Reducing Readmissions with Predictive Analytics

Conway Regional Health System uses business analytics and the L.A.C.E. index to identify patients poised for early readmission.
The Effect of High Hospital Readmission Rates

Since the inception of the Affordable Care Act in 2011, studies have highlighted the alarming cost and rate of unplanned and early hospital readmissions, and its overall impact on health care in the United States. Findings suggest that high rates of readmission are a widespread issue causing millions in lost revenue due to higher costs, and are not limited to any specific number or type of hospitals.

In response to this trend, the Hospital Readmissions Reduction Program, established as a part of the Affordable Care Act, requires the Centers for Medicare & Medicaid Services (CMS) to reduce payments to hospitals with excess readmissions within 30 days of a discharge from the same or another hospital, most particularly for conditions of Acute Myocardial Infarction (AMI), Heart Failure (HF) and Pneumonia (PN). Over 2,200 hospitals were penalized in the first year of the program. Already often operating on slim profit margins, potential or realized penalties from the Readmissions Reduction Program have prompted hospitals to make a concentrated effort to improve their readmission rates. Larger health care enterprises will also face difficult financial decisions as scrutiny over Readmission rates continues to grow.

Vitals
Location: Conway, AR
Size: 154-bed, 125 Physicians, 1,000 employees, 100 volunteers.
Type: Not-for-profit Acute Care Medical Center.
Serves: Five central Arkansas counties.
Facilities: Medical Center, Women’s Center, Health and Fitness Center, Home Care, Imaging Center, Personal Training Studio, Rehabilitation Hospital and Therapy Center.
Software used: RAPID Business Analytics

"The L.A.C.E. report has proven to be an invaluable tool in identifying patients with greater aftercare needs. Using the L.A.C.E. tool and implementing new processes has successfully shown a downward trend in readmissions at our facility."

-- Cathy Van Cleve, Quality Analyst, Conway Regional Medical Center, Conway, AR
Policy-makers continue to express greater interest in penalizing hospitals with relatively high rates of readmission and rewarding hospitals with relatively low rates.

CMS has raised the maximum penalties to a three percent reduction in overall Medicare payment for admissions as of October 1, 2014, and expanded the number of conditions covered to include chronic obstructive pulmonary disease (COPD), elective hip and knee replacements and stroke.

The L.A.C.E. Index

To avoid facing such penalties, and to enhance the level of care provided overall, hospitals have begun to look into different methods for identifying patients with a higher risk for unplanned readmissions prior to discharge, allowing hospitals to implement any pre-discharge interventions that could prevent readmissions after discharge.

One such method involves using predictive analytics to identify patients who have a higher probability of unplanned readmissions within 30 days. If a hospital were able to accurately predict a risk for readmission and quantify the level of risk that patient presents, it could segment patients requiring various levels of pre-discharge interventions, and determine the specific extent of interventional procedures, human resources, and time devoted to each patient during the discharge process.

The L.A.C.E. Index was created for just such interventions. L.A.C.E. uses four common variables – Length of Stay, Acuity of Admission, Comorbidity and Emergency visits within the previous six months – to quantify a patient’s risk of readmission. It is one of the more promising predictive analytic tools that hospitals have increasingly expressed interest in utilizing.

The L.A.C.E. Index, formulated by researchers from the Ottawa Hospital Research Institute and contributing cohorts, computes a score for each patient ranging from 0 to 19 based on the four specified variables, and is run daily while patients are still in the hospital. Each patient’s score correlates to their probability of an unplanned readmission within 30 days, thus allowing Care Managers to focus on higher scoring patients prior to discharge.

![Figure 1: Calibration curve for the LACE index, based on data representing patients in the derivation and internal validation groups.](image)
Medisolv has adapted this basic methodology into an automated dynamic calculation performed on each inpatient, with data refreshed daily. This allows hospitals to proactively identify patients at high risk of readmissions and makes interventions prior to discharge possible.

**Case Study: Reducing Readmissions with L.A.C.E. Index Scores**

Reducing readmission rates had been a top priority for Conway Regional Medical Center, which provides complete health care services – including cardiovascular and general surgery, orthopedic, cancer diagnosis and treatment, home health, women’s services, senior mental health and rehabilitation therapy services – to patients in the growing communities of north central Arkansas.

**Barriers to Adopting the L.A.C.E. Index**

After disproving the assumption, through their own internal data analysis, that the majority of readmissions came from nursing home residents, they considered utilizing the L.A.C.E. Index to help identify and manage patients at high risk for early readmission. They quickly realized the many barriers to operationalize this labor-intensive process, such as:

- The amount of time required to manually calculate a L.A.C.E. score for each patient;
- Locating required information for a patient that may reside in prior records (ex: comorbidities listed in a prior admission);
- Application of the appropriate interventions based on a case worker’s review;
- Difficulties in stratifying patients on a daily basis, as information continually changes.

**The Solution**

Conway Regional was already using Medisolv’s business intelligence solution, RAPID, for quality measurement and management and for Meaningful Use reporting. They discovered that the L.A.C.E. Index was included in RAPID’s reporting capabilities.

Conway knew the L.A.C.E. index predictive tool within RAPID was exactly what the hospital was looking for. RAPID is one of the only analytics solutions in the market to offer daily L.A.C.E. reporting as a built-in analytics tool, providing hospital administrators, clinicians, and case managers with near real-time information to help decrease readmission rates and improve patient safety.

RAPID automatically pulls data from Conway’s MEDITECH EHR data repository on a daily basis, scores each patient, and makes recommended interventions readily accessible to the entire organization. This allows users to successfully apply interventions without having to devote resources to compiling and verifying data for each individual patient.
Integrating L.A.C.E. within the Workflow at Conway Regional

Conway Regional made the decision to incorporate RAPID into all case management activities focused on readmission reduction. It quickly became their “go to” solution for preventing early readmissions.

Table: Daily LACE Report Pts Scoring 14 or Higher

<table>
<thead>
<tr>
<th>Discharge Date</th>
<th>Location ID</th>
<th>Unit Number</th>
<th>Patient Name</th>
<th>Account Number</th>
<th>Financial Class ID</th>
<th>Primary Care Provider Name</th>
<th>Attending Provider</th>
<th>Admit Date</th>
<th>Lace Score</th>
<th>ReAdmission Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
<td>5 East</td>
<td>M010100100</td>
<td>Doe, Jane</td>
<td>V11111111110</td>
<td>BC EXC</td>
<td>Han Solo, MD</td>
<td>Han Solo, MD</td>
<td>2/21/2015</td>
<td>14</td>
<td>33.6%</td>
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<tr>
<td>Not Available</td>
<td>ICU</td>
<td>M020202020</td>
<td>Smith, Anonymous</td>
<td>V222222222222</td>
<td>MCR</td>
<td>Luke Skywalker, MD</td>
<td>Good Heart, MD</td>
<td>2/21/2015</td>
<td>16</td>
<td>30.4%</td>
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<tr>
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<td>Doe, John</td>
<td>V333333333330</td>
<td>MCR</td>
<td>Obi-Wan Kenobi, MD</td>
<td>Ima Hospitalist, MD</td>
<td>2/9/2015</td>
<td>15</td>
<td>26.6%</td>
</tr>
</tbody>
</table>

Figure 2: Daily updates to L.A.C.E. Scores provide alerts about patients poised for possible early readmission.

RAPID generates a daily L.A.C.E. report; the scores display on the public status board within each nursing unit, and on the physician’s status board. Case Management staff takes the higher scores and adds them to their interventions, resulting in a case management consult order.

Having identified the patients at the highest risk for readmissions, admission/discharge nurses work with each patient to educate them on the reasons for their hospitalization, any previous diagnoses affecting their well-being, any new medications they might be prescribed, and any changes to their plans of care. The patient’s primary care physician is also alerted to the higher L.A.C.E. score, so that the physician can ensure the patient goes for a follow-up appointment within the first three days post-discharge.

Further, Conway Regional’s Case Management staff holds regular meetings with admission/discharge nurses, home care staff, representatives from area nursing homes, home care agencies, rehab facilities, and hospice agencies to ensure that each member of a patient’s care team is fully educated about how the L.A.C.E. scoring system works, and understands the protocol pertaining to patients with higher L.A.C.E. scores.

The Conway Regional staff also developed a standardized patient health summary document, based on feedback from the post-acute care providers, which includes the patients L.A.C.E. score. This document is shared with agencies providing care post-discharge and available to the primary care physician through their EHR.
Results

Here are a few real examples of how the staff at Conway Regional Medical Center have successfully incorporated the L.A.C.E. Index as a part of their patient care and Case Management workflow:

**Case 1:** “John Doe” is a patient who is frequently hospitalized, and was recently admitted with a fluid overload. Because his L.A.C.E. score was \( \geq 10 \) (it was 12), Mr. Doe’s case was discussed at the weekly case conference meeting between admission/discharge nurses, Case Management, and home care. The nursing staff began educating Mr. Doe on congestive heart failure and the causes of fluid overload, and he was referred for home care services post-discharge. During the first two weeks, home care staff contacted Mr. Doe daily, either through home visits or telephone triage, and continued to educate him on managing his condition. Mr. Doe’s primary care physician assisted in the process by working with home care staff, helping manage the care provided. Further, since Mr. Doe was a home care client before his more recent hospitalization, an audit was done to determine what caused the readmission. The physician could then also order additional disciplines in order for Mr. Doe to maintain and/or improve at home.

**Case 2:** A case manager called to report a potential error on the daily L.A.C.E. report which was set to run patients with scores of \( > 15 \). She was concerned that “James Doe,” (John’s brother) did not appear on the L.A.C.E. report; she believed that James Doe may have “at least a score of 15.” It turns out that James Doe’s L.A.C.E. score was actually 12. Still, the case manager recognized that because of the patient’s condition, his score should be well above 10. The case manager gets Kudos for being fully engaged in the process!

**Case 3:** The Chief Operating Officer recently reported that the L.A.C.E. report for patient “Jane Smith” must be incorrect. Evidently, Jane Smith was on the daily L.A.C.E. report; the COO determined that there must be something wrong because he saw Jane Smith at church just one day before. As it turns out, there was more than one person with the name “Jane Smith” who was admitted to Conway Regional, and it was the other Jane Smith who was on the daily L.A.C.E. report. Again, this is another example of how even C-level executives are engaged in the process, and help with identifying high-risk patients.
Conclusion

Hospitals that consider reduction of early readmissions a high priority can easily justify their return on investment in predictive analytics technology, through reduced penalties for high early readmission rates. As evidenced at Conway Regional Medical Center, the automated solutions from Medisolv enable hospitals to integrate predictive analytics into their existing systems and use technology to make their current workflows more effective.

As the Centers for Medicare and Medicaid Services (CMS) move towards aligning quality reporting programs around electronic reporting, and begin to use this data for both performance based reimbursement and public reporting, Medisolv’s suite of comprehensive quality measurement solutions enables hospitals to improve their clinical performance and revenues.

Medisolv, Inc., provides a single platform for quality management, reporting and business analytics for hospitals and their providers. Medisolv solutions are certified for reporting both electronic and abstracted measures to CMS and the Joint Commission, and are fully integrated with the MEDITECH data repository. Medisolv is a MEDITECH approved solutions vendor. Learn more about RAPID Business Analytics and ENCOR Quality Management & Reporting Solutions by visiting www.medisolv.com.

1 http://circ.ahajournals.org/content/131/20/1796.long
http://www.ihi.org/topics/readmissions/Pages/default.aspx
“Medisolv gives us quick access to data we just couldn’t produce ourselves.”  Jeff Hall, Chief Information Officer, Pella Regional Health

“We are not report writers... now, Medisolv takes care of that for us and we do what we do best—the clinical side!” Lisa Hipskind, Ancillary Analyst, Major Hospital

“It’s amazing what we can capture, and what we can see, and how we can evaluate our care.” Deborah Rogers, Vice President of Quality and Compliance, Duncan Regional Hospital

“We are fortunate to have a single vendor on a single platform, with performance data that is refreshed every day.” Kathleen Reilly, Director, Quality And Performance Improvement, Finger Lakes Health

“The support from this company is excellent! With Medisolv, we have more than just a software product – we have a great relationship.” Libby Willard, RN, MSN, Nursing Informatics Analyst, Northern Hospital of Surry County

“We are better able to manage the quality measure and reporting processes, and better utilize our data.” Ed Ricks, Chief Information Officer & Vice President, Beaufort Memorial Hospital