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Supporting Value-Based Care At Atrius Health With Linguamatics NLP

Atrius Health struggled to identify high-risk patients, report on quality measures and improve clinical documentation because key data was trapped in clinical notes. The Linguamatics NLP platform has helped Atrius Health to increase efficiencies, improve patient care and capture additional revenue.

QUICK FACTS

Situation: Accountable Care Organizations (ACOs) require access to clinical data to satisfy reporting requirements and facilitate quality care initiatives. Because critical patient information is often stored in narrative form in the electronic health record (EHR), Atrius Health had difficulty obtaining certain information for quality metric reporting, accurate clinical documentation and safety-net initiatives.

Solution: Using the Linguamatics NLP platform, Atrius Health created queries to extract clinical data from free-text fields within clinician progress notes and clinical reports. For example, Atrius Health now queries unstructured echo reports to analyze heart pump function and identify high-risk heart failure patients.

Success: At-risk patients are easier to identify, allowing Atrius Health to close gaps in care. For example, in 2017 Atrius Health identified 92 otherwise undocumented congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) patients. This has helped Atrius Health to gain between $75,000 and $150,000 in additional annual risk-adjusted revenue per disease area. Nurses also experienced a significant increase in the efficiency of their chart reconciliation process, problem lists are more accurate and complete, and ACO reporting is simplified.

Situation

As an ACO serving Medicare, Medicaid and commercial populations, Atrius Health needs ready access to clinical notes and data in order to improve clinical care and report on care activities to payers. For example, Atrius Health is required to track and report on activities that demonstrate improvements in the delivery of quality care, alongside any financial savings, in order to demonstrate that the care provided is consistently high value. To accomplish this, Atrius Health must identify at-risk patients, to minimize gaps in care quality and include these individuals in safety-net programs.

In the past, Atrius Health had had difficulty obtaining certain clinical information, including that comprehensively identifying patients with select certain medical conditions, and tracking quality metrics for some groups of patients. Craig Monsen, M.D., Chief Medical Information Officer at Atrius Health, explained the challenge.

"Seventy to seventy-five percent of our annual revenues come from full-risk contracts, so being able to monitor our quality metrics continuously is critical, to ensure we are providing consistently high-quality care," said Monsen. "Each year we refine the focus of what we consider to be high-quality care in part by what our contracted payers are looking to drive. We are then asked to report on our quality metric performance to ensure we are consistently providing that high-quality care," Monsen continued.

"Reporting on certain metrics had been a challenge, however, because some of the information we must measure is stored in reports in an unstructured format."

Like many healthcare organizations, Atrius Health captures a significant amount of clinical data as unstructured free text—in fact, an estimated 80% of all EHR data is unstructured. Atrius Health clinicians frequently input clinical details in narrative form as free text, particularly when structured fields for such information are unavailable. While this practice is necessary to capture clinical complexity and nuance, it creates data-completeness challenges because the free-text information does not automatically translate into structured information on patient problem lists.

Creating accurate ACO reports was difficult because relevant details could not be easily pulled from structured fields. "For example, to identify patients that have high-risk heart failure who would benefit from a bundle of evidence-based care interventions, we could attempt to use a structured field. However, data from that field is not generally precise enough to identify the severity of a patient's heart pump dysfunction," said Monsen. "A nurse would have to manually review the free-text fields within thousands of patient charts to identify their heart pump function—also known as ejection fraction—and determine how many were appropriate for the care bundle."

An analysis of clinical notes can also improve problem lists for COPD (FEV1), obesity (BMI) and diabetes (A1C). Up-to-date problem lists are critical for the delivery of quality care, and factor into Medicare Advantage reimbursement. To ensure accurate ACO reporting, as well as to properly identify at-risk patients for quality-improvement initiatives, Atrius Health was dedicating dozens of hours of clinical review time to manual review of patient charts, and to reconciling patient problem lists.

Atrius Health also struggled to identify certain social determinants of health factors, such as a patient's social network. "We know that in order to advance the delivery of care, we need details not typically captured within structured fields in traditional EHRs or in claims data," said Monsen. "We have a significant amount of data, but we needed a way to process it better and glean more value."

Further opportunities to close patient-safety gaps had been identified by Atrius Health: For example, radiology reports sometimes include incidental findings of features such as lung nodules. Generally, these are not dangerous and go away on their own, but in some cases they indicate a potential early-stage lung cancer. In an emergency room or urgent care situation, a physician may miss the findings, resulting in a later-stage diagnosis, worse outcomes and potential litigation.

Solution

Atrius Health recognized that they needed to eliminate the inefficiencies of manual chart reviews and problem list reconciliation, and help streamline the process. The organization identified natural language processing (NLP) as a technology that could help users identify critical clinical data hidden within the free-text fields of clinical reports and clinician progress notes.

> "*A vast amount of critical clinical data exists as unstructured text, which is difficult to access and analyze. We are leveraging the power of NLP to replace the manual, inefficient data extraction processes that many healthcare organizations struggle with in order to advance our quality care initiatives more rapidly. Linguamatics NLP allows us to close gaps in care, enhance clinical documentation for chronic disorders, reduce litigation risks and streamline Medicare ACO quality reporting.*"
>
> *— Joe Kimura, M.D., Chief Medical Officer for Atrius Health*

"NLP is a technology that offers more than just keyword search—it also allows you to string together multiple words that represent the same concept, such as 'COPD' and 'chronic obstructive pulmonary disease'," explained Monsen. "We saw NLP as a technology we could implement to get more value out of our clinical documentation."

The search began for an NLP solution that best met Atrius Health's needs. "There is an exploding number of vendors offering NLP as a piece of a larger solution, but few offer a mature technology already being applied to healthcare use cases," said Monsen. "We were interested in finding a partner with a flexible product that could enable our data analysts to query our unstructured data, just as they do our structured data."

Atrius Health learned of Linguamatics and its NLP platform, and validated their expertise through discussions with other healthcare organizations. One of the important considerations for Atrius Health was the ease of creating queries. "We felt [the platform] got us to functional NLP queries for our emerging use cases faster than starting from scratch, and were impressed by Linguamatics' community approach to building libraries that can be shared between organizations," explained Monsen.

In 2015, Atrius Health conducted an initial validation exercise with Linguamatics to assess Activities of Daily Living. Following the success of that pilot, Atrius Health implemented the Linguamatics NLP platform.

Today Atrius Health relies on the platform for three major use cases:

1. **Quality metric reporting:** Concepts are extracted from unstructured, patient-related documentation to facilitate quality metric reporting. For example, Atrius Health and Linguamatics have constructed an NLP query for echo reports to analyze ejection fraction (heart pump function) and identify high-risk heart failure patients who may require additional interventions. The extracted ejection fraction values are then used for ACO quality reporting to indicate the overall health of the heart failure population.

2. **Clinical documentation accuracy:** Rather than performing time-intensive manual chart reviews, certain diagnoses and concepts are automatically extracted from documentation and cross-referenced with registries and current problem lists, to ensure problem list accuracy. This promotes disease management and aids in risk-adjustment efforts. Several diagnosis categories are prioritized, including COPD, CHF, vascular disease and depression.

3. **Safety net:** Documentation that is frequently in a free-text format (such as radiology, pathology and procedure reports) is queried to identify significant diseases in early stages that could benefit from follow-up interventions. Clinicians then have the opportunity to close care gaps. For example, Atrius Health queries radiology reports for evidence of pulmonary nodules, and at-risk patients are flagged for follow-up with care co-ordinators.

Success

Since implementing the Linguamatics platform, Atrius Health has been able to close information gaps, which in turn has allowed closure of care gaps. For example, in 2017 Atrius Health leveraged NLP to identify 92 patients who were documented as having COPD or CHF, but whose conditions were not entered into a structured format. These patients became eligible for Atrius Health's population-based disease management programs, and chronic disease-related care gaps were closed. In addition, payers could now recognize that those patients needed risk adjustment for care-budgeting purposes. By identifying these patients, Atrius Health estimates it received $75,000 to $150,000 in additional risk-adjusted revenue to support the care of those individuals.

Clinician reviewers serving patient registry and quality metric reporting have experienced a significant increase in the efficiency of the chart reconciliation process with the use of the Linguamatics platform. Monsen explains: "The model we have adopted for NLP support of our clinical review process is one of 'augmented intelligence'. There will remain a need for the more manual clinical review of the NLP-based reports, but we can now be more targeted in that review. For example, whereas information gaps about conditions like CHF and COPD might exist for 1 in 1000 patients, well-constructed NLP queries allow us to home in on a smaller group of patients for whom 1 in 6 have information gaps we can close."

"In identifying more patients with particular chronic conditions, we can make sure we are lining them up with our disease management services, ensuring we are resourced to provide those services, and obtain better outcomes," said Monsen. "With the additional filtering capabilities that NLP queries provide, we are able to minimize the risk of inadvertently overlooking at-risk patients without adding to the burden of data entry and overload that our clinicians face."

Looking forward

Atrius Health is considering additional NLP use cases to support other targeted quality care initiatives.

"We are optimistic that there are additional opportunities to leverage new [NLP] queries to identify social determinants of health, and address these important contributors to patient well-being," said Monsen. "We'd further like to extend our safety-net work to cover more clinical findings, especially those that contribute to individual mental health, such as life stressors and resilience. We are fortunate to have Linguamatics join us on this journey to effectively match the NLP query technology with targeted use cases that support the care of our Atrius Health patients."

"By operationalizing our use of Linguamatics NLP, we can more efficiently support our value-based care initiatives. Clinicians and patients benefit from more accurate problem lists for chronic disease without adding to existing documentation burdens, the ACO reporting process can be simplified, and Medicare Advantage coding is more complete. We now can expand our patient safety-net efforts using Linguamatics because it is easier to identify patients with difficult-to-track conditions."

— Craig Monsen, M.D., CMIO for Atrius Health

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