Population Health Analytics Enables Rapid Identification of Super-Utilizers

HealthCatalyst®

Hospital Sisters HEALTH SYSTEM

100 percent relative improvement in efficiency for the risk-stratified patient identification workflow.

In just one day, the analytics application **identified more high-risk patients** than had been identified in the previous year and a half.

PRODUCTS

- Health Catalyst® Data Operating System (DOS™) platform
- Pop Analyzer™: Stratify Expert Data Collection™

EXECUTIVE SUMMARY

Half of the $3.5 trillion spent on healthcare annually in the U.S. can be attributed to five percent of the population, who are often ideal candidates for risk-stratified care management. This process gives a health risk status to patients and then uses this status to inform and improve care.

Seeking to drive down unnecessary cost, Hospital Sisters Health System (HSHS) and the Physician Clinical Integration Network (PCIN) needed a way to automate risk stratification of patients who may benefit from care management services and eliminate the burdensome manual work its care managers were performing to identify at-risk patients. To effectively, efficiently, and accurately risk stratify its care management and identify patients who would benefit from additional care management interventions, HSHS and PCIN utilized a population health analytics platform—combining information from multiple sources to generate automated, risk-stratified patient lists.

RISK-STRATIFIED CARE MANAGEMENT FOR IMPROVING OUTCOMES

In the U.S., five percent of the population accounts for half of the $3.5 trillion in annual healthcare spending.[1] These "super-utilizers" are often ideal candidates for risk-stratified care management, which assigns a health risk status to a patient and then uses that health risk status to direct and improve care.[2] The ability to identify, stratify, and manage high-risk patients is critical for organizations working to change cost structure and outcomes.

As a multi-institutional healthcare system, HSHS cares for more than 2.6 million patients in 14 communities in Illinois and Wisconsin and is comprised of 15 hospitals, scores of community- based health centers and clinics, nearly 2,300 physician partners, and more than 14,600 colleagues. PCIN is a physician-led organization with over 1,800 providers serving both Illinois and Wisconsin. Together, HSHS and PCIN work to improve and advance the quality of care and reduce the overall cost of care through its care integration strategy—working closely with physician partners to deliver high quality, patient-centered care.

MANUAL PROCESSES IMPEDES RISK-STRATIFICATION SUCCESS

The organization had already been using risk-stratified care management to ensure that its resources were appropriately deployed to those patients who would most benefit from care management interventions. However, the analytics tool it used from a previous vendor contained risk algorithms that were not visible to PCIN and hidden away in a "black box." It was difficult to understand which variables contributed to the patient being identified as high risk.

After PCIN stopped using the analytics tool, care management staff manually entered data for as many as 1,200 patients into the organization's patient intake tool, creating a unique identifier for each patient. Care management staff would review available claims data, and then physically enter the patient's demographic data, filling in as many as ten data fields per patient. These were time-consuming processes that did not produce the risk-stratified data PCIN needed to maximize the impact of its care management interventions. Additionally, tracking patients across multiple sources of data proved incredibly difficult.

To be successful in driving down unnecessary cost, PCIN needed a way to automate risk stratification, eliminating manual work. Any automation should provide the organization with visibility into the factors generating the risk score, and would need to be flexible, allowing PCIN to change and improve the risk score over time.

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> We no longer spend our time manually creating patient lists. It is exciting for our team to come in and have our lists already populated and ready for patient intake! This streamlines our work and enables us to do our jobs efficiently.
>
> **Tricia Hannig, RN, BSN**
> **Director of Quality Improvement**
> **Physician Clinical Integration Network, HSHS ACO**

CONSOLIDATED DATA AND AUTOMATED PROCESSES OPTIMIZE RISK STRATIFICATION

To effectively, efficiently, and accurately risk stratify its care management and identify patients who would benefit from additional care management interventions, PCIN turned to the Health Catalyst® Data Operating System (DOS™) platform and a robust suite of analytics applications, including the Health Catalyst Pop Analyzer™: Stratify Expert Data Collection™.

DOS consolidates multiple sources of data, including from within the EMR, and claims data from multiple payers. The platform links and tracks patients across the various sources of information, automatically assigning one unique identifier to each patient.

Using the Stratify Data Collection, PCIN has increased flexibility that other vendor solutions have not provided. The organization can define and create its own risk-stratification models, plus use custom algorithms that are visible, to identify, stratify, and target high-risk patients for specific PCIN care management programs. It is easy for users to see and understand the data used to generate the risk scores.

The organization elected to use the analytics application to develop custom algorithms that identify high-risk patients who could benefit from care management services. Each day, a risk-stratified patient list is generated for care managers to review. The list includes patients that may be appropriate for one or more of its care management programs:

- **Chronic disease program patient list:** Patients on this list have chronic diseases like diabetes, chronic obstructive pulmonary disease, asthma, heart failure, hypertension, and hyperlipidemia with a hierarchical conditional category coding score greater than 35.

- **Transitional care program patient list:** This list includes patients who have recently been admitted (inpatient or observation status) to the hospital within the past three days, and/or were discharged from the hospital within the past three days.

- **High emergency department (ED) utilization list:** Patients are included if they experience three or more ED visits within the past ninety days or six or more ED visits within the past year, both triggered when the most recent visit occurred within the past seven days. Initially designed to identify patients who had three or more ED visits within the last year, too many patients were included, some of whom had not required services during the last six months. Learning from the data, PCIN refined the risk-prediction model and narrowed its focus to those patients it needed to identify— patients with an ED visit within the last seven days and excluding ED visits where the patient was transferred to another acute care hospital.

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> We can easily, within minutes, adjust the risk scores— modifying and improving this score however we want, whenever we want. For example, if we want to look at rising-risk patients or a different patient population, we can quickly adjust the risk score and immediately obtain actionable data.
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> **Tricia Hannig, RN, BSN**
> **Director of Quality Improvement**
> **Physician Clinical Integration Network, HSHS ACO**

Rather than spending valuable time reviewing claims data to identify patients that may be appropriate for care management services, care managers arrive at work each day with a list of patients already populated in their work queue. They can then review the list and manage the intake of appropriate patients. Leaders, care managers, and users now can easily adjust the risk scores to identify rising risk patients and evaluate populations of interest.

Care managers are able, for the first time, to apply more than one risk model to patients, assisting them in identifying patients who have chronic diseases and high ED utilization, or another combination. They are then able to determine if it is appropriate to enroll the patient in more than one care management program.

In addition to improved, automated risk stratification, PCIN now has access to the data required to perform a comprehensive program evaluation. Previously, the organization did not have access to the rich data its governing board desired. Care management program leaders are now able to easily identify the number of patients their teams have engaged and evaluate the impact of the interventions on patient outcomes.

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> Previously, we could only apply one risk model to each patient, limiting our ability to identify patients who could benefit from multiple care management program interventions. Now, we can apply multiple risk models to each patient, and are better able to identify their unique needs.
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> **Bryan Carlson, BSc, BSN, RN**
> **Population Care Coordinator**
> **HSHS Healthy Partners**

RESULTS

The organization now has access to risk-stratified patient lists, enabling it to engage with the appropriate patients to reduce costs and improve outcomes. PCIN has achieved a:

- ❯ **100 percent relative improvement** in efficiency for the risk-stratified patient identification workflow.
  - ❯ Previously, the care management team would spend hours weekly consolidating data from multiple sources, creating patient lists, and then formatting the lists/reports so the information could be used effectively for patient intake.
  - ❯ Rather than spending much of their time attempting to create a list of patients who could potentially benefit from care management services, PCIN care managers are able to redirect these hours back to patient care and better serve their patients to improve outcomes.
- ❯ **Reduction in burdensome manual data entry and automation of risk predictions**, substantially increasing the number of patients PCIN can identify and evaluate for its care management programs. In just one day, the analytics application identified more high-risk patients than had been identified in the previous year and a half.
- ❯ **Full understanding of the data** used to create the risk-stratified list and can easily adjust the algorithm to better meet changing patient or program needs.

WHAT'S NEXT

The organization will continue using the analytics application to risk stratify its patients. Next, PCIN plans to evaluate how to integrate machine learning into the risk algorithms to further refine predictions and improve the accuracy of its risk-prediction models.

REFERENCES

1. Centers for Medicare & Medicaid. (2018). *National health expenditure data – Historical.* Retrieved from https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/nationalhealthexpenddata/nationalhealthaccountshistorical

2. American Academy of Family Physicians. (n.d.). *Key functions of a medical home – Care Management.* Retrieved from https://www.aafp.org/family-physician/practice-and-career/delivery-payment-models/medical-home/care-management.html

ABOUT HEALTH CATALYST

Health Catalyst is a leading provider of data and analytics technology and services to healthcare organizations, committed to being the catalyst for massive, measurable, data-informed healthcare improvement. Our customers leverage our cloud-based data platform—powered by data from more than 100 million patient records, and encompassing trillions of facts—as well as our analytics software and professional services expertise to make data-informed decisions and realize measurable clinical, financial, and operational improvements. We envision a future in which all healthcare decisions are data informed.

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