Driving Change: Implementing Interoperability, NLP, Standards for Data Collection, and Data Analytics for Hospital Enterprises and Private Practices

By: Anna Schoenbaum, DNP, MS, RN, NI-BC and Valencia Payne, RN, BSN, MS

In this series, Driving Change in Healthcare Today, we will explore how implementing interoperability, Natural Language Processing (NLP), and standardized data collection practices can drive transformative change in healthcare organizations, from hospital enterprises to private practices. We will share insights into how these cutting-edge technologies and strategies can improve patient care and operational efficiency.

- **Implementing Interoperability**
- **NLP, Standards for Data Collection**
- **Data Analytics for Hospital Enterprises and Private Practices**

Blog #2

Introduction: Natural Language Processing (NLP)

In the bustling realm of healthcare, where decisions must be swift and informed, unstructured data looms as both a challenge and an opportunity. Clinical notes, radiology reports, and discharge summaries are treasure troves of insights, yet they often remain buried under the weight of free-text complexity. For clinicians, sifting through this vast sea of information can be a laborious task, fraught with the potential for error and oversight.

Enter Natural Language Processing (NLP), a revolutionary technology that transforms unstructured data into actionable insights. By automating the extraction of key information from medical texts, NLP empowers healthcare providers to make quicker, data-driven decisions, enhancing both workflow efficiency and patient care. Imagine a world where vital details about symptoms, medications, and diagnoses are effortlessly brought to the forefront—this is the promise of NLP.

In this blog, we will explore the goals and strategies for implementing NLP in healthcare. From automating documentation to enhancing decision support and improving research capabilities, NLP is not just a tool; it's a catalyst for innovation in care delivery. Join us as we delve into the practical steps healthcare organizations can take to harness the power of NLP, transforming unstructured data into meaningful insights that improve patient outcomes and streamline clinical workflows. Together, we'll uncover how NLP can reshape the future of healthcare, making it more efficient, personalized, and ultimately, more human.

Natural Language Processing (NLP) – Turning Unstructured Data into Actionable Insights

In the fast-paced world of healthcare, the vast amount of unstructured data—such as clinical notes, radiology reports, and discharge summaries—poses a significant challenge for clinicians. While these free-text documents contain valuable insights critical for patient care, manually extracting and interpreting this information is both time-consuming and prone to human error.

Natural Language Processing (NLP), a transformative technology, bridges the gap between unstructured data and clinical decision-making. By automatically extracting key information from medical text, NLP empowers healthcare providers with quick, actionable insights, streamlining workflows, and enhancing patient care.[1] Beyond data accessibility, NLP enables more personalized and accurate treatments and could unlock new opportunities for innovation in care delivery. Below are key goals and strategies for implementing NLP in healthcare.

Goals and Strategies for NLP in Healthcare

1. Automate Documentation

Documentation is often a time-consuming burden for clinicians, reducing their time spent with patients. NLP has the power to automate this process by extracting critical information from clinical texts. Whether it's pulling key facts from a patient's history or identifying symptoms, NLP allows for more efficient data entry, reducing the administrative workload on clinicians. By decreasing the time spent on documentation, healthcare providers can focus on what truly matters—delivering quality patient care.

2. Enhance Decision Support

NLP not only simplifies documentation but also enhances clinical decision-making. By quickly scanning and analyzing patient records, clinical notes, and relevant literature, NLP tools can help healthcare providers identify vital data points, such as symptoms, medications, and diagnoses. This rapid analysis enables clinicians to make informed decisions faster, whether flagging potential complications, suggesting treatment options, or identifying adverse drug interactions. By bringing critical information to the forefront in real time, NLP ensures that no detail is overlooked.

3. Improve Research and Real-Time Alerts

NLP's benefits extend beyond clinical workflows. It can play a pivotal role in healthcare research and patient safety initiatives. By mining unstructured data, NLP tools can detect trends, uncover patterns, and trigger real-time alerts. For example, they can identify early warning signs of patient deterioration, allowing healthcare teams to intervene before the condition worsens. This capability enhances preventive care and clinical outcomes while reducing the risk of complications. NLP also boosts research efforts by quickly analyzing

large datasets to reveal insights that inform best practices and future research projects.

Deliverables for NLP Implementation

When implementing NLP in healthcare organizations, focus on the following key deliverables:

- **NLP Requirements:** The first step in successful NLP implementation is identifying the specific needs of your organization. Determine which unstructured data sources need processing and outline the clinical or operational goals you aim to achieve. Incorporate data curation practices to ensure high-quality data input. By addressing these elements, you can ensure that the selected NLP tools are customized to your organization's unique environment, maximizing the return on investment.
- **Implementation Strategy:** Integrating NLP into existing workflows requires careful planning to minimize disruptions. Develop a strategy for gradual NLP adoption that emphasizes the benefits of automation, real-time analysis, and decision support. Establish governance frameworks to oversee the implementation process, ensuring compliance with regulations and standards. Engage both technical and clinical stakeholders from the outset to ensure seamless integration into daily practices.
- **Data Preparation:** Preparing your data is one of the most critical steps in NLP implementation. Unstructured clinical data is often messy, inconsistent, and unstandardized. Implement robust data curation processes for cleaning and organizing this data, enabling accurate analysis by NLP models. Standardizing terminology and formats will ensure that the insights generated by NLP tools are reliable and actionable.[2]
- **Model Development and Sustainment**: Building robust NLP models necessitates collaboration between clinical teams and data scientists. The models must comprehend the specific context and language used in healthcare to provide meaningful insights. An effective NLP model should accurately interpret complex medical texts, including identifying nuanced symptoms and differentiating between similar medical terms. Involve clinicians in the development process to ensure that the models meet real-world needs and deliver valuable outcomes. Establish a sustainment support model to monitor the performance of these models over time, making necessary adjustments based on feedback and evolving healthcare requirements.

Conclusion

Natural Language Processing is revolutionizing the way healthcare handles unstructured data. From automating tedious tasks like documentation to enhancing decision support and improving research capabilities, NLP is unlocking the full potential of clinical data. By implementing NLP strategically—focusing on data preparation, model development, and integration into workflows—healthcare organizations can turn unstructured data into actionable insights, improving both patient outcomes and operational efficiency.

To access the Data Automation Action Plan and other resources created by the HIMSS Clinician Burden Reduction Task Force, click here to access the Burden Reduction Task Force Toolkit.

References

1. Tamang S, Humbert-Droz M, Gianfrancesco M, Izadi Z, Schmajuk G, Yazdany J Practical Considerations for Developing Clinical Natural Language Processing Systems for Population Health Management and Measurement. *JMIR Med Inform* 2023;11:e37805
doi: 10.2196/37805
2. Schoenbaum A, Elahi A, Cook T. Implementing AI in clinical workflows: Steps to success. Nursing Management (Springhouse). 2024 (preprint).