



# Analytics for Accountable Care Organizations

## Patient and population analytics

### Achieving clinical excellence through analytics

#### Overview

Health care organizations are at the center of changing patient demographics, technological innovation, and governmental regulation. Recent health reform initiatives and incentives have accelerated the industry's movement from volume based care to value based care. Accountable Care Organizations (ACOs) face significant challenges as they lead the industry toward value based care models. The successful collection of data and information, as well as the adoption of analytics, are critical to ACOs successfully enabling value based care.

#### Analytics enable quality care

As ACOs enable value based care, delivering quality care to individual patients and specific patient populations continues to be a significant problem. Health care providers continue to lack an integrated, 360 degree view of each patient. Incentives are not seamless and easy to access. Analytics could help both of these scenarios to drive value based care toward better management of the diverse populations now serviced by ACOs.

Analytics needs to be a key driver in the business of ACOs. Analytics can help ACOs to enable value based care by achieving integrated care management and allowing risk stratification in subpopulations of patients.

Through the collection and utilization of comprehensive data on patient populations, ACOs can take steps to provide timely and appropriate care, identify interventions for risk prevention, and adjust care delivery models to meet the needs of specific populations. ACOs should implement the full scope of analytics to fully analyze and utilize the comprehensive data that ACOs collect. The full scope of analytics includes prescriptive analytics, predictive modeling, business intelligence, and risk stratification.

#### Analytics in action: Larry and Theresa

Larry is a 60 year old male who receives his Health care from an ACO. Larry is relatively healthy, though he has been identified as at-risk for developing diabetes due to being overweight and his history of high blood pressure. Larry's wife, Theresa, also receives care from the ACO. She is a 59 year old female diagnosed with osteoarthritis and asthma. Larry and Theresa both experienced increased quality of care due to the ACO's effective use of analytics. Follow their story and their contact with analytics throughout this series.

This paper, as part of Deloitte's series on ACO Analytics, illustrates how analytics enables ACOs to:

- Provide adjusted care delivery models
- Identify early interventions for at-risk patient populations
- Increase patient engagement



## Instant Insights

Solving your most pressing business challenges starts with knowing the landscape. Instant Insights offers you a digest of vital knowledge and practical steps you can take now.

# Integrated patient care management

## Finding gaps in care delivery

Gaps in care tend to be common in high-risk patients, but are also found in relatively healthy, low risk patients. According to the Centers for Disease Control and Prevention, lifestyle-related habits and chronic diseases contribute to 75% of health costs<sup>1</sup>. Many of these costs can be decreased with health coaching and monitoring so that minimal gaps in care occur.

Properly implemented analytics environments have the capability to combine data from disparate systems and generate a holistic 360 degree view of patients. This view enables the ACO to identify trends and spot gaps in care coordination and delivery, potentially enabling Health care cost savings, especially with low risk patients.

Metrics (such as 30 day post-discharge physician visit, mammograms, and pap smears) enable ACOs to capture a more complete view of the patient and spot gaps in a particular patient's care experience.

## Analytics prevents adverse patient events

Analytics can be used to track the care delivery for high risk individuals by combining the data from different Health care resources with which the patient interacts, such as: other providers, insurance records, sometimes even through the use of wearable devices, to give the care team a comprehensive view. The care team can use the appropriate data and analyze it using a visually rich dashboard in an effort to provide proper treatment.

## Prescriptive analytics in health records systems

Prescriptive analytics harness the ability to improve outcomes based on population data. Results from prescriptive analytics can provide recommendations for treatment and interventions for health care providers to make decisions that can lead to improved outcomes and quality of care. Prescriptive analytics uses population data and built-in logic to develop alerts and recommendations for treatments that Health care providers should consider. Logic for alerts can be adjusted and modified to provide alerts and reminders to the providers to improve treatments and interventions. Interventions and therapies based on analysis of patient data can be presented to the clinicians as they determine the patient's treatment plan.

Due to Theresa's history of osteoarthritis, her primary care physician refers her to an orthopedic surgeon in her ACO for a knee arthroplasty. Theresa's orthopedic surgeon leverages the results of analytics as part of his pre-operative protocol to reduce infections. In this hypothetical example, data on a cohort of patients was collected post arthroplasty and it was found that administration of appropriate antibiotics before the surgical incision is made is essential to minimize infection. A group of orthopedic specialists validated the results of the study and developed recommendations for the administration of antibiotics. A set of rules based on these recommendations is developed and deployed within the electronic health record (EHR) at the ACO to guide physicians. When Theresa's surgeon puts in the order for her arthroplasty, the EHR reminds him to prescribe pre-op antibiotics for Theresa to lower her risk of post-op infection.

While EHRs have the ability to provide clinicians with alerts and recommendations at the time they interact with Theresa, prescriptive analytics can be used to help prevent adverse patient events by providing recommendations based on data collected in EHRs and other sources based on population level data. By using prescriptive analytics to administer pre-op antibiotics, Theresa and Larry's ACO may have prevented a negative care experience that could have led to increased cost for the ACO, including medical malpractice suits as well as increased care expenses for Theresa.

## Preventing readmissions with predictive modeling

Roughly 90% of readmissions are preventable, with an estimated cost of \$42 billion annually<sup>2</sup>. Readmission rates are reportable metrics and can impact reimbursement for ACOs with a high rate of readmissions. Predictive modeling provides the ability to identify treatments and interventions to reduce the risk of readmission for patient cohorts and individual patients. Early appropriate intervention and treatment can result in improved quality of care.

Effective predictive models have a high degree of accuracy and are scalable to larger populations. ACOs can utilize variables that pertain to their unique patient populations, and combine information from inpatient, outpatient, pharmacy claims, and administrative/demographic data to generate re-admission propensity scores. Administrative and demographic data such as marital status, age, and the number of previous hospitalizations are factors in the prediction of re-admissions. By using predictive modeling to stratify patients into different risk populations, ACOs can identify patients requiring interventions in an effort to prevent hospital readmission. Once these patients are identified, the ACO can coordinate the appropriate level of care, improve discharge plans and educate the patient and caregivers on steps to avoid readmission.

Theresa was hospitalized following a severe asthma attack. After being admitted to the hospital, Theresa's patient information was used in a predictive model intended to prevent readmission. Bio-informaticists and bio-statisticians at Theresa's ACO created a model that predicted the likelihood of hospital readmissions for patients suffering chronic asthma. Since Theresa is of a healthy height and weight, married, and has been hospitalized less than twice in the last year, she receives a low propensity score. The bio-informaticist passes this information to Theresa's care coordinator, who creates a care plan for Theresa. Since her propensity score is low, Theresa's care coordinator sets a one month follow up visit and puts together a packet of post-surgical care material for Theresa to follow. Had Theresa's propensity score been higher, she would have been flagged for an enhanced post discharge care program.

### Measuring patient engagement and experience

While analytics enable benefits to ACOs and patients during acute medical events, analytics also plays a role in preventative medicine and patient engagement. The emergence of both the Internet of Things and wearable devices has had a huge impact on the Health care industry. Wearable activity trackers are typically worn on the wrist or ankle and track the physical activity of the individual, such as number of steps taken, number of stairs climbed, and hours of sleep. Wearables can also monitor heart rate and other physiological parameters. The real-time patient data collection provided by wearables allows for powerful analysis of specific patient data and enables recommendations for treatment and intervention based on the overall population data. Algorithms can be used to send patients proactive messages or reminders to take medications based on the data transmitted by the devices. Demographic data combined with biometrics can be used to analyze and predict risk factors for patient populations. Furthermore, specific patient populations can be analyzed based on their reactions to proactive messages and their engagement with their care.

Larry decides to invest in a wearable activity and heart rate monitor. Larry enrolls in an eight-week wellness program sponsored by his ACO that encourages exercise among populations at risk for developing type II diabetes. During a meeting with his care coordinator, Larry provides approval for his ACO to track and monitor his heart rate and fitness activity from his device and together he and his care coordinator set a goal for the number of steps taken per day. Over the next eight weeks, Larry's wearable transmits his step and heart rate data to the ACO's dashboard. At the end of the eight week program, Larry's care coordinator reviews Larry's step and heart rate data from his wearable and compares it to benchmarks for individuals in Larry's age and weight group. Larry's ACO uses the data collected from his wearable to further coach him on his health and to decrease the likelihood that he will develop type II diabetes. The use of the wearable in combination with the wellness program engages and encourages Larry to take an active role in his health.

## Population health management

### Targeting at-risk patient populations

As stated earlier, lifestyle-related habits and chronic diseases contribute to 75% of US health costs. ACOs could try to better manage population health by preventing disease progression and driving appropriate utilization. Accountable care can achieve sustainable and effective population health management through decreased cost and improved quality and outcomes.

The effective health management of populations with one or more chronic illnesses may require a shift from a focus on hospital centered care to community centered care models. Analytics can assist in identifying interventions that address preventable hospital admissions and allow for timely interventions from a care team member.

Nearly 30 million Americans have been diagnosed with diabetes, and direct medical costs associated with diabetes reached \$176 billion in 2012<sup>3</sup>. ACOs can harness analytics to identify an effective combination of steps to prevent diabetes for a specific population group and initiate the appropriate interventions.

### Analytics capabilities for population health management

What does it mean to "harness" analytics for a population? Analytics enables ACOs to budget for the Health care expenses of a defined population by analyzing the data over time to identify trends and spot gaps in care relative to that population. Analytics enables better risk stratification, providing better visibility to the return on investment of population health programs. Also, by measuring patient experience and satisfaction for a particular population and aggregating the information required to demonstrate better outcomes, ACOs could qualify for a larger share of their upside risks, or conversely, better mitigation for downside risks they may receive.

### Identifying patient trends with business intelligence

Identifying trends among patients can help ACOs to better serve their populations and better prepare themselves to provide care to its population. Specially designed business intelligence applications can measure mortality, health status, disease prevalence, and patient experience. Business intelligence dashboards can allow ACOs to examine populations on several different levels. ACOs can filter populations based on geographical location, provider location, social trends such as marital status, and administrative data such as age and gender. For example, Larry's ACO uses business intelligence to identify the number of people admitted with serious complications due to the flu. When the number of patients admitted with serious flu symptoms in a certain geographical area reaches a certain threshold, the ACO can send notifications to its members in those specific geographic areas to take precautions such as washing their hands frequently, and offer reminders for flu vaccinations. This action can potentially decrease the number of patients who contract the flu and could result in savings for ACO.



#### Larry

##### Background:

- 60 year old male
- Relatively healthy but overweight and history of high blood pressure
- Identified at-risk for diabetes



#### Theresa

##### Background:

- 59 year old female
- Healthy weight and height
- Diagnosed with osteoarthritis and asthma

## Leveraging advanced rules engines for risk segmentation

An advanced rules engine can integrate disparate types of data with evidence-based guidelines to generate customized reports and show ACO management how well the Health care system is serving various segments of its patient population. Rules engines can execute both complex and simple business logic on sets of data and allow for the customization and frequent adjustment to business logic. Business rules engines evaluate the ACO's population in patient segments based on risk classes. The rules for these risk classes are determined by the ACO, and may be based on administrative data as well as clinical data. This segmentation can be used to shift the ACO's focus to the patient populations that are approaching high risk or are at high risk. Larry's ACO used a business rules engine to segment its patients to view those who were at highest risk for developing type II diabetes. Due to Larry's previous medical history of hypertension, BMI, and family history of diabetes, he was placed into the high risk group for developing type II diabetes.

ACOs that segment the risk levels of patient populations can achieve a greater ability to target individuals at risk for preventable diseases, and lower Health care costs by providing early intervention. For those patient populations, facilitating the appropriate level of care is invaluable to limiting future Health care expenditures. ACOs can use the segmentation of populations to market and coordinate wellness and disease prevention programs, as well as provide increased provider interaction with those patients. Since Larry's ACO identified him as a high risk individual, his ACO encouraged him to enroll in a six-week wellness program that helps track his diet and fitness. During the wellness program, Larry meets with the ACO's care coordination team to discuss healthy lifestyle choices, and receives education on type II diabetes and its prevention. Larry's education and participation in the wellness program could lower his risk for developing diabetes and potentially lowers the ACO's risk of high spending related to Larry's health.

## The bottom line

A full suite of analytics capabilities, including prescriptive analytics, predictive modeling, business intelligence, and risk stratification, can give ACOs the 360° view of patients required to achieve integrated care. Analytics enables ACOs to provide adjusted care delivery models, identify early interventions for at-risk patient populations, and increase patient engagement. As ACOs continue to move toward value based care models, analytics will be essential to fully understanding risk at the patient and population levels.

### Contacts

To assess your ACO's Analytics, contact:

#### Authors

##### Tony Jurek

Director  
Technology  
Deloitte Consulting LLP  
[tjurek@deloitte.com](mailto:tjurek@deloitte.com)

##### Morgann Carlon

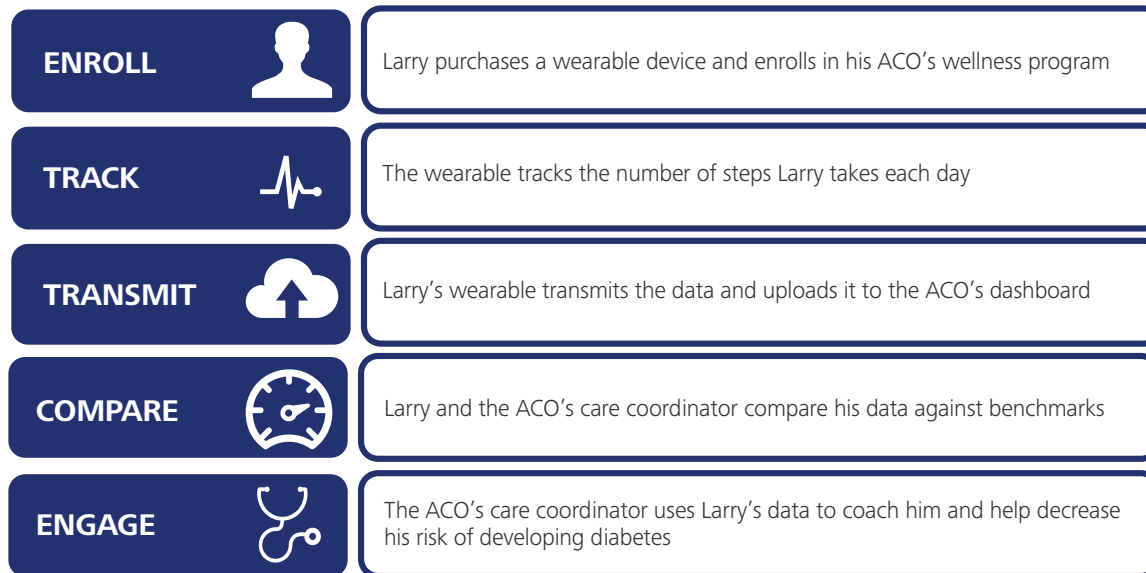
Consultant  
Technology  
Deloitte Consulting LLP  
[mcarlon@deloitte.com](mailto:mcarlon@deloitte.com)

##### Jane Danstrom

Analyst  
Technology  
Deloitte Consulting LLP  
[jdanstrom@deloitte.com](mailto:jdanstrom@deloitte.com)

### Acknowledgements

We would also like to thank Gerda Wilcox who contributed to the preparation of this report.



## References

1. <http://www.cdc.gov/chronicdisease/overview/>
2. [http://www.imshealth.com/deployedfiles/imshealth/Global/Content/Corporate/IMS%20Institute/RUOM-2013/IHII\\_Responsible\\_Use\\_Medicines\\_2013.pdf](http://www.imshealth.com/deployedfiles/imshealth/Global/Content/Corporate/IMS%20Institute/RUOM-2013/IHII_Responsible_Use_Medicines_2013.pdf)
3. <http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html>

## Additional resources

- A. Institute for Health care Improvement- <http://www.ihl.org/Engage/Initiatives/TripleAim/Pages/default.aspx>
- B. Chronic Disease Prevention and Health Promotion - <http://www.cdc.gov/chronicdisease/resources/publications/aag/chronic.htm>
- C. Center for Health care Quality and Payment Reform - <http://www.chqpr.org/downloads/HowtoCreateAccountableCareOrganizations.pdf>
- D. A Population Health Guide for Primary Care Models - <http://www.carecontinuumalliance.org/pdf/I-E-Documents.pdf>
- E. ACOs and Population Health Management - How Physician Practices Must Change to Effectively Manage Patient Populations - [http://www.amga.org/AboutAMGA/ACO/Articles/CaseStudy\\_final.pdf](http://www.amga.org/AboutAMGA/ACO/Articles/CaseStudy_final.pdf)
- F. <http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html>
- G. Hospital Value-Based Purchasing - <http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/hospital-value-based-purchasing/index.html?redirect=/Hospital-Value-Based-Purchasing>
- H. Measuring progress towards accountable care - <https://www.premierinc.com/wps/wcm/connect/a69650a1-5b28-4759-9b4a-5cb5e8954264/Measuring+Progress+Toward+Accountable+Care.pdf?MOD=AJPERES>
- I. Brookings-Dartmouth Accountable Care Organization Initiative - [www.aha.org/research/cor/content/ACO-Synthesis-Report.pdf](http://www.aha.org/research/cor/content/ACO-Synthesis-Report.pdf)
- J. Deloitte D-brief - Accountable Care Organizations: A new model for sustainable innovation - [http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/US\\_CHS\\_AccountableCareOrganizations\\_070610.pdf](http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/US_CHS_AccountableCareOrganizations_070610.pdf)
- K. Deloitte D-brief - Physician-Hospital Employment: This Time It's Different - [http://www.deloitte.com/view/en\\_US/us/Industries/life-sciences/Center-for-Health-Solutions-Life-Sciences/8bc7b5636b4e0410VgnVCM2000003356f70aRCRD.htm](http://www.deloitte.com/view/en_US/us/Industries/life-sciences/Center-for-Health-Solutions-Life-Sciences/8bc7b5636b4e0410VgnVCM2000003356f70aRCRD.htm)
- L. Gartner - ACOs Link Health care Payer Technology to Providers
- M. Reducing Hospital Readmissions: Lessons from Top-Performing Hospitals - [http://www.commonwealthfund.org/~media/Files/Publications/Case%20Study/2011/Apr/1473\\_SilowCarroll\\_readmissions\\_synthesis\\_web\\_version.pdf](http://www.commonwealthfund.org/~media/Files/Publications/Case%20Study/2011/Apr/1473_SilowCarroll_readmissions_synthesis_web_version.pdf)
- N. Deloitte D-brief - Organizing for analytics in health care - [http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/us\\_hcp\\_OrganizingForAnalytics\\_030413.pdf](http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/us_hcp_OrganizingForAnalytics_030413.pdf)
- O. FAQ On ACOs: Accountable Care Organizations, Explained - <http://www.kaiserhealthnews.org/stories/2011/january/13/aco-accountable-care-organization-faq.aspx>
- P. Getting to the ACO tipping point <http://healthaffairs.org/blog/2015/06/03/getting-to-the-aco-tipping-point-what-else-might-be-needed/>
- Q. COPD: Management of Acute Exacerbations and Chronic Stable Disease <http://www.aafp.org/afp/2001/0815/p603.html>



This publication contains general information only, and none of the member firms of Deloitte Touche Tohmatsu Limited, its member firms, or their related entities (collective, the "Deloitte Network") is, by means of this publication, rendering professional advice or services. Before making any decision or taking any action that may affect your business, you should consult a qualified professional adviser. No entity in the Deloitte Network shall be responsible for any loss whatsoever sustained by any person who relies on this publication.

As used in this document, "Deloitte" means Deloitte Consulting LLP, a subsidiary of Deloitte LLP. Please see [www.deloitte.com/us/about](http://www.deloitte.com/us/about) for a detailed description of the legal structure of Deloitte LLP and its subsidiaries. Certain services may not be available to attest clients under the rules and regulations of public accounting.

Copyright © 2016 Deloitte Development LLC. All rights reserved.  
Member of Deloitte Touche Tohmatsu Limited