate the care of their patient population, it was explained that all provider communication and all communication within medical teams is done through the electronic medical records (EMR) system. Additionally, all documentation of care managers are also made directly in the medical records so that the information regarding management of high-risk patients becomes a part of the provider workflow as well. Communication can be everything from “*this is a diabetic patient who hasn’t had her A1C this year, to this person needs a prescription refill, or this person can’t afford their meds.*”

When describing how patients are tracked throughout the health care system, a clinician alert technology called ‘Member Match’ was also described. Through this

programme, providers get an alert any time a patient registers at a connected hospital (most hospitals in Texas are connected). So, if a patient presents in the ER, staff at the ACO get an alert so that they can reach out and intervene with patients in real time to try to avoid a hospitalisation. This system works for physician office visits as well. While this system works fairly well within the network, it is more challenging when a patient goes to an out of network hospital. But within the BSWQA network they are well connected electronically at all affiliated practices and hospitals.

Currently, most of the BSWQA network are on the EPIC system, though there are still some practices that are on different EMRs. A goal of the organisation is to get everyone on the EPIC system *“in the not too distant future.”*

Regarding the types of data that are used by the ACO, respondents talked about claims and EMR data being their biggest data sources. On a monthly basis, analysts receive updated data about their populations through claims and EMR data. The claims data does not always have the richness that the EMR data will have, but it does provide a fuller picture of patients' utilisation of health care services – both in and out of the BSWQA network. Whereas EMR data may include things like clinical observations, family medical history and social determinants of health, claims data provides the full picture of the patients' year in terms of where they went in the health system. Together, the data is combined to build the data analytics and predictive algorithms used by BSWQA to manage their patient populations.

When asked about how they decide which technologies to invest in, it was described how they look for technologies that are compatible with their current systems. While every population may be different, it's not feasible to invest in separate systems for each of those populations. So they need enough *“bang for the buck”* when investing in a new technology.

Additionally, when making new technology purchases, they try to work with companies with good reputations or those that they have previously worked with. It was explained that they had worked with a lot of vendors in the past where they did not get what was expected. So, in addition to ensuring that they are working with reputable, realistic companies, they have also come to be more practical and manage their expectations. In the words of one respondent, *“Nothing works out of the box. You can't just plug in a technology and have it magically do everything ... it is really important to stop and think how will we be successful and what are the metrics that we think will help us be successful in reducing costs and improving quality for these populations, and what are the key pieces of people, process and technology that will help us get there. Because otherwise we can spend a lot of money on technologies what won't have the acceptance or the adoption that we need to make a meaningful effect.”*

## 2.4 Challenges

Many of the challenges that were discussed were related to data analysis. Data comes in a variety of *“flavors, forms and fashions.”* This includes claims data from a variety of different payers including the U.S. Centers for Medicare and Medicaid Services (CMS), various commercial health plans, along with hospital discharge data and various EMR data. The ACO then needs to receive all that data in its data warehouse and *“make sense of it for analysis.”* In practice, respondents described how data integration in practice has been even more complex than anticipated, as claims data does not always

map easily to medical records, and has to be matched to individuals, before analysts can work on attempting to categorise the data in useful ways.

Another challenge is in trying to make the data as actionable as it can be for the ACO. While it is not difficult to create new forms and queries in the system, the challenge is in making things easy for clinicians to use and also provide data with the most meaningful and actionable insights. Since there is so much data available, the challenge is in how to distil the data to generate the most helpful and actionable data to share with clinicians. It was described how they often start with the minimum information they need to make the right decisions and do the right thing for their patients. It was described that when they began as an ACO, they overloaded clinicians with too much information, but realise that now they need to be very focused on the data they provide and use.

The diagram below (Figure 2.3) illustrates the approach of BSWQA to bringing data analytics into everyday practice, which is based on the five principles of transparency, engagement, consistency, optimisation and variance reduction.

Figure 2.3 The BSWQA approach to using data in clinical decision making



As well as developing new ways of using data in routine practice, a further challenge has involved navigating the cultural shift from fee for service to value based care, especially when fee for service has been so successful in generating income in the past. The challenge has included both a cultural shift as well as needing a new skill set from an operational perspective. There is a conflict between incentives that needs to be managed, as fee for service is still a big part of BSWQA's income.

Senior leadership has been critical in increasing the focus on value based care: a new CEO serves as a champion and leads strategic planning on value based care. Prior to having the new CEO it was much more challenging. In the words of one respondent, *“the CEO seems to be saying let’s leap over into value based care so we won’t be so scared of letting go of fee for service. Let’s go gain as many lives in value based care as we can so we are able to stay in operations and don’t feel so compelled to keep going back to fee for service.”*

## 2.5 Skills and Competencies

When asked about the skills and competencies needed to be successful in value based care and making the best use of data and technology, a variety of topics were discussed. Most importantly, hiring people who understand value based care and how it works. It was explained how this can be a difficult skill to find since so much healthcare in the US is still based on fee for service.

Having people in leadership who understand value based care is very important – so they understand their own information enough to know about the organisation’s data needs and what tools might be needed. In this regard, leadership needs to be able to ask the right questions to both understand the data and also purchase the right products. One way that this is accomplished is through fostering open communication between the data analysts and clinical leadership, which is facilitated through weekly meetings where everyone comes together. Additionally, the new CEO has been able to serve as a champion for value based care and has refocused leadership in this direction.

From an analytics perspective, the Director of Analytics spoke about three areas of relevant skills that they look for when hiring people:

- Subject matter expertise in the health field. Though not many people have skills in VBC, they still want some healthcare exposure. As an example, if someone is an analyst coming from banking, there is a big learning curve that needs to be overcome.
- Analytic methodological expertise (i.e. statistics, engineering). This includes knowing how to bring data to life and drive decision making.
- Technological expertise focused on data. This could include experience with data warehousing and data manipulation, data movement, and/or data integration.

Though it is ideal to find people with health care specific experience, transferable skills are also important. Those with mathematics, engineering or a logical reasoning background are useful because *“that logical reasoning brain is going to ask questions.”* It was also described how communication skills are also very important, as healthcare systems today have many employees with different backgrounds. This is especially important for analysts who need to be able to communicate effectively with providers and clinicians.

*“One thing we’ve learned about tools is that we can buy a lot of fancy tools, but if we don’t have the analytical and subject matter expertise, to get value out of these tools, they will just sit on the wall.”*

Weekly meetings are held, bringing analysts and clinicians together, so that the analysts can understand enough about the business and clinical side of the organisation and the clinicians can learn more about the data. This integration was described as very important and these meetings have been taking place weekly for the last three years.

### 3 Case study 2: Henry Ford Physicians Accountable Care Organisation, Michigan

**Interviewees:** Chief Medical Officer, Henry Ford Physicians Accountable Care Organisation; Chief Medical Information Officer (CMIO), Henry Ford ACO; Senior Vice President, Population Health; Director, Population and Practice Management Analytics

The Henry Ford Physicians ACO, LLC (HFACO) is part of the Henry Ford Health System and serves 26,000 patients as of February 2018. The ACO made an early decision to build on the experience of its parent organisation in coordinating patient care. They focus on high-risk populations, reducing emergency room (ER) use and better management of discharges from hospital. They try to target those patients where interventions are likely to have an impact on health and costs.

The HFACO approach is based around a population health model, with robust research and analytics at the heart of the strategy. The aim is to provide tools that clinicians can use to support evidence-based practice, thus reducing variation. HFACO use a range of tools, including patient registries that include specific health conditions. Point of care tools are also important, providing alerts for clinicians so that patients can be called in for checkups and unmet care needs. An ER decision support team is also employed to help avert hospital admissions for patients who visit the ER. Health information technology (HIT) is used to compare key indicators and look for trends across HFACO network providers, and inform the ACO leadership.

HFACO is unique in that most of its providers already operate the same electronic medical record (EMR) system. However, consistency in data entry still remains a major challenge, as is bringing together data from different sources to produce actionable reports that can give clear direction to clinicians. HFACO are considering how data on social determinants of health might be used to improve their health analytics. In relation to risk stratification, HFACO are trying to understand more about how the 'off the shelf' stratification tool assigns risk scores. Although the investment has been useful, they need to combine it with soft intelligence about patient activation and how well patients manage their own conditions for it to be most meaningful.

Respondents reflected on the scale of the cultural and leadership shift required to bring about a mind-set focused on population health, and the need for strategic approaches to investing in HIT: more systems do not always mean better results. The importance of different professionals (data analysts and clinicians) being able to cooperate was emphasised. There is a need for financial expertise, data architects who know how to combine data sources, and the ability to draw inferences and patterns in the data. There was a sense that data from the EMR is not yet being used to its full potential.

#### 3.1 Background

The Henry Ford Health System (HFHS) is a non-profit organisation governed by a 17-member Board of Trustees. It was founded in 1915, employs over 30,000 staff and is

comprised of six hospitals, eight emergency departments, 40 general medical centres, and seven specialised medical facilities. The HFHS also includes the Henry Ford Medical Group, which is one of the largest group practices in the U.S. with more than 1,200 physicians practicing in over 40 specialties. Henry Ford Hospital, its flagship location in Detroit, is recognised for clinical excellence in cardiology, cardiovascular surgery, neurology and neurosurgery, orthopaedics, sports medicine, multi-organ transplants and cancer treatment.

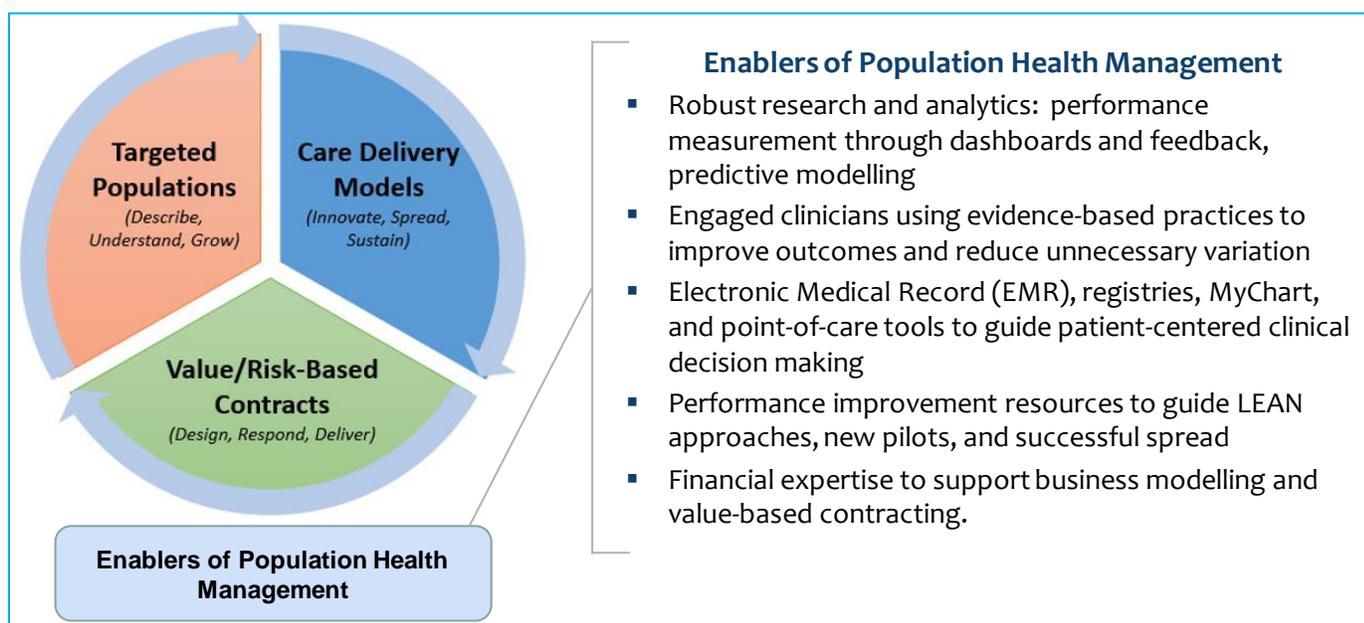
The Henry Ford Physicians Accountable Care Organisation (HFACO) began their activities on January 1, 2016 and combines staff, resources, and expertise from the HFHS. The ACO covers over 26,000 patients around southeast Michigan. Overall, HFACO's goal is to create healthier outcomes for all their patients while simultaneously reducing patient costs.

During start up, HFACO investigated various ACO incentive frameworks, including the Pioneer ACO and Medical Shared Savings Program (MSSP) models. Ultimately, HFACO decided to select the Next Generation ACO model developed by the Centers for Medicare & Medicaid Services (CMS). The Next Generation model is an initiative for ACOs that are experienced in coordinating care for populations of patients, allowing provider groups to assume higher levels of financial risk and reward than are available under other models. HFACO focused their initial efforts on high-risk populations, acute care episodes, and post-acute care and transitional care and hired two case managers to help reduce costs by safely getting patients back home sooner after a hospital admission.

## **3.2 Improving Population Health**

HFACO's director of population health described a strategic framework for how the organization approaches value based care and population health, with a goal of creating value through improved clinical outcomes and improved patient experience at a lower cost (Figure 3.1). This shows how intelligence and evidence are integrated, to align analytics with service improvement.

Figure 3.1 HFHS Population Health Strategic Framework



The framework represents a combination of value-based contracting elements and a deep understanding of the target populations, implemented through innovative care delivery models. These three key constructs are informed by a variety of enablers, including robust research and analytic tools, electronic medical records (EMR), and engaging clinicians in evidence-based practices to improve outcomes and reduce variations in care.

One approach to improving population health involved using data to create patient registries. Registries were described by one respondent as “*the spine of the population health program.*” Patient registries can be created based on specific health conditions such as diabetes, chronic obstructive pulmonary disease (COPD), or hypertension, as well as for social determinants of health and demographic factors. Registries are then used for a variety of purposes, including point of care patient monitoring, identifying high-risk patients for interventions, and benchmarking provider and clinic performance. Providers can use point of care reports to identify specific patient care gaps, such as those patients due for a mammogram or colonoscopy.

Registries are also used to identify high-risk patients – those deemed most likely to use the ER in the next six months – so that appropriate interventions can be implemented to try to minimise ER use and hospital admissions. This includes assigning high-risk patients to case managers, who can help “*keep tabs on*” these patients and help them navigate their healthcare needs and the continuum of care to avoid the ER. As the number of case managers is limited, this resource is reserved for HFACO’s highest risk patients.

Identifying the “*right patients*”, however, was described as a “*balancing act.*” Since the top 1% of patients are likely to be too sick for case management to make much of an impact on outcomes or costs, the ACO instead generally focuses on the top 3-5% of patients – those who have high risk health care needs, but where an intervention is likely to benefit them. . Assigning risk to patients is still something of a “*black box*” as it is not always transparent what calculations are used by off-the-shelf risk stratification

software to create a particular risk score. Effectively understanding patient risk requires a careful combination of provider insight used alongside the risk scoring.

Another population health approach used by HFACO is the Emergency Department Disposition Service (EDS), which is focused on ER interventions intended to avert hospital admissions. When a patient on a high-risk register arrives in the ER, a notification is triggered that alerts an emergency technician or paramedic who is part of the EDS team who then tries to intervene to avert a hospital admission. For example, if an ER physician is considering admitting a patient to the hospital, the EDS team can intervene to discuss alternatives to hospital admissions. This might include offering the patient a same day/next day appointment with a specialist, or access to same day/next day scheduling of tests and procedures. The aim is to provide follow-up care options to the ER physician so that he or she feels comfortable discharging the patient instead of admitting him to an observation or inpatient bed.

### 3.3 Role of Health Information Technology

Respondents described how HFHS has been on the cutting edge of health information technology (HIT) for decades and has been using electronic medical records (EMRs) since the 1970's. Originally, HFHS built its own proprietary EMR system, but it became a very complex platform over time. The leadership decided to switch to the EPIC platform for all HFHS facilities and providers. While there are still a handful of non-EPIC EMRs in the HFHS network, most of the organisation, including the ACO, operates on a single EMR platform. This was described as a unique feature for a health system as large as Henry Ford.

Similar to other ACOs, HFACO uses HIT for a variety of purposes, including creating patient registries and population management tools, and then developing dashboards and reports that allow providers and clinics to compare performance and trends:

- HIT data is used to develop point of care reports, including pop-up alerts and reminders that can be used when providers are seeing patients. For example, physicians may see alerts for patients who are due for colon cancer screening or an annual preventive checkup.
- HIT is also used to create dashboards where ACO leadership and providers can look for trends and benchmarks across cohorts of patients (e.g. patients with diabetes or COPD) or to compare key indicators and measures across providers or clinics.

In general, data comes from a variety of sources, the two largest of which are EMR data and claims data. EMR data was generally thought to be a richer data source. Claims data also comes from a variety of sources, including CMS and the various health plans (insurance companies) that the health system works with. The HFACO is also considering purchasing an additional source of public data on the social determinants of health (SDH), which has not traditionally been collected by the organisation. SDH data might include zip code-level information on housing, median income levels, and even debt in order to consider the social needs of their patient population. Patients' social needs could then be included in point of care reports.

HFACO uses the OptumOne risk stratification tool to identify high-risk patients, defined earlier as those who are deemed likely to have an ER visit in the next 6 months. Used

together with their EMR data, this tool helps identify patients for the ACO's high-risk registers, as well as patients who might benefit from case managers, or just those they "might want to pay attention to" even if not currently in need of a case manager.

When discussing the role of HIT more broadly in their organisation, the CMIO described how it is important to create an IT infrastructure of tools that are useful now, but also have the flexibility for future use. They do not want a tool that is only good for creating one kind of output, and want to make sure that an infrastructure is in place that lets them handle their diverse HIT needs. One of the concerns with investing in multiple systems is the additional associated complexity. In the words of one respondent, "every time you buy a new system, you make your systems more complex such that workflows become harder for frontline people and navigation becomes more difficult for patients."

### 3.4 Challenges

A variety of challenges were described, including culture, data quality and the uncertainties involved in assigning risk scores to patients.

One of the biggest challenges of working in value-based care is changing the culture and creating a vision for the organisation to endorse value-based care and move away from volume-based care (fee for service). As one respondent described, "it is hard to pivot from fee for service to value based care" when providers have been working in a fee for service world for so long. The most important associated cultural shift was reportedly moving from task-oriented care to a population health view, so that providers can think more holistically about a patients' overall health care journey rather than just treating a specific episode.

Aligning incentives around value based care was thought to be a challenge. Many leaders and providers in the wider organisation are still focused on generating revenue, and the challenges of balancing value based care models with fee for service are evident throughout the various levels in the system.

The organisation still has a foot in "both boats" and there can be conflicting goals between HFACO leadership and the HFHS hospital leadership. Whereas the ACO is working towards keeping hospital admissions down, hospital CEOs generally want increased admissions to generate income. In an insurance-based system, there are still very significant financial incentives for hospitals to bill insurers for as much healthcare utilisation as possible. It was discussed how the population health side of the organisation celebrates decreasing hospital admissions, but the finance side says "you're going to bankrupt the organisation if you keep this up." As a result, the organisation sometimes struggles with trying to define what constitutes 'good' hospital admissions compared to 'bad' admissions.

*"Stop counting heads and beds as success, but rather count the heads that stay home as success if they weren't supposed to be in the hospital"*

Respondents also spoke broadly about the variability and waste in the US health care system and how this creates challenges. Even among patients receiving the same care, costs in the insurance claims are sometimes variable. The HFACO, as well as the larger health system, is currently trying to better-understand this variability as a way to improve care and keep down costs.

There are also challenges associated with the system that the ACO uses for attributing patient risk and identifying those patients who are most likely to visit the ER or be admitted. Risk scores provided by their tools do not always provide sufficient information about why a patient is high risk. This has led to attempts to bring greater specificity and transparency to the data. For example, two patients with diabetes may have similar risk scores, but very different health outlooks according to how well each patient is managing their disease. So, risk scores alone do not always provide the whole picture about who needs the most support to stay healthy.

A further challenge relates to the wide variety of data types that the ACO receives about their patients. If a patient has not been receiving all of his or her care at HFHS, it is more challenging to track and map patients throughout the health care system. Since there is not a national patient identifier number used in the US and health care systems do not always use social security numbers to identify patients, matching patients from external systems can be challenging.

### 3.5 Skills and Competencies

Respondents talked about a variety of skills and competencies related to managing data, and leading change. On the data side, it was important to have data scientists with a background in statistics, who are able to develop predictive models and machine learning techniques, as well as identify data trends. Excellent programming skills alone are not sufficient. It is easy to get lost in the data, and so it is important to have people who can turn the data into useful and actionable pieces of information. It is also important to go beyond creating pretty displays, and be able to draw inferences and patterns.

Data architects and people who are skilled in combining and linking various data sources are also important. HFACO, and ACOs in general, are working with a lot of different data sources (claims data, EMR, hospital data) and people are needed with the skills to combine these data sources and make the data usable and easy to understand.

Therefore, it is equally important for all staff to understand how to use the full capabilities of the EMRs. EMR systems have extensive tools and information. In the words of one respondent describing the often limited use of their EMR, "*we built a really good piano with our systems but we play a lot of chopsticks.*" The importance of putting resources into training programmes on using EMRs was emphasised, especially for data entry (such as billing and diagnostic codes) and clinical documentation. It is extremely important that everyone inputs data in the same way so that it is consistent and uniform across the organisation; everyone has a role to play in producing good quality analysis.

Another important competency is the ability and willingness to cooperate. For instance, it is important for operations and clinical leaders to talk to each other and understand what the data means and what actions need to be taken. While the frontline clinicians do not necessarily need to be able to perform the analysis, they do need to be able to understand what the analysis is telling them and what to do with it. It is important to have clinical staff who can digest the information, understand it, and know how it is used in the organisation, so when a physician sees an alert he/she knows why it is important to take action.

Other skills that were described as important included having financial expertise within the ACO, even actuarial expertise. Respondents described how they sometimes lack the ability to quantify some of the things that they are trying to understand, such as how to predict the right amount of money to spend on particular population health investments. Clinicians often need expert support to make the right decisions from the data.

## 4 Case study 3: Wilmington Health, North Carolina

**Interviewees:** Chief Medical Information Officer; Chief Executive Officer (CEO); Clinical Data Analyst

Wilmington Health (WH) became one of the first ACOs in North Carolina and has achieved good results on quality of care and cost savings. Its model is typified by a conservative approach to investing in external health information technology (HIT) solutions where improvements must be proven to be better than what can be done with existing methods for analysis; and a similarly selective approach to implementing large-scale changes to care for whole segments of their population.

WH makes investment decisions by piloting small-scale experiments, only implementing them if they are proven to reduce costly episodes of care. Their approach to population health management is data-driven, and based on giving clinicians task lists and pared-down directions that are carefully produced and monitored, as well as ensuring senior leadership understands and acts on the data.

Respondents from WH described features that they felt were unique to their population health work. This includes enrolling the highest risk and most vulnerable patients in clinical research, which was felt to be a major driver in improving health and keeping down costs for these patients.

Making data from a wide variety of sources useful, and keeping providers motivated were thought to be the major challenges. Local laws on developing health facilities out of hospital were also felt to be a challenge. Respondents emphasised that a key to using data cost-effectively was having a leadership team that understands data and data analysis without relying extensively on data analysts to generate answers.

### 4.1 Background

Wilmington Health (WH) has provided care and services to residents of South Eastern North Carolina for nearly 50 years. This multi-specialty organisation leads on the integration of primary care providers throughout its network and, according to respondents, has a state-of-the-art Electronic Medical Record (EMR) that enables Wilmington to provide a more comprehensive and coordinated approach to patient care.

WH is committed to using collaborative, evidence-based medicine in providing the highest quality of care to the patients they serve. They base their mission on seven strategic pillars: growth; continuous improvement; patient satisfaction; being an employer of choice; community commitment; financial strength; and quality. WH strategically focuses on direction setting and process improvement to improve patient outcomes, but also to lower costs and to improve staff happiness and satisfaction.

Since 2013, WH's providers have participated in the Medicare Shared Savings Program (MSSP). Their data showed a three-year trend of substantial savings to the Medicare system and improved healthcare outcomes for patients seen by WH providers compared to other healthcare providers across the country. This includes a 37% lower Patient Hospitalisation Rate, a 38% lower Emergency Department Visit Rate, and 20% lower 30-day Hospital Readmission Rate. To further these efforts, WH

partnered with Blue Cross Blue Shield of North Carolina (a health insurance company) to form an ACO agreement, the first such organisation in the region.

## 4.2 Improving Population Health

WH has been working on population health improvement for the last 10-12 years, not just in the period since the ACO was formed. These years of experience gave Wilmington Health the confidence to feel it was well positioned to become an effective ACO. In 2013, the first year of ACO operations, it ranked 4th in the nation in terms of cost efficiency and 2nd highest in terms of quality of care.

Despite being one of the highest rated ACOs in the US, the CEO emphasised that its operating budget is *“really, really, really, low”*. Before Wilmington Health will invest in anything, its leadership wants to completely understand what the outcomes will be. In the words of the CEO, *“the way that we approach this is that we are very conscious of achieving the biggest levels of improvement with the lowest resource utilization.”* Respondents contrasted their approach with other ACOs, which are felt to use a more ‘scattergun’ approach to investing in value based care and refining their approach afterwards. For WH, until an approach can be fine-tuned to know that it works to reduce costs and improve care, it will not be employed beyond a pilot test.

To test new approaches to population health, WH sets up what respondents referred to as *“experiments”*, starting slowly in order to really understand a programme before expanding it throughout the organisation. For example, it was explained that while many ACOs hire care coordinators to manage their sickest and highest-risk patients, WH does not employ this approach. Care coordinators are viewed as an expensive resource, and leadership at Wilmington Health believe that equally good or better results can be achieved without them. However, there is one small-scale pilot running currently to enrol frequent users of the emergency room (ER) in 24/7 care and support from a care coordinator to test whether this approach results in improved health outcomes at lower costs among enrolled patients. As one respondent described this approach, *“until we can prove it, we won’t continue it.”*

A valued population health approach used by WH is enrolling patients in clinical research studies. WH claims to have more patients involved in clinical research studies than any other ACO. Respondents explained that there is a strong link between patients enrolled in research studies and the organisation’s Triple Aim aspirations. Patients enrolled in research studies usually receive extensive follow up care, which in itself has been shown to improve wider health outcomes. By targeting research studies at their highest risk patient group, WH can improve patients’ health while avoiding a more ‘blanket’ approach to care coordination, and keeping down costs for their highest risk patients. Respondents indicated that they have generally found that those patients enrolled in research studies have had higher engagement in their health care, lower medical costs and better health outcomes than similar patients not involved in research studies. Research studies have generally focused on lipid management, hypertension, diabetes, COPD, asthma and other medical conditions that would appear to have high value in treatment and risk reduction over the long term. Potential patients are identified based on searching patient data from WH’s medical records system, along with a search combining study criteria to see which patients might be eligible. Patients are then approached through a variety of outreach methods, to see if they would be interested in participating.

Respondents also discussed a variety of approaches aimed at reducing hospital admissions. For example, a physician assistant-led internal medicine walk in clinic was set up to serve as an “*ER avoidance clinic*”. The daytime clinics provide a full spectrum of care to potentially replace an ER visit. The clinics can handle many of the same conditions as the ER. WH patients are told that if they are thinking of going to the ER, they can go to the walk in clinic instead. Respondents felt that the clinic has been very successful in helping to divert patients from the ER.

An additional approach to reduce hospital admissions that is being explored by WH is a hotline for emergency physicians. This can be used to guarantee that referred patients will be seen the next day by a WH provider. As patients often get admitted to the hospital in order to make sure that a specialist can see them, this was thought to alleviate concerns that patients would not be seen by a specialist.

WH respondents expressed scepticism that investments in addressing the Social Determinants of Health (SDH) in their population health work would have a substantial enough impact on cost. While they feel that SDH is important to consider, the resources it would take to address these factors on a population level would likely be too great compared to the impact they would achieve. Instead, they try to address related issues that impact on their patient population, such as ER utilisation, through their other population health efforts as described previously

### 4.3 Role of Health Information Technology

Health information technology (HIT) is used for a variety of purposes at WH. It identifies patients, provides lists of all “*open opportunities*” and supports the generation of point of care prompts. It also provides lists of patients who are in need of healthcare services, have gaps in care, and those who are the sickest and may require referral to a clinical research study or the care coordinator pilot. To make this data usable for physicians, paper reports of patients are usually generated. As one respondent said, “*we are still killing trees*”. The paper reports make it easier for physicians to access rather than having to log into various EMR screens. Each day, a physician assistant will print out lists related to patients who are scheduled for a visit and provide the lists to the physicians to use at point of care.

Respondents described a variety of specific activities that WH engages in to improve population health through using data. One approach is using a point of care tool based on patient claims and EMR data, which provides prompts about patients who may need a test or checkup, such as a mammogram. In addition to providing the point of care reports on specific patients who are visiting the practice, WH also generates wider lists of patients who are due for care, but who may not have a visit scheduled. Providers/medical staff can use these lists to call patients and invite them to a clinic.

In addition to providing patient specific reports, WH also publishes the performance data of their physicians on a per measure basis, un-blinded so that all providers in the organisation can see how others are closing gaps in care. This transparency was reportedly important; according to one interviewee, “*peer pressure works*” and has resulted in “*tremendous improvement.*” WH also uses patient satisfaction data, making this a key part of performance reports.

Data is also used to identify patients at risk of being hospitalised in the next six months to a year (i.e. with high risk and co-morbidity scores). Clinicians can then follow up with these patients so that appointments are scheduled and follow-up visits take place.

HIT is also used to coordinate patient care among various providers (specialist and primary care), as well as coordinate patient tests and procedures. An automated data system is used throughout the ACO to indicate specialist visits and

diagnostic/screening tests. For example, if a patient sees a specialist, an alert is automatically included in the patient's file in the EMR so their primary care provider will automatically know that a patient visited a specialist. This system eliminates the need for a specialist to send a separate note to providers about patient visits. The automated system works similarly for tests. If a provider orders a CT scan, this automatically generates a referral that initiates appointment scheduling (and insurance follow up). Automated reminders also go to nurses, who can check if the patient followed through on their visit or if they need to chase patients accordingly. Respondents described how their EMR system is very streamlined and automated so that patients do not fall through the cracks.

*"We live in an era of directional imprecision. You can go a particular way, but you can't go there precisely"*

In keeping with their vision of keeping costs down, respondents at Wilmington Health talked about investing carefully in HIT. Their biggest investment has been the Optum risk stratification tool to identify patients at risk of hospital admission. As an early adopter, they locked in a low price for the tool.

Respondents felt that it was not necessary to spend a lot of money on external HIT suppliers to make good use of it, preferring Microsoft Excel to produce their data reports and tables. In their view, the most important factor was having a leadership team that knows how to understand and work with the data to make it usable and easy to understand for frontline clinicians.

*"If leadership cannot understand the data and be up to their elbows in it, the outcomes will be less than optimal"*

## 4.4 Challenges

A major challenge is that some information from providers and systems outside of the WH group does not come through electronically – paper reports and faxes need to be entered manually into WH's data warehouse. Respondents hope that a stronger health information exchange (HIE) in North Carolina will improve this in the near future<sup>7</sup>.

Similarly, there is *"a mosaic of information that needs to be woven together."* Making sense of a variety of different sources to make data useful was described as challenging. Specific concerns involved claims data, which comes from multiple sources with no uniformity. In the words of one respondent, *"If you've seen one [claims]*

<sup>7</sup> HIEs are an important feature of the US healthcare system. Their role is to assist in the secure transfer of patient data between different hospital systems and between providers and insurers, and in some cases they play a role in standardising the way in which data is categorised. They may be set up by state governments or partnerships of hospital systems (or both), and can also be funded by the federal government, which is seeking to improve this part of the infrastructure.

*data set, you've seen one data set.*" Additionally, respondents felt that claims data is often not very timely and so translating this into actions was also difficult.

Respondents were hopeful that the next generation of analytic tools would have more advanced features and capabilities, to make it easier to match claims data with EMR data, but it was felt that a lack of integration and consistency made it hard to get everything into one system.

Looking beyond data, motivation of providers was thought to be a challenge for WH. Reflecting on the 'Quadruple Aim', respondents said that their success was partly due asking doctors to do a lot of work, which often results in provider fatigue.

Lastly, respondents pointed out legal constraints to opening new community facilities that would provide better alternatives to hospital-based care. Certificate of Need laws were put in place in the 1970s to restrain expansion of hospitals and facilitate coordinated planning and building of new facilities. In North Carolina, these rules require providers to first seek permission before they may open or expand their practices or purchase certain devices or new technologies. The applicant must prove that the community "needs" the new or expanded service, and existing providers or facilities (mainly hospitals) are invited to challenge a would-be competitor's application. In a competitive market, this provides an incentive for different providers to work against each other.

## 4.5 Skills and Competencies

When asked about the skills and competencies needed to make the best use of data, the CEO felt strongly that leadership must know how to work with and interpret data as part of a strategic vision. While leadership might not need to know how to write a SQL query, they do need to know what goes into the process, what the data means and how to interpret it: *"we all deal in the data and no one is able to escape that. You have to be able to play in this world."*

Respondents said that most clinicians do not necessarily need to be aware of the analytics. In their view, the key to using data successfully was to give them well-produced reports (simple charts) that are easy to read and interpret. Committees of staff usually vet the data first to make sure it is clear before distributing it.

*"Most other organisations use more sophisticated tools, we don't need to do that. All we need to be able to do is pull data out of [our system] and use Excel."*

## 5 Case study 4: OneCare, Vermont

**Interviewees:** Chief Medical Officer; Executive Medical Director for Accountable Care.

OneCare Vermont is a state-wide ACO whose approach focuses on being a system leader, leading improvements in population health, whilst allowing for more local partnerships and collaborative working to play a key role in implementing those changes on the frontline. OneCare works to bring all of the local providers on board (acute and community) in the areas in which it operates. It is primarily an organisation that joins up care, rather than being a direct care provider.

The OneCare population health care approach stratifies patients according to risk, and aims to give each group of patients an appropriate level of care coordination and preventative care in order to standardise their experience of care, reduce ER use, lengths of stay, and readmission to hospital. Above all, it aims to ensure that providers have the tools in place to analyse their performance and communicate effectively with each other to coordinate patient care, regardless of the patient's 'front door' into the system.

There are four key items of health information technology (HIT) infrastructure that underpin the ACO's approach:

- Vermont Information Technology Leaders (VITL), the state-wide health information exchange (HIE). This is a secure network and data warehouse that allows for claims and electronic medical record (EMR) data from different sources to be combined. This initiative is supported by the state government, although OneCare is a key stakeholder and customer. OneCare encourages its providers to ask patients for their consent to share their personal health data with any other provider that they see via this network.
- The Johns Hopkins ACG risk stratification and predictive modelling tool, which is used to stratify patients and understand which patients and condition groups to focus on.
- 'Workbench One', a custom-built dashboard that is accessible in a transparent way to all providers to look at performance, utilisation and cost.
- 'Care Navigator', an 'off the shelf' solution that has been tailored for clinicians to coordinate patient care – used for developing shared care plans, communication between providers, and planning transitions of care.

Improvements are still being made or planned (e.g. integrating telemedicine and teleconsultation) and there has been a growing demand for data from clinicians that cannot always be met due to limited resources. Take-up of care coordination among providers is still in the relatively early stages but it is expected that OneCare's approach will create more durable relationships and collaboration at the local level.

It is important to note that OneCare is part of a wider infrastructure put in place by the state government in Vermont, where policymakers are driving the value-based care approach across the system (not only Medicaid beneficiaries).

## 5.1 Background

OneCare Vermont is a state-wide ACO formed in May 2012 through a collaboration between the University of Vermont Medical Center and Dartmouth-Hitchcock Health for the purpose of applying for the Medicare Shared Savings Program (MSSP). The ACO is now part of CMS' Next Generation ACO programme, assuming a bigger financial risk. The overall goal was to move away from a fee for service model that incentivises volume, and move to a capitated payment system that rewards providers for keeping patients healthy. The clinical model used by OneCare was developed in consultation with its Clinical Advisory Board and comprises three key elements: care coordination; clinical data sharing; and quality measure management. The University of Vermont Medical Center and Dartmouth-Hitchcock provide substantial financial support and human resources for the infrastructure and operations of the OneCare Vermont ACO.

The OneCare Vermont ACO coordinates the health care of approximately 122,000 combined Medicare, Medicaid and Commercial Exchange<sup>8</sup> Vermont beneficiaries. The network includes roughly 160 health care organisations (hospitals, community based primary and preventative services, nursing homes, home health agencies, independent doctor's offices, and mental health and substance abuse agencies) that signed up to participate in the new payment system, covering the whole 'continuum of care'. All of the different types of provider organisations are represented on the OneCare Vermont Board. OneCare Vermont is continuing to expand and now includes two new hospitals in the neighbouring state of New Hampshire.

Respondents said that the OneCare model is unique in its partnership approach in that participating hospitals share in the financial risk. The 10 hospitals participating in OneCare receive fixed monthly payments for the care they provide.

## 5.2 Improving Population Health

Several key approaches were described in relation to OneCare's efforts to improve population health (see Figure 5.1). For each risk group in the whole population, different key activities are described:

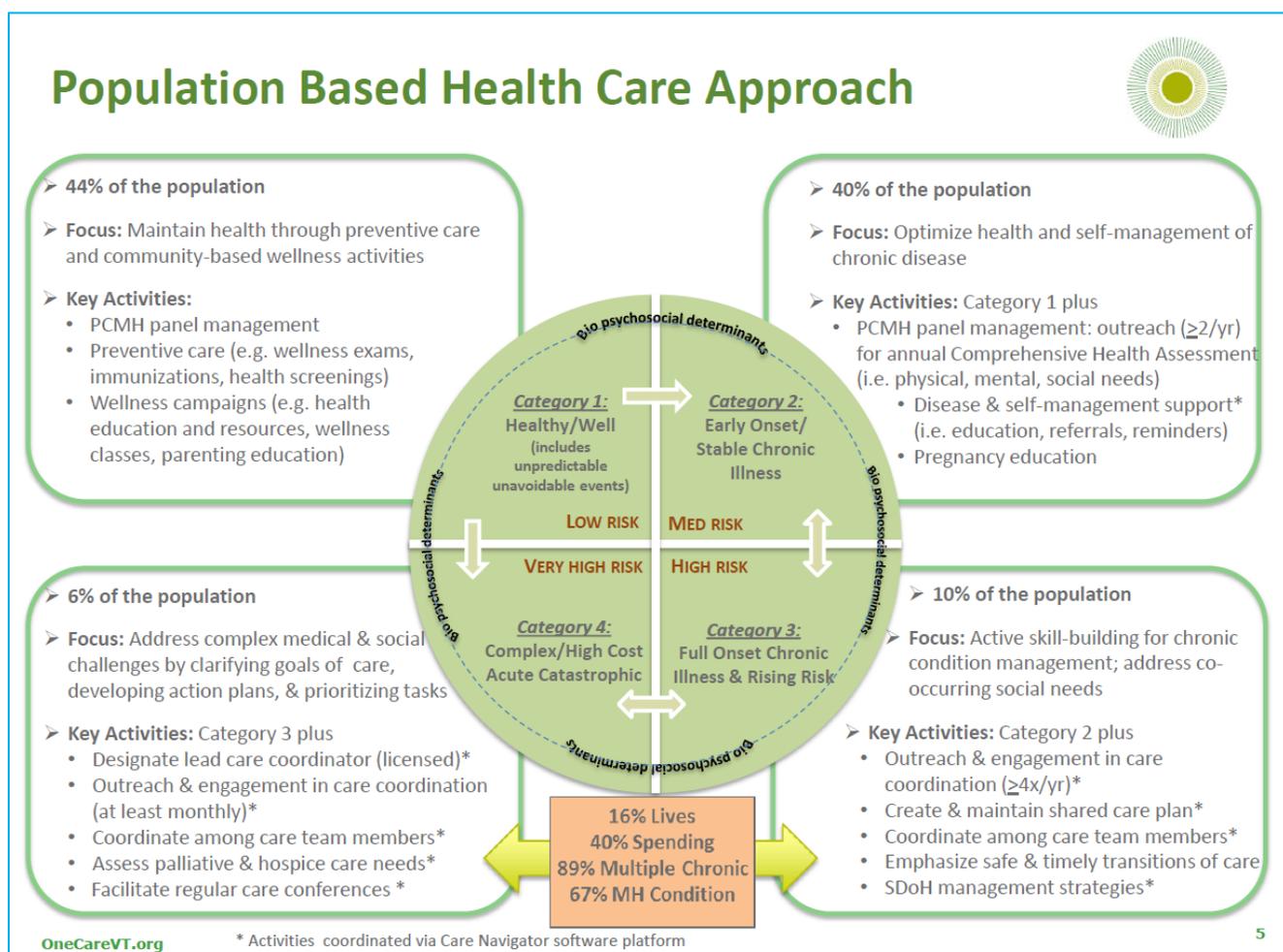
- Preventative health for the healthy population;
- Increasing degrees of support with self-management and care coordination for the 'at risk' groups with long term conditions; and
- For the 6% of the population judged to be at greatest risk, access to specialist support including a designated lead care coordinator and case conferences.

The Care Navigator software platform coordinates many of these activities. It is provided by a private technology company that also provides model care plans and educational materials that can be used in a consultation with a care coordinator or clinician.

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<sup>8</sup> This refers to the subsidised private insurance coverage that became available following the passage of the Affordable Care Act.

Figure 5.1 The OneCare Vermont approach to population health<sup>9</sup>

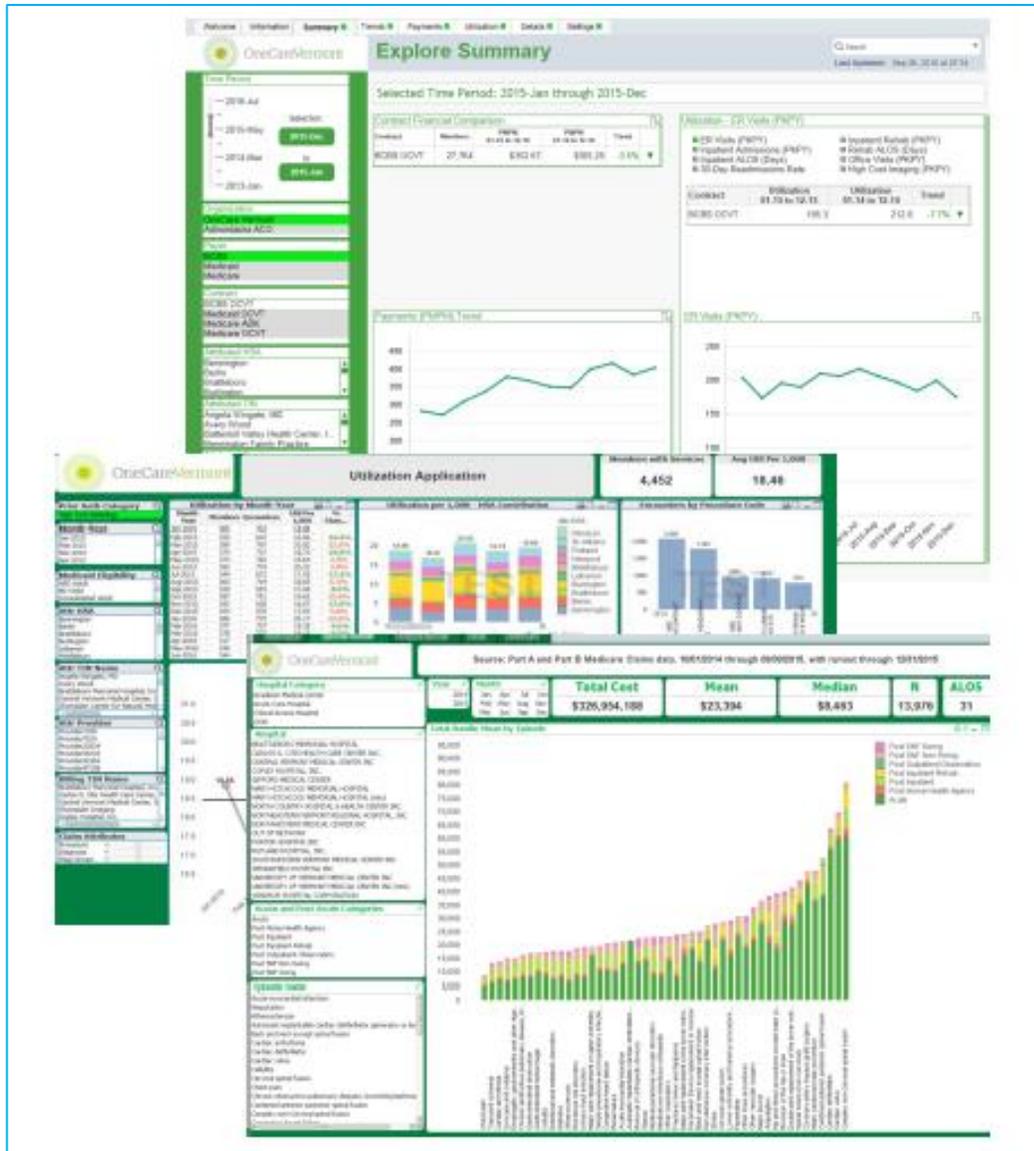


OneCare is unique in that it partners with hospitals in the state to assume the financial risk for patients. Hospitals in the network sign up for capitated payments, so that the hospitals themselves are incentivised to keep costs down, and lower admissions and readmissions. This is seen as very important part of the OneCare model that differs from other ACOs. If any physician practice in the state of Vermont is interested in being part of the ACO, the local hospital in their area must also agree to participate and accept capitated payments. It was described that the OneCare model takes an approach that “*unlocks hospitals from the fee for service treadmill*”, which brings in all the different kinds of providers in each local patch that it operates in. This approach was described as being successful in persuading participating hospitals of the importance of value-based care and ensuring buy-in. As a result, most initiatives to improve quality of care and improve value take place in local community partnerships, a level down from the ACO itself.

<sup>9</sup> See *OneCare Vermont Update 2017*, <http://gmcboard.vermont.gov/sites/gmcb/files/GMcb%20VMNG%20presentation%205%2011%2017%20FINAL%20DF.pdf> for further information on this model.

Another approach employed at OneCare involves using data and health analytics to shape its population health work. The catalyst for this work has been the development of a state-wide data warehouse called Vermont Information Technology Leaders (VITL). Through this, claims and EMR data is combined to create a variety of tools and resources for OneCare, including patient registries and dashboards. One specific tool that was described was a self-service dashboard tool called 'Workbench One' that hospitals and providers use to look at their patients' health care needs, cost utilisation, and performance. This was produced in-house by an eight person analytics team.

Figure 5.2 Example screenshots from the 'Workbench One' dashboard



An additional strand to improving population health is promoting complex care coordination. Using health analytics to stratify their patient population based on risk factors, OneCare enrolls its most complex and high need patients in a complex care management programme. This uses a Patient Centred Medical Home (PCMH) approach to manage patients with complex care needs. At the centre of this approach

is a communications hub that allows various providers who are treating a patient with multiple health care needs to communicate with each other. So, for example, if a patient has a primary care physician, many specialists, a mental health provider, a specialised social worker, and benefits from a transportation service – all of these services can come together to create a shared care plan and stay in touch to coordinate patient care. Based on the principle that OneCare is a system manager rather than a provider as such, it does not manage frontline care coordinators. Rather, the partner organisations are given the funds and resources so their employees can take on these roles and address both medical conditions and wider social, financial, and behavioural health challenges.

Telemedicine is a future area of focus for OneCare's population health work. Since Vermont is largely rural, telemedicine can be an important way to expand health care services to isolated populations. The CMS Next Generation ACO model allows ACOs to perform billable telemedicine visits, allowing clinicians to provide virtual consultations. OneCare respondents hoped that once providers start to develop these facilities, emergency room (ER) visits and hospitalisations could be further reduced, by reaching patients that might not be able to come into contact with health services before they need an ER visit.

### 5.3 Role of Health Information Technology

When describing its use of health information technology (HIT), respondents mentioned two valuable forms of infrastructure: VITL and the Johns Hopkins ACG system.

VITL was set up in state law as the non-profit operator of the state-wide health information exchange (HIE), a secure data network which gives health care providers in Vermont the ability to electronically exchange and access patient data. In addition, it has employed data architects to create a data warehouse and has made a great deal of progress in bringing together analysts from providers and ACOs to establish greater standardisation of clinical data across the state.

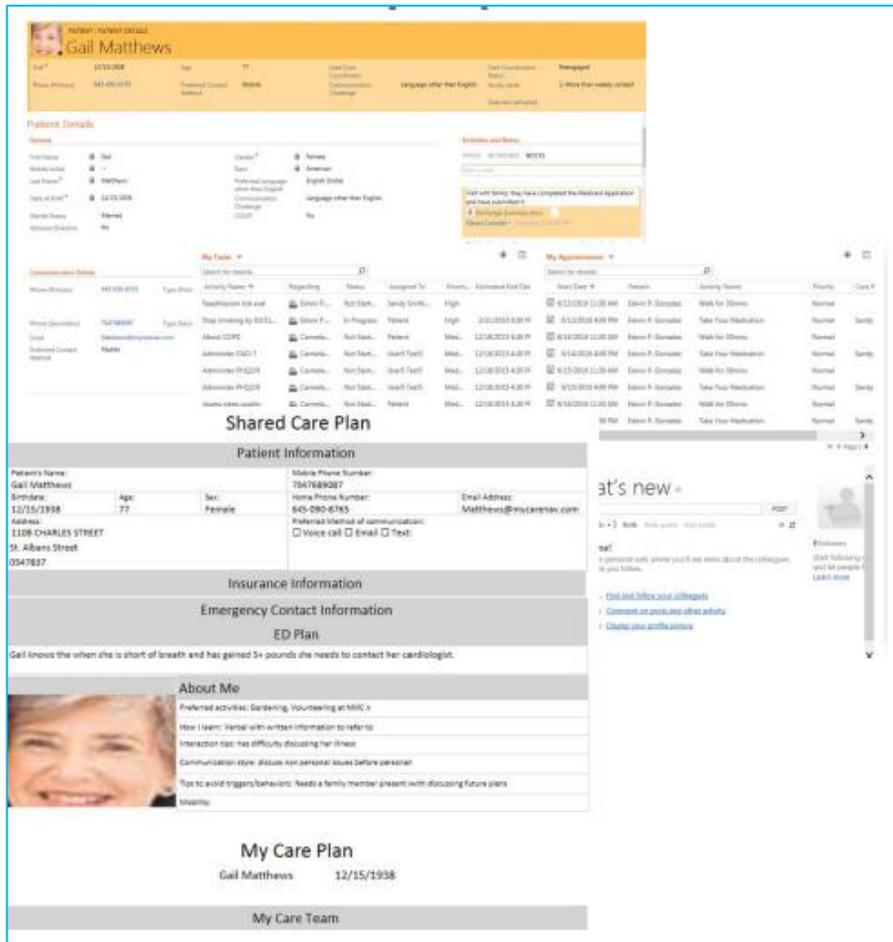
VITL collects and manages demographic data, laboratory results, discharge summaries, radiology reports and medication histories, from multiple sources including hospitals, primary and specialty care, Federally Qualified Health Centers (community primary care facilities), home health, long term care, designated agencies and commercial laboratories. With patient consent, the information in the VITL network is available to all authorised, treating providers, to help them make more informed clinical decisions at the point of care. This consent underpins the exchange of data and better care coordination, no matter which 'front door' of care is accessed by the patient.

OneCare combines the data from the HIE with claims and EMR data to create the tools that used to manage population health needs, including identifying patients for complex care management (illustrated in Figure 5.3). VITL continues to add new functionalities, most recently introducing feeds for telemonitoring devices in the home, and automating the consent process so it can be flagged in electronic medical records<sup>10</sup>.

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<sup>10</sup> See also, *VITL 2017 Annual Report* (<https://www.vitl.net/sites/default/files/documents/Annual-Reports/2017-vitl-annual-report-final.pdf>)

Figure 5.3 Example screenshots from the 'Care Navigator' system used for population health management and care coordination



The Johns Hopkins ACG System is the tool used by OneCare to identify patients at high risk for medical needs and forecast their health care utilisation. This system was selected because it involves a broader set of data than other systems, including pharmaceutical claims, and according to respondents, enables OneCare to forecast risk well into the future. The Johns Hopkins system risk scores are a key part of the process of assigning patients into different risk groups so that they can receive a care coordinator and care plan.

OneCare is also investigating using other sources of public data to help address the Social Determinants of Health (SDH) for its patients so that data besides claims and EMR can inform their forecasts of risk. Using data that addresses SDH could, in the respondents' view, help them determine other risk factors that can shed light on non-health factors that might be impacting patients' overall health and wellbeing. Since the trigger for getting patients into the complex care management programme is based on risk stratification, having additional sources of data would provide a more comprehensive understanding of their patients' needs.

As an ACO, OneCare uses all the tools and data it has to promote population-level improvements across a diverse hospital network. For example, in 2016, leadership identified that there was significant variation in utilisation and lengths of stay. A

retrospective analysis of claims data was used to identify the hospitals and groups of patients with significant variation and readmissions and, as a result, it was decided to focus on joint replacement, as these are among the most common surgical procedures. The results of the analysis were un-blinded, but “rather than using the variation data to strictly enforce behaviour change [among providers], OneCare believes that by empowering providers with data and allowing them to see who is most successful, they will naturally seek to learn from one another” (Accountable Care Learning Collaborative, 2017). OneCare took action by organising a virtual symposium with orthopaedic surgeons and is starting to see an improvement in referral patterns.<sup>11</sup>

## 5.4 Challenges

Working with and loading claims data is still a time-consuming process. Firstly, insurers now pay hospitals in many different ways. Additionally, there is often a lag involved with receiving claims data and a long wait for payers to send data sets, then clean the data and then get it into the data warehouse.

The appetite for using data analysis to inform patient care has generated capacity issues for analysts, too. It was explained that whenever analysts provide dashboards and data reports, recipients will often ask for more information. With limited resources to develop reports and dashboards, and process additional ad hoc analytical requests, prioritisation has become important. Therefore, when the ad hoc requests come in, analysts try to create queries that can be used by multiple parties, so that it is not a one-off ad hoc request.

*“Data hungry faculty and practice docs can pretty quickly create lots of requests that take time to produce ad hoc queries”*

Patient matching is also a challenge. Since there is no universal patient identifier number in the US and VITL is not always in possession of Medicare/Medicaid numbers, matching patients to their various health data becomes challenging, especially when patients visit providers outside of the OneCare network. Additionally, since not all practices are using the same electronic medical records (EMR) systems, it is also challenging to work with a lot of different EMRs to combine the data.

Additionally, there has not always been strong partnerships between different health care entities in Vermont, particularly between hospitals and community agencies. Even with all the tools for risk stratification and care coordination that have been put in place, most providers are just beginning the process of take-up and implementation in relation to assigning patients to coordinators and setting up shared care plans<sup>12</sup>. But now that state policymakers are driving the value based care model, it will be more important to have better coordination throughout the community so that various community agencies can be involved. For instance, while hospitals may not have always had good pathways to community and social agencies in the past, these connections can be very important for improving population health. Community partnerships and linkages to address the social determinants of health are therefore a priority in the future, and

<sup>11</sup> See Accountable Care Learning Collaborative, 2017. *Reducing Variations in Care through Transparent Data Reporting: OneCare Vermont’s Approach*. Accountable Care Learning Collaborative, 2017 <https://www.accountablecarelc.org>

<sup>12</sup> *OneCare Vermont Update 2017*

OneCare hopes to use its role as a leader to foster better collaboration across different agencies. The emphasis is on helping all providers to work together, rather than narrowing patients' options for access (in contrast to the 'narrow network' approach taken by some health insurers and ACOs).

## 5.5 Skills and Competencies

Health information technology skills and competencies were not widely discussed during the OneCare interviews. Respondents mainly focused on the lack of time available to clinical providers and staff for prioritising workflow and paying attention to the various initiatives that aim to initiate more proactive contact with patients.

In reflecting on OneCare's work as an ACO, respondents expressed the view that the biggest lesson learned is that improvements take time and that patience is needed to see change bear fruit: "*In such a complex world and system, things just take time.*"

## 6 Case study 5: Aledade, nationwide

**Interviewees:** Vice President, Healthcare Policy; Vice President of High Risk Product; Senior Vice President of Medical Affairs and Product; Medical Director, Prairie Star Family Practice, Plainville, Kansas.

Aledade is a start-up company that operates ACOs in 18 US states, with contracts from both government and private insurers to deliver value based care. Aledade believes that better health outcomes will result when patients have a strong relationship with their primary care physicians. It aims to give independent primary care providers the technology, tools and support that they need to become 'accountable' for all aspects of their patients' care.

Aledade focuses on those patients who are at risk of becoming high-cost, high-utilisation - so they have the care management, medication support and preventative health and social care that they need.

The approach to population health management is very much data-driven: the organisation has invested in numerous analysts and a proprietary platform for clinicians, supported in part by venture capital. The platform provides a daily workflow and brings together data from electronic medical records (EMR), claims and practice level intelligence in order to eliminate gaps in care, and make sure that data is collected more consistently on the frontline. Improving the quality of referrals and transitions of care are two specific areas of focus. There is a culture of experimentation, in which analysts test different algorithms and predictive models to determine which opportunities are worthwhile.

Challenges faced include the varying quality of data recorded by primary care providers, interoperability (as Aledade deals with numerous EMR systems), and ensuring that workflows are relevant to local needs and individual practices. To ensure that participating practices are able to understand and act on their data, Aledade employs field staff who use their frontline clinical expertise and empathy to engage frontline staff in the changes that are needed to become successful in value-based healthcare.

### 6.1 Background

Aledade was founded in 2014 by Farzad Mostashari, the former national coordinator for health information technology (HIT) at the federal Department of Health and Human Services (HHS). Aledade is a start-up company with the goal of improving patient care and reducing health care costs. Aledade now operates in 18 states, with more than 260 practices and 330,000 patients.

The Aledade model involves putting primary care providers (PCPs) at the centre of patient care, driven by the belief that all patients benefit from a strong primary care relationship and better care coordination. To do this, Aledade partners with independent primary care practices across the US and provides clinicians with tools and assistance to make the transition to value based healthcare, so they can join Aledade Accountable Care Organisations (ACOs) in each of the states in which Aledade operates. Aledade ACOs operate value-based healthcare contracts with a

range of payers – including state Medicaid administrations, the federal Medicare programme and commercial health insurers.

Partner practices invest in a modest monthly membership fee, attend regular meetings with an Aledade fieldworker who tracks progress and provides hands-on support, and commit to the Aledade mission of providing high-quality, affordable care for their patients. Aledade in turn helps these primary care practices become part of effective ACOs by providing practices with business transformation services, advanced data analytics and technology. By giving primary care providers more information about their patients, so care can be better coordinated, those primary care providers can also encourage those patients to form more loyal relationships, rather than visiting a specialist for common ailments (reported as a major source of waste in the US system).

Aledade has its own proprietary data analytics platform that pulls data from a variety of sources, including practices' own electronic medical record (EMR) systems, hospital records, health information exchanges and Medicare, to provide primary care physicians with insights and workflows (lists of patients and actions to carry out). It also provides independent primary care providers the business intelligence they need to look for wider opportunities to reduce costs and increase quality of care; for example, by targeting those people who are frequent users of hospital or emergency room (ER) services, but who do not have a consistent relationship with a primary care provider<sup>13</sup>. Aledade therefore provides the investment and support that primary care organisations need, so they can take on value-based contracts where risks and gains are shared, and thus take on greater oversight of the whole patient journey.

## 6.2 Improving Population Health

Aledade's approach to improving population health is all about "*the primacy of data*". Respondents described how their organisation looks at a variety of data sources – claims, billing, EMR, hospital discharges, from any source that they can find. The data is then used to understand and gain insight into the patient population. However, respondents also said that it was just as important to make the data useful to the needs of each individual practice. As one respondent said, "*unfortunately the data is not useful unless we can get it to the practice and help them understand how to use the insights that we are providing, so the workflow is paramount in this change.*"

In describing how the data helps Aledade improve population health, one respondent described targeted reports that add value by providing physicians with information on patients who may have a particular gap in care. For example, such a report may provide a practice with a list of patients who are over 65 and due for a pneumonia vaccine. In addition to just providing the data reports, the reports also provide clinicians with prioritised actions to take based on the data (i.e. a workflow). Aledade learned that providing a report was not enough, as clinicians would not always take action or know what actions to take as a result. So, now the reports provide targeted steps for

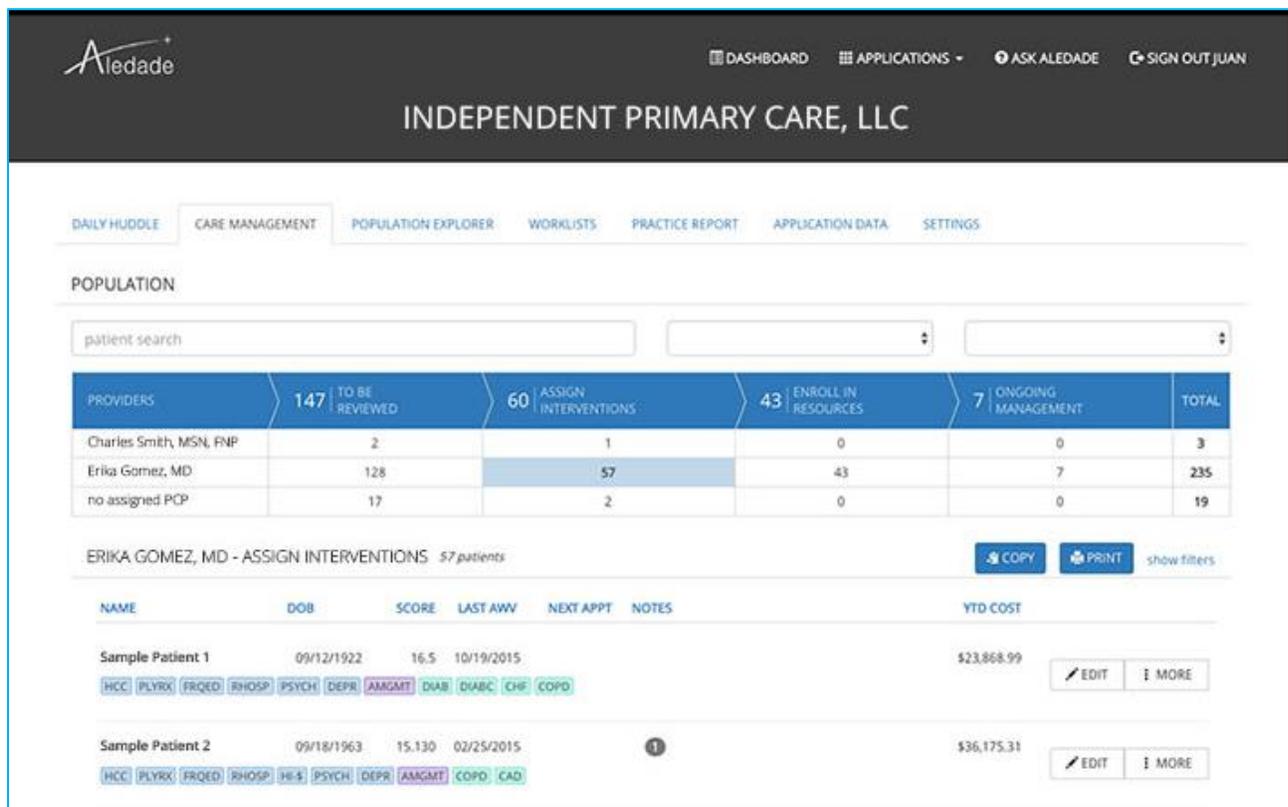
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<sup>13</sup> This is not uncommon in the US. People who are uninsured or under-insured are deterred from accessing primary care because of cost; people whose insurance is more comprehensive will tend to go straight to a specialist when they need it. The low status (and patchiness) of primary care means that there is no 'default' role in the system, akin to a GP in the UK, that is expected to coordinate care; there is less access to preventative services or good quality medication management. Value based healthcare is expected to address these challenges.

clinicians to act on, such as telling them that they need to reach out to all patients due for a vaccination by a set date, and then they are instructed to update their EMRs with the outcomes in a particular way (to enable greater consistency in data management).

In addition to the reports, respondents described how practices / providers are also given daily reports called the 'daily huddle'. This is a daily data feed that gives providers information pertaining to patients that will be seen on each day and what their particular health care needs or gaps in care might be. Providers can then use this information to attend to the needs of those patients and make onward referrals or signpost as needed. In general, the more aware a primary care physician is of each patient's likely issues, the more likely it is that they can deal with those issues at the same time.

Figure 6.1 The Aledade clinician interface



Aledade also analyses patient data to risk stratify patients using a pyramid model, as Aledade's approach is that interventions must be tailored. At the bottom of the pyramid are the healthiest patients. This group comprises the majority of the patient population. This group may do well to avoid unnecessary and potentially harmful utilisation; however, they may need help to coordinate any specialist care they may need, and to attend preventive health screenings. At the top of the pyramid are the sickest patients and this comprises the smallest number of patients. Generally, these patients need conversations so that health services can understand and follow people's wishes at the end of life.

However, in the middle are the patients who might benefit the most from interventions to improve their health. These groups might include patients who have multiple chronic conditions, patients who have been using the ER frequently, or patients who are not

adhering to their medications. For these patients, Aledade's system will recommend assigning a care manager to help people with multiple conditions to coordinate and manage their care better. Aledade also hired a Director of Pharmacy, to address medication issues specifically.

Aledade's work with primary care and improving population health also involves the provision of support to help bring about transformational change within the providers. This support varies by practice need and experience with value based care, but generally includes coaching practice staff in the use of reports, improving the coding and management of patient data, and upskilling practices to develop case management or outreach approaches to engaging with patients and their health. One example given was the use of clinical codes to paint an accurate picture of a patient. So a person with well-managed diabetes and a person who has lost both legs and who has a comorbid kidney condition – could both be coded as 'diabetic'. However, since the amputee requires much more care, more accurate coding will provide a truer picture of that patient's health needs, whereas incorrectly coded conditions may mean that providers can lose money because they will receive a lower risk-adjusted capitated payment. In this regard, Aledade can help practices navigate the intricate coding nuances that are required for value-based contracts.

Accurate recording of patient conditions is also critical when liaising with insurance companies, as patients can sometimes change their insurance provider from year to year and data about patient conditions needs to be inputted each time (or this knowledge is lost). Aledade's field staff can help coach practices on the nuances and specific requirements with regards to the necessary diagnostic coding to be successful in value based payment models. Once better data about patients' health status and the social determinants of health is gathered, it can be fed into Aledade's data analysis and used to improve the quality of the reports.

Field staff who support practices include population health coaches, nurses, medical assistants or social workers, who can show empathy. They must also understand how to help practices navigate change, including transitioning to value-based payment and addressing work flow improvement. It was considered important to use people who have experience working in primary care or "*in the trenches*" and who can relate to the needs of frontline staff.

### 6.3 Role of Health Information Technology

HIT and data play a critical role at Aledade. Aledade uses a comprehensive proprietary data platform that combines data from a wide variety of sources to provide insight that helps providers to manage their patients. Even if the data is not perfect, Aledade will take data from any sources willing to provide it, and will work to improve the quality of data over time. As one respondent indicated, "*once the data starts flowing it always gets better, so we don't obsess over initial quality*".

The workflow that clinicians see (Figure 6.1) helps them to manage their patients. The analytics can segment patients into several key categories: those patients who are due for services and/or have gaps in care (i.e. due for a wellness visit); and those patients who have a higher risk of complications and incurring greater cost (i.e. patients with multiple chronic conditions, patients who use the ER). The approach taken to the analytical process is experimental and iterative: Aledade's analysts will design

algorithms that try to identify patients that are high cost, and look for data about them to understand how those costs could have been predicted, and determine which gaps in care might have led to those outcomes.

Respondents also described how its HIT capabilities allow Aledade to look at their patients “*beyond the four walls*” of the clinic. As an ACO, Aledade and its member practices are accountable for their patients’ care, including where they go outside of the practice. Aledade has an entire team dedicated to referral management and transitions of care. The data that Aledade collects aims to allow clinicians to see the care that their patients are receiving outside of the practice – for instance, whether patients are visiting other doctors or using the ER. This insight can help providers better manage their patients and adjust practice behaviour as needed. So, if a patient used the ER, it can be important for their primary care doctor to know why: was it because their usual primary care facility was closed; or was it because the patient did not think that they could get a particular service from their provider? By having this information, a provider can make adjustments to improve patient care such as expanded hours or additional services.

To collect this type of data, Aledade works with external entities such as hospitals and surgery centres. Changes made by the Centers for Medicare and Medicaid Services (CMS) – the government payer for Medicare and Medicaid – have made it easier for providers within an ACO to share personal health information about Medicaid beneficiaries between themselves and obtain claims data from CMS, as patients are now opted in to data sharing by default (patients still have the option of opting out).

Respondents also provided insights into how Aledade makes investment decisions about what data analysis technologies to buy. They described learning through trial and error, and being open to trying new things. As one respondent said, “*you need to be able to fearlessly abandon things*” – in other words, to experiment with different tools and let go of those that are not working. The other important aspect that respondents considered is how labour-intensive the data analysis might be; the time it takes to arrive at a modest insight may not be worth the outlay. Respondents said there is no magic formula in deciding where to invest and it often involves insight from experienced teams and boils down to the collective wisdom of the people who work at Aledade and “*a heck of a lot of testing!*”

*“[We look at] what happens to patients when they’re in the hospital, when they’re in the ER, when they are in a skilled nursing facility [etc] ... that perhaps isn’t providing high value services and we do a lot of data mining, opportunity analysis and work on workflows to address care that happens outside of our PCPs’ offices”*

## 6.4 Challenges

In describing their efforts to improve population health and use HIT more effectively, respondents described a variety of challenges. One challenge was the lack of interoperability among the various EMR systems used by different providers. While respondents felt it would be ideal to have one Aledade-wide EMR system, there are currently over 55 different EMR systems used by partner practices and considerable

data mining and testing is necessary to extract usable data from them. Therefore interoperability is a challenge to mapping what data is available.

An additional challenge was the quality of data, which varies considerably. EMR data was described as generally much more reliable than claims data. One respondent provided an example of this with regards to a clinic that sought to improve colorectal cancer screening through identifying patients who were due for a colonoscopy. However, it turned out that the data for this was not very reliable and resulted in reaching out to patients who were already screened. This effort resulted in a lot of work for very little yield.

Another challenge is that practices vary a lot in terms of their experiences and knowledge of improving population health and implementing value-based payment methods. Some were not familiar with how to do this work and it required a lot of close working and support to practices. Related to this challenge was the need to help primary care providers in Aledade practices establish stronger relationships with their patients. Respondents emphasised that the key to Aledade's success is developing strong provider / patient relationships. One respondent provided an example of how patients are often seeing multiple providers rather than working with a single primary care practice. It was described how four out of ten patients are also seeing other doctors (who could also be specialists) as well as primary care doctors, each potentially using their own EMR system. Aledade would like to create a model where primary care physicians (PCPs) are at the center of all patient care. In this model, PCPs would build longer-term relationships with their patients so that patients come to rely on their PCP and coordinate all of their medical needs through their provider.

There are also difficulties in working across primary and secondary care, and between different payers. Hospitals that depend on fee for service income may be reluctant to work with ACOs or share patient data with them. Payers such as different insurance companies operating a value-based care model may also have very different definitions of 'value' as expressed by a range of different quality metrics – it is near impossible for small, independent providers to prove that they are meeting those standards without external support.

## 6.5 Skills and Competencies

Respondents described the skills and competencies needed to make the best use of data. Aledade employs data scientists, data analysts<sup>14</sup>, and staff with skills in producing actionable intelligence. Aledade currently has 15 people in its health analytics team who work on data processing and cleaning, as well as six analysts who look through that data and create the algorithms that determine which patients appear on practices' priority lists.

*"You really need a translator. You need someone who says this is the data and this is what the data means. It's really easy to get lost in the spreadsheets and not understand which changes make a big difference and which changes don't really matter"*

<sup>14</sup> Respondents did not distinguish between or define these terms at interview, but in general, a data analyst is a more operational role. Data analysts use their skills to collect, organise and look for patterns in data. A data scientist

Respondents emphasised the importance of having data analysts with the skills to integrate data from a variety of different data sources. Equally important, however, are skills in data interpretation – being able to see opportunities to improve care and reduce costs, and see patterns and trends in the data. While data analysts need to be able to create reports of the data, they also need to be able to link data to business decisions. The field staff who work with the individual practices are key to making those links and making the data relevant. To a certain degree, the investment in analysts is ‘up front’ and will change as Aledade scales up – so as the organisation grows, respondents thought that the proportion of employees that are analysts will become smaller.

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is usually a more senior role charged with helping their business to make predictions, by designing new models and processes for gaining insights from data, and making strategic decisions.

## 7 Discussion and conclusions

This section brings together the findings from the case studies to look at the learning from ACOs in the US. In particular, we focus on:

- Differences and commonalities between US ACOs and the NHS landscape;
- Key features of ACOs' approaches to population health and value-based healthcare;
- The use of different kinds of data and analytical tools to inform those approaches;
- The use of data analytics tools and reports by clinical teams;
- The skills and competencies identified as critical by the US ACOs, both for analysts and other staff; and
- Organisational support needs in order to make better use of data and how these have been addressed.

To conclude, we summarise the learning that might be applied in the development of design principles for business intelligence in the future NHS.

### 7.1 What do the case studies show about the role of business intelligence in improving population health?

#### What common challenges face the US and the NHS?

The health systems of the US and the NHS in England are very distinct. Nevertheless, the five examples presented in this report highlight challenges faced by US ACOs that resonate with the NHS context. The basic concepts of 'value based health care' and population health management in the US, and the pursuit of the Triple / Quadruple Aim will be familiar to the UK audience. In essence, the goals of the ACOs presented here are consistent with those that health systems of many other advanced economies, namely:

- Improving care coordination for people with increasingly complex needs and comorbid long-term conditions;
- Reducing the wasteful utilisation of care and preventing acute ill health wherever possible by developing primary care and public health systems;
- Motivating staff and organisations across a whole health system to work together around the patient; and
- Engaging patients in self-management and empowering them to look after their own health as equal partners with services.

This means that in broad terms, the US ACOs and the NHS share the same analytical challenges in relation to data:

- How can data be used to improve outcomes and patient experience for people with complex conditions?
- How can data be used to target and intervene earlier with people who are most at risk of acute admission or emergencies?

- What analytical (and other) skills are needed by staff across the health system so they can intervene effectively and work together?
- What data analysis is useful when designing incentives to transform the system and invest in prevention?
- And, perhaps most importantly, what constitutes effective investment in analytics and health information technology?

As a result, there is the potential for learning from the different ways that the case study ACOs have approached the use of data for improving population health, provided that those actions are placed in context (see below).

## The case studies also highlight important differences between the US and the NHS

There are, however, important contextual differences that are relevant when applying learning from the US:

- There is much greater access to personal health data in the US than in the UK (see **Error! Reference source not found.** for further detail). The legal environment in the US is arguably more conducive to data sharing. In some cases, patients have to opt out of data sharing. There appear to be fewer barriers in the US to sharing data between insurance companies / payers and health providers, and between health providers that have joined a network. However, the case studies show that consistency in the gathering and management of data is a significant barrier to joining up care – even though accessing it may be easier.
- Matching patients' health records in the US is challenging for ACOs. Some of the respondents were aware that all UK patients have a unique identifier (their NHS number). They argued that having similar in the US would make data matching (and subsequent analysis) easier from their point of view.
- The case studies highlighted wide variations in 'costs'. Under the fee for service model, providers are able to charge in many different ways, making it difficult to ascertain where costs and savings might fall in a more value-based system, and assess what might be the appropriate level of a capitated payment. The NHS national tariff system arguably makes financial flows more transparent.
- There is potentially more waste to cut out of the US health system, and most of the case study ACOs (with the exception of Wilmington) alluded to making large investments in value-based care as they attempt to realise those savings – whether in analytics, care managers, or staffing more generally. There are a number of key factors at play:
  - In the US, a large share of the provider market income is from fee for service. The value-based care model challenges this, but while fee for service exists there will always be strong incentives to admit more patients, and for acute providers to increase patient utilisation of their services. In the NHS, there are already strong disincentives to this due to a lack of spare capacity, and because system-level planning makes it much more difficult for acute providers to open more beds in order to gain income. This is not only because of the profit motive,

but because hospital systems have historically used fees to cross-subsidise non-clinical missions such as research or training (Mayer, 2018)<sup>15</sup>.

- Primary care in the US is also underdeveloped in comparison to the UK. There is no equivalent of the GP ‘gatekeeper’ and according to some respondents, un/under-insured people rely on emergency rooms for their primary care needs. Some also argued that hospitals ‘hold on to’ patients, as clinicians do not believe they will get appropriate care in the community.
  - Although investments in primary care are likely to result in lower utilisation of acute services and emergency care in both countries, there is arguably greater potential to make more significant reductions in health care spending in this way in the US, compared to the UK.
  - However, it is also worth noting that some of the US primary care facilities also provide what we would recognise as social care or social assistance, too – and in some of the case studies, ACOs are investing in these services too, whereas the NHS cannot.
- As a result, it remains to be seen whether the possible savings in the NHS would justify similarly large investments. Many of the case study ACOs’ investments in population health followed a ‘test and learn’ approach where experiments in data analytics led to more clinical interactions with patients, in an attempt to learn what new interventions in primary care might benefit patients and ACOs’ bottom line the most. Such an approach to investment and experimentation might be more challenging in the NHS environment as there is less spare capacity, and trialling large-scale change of this kind in the NHS would incur a higher opportunity cost for the system, by diverting staff from other work.
  - Some of the initiatives to improve population health that were mentioned by case study ACOs are already familiar to the NHS e.g. Wilmington’s ER walk-in centre sounds much like a minor injury unit or the GP in an A&E department. Also, a lot of work has already been done in the NHS to deter people and clinicians from using emergency departments inappropriately – meaning that the ‘easier’ savings from investing in urgent care or ambulatory care services might already have been realised in the UK.
  - It is also worth noting in passing that some of the findings challenge some of the commonly-held perceptions on government involvement in the US health system. It is clear from the case studies that state governments (as administrators of Medicaid) hold considerable sway in incentivising providers to behave in different ways. They have, in some cases, been instrumental in driving the value-based care agenda (e.g. in Vermont) and they invest in infrastructure such as health information exchanges (HIEs).

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<sup>15</sup> Mayer, Gregg (2018). *Population Health Management in the US*. Presentation given at the International Conference on Integrated Care, Utrecht, 24<sup>th</sup> May 2018.

## **In the case studies, there was no uniform view of the ACO role within a wider health system**

The case study ACOs took on different roles in respect of their stakeholders. In the NHS, different kinds of organisational vehicles for integrating care are also likely to pursue varying roles within their wider systems.

There are three examples of integrated health system ACOs (BSWQA, HFACO, and Wilmington) where an established health system has set up an ACO and is at the forefront of bringing local providers together around a model of care. In these ACOs, the health system carries out data gathering and analysis, employs care coordinators, and produces various tools, dashboards and clinical workflows so that staff and partners across their networks can take action. In NHS terminology, they are examples of 'vertical integration'.

OneCare's approach is distinct as it is more of a 'system leader', primarily working through improving health systems at a more local level than the ACO, with whom it shares the risks and gains that result. Like the other case studies, it carries out data analysis and uses BI as a means of measuring performance; but it also works closely with state government to develop the wider infrastructure and the whole model for value-based care across Vermont. For example, it provides software to facilitate care coordination and runs system-wide improvement projects.

Aledade is a very different kind of ACO as it is based on working with independent primary care providers who are not part of a vertically integrated health care network. It sees its role as providing the analysis and the tools to enable them to be accountable for their patients' journeys across primary and secondary care. Aledade acts as an enabler, helping to build up the capabilities of primary care providers in using data and developing new clinical pathways, which in turn improves their relationships with patients. As well as sharing in risks and gains, the providers gain a more 'loyal' base of patients with whom they can intervene more effectively.

As a result, the health system-based ACOs appear to be more focused on trying to keep their patients within their network, as costs, referrals and quality can be more easily controlled from their point of view; for OneCare and Aledade, the focus is on enabling other parts of the system to take greater control of their patients and their pathways.

## **The case studies (mostly) demonstrate consistent approaches to population health management**

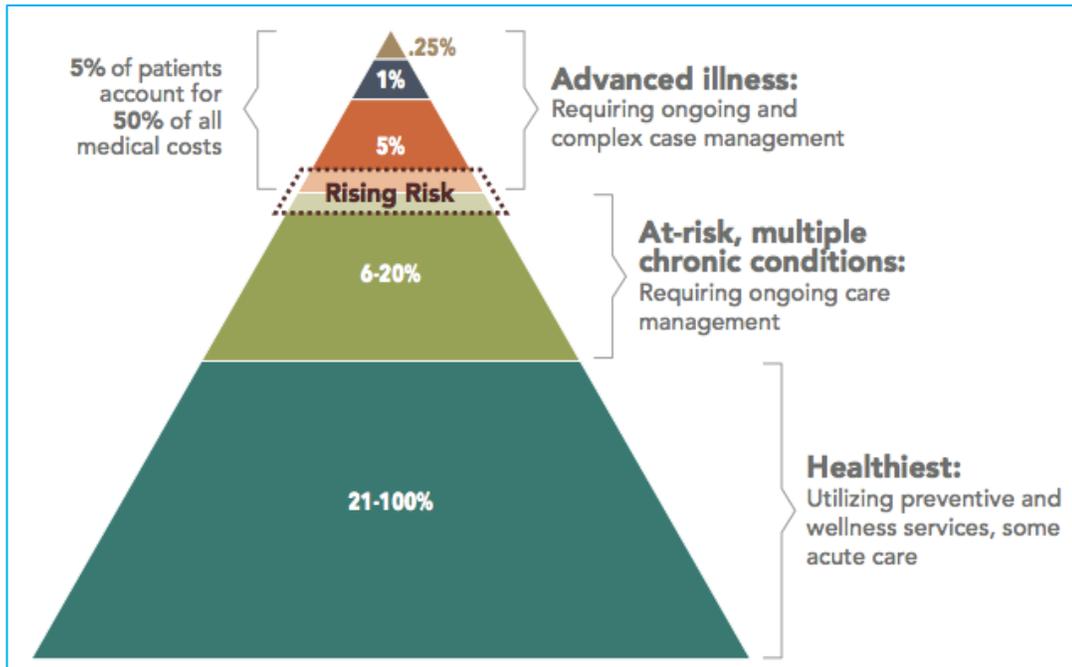
There are similarities between the five case studies in relation to their overall approach to population health, with data analytics supporting the whole model and driving the deployment of resources. Many of the new interventions would be very familiar to NHS staff.

The case study ACOs used a pyramid model or similar to focus on those patients at highest risk. They then focused their attention on developing interventions and support for those patients near the top of the pyramid – typically patients judged to be at the greatest risk of readmission to hospital, or those who use emergency rooms frequently. In the case of HFACO and Aledade, there is a focus on those high-risk / high-need patients where population-wide interventions (such as case management for people

with long term conditions and frailty) could make a difference to their use of health services, rather than those patients at the very top of the pyramid (who are likely to need unique pathways or very specialist packages of care).

A typical population health risk stratification model is shown below (Figure 7.1); such models are also used in the NHS.

Figure 7.1 Example risk stratification model



*Amati Health, 2015*

The case study ACOs generally made similar investments in interventions for the high-risk patients:

- Nurse-led care management (with the exception of Wilmington, which took a more conservative approach to investments in interventions);
- ED diversion schemes to ambulatory or urgent care – whether walk-in clinics (Wilmington) or care navigators who receive real time alerts and then liaise with patients and ER clinicians on arrival (e.g. BSWQA, HFACO);
- Assignment to a Patient Centred Medical Home (PCMH) – a multidisciplinary team; or
- Shared care plans (OneCare)

Attention is also paid to particular parts of the pathway such as transitional care – i.e. making sure that specialists or nursing care are available in the community to facilitate the discharge of patients from hospital (BSWQA, HFACO, OneCare and Aledade). Sometimes there is also a focus on particular patient groups where variation, high costs or poor quality was determined to have a significant impact (e.g. orthopaedic surgery in OneCare).

For patients at lower risk, data is often used to set reminders to providers to carry out outreach activity, screening tests, wellness checks and patient education, which were among the components of preventative approaches pursued by the case studies.

### **While case study ACOs use data from a range of different sources, the use of data on social determinants is still in its infancy**

Case study ACOs described their use of data, and all of them used both EMR data and claims data from insurance companies or CMS in the case Medicaid and Medicare. They point to the need for investments in data analytics to focus on the consistency of data, effective management via a data warehouse, and making use of data about the social determinants of health.

Mostly, case study ACOs described similar challenges in preparing the data for use:

- EMR data is inconsistently or sometimes poorly coded, even at HFACO where most providers were already using the same system. Better record keeping is a key focus of improvement efforts and provider workflows to remind clinicians to code correctly (e.g. Aledade, Wilmington). OneCare participates in the Vermont health information exchange's efforts around interoperability, while Aledade said that they used data mining to try and overcome these barriers.
- Claims data is universally described as less rich and not as timely as EMR data (it lacks clinical observations, for example). Nevertheless, this data plays an important role in identifying costs and understanding patients' health care utilisation.

All of the case study ACOs are just starting to think about how to include data on the social determinants of health to their risk stratification models. All (except Wilmington) thought it would be a positive development: education, zip code (postcode) and other factors were thought to be some respondents to be accurate predictors of poor health.

Some ACOs are working to include telemedicine or home monitoring feeds into their EMRs and into their analytics, although this is also a very recent development (OneCare). HFACO uses intelligence about patients' ability to self-manage. As the volume of health data grows, some respondents expected that their ACOs would be able to do much more predictive modelling and analysis in the future.

Case study ACOs use data warehouses to bring together data, and some said that they had invested in data architects in order to make sure that data from different sources was well organised. The only exception is Wilmington, where respondents said they favour Excel and paper.

### **Case studies used a mix of in-house and 'off the shelf' tools for risk stratification and data analysis; tailoring to local need is important**

Case studies were using both proprietary and 'off the shelf' tools to carry out risk stratification and identify lists of people that could be offered additional support to help keep them healthy. Broadly, there seems to be a more developed market for these analytical tools in the US. HFACO and Wilmington use Optum; OneCare designed its own front end, combined with the use of the Johns Hopkins ACG system to stratify risk; while BSWQA and Aledade's analytics are entirely proprietary.

Experiences of investing in such tools were mixed (for example, HFACO thought that their risk stratification was too much like a ‘black box’). Many respondents said that initial expectations of ‘off the shelf’ products were too high, and over time, they have supplemented them with their own analytical expertise or other tools.

We found a preference among the case study ACOs to develop their own, ‘home grown’ expertise, especially in relation to the presentation of relevant insights to clinicians, senior leaders and frontline staff. This points for a need for investment decisions in data analytics to be carefully taken, with attention paid to local relevance and building the internal expertise to get the most from external tools.

### **Case studies have focused on generating ‘actionable insights’**

In terms of using data to generate insights, all the case studies highlight the effort that is required to ensure that those insights are both useful, and used. Engaging end users and understanding what matters to them is key. Investment focused on making the actions resulting from data analysis clear to each individual clinician, and training users of analytics, including building relationships between analysts and other staff. This includes holding regular meetings between clinicians and analysts (BSWQA), using workers in the field to ensure that what is produced is locally relevant (e.g. Aledade) and employing skilled leadership that understands data (e.g. Wilmington).

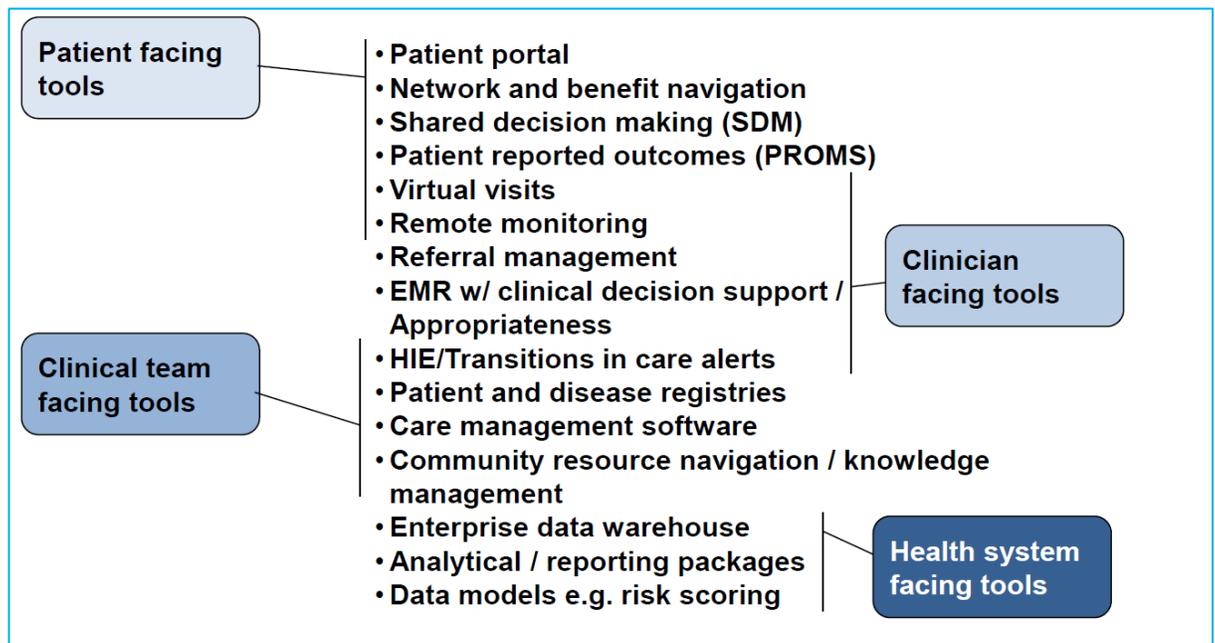
Data analysis is used for a number of different purposes, similar across all of the case studies. Many of these are familiar in NHS settings:

- Point of care tools;
- Clinician workflows (a list of priority tasks to be undertaken with patients);
- Registers of patients with specific care gaps (e.g. patients in need of a checkup);
- Performance dashboards, which were usually shared with providers with the aim of using transparency to drive up quality;
- Health profiles to help local communities to plan service provision (BSWQA).

In addition, ACOs are expected to use their data to report against the quality measures set by their local state Medicaid administration and any set by private insurers.

OneCare uses software called Care Navigator to create the workflows for those staff doing outreach or care management with patients, based on their medical history. Overall, the respondents that we spoke to said that having a workflow was useful and reminded frontline staff to refer patients for a checkup or to signpost them to other services. This seems to be readily accepted by those staff.

Figure 7.2 A summary of different data-driven tools used in population health management



Gregg Mayer, Partners Healthcare (2018)<sup>16</sup>

### It is vital to consider the cultural aspects of making a transition to a population health approach

All of the case studies emphasise the importance of shifting the whole culture of care towards an environment where population health is a focus. Investment is not only focused on leadership, but also the whole workforce.

This is perhaps of particular relevance in the US where respondents often pointed out the conflicting goals that sometime exist between hospitals and ACOs with regards to value based care and admitting patients. Some respondents (Aledade, HFACO, OneCare) said that bringing about this shift requires both time and patience. In the NHS, these relationships are arguably better aligned, although silo working is still a key barrier to bringing about more integrated care.

Leadership was also mentioned as a key factor in all of the case studies. In particular, the ability to understand data and ask the right questions of it to ensure that the right opportunities to bring about change are identified and acted on. This is accomplished in a variety of ways in the ACOs. In many cases, it was emphasised that individuals in leadership positions should have the training and background to be able to work with data directly and not rely on the analysts for interpretation. In other cases, the clinical and analytics teams met on a regular basis (weekly in some instances) so that the analysts could understand enough about the business and clinical side, and the clinicians could learn more about the data.

<sup>16</sup> Mayer, Gregg (2018). *op cit*.

Many of the changes brought about by the case studies required a rethinking of the workforce, too. For example, Aledade employs field workers to work closely with their partner practices in primary care to show them how to use data, how to improve their use of coding in EMRs, and to provide hands-on support in bringing about a change in their ways of working. In other case studies, care managers or multidisciplinary teams take on similar liaison roles.

## **The ability to interpret and place data in context is the most important skill requirement of the shift to value based healthcare**

Most of the case studies employ dedicated teams of analysts and statisticians. However, they also pointed out that this was insufficient to bring about change: people who can ‘translate’ data into real world use are needed. Respondents emphasised the importance of interpretative skills and presenting data in way that makes it more likely that it will be used. Working effectively with data also requires an investment in time and effort from those who are not analysts, too.

Some of the case study respondents also pointed out that organisational experience and know how was needed in order to perform the analytical role effectively; it cannot be bought in easily from the outside; expertise has to be embedded. NHS investments in data analytics will also need to consider how best to build up the interpretative skills needed in the wider workforce in order to make the best use of new technology in data analytics, and make sure that investments are made in cultural change.

## **7.2 Key learning points for the NHS**

To conclude this report, we outline some key learning points for the NHS. This will inform the development of design principles for the business intelligence of the future.

Business intelligence should:

### **1. Bring together many different data sources**

In order to provide a rich picture of population health, it is important to use data from across the system, and invest in making it usable (for example, by considering interoperability and setting up a data warehouse). Data about the social determinants of health is particularly important.

### **2. Link to holistic interventions**

The data analysis should drive a population health strategy, with a range of interventions that can be deployed in order to keep people healthy.

### **3. Link to clinical action**

Data should be used to populate workflows, point of care tools and care plans that emphasise the proactive nature of population health management.

### **4. Become part of day to day clinical practice**

Analysts need to work closely with clinicians and leadership so that the use of data becomes part of the ‘day job’.

### **5. Be subject to continual testing and refinement**

There are no perfect solutions, and data should be used to 'test and learn' to understand more about whether poor outcomes can be predicted and prevented.

**6. Foster collaboration and information sharing among providers**

Data about the population and provider performance should be transparent and readily available, so that it can prompt discussion among different providers and professional roles.

**7. Be appropriate to local needs**

There is no 'one size fits all' model of data analysis, and if the outputs are not relevant to local priorities and needs, they will not be used.

**8. Be coupled with interpretation to make effective decisions**

Interpretation of data is a fundamental skill required not only of analysts, but the wider workforce too.

# Part A: ANNEXES

# Annex 1 Introductory script and topic guide

## A1.1 Introduction and Informed Consent

Hi. My name is \_\_\_\_\_. And I am on the phone with my colleague \_\_\_\_\_. We are both with ICF, a research and evaluation company. Thank you for giving us this opportunity to discuss your role in [ACO/Organisation name]. This discussion should take no more than 1 hour of your time. We will do our best to stay on track.

The purpose of this project is to conduct a review of best practices and innovation in the use of clinical, financial, operational and other data to inform health care decision making. There is a sense that Accountable Care Organisations (ACOs) in the U.S. have made major strides in the use of health information technology (HIT) to better understand population health. The National Health Service (NHS) in the United Kingdom (UK) is looking to learn from these examples to help clinicians across primary and secondary care in the UK work better together to improve health and reduce hospital admissions. We are requesting your participation in an interview because we are interested in learning about your experiences at [ACO name] with activities geared toward improving population health, including health information technology.

You are the expert on your experiences, and your opinions and thoughts are important. There are no right or wrong answers and we are interested in anything you have to say on this topic.

Steps will be taken to protect your privacy; no information that identifies you will be shared with anyone except our project staff. We will never report your comments by name in any report, unless we have received direct written permission from you before the report is shared.

Your participation is completely voluntary. You may choose not to answer some of the questions or you may choose not to participate. You can choose to discontinue the interview at any time for any reason.

Do you agree to participate?

<Yes>, “Thank you” and continue on below

<No>, “Thank you for your time” and end call

With your permission we would also like to record our conversation so that we have a backup to our notes. Additionally, we will not share interview notes or audio from this or any of the other interviews with anyone outside of our project staff.

Do I have your permission to record?

<Yes>, continue on below with the interview

<No>, “This call will not be recorded and we will only take typed or hand written notes during the call.”

Do you have any questions before we get started? [ADDRESS ANY QUESTIONS AND THEN BEGIN.]

1. Please briefly describe your role and the accountable care organisation/health care system/PCMH [*tailor as needed*] that you work in

*Probe: What are the main features of your organisation that might be useful for us to know (population size, governance, wider system it belongs in, etc.)*

The next few questions refer to some key elements of the Triple Aim framework as developed by the Institute for Healthcare Improvement. These elements include improving patient care, improving population health, and reducing health care costs.

2. What approach(es) has your organisation adopted to improve population health? Why these approaches?

*[Probe about improving population health and improving patient experience with Q2]*

*Probe: Has this involved addressing the social determinants of health, and if so how?*

3. What payment models does your organisation utilise? Why?

*Probe: Fee for service or value-based payments? Other physician incentives?*

4. What have been some of the challenges with the approaches to address population health? What has worked best?

5. How are you currently using health data and new health information technology (HIT) solutions to inform your approach to population health management?

6. Now, we would like to discuss the role of health information technology (HIT) specifically and data analysis in your organisation's work. What role does HIT play in your organisation in helping to identify patients who are most likely to benefit from care?

*[This might include looking at risk stratification, predictive analytics, health surveillance tools, or data mining]*

*please give examples from your organisation and any evidence of their impact on quality, satisfaction, costs (e.g. a written case study, advertorial, clinician / patient testimony etc)*

*Probe for uses of data to learn about planning future health needs at an individual or population level*

7. What role does data analysis and HIT play in your organisation in providing tools and resources for clinicians to improve their ability to manage population health across your community?

*Probe for interesting examples of data visualisation, patient or organisational dashboards, use of real-time monitoring of health data, etc – and evidence of the improvements in care / population health management that they facilitate*

8. What role does data analysis and HIT play in improving the coordination of care across your teams and organisation(s)?

*please give examples from your organisation and any evidence of their impact on quality, satisfaction, costs (e.g. a written case study, advertorial, clinician / patient testimony etc)*

*Probe for how data is being used and shared across community providers and between communities and hospital care, to identify ways in which your health system can improve*

9. What skills and competencies does your organisation need to make the best use of data, and the HIT described?

*Probe: Could be skills in data analysis [what / which?], as well as broader skills in building relationships in local communities, setting shared outcomes across organisations or communities, etc*

10. How does your organisation determine what data analysis technologies are worth investing in?

*Can you give some examples / names of technological solutions that you are using (if not already mentioned or proprietary) and talk us through why you chose these*

*Is there a percentage spend on HIT technologies?*

*What evidence do you have for the impact/success of HIT investments across your organisation? Or are you still assessing this?*

11. What challenges have you experienced working with the various HIT that we've discussed? What has worked best?

12. Lastly, we would like to ask for your reflections and learning on the wider process of being an effective ACO. What would you say are the main things that you and your organisation have learned on this journey?

*themes might include organisational issues, communication / stakeholder management issues, financial constraints, etc*

13. Is there anything else you would like to discuss or anything else that is important that we didn't talk about?

*Thank you and close*