Reducing Readmission Risk Through Whole-Person Design

Corewell Health

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Executive Summary

Corewell Health is a $15 billion not-for-profit health care system that serves three geographical regions with 300+ ambulatory locations and 5,000+ licensed beds across 21 hospitals. Corewell Health also includes Priority Health, a provider-sponsored health plan serving more than 1.3M members across the state of Michigan.

National averages show that within 30 days of a hospital discharge, approximately 20% of patients are readmitted to the hospital and 27% of those readmissions are for a reason that was considered preventable with proper management. On average, this costs the US health care system around $17B per year.[1,2,3] In early 2021, Corewell Health in West Michigan embarked on an outcome improvement journey to reduce hospital readmissions for patients with both public health care insurance that qualified for the Centers for Medicare & Medicaid Services Hospital Readmission Reduction Program (CMMS HRRP) and privately funded value-based contract arrangements.

Adopting the Scaled Agile Framework for Enterprises (SAFe®), Corewell Health developed cross-functional teams comprised of individuals from operations and digital services that

quickly adapted to changes, new insights and information, embodying transparency, alignment, respect for people, and continuous improvement. These teams aligned around a common purpose, vision and understanding focused on the problem first, and then allowed the best solution to emerge through iterative end-user feedback and person-centric development. With this new collaborative agile approach, the teams were able to maintain continuous delivery of viable, desirable, feasible and sustainable innovative solutions.

Using predictive analytics and patient indicators for target populations within Epic, the electronic medical record (EMR) software used by Corewell Health, to identify patients at the highest risk for readmission, additional coordinated resources were deployed to focus on those individuals with unpredictable recovery journeys and would most benefit from support of care managers to provide interventions focused on transition support and whole-person care. New documentation tools were also developed to facilitate the targeted nature of this intervention.

Corewell Health learned that customized care that is acceptable to the patient is imperative to success where blanketed solutioning is not nearly as effective. By utilizing predictive analytics and patient identification tools, the newly formed transitions of care team was able to focus their efforts on patients who most needed post discharge support.

Define the Clinical Problem and Pre-Implementation Performance

With recent advances in predictive analytics and the expanded ability to incorporate behavioral and social health solutions into transition support, our care coordination leaders hypothesized that more readmissions could be reduced by focusing support on those with greater barriers to optimal health. This solution is compelling to Centers for Medicare & Medicaid Services (CMS) readmission programs, due to potential for reduced penalty assignment, such as the Hospital Readmissions Reduction Program (HRRP), a Medicare value-based purchasing program that links payment to the quality of hospital care and reduces payments for excessive readmissions.[4] For example, the program encourages hospitals to improve communication and care coordination to better engage patients and caregivers in discharge plans and in turn, reduce avoidable readmissions. Acute care hospitals are at risk of Medicare payment reduction through the CMS HRRP when readmission rates exceed national rates. (See Figure 1 below for HRRP national benchmarks and Corewell Health performance prior to intervention onset.) Patients are included in the readmission measures if they meet, at minimum, the following criteria:

- Are age 65 and older.
- Have been hospitalized for one of the conditions or procedures included in HRRP: Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary Disease (COPD), Heart Failure (HF), pneumonia, Coronary Artery Bypass Graft (CABG) surgery, or Total Hip Arthroplasty / Total Knee Arthroplasty (THA/TKA) during the performance period.
- Are enrolled in Medicare Fee For Service (FFS) Part A and Part B for the full 12 months prior to the index stay (initial admission), as well as enrolled in Part A during the index stay.

2020 Benchmark and Performance			
	National rates in 2020	Corewell Health rates in 2020	Delta
Pneumonia	16.9%	16.9%	0.0%
COPD	19.6%	21.1%	-1.5%
Heart Failure	21.9%	20.8%	1.1%
AMI	16.1%	16.1%	0.0%
CABG	12.7%	11.0%	1.7%
Hip/Knee	4.0%	4.4%	-0.4%
Hospital Wide	15.6%	15.5%	0.1%

Figure 1

Patients enrolled in Medicare Advantage are not included in the readmission measures.[5] The program goal is to perform better than national rates and avoid payment penalties.

More effective readmission reduction is also important to value-based care design because it lowers total cost of care. Readmission reduction is impactful to all patients who can recover smoothly with targeted support. In addition, given pandemic stresses on staff and facility resources in acute health, fewer hospital admissions relieve strain on system resources and allows other patients to benefit from a greater amount of attention. It is essential for teams to look ahead during the patient's stay to consider their likelihood of succeeding at discharge while not losing sight of Length of Stay. Teams use the expected discharge date and discharge delay Epic functionality to ensure that care is progressing forward seamlessly and without waste.

Early success with the targeted HRRP focus led to identification and inclusion of patients who score as high risk for readmission *and* have value-based contracts. The value-based contract cohorts consist of traditional Medicare patients in an Accountable Care Organization, members of the payer in our integrated delivery system, and one additional national payer with 40,000 Medicare Advantage members in our care. Outcomes from this approach reflect a readmission rate decrease from an internal baseline of 23% to 7% in the highest risk cohort. These two populations combined represent the highest return on investment for the intervention.

Our goal of providing differentiated transition support relied heavily on our growing realization that patients would benefit from a more comprehensive experience that prioritized a whole person approach: assessing for clinical health, behavioral health and social determinants of health (SDoH), and intervening appropriately. Our intention was to move away from a one-size-fits-all approach to readmission prevention. We believed the success of the program would not be attributed to a single intervention but to the aggregate of solutions delivered by the right skill set, within the context of a 30-day transition period.

Throughout the program implementation, the team noted a high incidence of services provided to individuals traditionally challenged in obtaining equitable health care. Even though the intervention was not designed with an equity lens, enabling inclusive access is a notable theme in this work. The power of timely problem-solving creates new synergies in the tasks of caring for patients within the context of their community, family, health behaviors and social network, and utilizing whole-person solution-finding facilitates a trusting relationship with patients. This trust is particularly valuable for complex patients with multiple challenges to

recovery. We found that our most vulnerable patients benefit from an increased sense of control over their own health and the consequences of their decisions.

There are two sets of intervention numerator / denominator definitions:
- HRRP: # of HRRP patients who engage in the intervention and readmit within 30-days of the index admission (numerator) / total # of HRRP patients who engage in the intervention (denominator). See program inclusion criteria above.
- High Risk for Readmission: # of value-based patients with high risk of readmission who engage in the intervention and readmit within 30-days of the admission (numerator) / total # of value-based patients with high risk of readmission who engage in the intervention (denominator).

Design and Implementation Model Practices and Governance

Value-based care has changed the way integrated health systems approach patient transitions. For years, Corewell Health has provided transition of care support after patients are discharged from an acute care episode, but this support was a single transition-of-care phone call from a registered nurse care manager. Unstructured feedback from these calls suggested complex patient needs varied, based on multiple factors, and the barriers experienced during recovery in the community were not limited to clinical or medical issues. Many of our patients were experiencing SDoH barriers and co-occurring behavioral health conditions. Furthermore, the intensity of our patients' needs was linked to their risk of readmission, and a single interaction with the patient was not sufficient to mitigate the complexity of our most vulnerable patients.[6]

Most American hospitals do a thorough job of discharge planning, yet in-hospital support is not enough to move the needle on readmission reduction. Dr. Tricia Baird was leading care coordination across inpatient and ambulatory settings and knew that the existing Epic system could be optimized, leveraging the information to better support the work her teams needed to accomplish. The execution of this initiative involved two key aspects: developing accurate and personalized prediction of patient readmission risk and deployment of a meaningful intervention that would prevent readmission.

At Corewell Health in West Michigan, a traditional readmission prediction tool, the LACE+ index, an assessment that scores on the parameters of Length of stay in hospital, Acuity of admission, Comorbidity and Emergency Department utilization in the six months before admission, was historically used in patient discharge planning, but this tool only accounts for some of the factors that create challenges for people recovering from acute illness and is not sensitive to a patient's discharge environment. We recognized that this tool was no longer providing the amount of differentiation needed to determine which patients would benefit most from extra recovery support; specifically, that the LACE+ index and other existing tools had limitations in accurately predicting social and behavioral health factors.

Our design teams that studied this problem observed that some patients face a greater likelihood of readmission than others and needs for recovery support and effective solutions differ within individuals in the highest risk groups. The team developed a 30-day program that allowed us to focus not only on the agenda of the care team, but also on what is important to the patient. The aim was to encompass assessment elements that captured a patient's clinical burden, screening for depression and anxiety, and identification of SDoH. We wanted to provide our team members with a roadmap of interventions that would be applied at standardized intervals. Finally, we wanted to design a workflow with metrics in mind, measuring both process and clinical outcomes.

This program, named Transitions of Care (TOC) Coordination, is based on founding principles of focus, intention and consistency. The team defined these meaningful interventions to prevent readmissions:

- 30-day program.
- Partner on patient's goals.
- Timely outreach.
- Support equitable care and health literacy.
- Assess patient's understanding of the plan.
- Connect patient to ongoing care.

In early 2020, utilizing the Scaled Agile Framework (SAFe) methodology (Figure 2), the clinical care coordination and digital services teams partnered to improve patient outcomes using a new approach that allowed for close collaboration between operations and development to build capabilities in Epic that would best support the care managers.
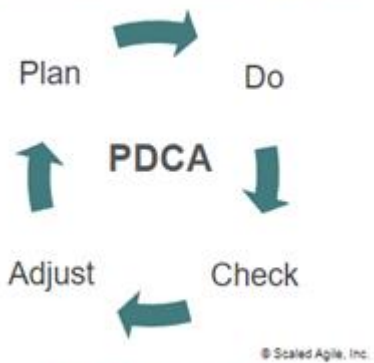
Figure 1. PDCA cycles

Figure 2: SAFe Methodology

This approach required a new process for breaking down the work into smaller incremental valuable components that could be continuously integrated into the larger working solution by a dedicated network of cross-functional, value-aligned teams. The care coordination clinical team (Figure 3), including registered nurse care managers (NCM), master's prepared social workers (MSW), and community health workers (CHW), were the key subject matter experts involved in the design and implementation, to ensure planning and development followed a people-centric approach. CHWs often have life experience and provide credibility that sometimes our licensed staff cannot represent, making CHWs instrumental in bridging trust between the patients and the care teams.

Given the specificity and time limited nature of the intervention, the team benefited from multiple layers of education. Training encompassed three key areas: clinical education, motivational interviewing and workflow training. Clinical education offered the team refreshers on the chronic conditions that are often present for our high risk for readmission patients. Diabetes, COPD and CHF are among the trainings the team experienced. Motivational interviewing provided our team members the skills and tools to help patients engage in change talk and navigate ambivalence. Team members participated in "readmission boot camp" which focused on workflows and helping team members identify how to integrate their clinical knowledge within the framework of a 30-day program.

Multidisciplinary team that consist of RN Care Managers, MSW, and Community Health Workers

Care Manager
•Medication Reconciliation
•Review discharge instructions
•Follow up appointment reminders
•Symptom monitoring / education

Social Worker
•PHQ9 / GAD7
•Behavioral health concerns (linkage and referral)
•Brief crisis response

Community Health Worker
•Transportation
•Utility Assistance
•Eldercare
•Medication Assistance

Figure 3: Care Coordination Clinical Team

This approach improved workflow efficiency and effectiveness to free care managers' capacity to work on the most critical elements of their jobs. The increments of work were prioritized using an economical approach to ensure the highest valued items with the least effort were completed first to maximize the early value delivery of the integrated solution. The team completed live demonstrations of the integrated working solution routinely and at close intervals to ensure early feedback from stakeholders, end-users and the internal application oversight committee was incorporated into the build for continuous optimization of the solution.

Prior to implementation, role-appropriate training was delivered to each member of the TOC team. "Readmission Bootcamps" continue periodically to reinforce clinical and condition-specific education, introduce new optimizations or changes in documentation and technology, and hone patient engagement skills.

Using the artificial intelligence (AI) tool in Epic, we started identifying HRRP patients at the highest risk of readmission. Between February 2021 and October 2022, the team was able to consistently identify the patients in the highest quintiles of readmission risk. These cohorts had consistently higher native readmission rates than the low-risk patients in the lowest quintiles. We sent a transition care coordinator to solve barriers and support the recovery of these patients and we began to improve our HRRP performance. This meaningful differentiation of future clinical outcomes served to isolate groups for intervention. For example, the AI tool identified 18% of all hospital inpatients as high risk for readmission and 23% of this group was readmitted within 30 days. This group accounts for 30% of all readmissions, creating a logical focus population.

Clinical Transformation enabled through Information and Technology

Formula for Accurate Patient Identification
With personalized care in mind, the care coordination team acknowledged that not all patients need the same level of transition support. The target of this work was to highlight a subgroup of patients with a higher probability of struggling in their recovery. Armed with insights from literature searches and design workshops that we conducted, Corewell Health defined

the appropriate formula for accurate readmission risk scoring through predictive analytics. See table below (table 1) and Figure 4.

Our design team made a key breakthrough when realizing that not every patient has a working relationship with an office-based clinical provider who sees them regularly and is positioned to respond to health recovery needs. Based on observation and literature review, lack of an ambulatory provider relationship was identified to be a significant factor in readmission.[7,8] While the ideal model for clinical providers is a primary care provider in a medical home model, we also theorized that some acutely ill patients can experience helpful follow-up care from specialists who can take functional responsibility for recovery — in specialties that often take the lead for advanced diseases in cardiology, nephrology, oncology and gynecology. We reduced the predictive weight given to these specialist relationships because a specialized provider may not be as prepared to address patient care needs outside of their specialty focus.[9]
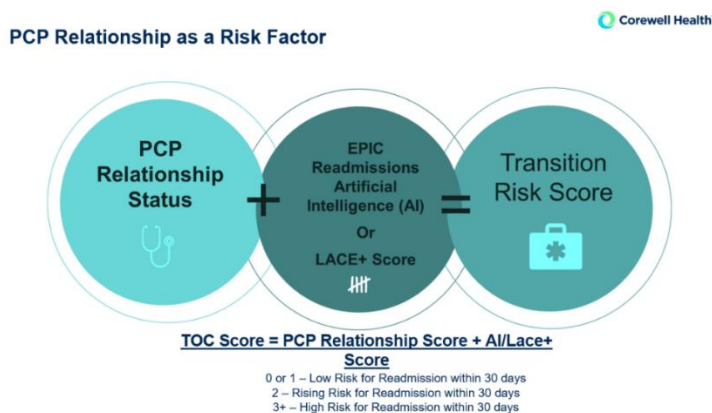
Figure 4: LACE+ in ED, Epic EMR readmission predictive model for inpatient)
paired with PCP relationship status

- The low-risk patient cohort would continue to receive printed after visit instructions and one discharge support phone call.
- The rising-risk cohort would contain a group of patients that gave the interdisciplinary team a moderate amount of concern about transition success.
- The high-risk cohort consisted of patients that gave the team a high degree of concern regarding successful recovery.

The predictive model of individual readmission risk was incorporated into the electronic medical record with clear summary formatting to facilitate quick interpretation by the interdisciplinary team and those following the patient's transition out of the acute setting.

The readmission risk score was added to the patient storyboard for quick reference with an added electronic "hover to discover" feature that allows clinicians to see the breakdown of that patient's scoring factors (Figure 6). The score categories were given corresponding colors: green for low-risk, yellow for rising-risk and red for high-risk, so that

Table 1

Readmission Artificial Intelligence	
Lace + and Primary Care Provider or Specialty Relationship (Predicted risk of hospital readmission for Emergency and Observation Patients)	**Readmission Artificial Intelligence and Primary Care Provider or Specialty Relationship** (Predicted risk of an unplanned readmission in the next 30 days for inpatients)
Male Patient	Length of Stay
Urgent Admission	Number of Active Rx Orders
Length of Stay	Number of ED visits in the last six months
Discharge Institution	Number of Hospitalizations in the last year
Alternative Level of Care Status	Active Antipsychotic Rx orders
ED Visits in Previous 6 months	Encounter of 10 days or longer in the last year
Elective Admission in Previous Year	ECG/EKG Order present in the last 6 months
Comorbidity Score (by age & number of urgent admissions)	Imaging order present in the last 6 months
	Age
	Active Anticoagulant Rx Order
	Active Corticosteroid Rx Order
	Charlson Comorbidity Index
	Active Ulcer Medication Rx Order
	Future Appointments scheduled
	Restraint order present in the last 6 months
	Latest Hemoglobin Level is low
	Latest Calcium Level is Low
	Latest BUN Level is Low
	Latest Creatinine Level is Low
	Phosphorous Result
	Latest INR is high
	Active NSAID Rx Order
	Diagnosis of Cancer
	Diagnosis of Electrolyte Disorder
	Diagnosis of Deficiency Anemia
	Diagnosis of Renal Failure
	Diagnosis of Drug Abuse

clinicians would think of a stop light for quick and universal recognition.

Now when patients are admitted to the hospital, our Transitions of Care Risk Score combines Epic's Risk of Unplanned Readmission with the patient's care team relationships to determine their risk level. Epic's cognitive computing model calculates the patient's risk for readmission within 30 days of discharge utilizing diagnosis codes, patient demographics, lab results, medications, previous orders and utilization history. When leveraging care team data, we chose to include the patient's relationship to their primary care physician, PCP department and any specialists that may provide comprehensive care for the patient.
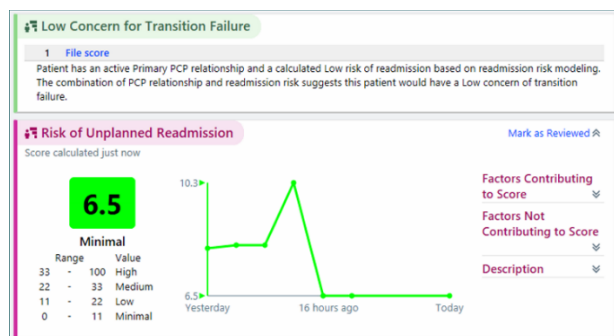
Figure 4

Once the patient is discharged, our score switches from Epic's cognitive computing model to utilize the LACE+ score; however, it still leverages the patient's care team relationships. The LACE+ score predicts the patient's risk of mortality or urgent readmission within 30 days of discharge and is calculated using comorbidity data, length of stay, ED visit history, patient demographics, diagnosis history and procedures performed during admission (Figure 7).
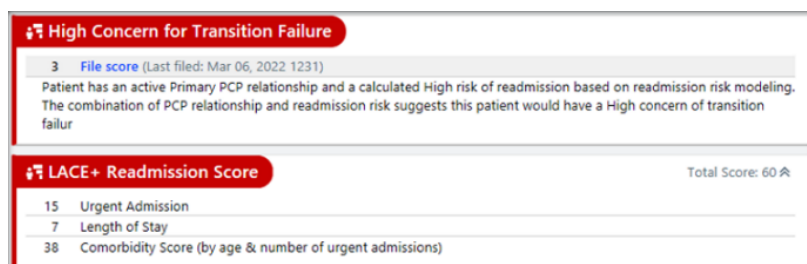
Figure 5

The care team provider relationship component of the total score is weighted as follows:
- Zero (0) indicates that they have an active relationship with their PCP. This can include seeing their PCP regularly or seeing someone else within their PCP department.
- One (1) indicates that the patient doesn't see a PCP, but they receive regular care from a specialist.
- Two (2). is reserved for patients who have no active relationship with a PCP, PCP's department, or any specialists.

The care team relationship score is combined with either the Readmission Model or the LACE+ score (depending on whether the patient is currently admitted), to identify the patient as Low-Risk, Rising-Risk, or High-Risk (Figure 8).

Figure 6

The final score is stored in an Epic flowsheet row. This allows us to display the score in reports, dashboards, columns, navigators, or the Storyboard (Figure 9).

Figure 7

Corewell Health care managers use the Transitional Care Management Services Dashboard (Figure 10). This dashboard leverages Epic's Reporting Workbench (Figure 11) functionality to create a Targeting List which generates a list of patients based on each program's specific criteria. Value-based patients must meet the following criteria to be included in the program:

- Recently discharged.
- High Risk for Transition Failure/High Risk Stratification Score.
- Over the age of 18.
- Member of Value Program Registry (Risk Contract)
- Clinical judgment of need by the care manager.

Patients are enrolled in Epic's Compass Rose module from these lists and care managers use additional reports in the dashboard to manage their current caseloads and tasks due.
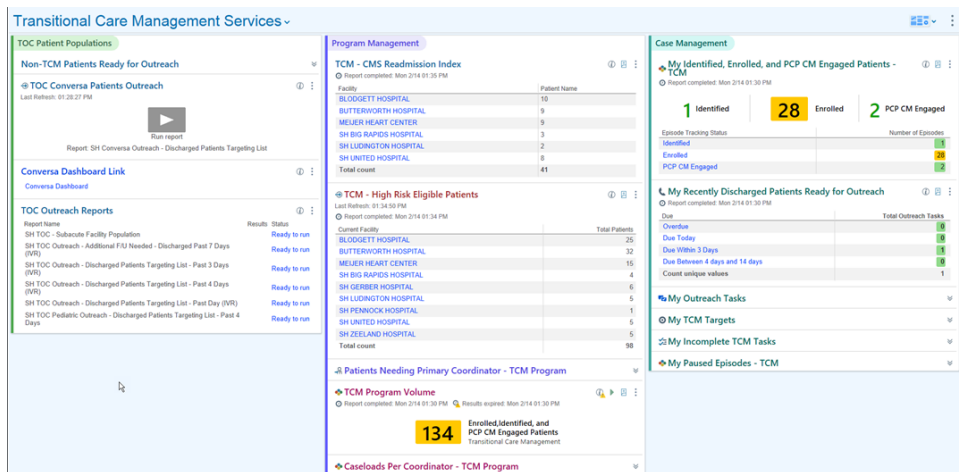

Figure 8

Figure 9

Unsurprisingly, our high-risk patients often had complex needs that required coordination across the Corewell Health enterprise and within the community. Asking the right questions was important, but even more critical was being able to offer meaningful solutions. Building trust with patients and maintaining their engagement was dependent on our ability to provide value from the patient's perspective. It was also important to establish a network of community-based partnerships and resources to connect patients with ongoing support in addressing social, medical and behavioral health needs, which include whole person design, timely outreach, supporting equitable care and assessing patient satisfaction. The program workflow (Figure 12) includes four weekly stages of activity to address whole person matters that may affect the patient's successful discharge.

Week	Activity
1	Review discharge instructions, confirm discharge appointments, medication reconciliation, screening for depression and anxiety, identify social determinants of health barriers, symptom review, and establish a transition-of-care plan.
2	Follow up on barrier solutions provided in week 1; confirm follow-up appointments were attended; referral to pharmacy, social work, community health worker as appropriate; care coordination; and symptom review.
3	Identify long-term follow-up needs; care coordination/follow-up on barrier resolution.
4	Provide warm handover to the next level of care (i.e., primary care provider, ambulatory care management, or community-based resources).

Figure 10

To meet the goal of providing a reliable prediction of hospital readmission risk, we evaluated challenges faced across outpatient and acute environments — the barriers that prevent clinical recovery from the perspective of a person or community.[10] After evaluating options for a more thorough assessment of discharge risk, in November 2020, the team realized the need to adopt a more robust tool to assess and communicate transition risks that are relevant for both acute and transition support teams. An ideal tool would incorporate a future focus and highlight the common root causes that create difficult recovery journeys. The tool needed to provide relevant information for use by the different teams who may play a role in supporting readmission prevention.

The Epic Compass Rose tool uses program data stored in an episode structure for Coordinated Care Management (Figure 13). Compass Rose allows us to provide a standardized care model for following patients over time. Custom targets for each program help us track key performance indicators and program level milestones (Figure 14).

Figure 11

Figure 12

We developed a custom Care Plan for Risk of Readmission failure to create a patient centered approach to mitigating clinical, social and behavioral health issues that might lead to a readmission (Figure 15).

Figure 13

Outreach tasks were developed to ensure we provide timely outreach to patients and assist in prioritizing patients based on due dates for tasks (Figure 16). Checklist tasks are auto-generated by a program to track and manage day-to-day interventions related to the patient's care. Multiple custom SmartForms are embedded in the TOC navigator to allow for standardized documentation by our care managers. Using SmartForms also allows us to bring in this documentation to a standardized Note Template, which is completed during each encounter.
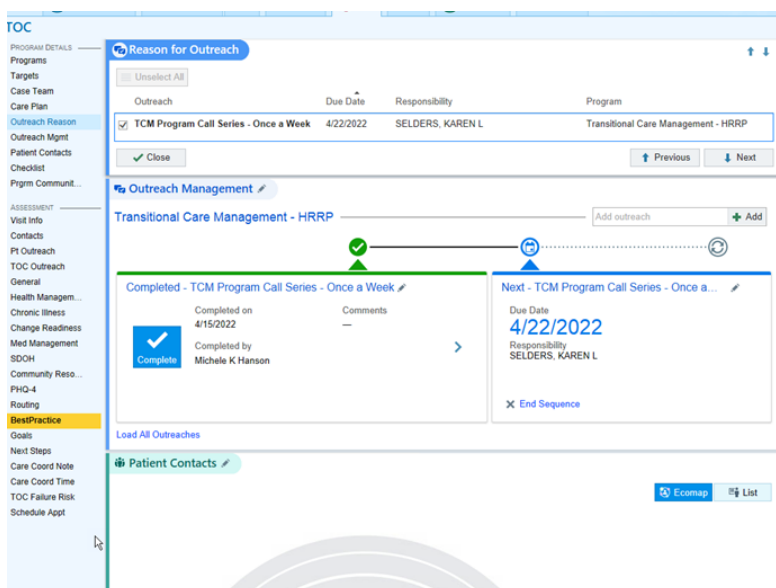
Figure 14

Improving Adherence to the Standard of Care
Scoring Accuracy

Prior experience taught us that a fully automated score was prone to provider skepticism, resulting in lower adoption into workflow. To address that concern, in addition to a validation process during development of the algorithm, each patient's transition scoring had to be affirmed or modified by a nurse care manager before it became visible to the rest of the team. This step took about 30 seconds and reinforced the validity of the response; in about 10% of the cases, the nurse care manager will modify the automated score.

C-statistic scores were used to measure reliability of the score, to compare how well the readmission prediction tool was stratifying the readmission risk level of patients compared with the validated LACE+ and our electronic medical record (EMR) readmission predictors. In May 2021, our preliminary findings indicated that this approach improved the predictive capability for the readmission risk, from a pre-intervention C-statistic range of 0.63 to 0.74 to a range of 0.80 to 0.85 for combined hospital utilization and as high as 0.91 and 0.92 for inpatient and ED utilization, respectively (Table 2). Follow-up findings confirm stable performance in this population.

TC-Statistic Score Comparison

Table 2

	Model	C-statistic Score
	LACE+	0.63–0.69
	Epic readmission model	0.69–0.74
Intervention: Spectrum Transition-of-Care Risk Score	Hospital **inpatient** utilization	0.86–0.91
	Hospital **ED** utilization	0.87–0.92
	Hospital **combined** (inpatient and ED) utilization	0.80–0.85

LACE+ = length of stay in hospital [L], acuity of admission [A], comorbidity [C], and ED utilization in the 6 months before admission [E]. The table shows the C-statistic (C-stat) scores for the different readmission risk prediction models when assessed in the first quarter of 2021. Generally, a value below 0.5 indicates a poor model; 0.5 is no better than random chance; 0.7 is a good model; 0.8 is strong; and 1.0 represents a perfect prediction of the outcome. The LACE+ was the baseline standard for readmission prediction for ED and observation status patients prior to this whole-person transition-of-care intervention. The Epic second-generation artificial intelligence model was used as the baseline standard readmission score for the patients with inpatient status. With the addition of primary care relationships, the average C-stat score rose to 0.89 for hospital inpatient utilization. The average C-stat score rose to 0.89 for ED utilization. The average C-stat score rose to 0.82 for predicting both inpatient and ED utilization. Source: The authors, using Epic C-stat scores and locally generated data

Clinician adoption of the readmission prediction tool gained momentum and use with the support of the nurse care manager verification process. We found that our clinicians modified the score in less than 10% of the cases, with less than 7% category variation month to month (figure 17).

Due to the strong correlation between score and clinical concern, other clinical departments began adopting the score into their workflows. Hospitalists, orthopedic care pathways and post-acute providers have added visibility of this scoring to their daily data inputs. We continue to monitor risk category breakdown over time, to ensure consistency and note any unintended spread. Clinical staff continue to validate scores and can make a change, if determined inappropriate, which occurs on 5-7% of patients.

Clinician Validation and Revision of the Predictive Analytic Risk Score, August 2022

Total, N=6,673; low, n=4,273; rising, n=1,015; and high, n=1,048. These scores reflect the final numbers for each risk category and show the share that involved adjustment by clinicians — 503 low-risk patients, 174 rising-risk patients, and 100 high-risk patients. The gray area indicates patients who have died, left against medical advice, or were admitted for less than 48 hours; in August 2022, 337 patients fell into this category.

Clinician Validation and Revision of Predictive Analytic Readmission Risk Score, August 2022
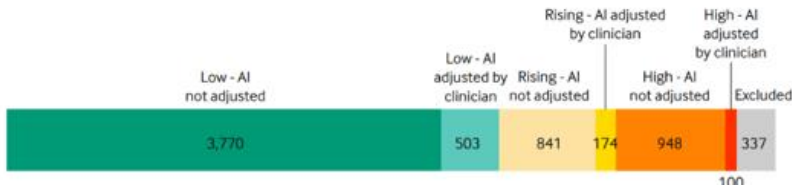

Figure 15

Program Enrollment

One indication of success can be seen in high program enrollment rates. We noted consistent enrollment rates, with 75% of eligible HRRP patients enrolling in the program, 80% of enrollees graduating, and final readmission rates for the graduated group 65% lower than other high-risk patients who were not offered the intervention. This consistently improved readmission outcome gave us the confidence to continue expanding the intervention to a second cohort, which involved patients in a value-based risk contract, beginning in August 2021. All diagnoses in this expanded high-risk group were included as eligible for inclusion. Since this value-based cohort's inception, 1,000 value-based patients have been enrolled and 804 have graduated from the program as of September 2022. Our team continues to maintain enrollment of at least 75% of eligible patients and more than 80% of those enrolled graduate after completing the full month. Team member fidelity to the model is 86%. This is based on completion of related tasks within the time allotted, as measured in the electronic health record. We had set a goal of 80% fidelity, recognizing some interventions may take longer than anticipated or patients may have emergent needs that arise.

As clinical resources were added, additional offices were brought into the intervention, notably eight offices joining in February 2022, which led to a sharp increase in eligible patients in March 2022. This occurred as local teams worked to schedule a backlog of elective cases that had been paused from November 2021 to February 2022 due to COVID-19 conditions.

The outcome of these patient-centered interventions surpassed the initial goals for reducing readmissions, positively impacted hospital bed capacity and demonstrated both scalability and sustainability. By focusing on patients at the highest risk of readmission, we saw a two-thirds reduction of readmissions (one out of every three hospitalizations) in the highest quintile of patients, reducing that readmission rate from 23% to 7%, and cut the overall readmissions rate by 50%.

Improving Patient Outcomes

Since implementation, more than 2,000 patients have successfully completed the 30-day period without readmission. These enrolled patients received support from a care manager (RN), social worker and community health worker to address clinical, social and behavioral health needs. Patients receive a minimum of one outreach per week, with most patients averaging seven to eight team member encounters over the course of 30 days. At the end of

30 days, patients who need more care coordination are transitioned to ongoing allied health teams.

The readmission rate for high-risk patients in the value-based cohort of the TOC program is 7% compared to 23% for high-risk patients not receiving the intervention, producing a 70% reduction in readmission rates. Further investigation revealed an increased number of patients who displayed a high risk of readmission combined with a clinical journey that naturally connected them to a clinical pathway for their episode of care, such as active oncology treatment and bariatric surgery. Starting in April 2022, program eligibility review returned these cases to the traditional discharge transition program that provided one follow-up phone call to affirm strong patient support for these cases. The April episode volumes reflect this adjusted program scoping. Further observation of program intent, in combination with clinical case profiles, will ensure ongoing matching of the clinical scenario and designed intervention. This special cause variation reflects health system work to complete a backlog of elective surgery cases, which was associated with the COVID-19 backlog and resumption and demonstrates the importance of matching designed interventions with data identification. With the April/May 2022 work to restore a match between identified patients and transition support intervention, engagement rates improved and readmission results stabilized.

Outcome measurement is an active data collection, based on patient-reported barriers and outcomes. Also, the graduation rate for a given month cannot be determined until we finish the succeeding month and can confirm that no 30-day readmission occurred, which marks successful graduation. Due to the new baseline readmission rate established in the HRRP pilot running since February 2021, we confidently predict that the same intervention will take this cohort from a 23% native readmission rate to an intervention readmission rate of 7%. Figure 18 demonstrates that 7% rate starting to form in December 2021 through February 2022, with rates of 7.9%, 3.0%, and 6.5%, respectively. After the corrections to the program inclusions in April 2022, we expect the intervention readmission rate to continue its trend to the targeted 7%. In fact, between May 2022 and September 2022, 30-day readmission rates were less than 5%. Since inception in August 2021 through September 2022, 816 patients graduated from the program. On average, our team enrolls 75% of eligible patients and more than 80% of those enrolled complete the 30-day program to graduate without readmission.
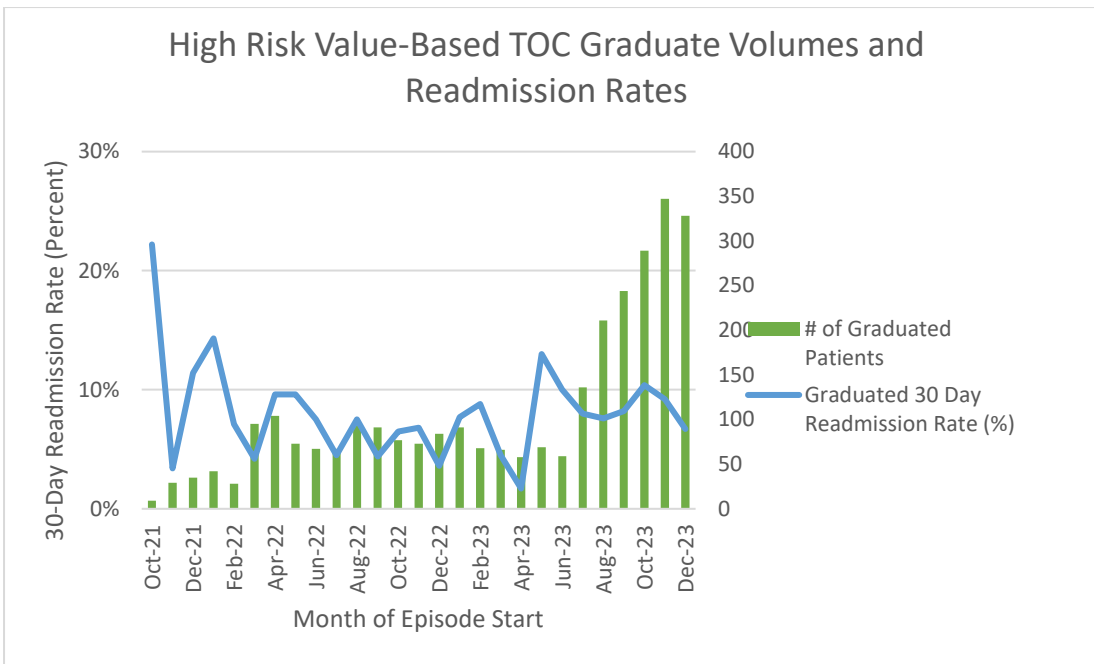
High Risk Value-Based TOC Graduate Volumes and Readmission Rates

Figure 16

The increase seen in May 2023 correlates directly with program expansion. New team members were added as coverage increased and the noted spike indicates a learning period. This growth is reflected in the following month's graduation rate.

HRRP readmissions have been improving, as indicated by declining readmission rates, since the start of the transition program (Figure 19). While noted in the following HRRP performance table, two of the conditions of the HRRP program were not included in the TOC program: coronary artery bypass graft (CABG) and pneumonia. Cardiac surgery has always been well managed and was not included in an effort to avoid disruption to existing support. Pneumonia was suppressed because a COVID-19 exclusion had not been completed on the data; however, we did see improvement in the readmission rates in those areas.

2020 Benchmark and Performance performance period: 7/16-6/19 (pre-intervention)				2023 Benchmark and Performance performance period: 7/19-6/22 (pilot program in place)			
	National rates in 2020	Corewell Health rates in 2020	Delta		National rates as of 8.2023	Corewell Health West rates	Delta
Pneumonia	16.9%	16.9%	0.0%	Pneumonia	16.9%	15.1%	1.8%
COPD	19.6%	21.1%	-1.5%	COPD	19.2%	18.0%	1.2%
Heart Failure	21.9%	20.8%	1.1%	Heart Failure	20.2%	16.9%	3.3%
AMI	16.1%	16.1%	0.0%	AMI	14.0%	12.6%	1.4%
CABG	12.7%	11.0%	1.7%	CABG	11.0%	9.5%	1.5%
Hip/Knee	4.0%	4.4%	-0.4%	Hip/Knee	4.3%	4.5%	-0.2%
Hospital Wide	15.6%	15.5%	0.1%	Hospital Wide	14.6%	13.8%	0.8%

*Fully expanded program for entire performance period will not reflect until 2028 penalty

Figure 17

Accountability and Driving Resilient Care Redesign (One Page)

Compass Rose allows for extensive data capture within a patient's episode of care. These numerous data points provide an in-depth look into each episode as it progresses from start to finish. Since the transition programs were first implemented, we have worked with our analytics team to create and refine case analysis dashboards for each program that utilize Epic's ability

to discretely record both episode and encounter-level data. Figure 20 and Figure 21 show metrics for episode-level data. Supervisors candetermine caseload volume and gauge program success, as well as identify any barriers care managers and patients are facing through disenrollment reasons and decline reasons.
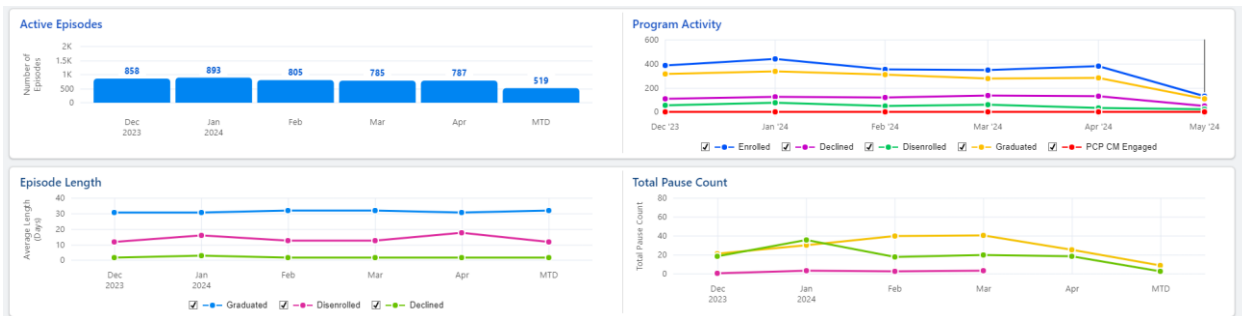

Figure 18 - Notes: episode metrics detailing caseloads, trending by month over time.

Figure 19 - Notes: episode metrics cont. Donut graphs show data back to the previous month to better encapsulate current state of disenrolled, declined, engaged, and graduated episodes.

Figure 22 shows encounter-level data relevant to care manager workflows within the transition programs. The dashboard allows for summarization at four different levels: program, hospital discharge location, patient PCP department and individual care manager. Care managers link their encounters to the patient's episode in Epic, which allows easy access to the encounter level of granularity. The top four sessions are derived from SmartData elements embedded in SmartForms. These metrics provide insight into which interventions are commonly provided by our care managers. The bottom two sessions are used to audit checklist task completion, to ensure our care managers are completing their episode goals. The two sessions can be used side by side to compare specific tasks to all tasks.

Figure 20 - Notes: encounter-level documentation summarized by source, trending by month over time.

The program level shows metrics for the program as whole. Hospital discharge location allows for an input of a Corewell Health hospital to only show metrics for discharges from that hospital. Patient PCP department takes any Corewell Health PCP office as input and only shows metrics for patients whose PCP works in that office. And finally, individual care manager takes the name of any given transitional care manager to show metrics on their personal caseloads.

Topic Guidance: Check three which apply to this case study

Clinical Informatics and Clinician Engagement	Healthy Aging and Technology
Clinically Integrated Supply Chain	**Improving Quality Outcomes**
Consumer/Patient Engagement and Digital/Connected Health	Innovation, Entrepreneurship, and Venture Investment
Consumerization of Health	Leadership, Governance, and Strategic Planning
Culture of Care and Care Coordination	Population Health Management and Public Health
Data Science/Analytics/Clinical and Business Intelligence	Precision Medicine and Genomics
Disruptive Care Models	**Process Improvement, Workflow, and Change Management**
Grand Societal Challenges	**Social, and Behavioral Determinants of Health**
Health Informatics Education	Telehealth
Health Information Exchange	User Experience (UX)
Interoperability	Usability
Data Integration, and Standards	**User-Centered Design**
Healthcare Applications and Technologies Enabling Care Delivery	

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