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# **Tracking Adoption of Pharmacists' Clinical Recommendations & Utilizing NLP to Standardize Medication Directions and Automate Acceptance of Pharmacist Recommendations**

Grant Funded to:

RxLive

NCPDP Integration:

WG10 | Professional Pharmacy Services

- MTM and Pharmacist Clinical Services Task Group

WG11 | ePrescribing & Related Transactions

Pharmacist eCare Plan

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## Abstract

Prescriber action in response to pharmacist recommendations can improve patient care through reduced hospitalizations. This study aimed to investigate prescriber actions to pharmacist recommendations, natural language processing (NLP) to automate acceptance of pharmacists' recommendations and standardizing Sig medication directions. Researchers found that prescriber action on pharmacist recommendations was highest for 'laboratory request for evaluation' at 45.79%. Research also indicated an increased likelihood of action with increased duration of the relationship between the prescriber and the pharmacist. In connection with research on NLP, findings indicated gaps in data elements included within the Qualified Health Information Network (QHIN) finding areas for improved interoperability for NCPDP with their collaborative efforts with TEFCA and the emerging QHIN.

## Background

Collaboration between prescribers and pharmacists is an essential step in optimizing patient care and realizing positive outcomes (Matzke et al., 2018). Pharmacists provide invaluable support to prevent adverse drug reactions and the associated increased risk of hospitalization for patients (Lee et al., 2019). Though there is proven value of pharmacist inclusion in the patient's care team, there is little research to examine provider action in response to pharmacist's recommendations.

When considering patient outcomes, one area of importance is standardized medication directions to enhance patient understanding and adherence. While the Universal Medication Schedule (UMS) provides standard time periods, variability in prescriber instructions to the patient (Sig) continues to negatively affect patient outcomes (Yang et al., 2018). RxLive data indicates pharmacist consultations and systematic adoption of pharmacist recommendations can reduce hospitalization rates by 25% and up to 40%, respectively.

## Research Objectives

This study had a two-fold objective:

1. Investigate prescriber actions in response to pharmacist's recommendations.
2. Research utilizing natural language processing (NLP) to standardize medication directions and automate acceptance of pharmacist recommendations.

## Research Findings

### Prescriber Action in Response to Pharmacist Recommendations

Analysis of the data suggests providers have the highest likelihood to act on 'laboratory tests for evaluation' recommendations from the pharmacist with a 45.79% response rate. The next closest category, with a 34.06% response rate, was 'discontinue' recommendations from the pharmacist.

Findings showed an increased response rate from providers if the pharmacist recommendation was focused on cost-saving measures. This is supported by prior studies which indicate physician acceptance of pharmacist recommendations is

more likely to save costs than those intended to improve safety or adherence (Allen, 2016).

A total of 233 patients participated in a post-consultation survey to provide satisfaction levels of their encounter with the pharmacist. This research indicated high satisfaction scores with an average of 9.4 out of 10. This indicates patients found value in the pharmacist's professional services and recommendations.

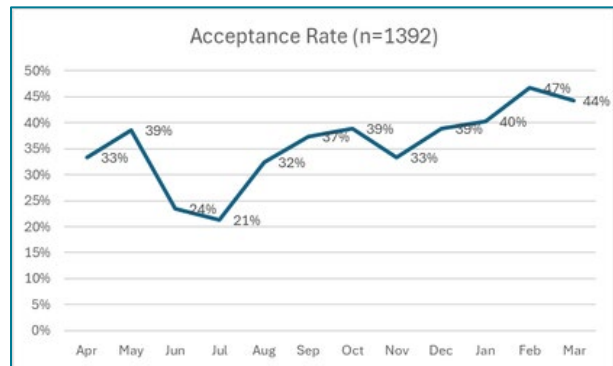


Figure 3 – Trend Analysis for Live Consultations

Findings indicated a positive correlation between the duration of the pharmacist-provider working relationship and the provider's acceptance of the pharmacist's recommendations. This finding repeated itself in provider acceptance of pharmacist patient encounters and pharmacist chart reviews, as seen in Figures 3 and 4.

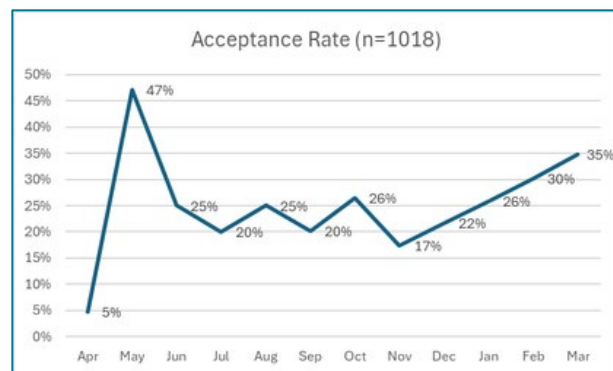


Figure 4 – Trend Analysis for Chart Reviews

### Utilizing NLP to Standardize Medication Directions and Automate Acceptance of Pharmacist Recommendations

The goal of this portion of the research study was to utilize the NCPDP Structured and Codified SIG format to code medication directions received through RxLive and push those standardized directions back through the Qualified Health Information Network (QHIN), Health Gorilla®. The QHIN would then be able to utilize the standardized data to further research prescriber actions in response to pharmacist recommendations. Due to the number of data elements (104) with similar concepts, it was difficult to determine the significance of the change in directions from unstandardized to standardized. However, researchers were able to implement logic rules and transform a large portion of incomplete medication directions to complete directions which is promising in increasing patient safety and adherence.

Researchers noted that a number of data elements within both HL7® and NCPDP Standards were not supported by the Health Gorilla® QHIN. This is an important finding and a step towards increased interoperability as Health Gorilla® has notated the gap in necessary data elements for medications and the directions for their use.

Additionally, this finding further supports the value of NCPDP's collaboration with TEFCA and the emerging QHIN network for standardizing the exchange of health information as it relates to ePrescribing.

### Recommendations to Move Forward

Researchers provided preliminary findings to NCPDP's Work Group 11, ePrescribing and Related Transactions, for further investigation and discussion within NCPDP's consensus-building forum. Further research and development is needed to expand NLP application within prescription medications including real-time acceptance of pharmacist recommendations.

### NCPDP Integration

#### WG10

#### Professional Pharmacy Services

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##### •MTM and Pharmacist Clinical Services Task Group

This task group is working with pharmacy professionals and other stakeholder organizations, to enable adoption, enhance existing, or develop new standards for electronic communications amongst and between patients, payers and providers related to medication therapy management and other clinical services provided by pharmacists.

#### WG11

#### ePrescribing & Related Transactions

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- This work group develops standardized messages for prescribers, pharmacists, payers and/or other interested parties to exchange information related to a prescribing event or patient encounter.

## Disclosures

Research was performed by the Grantee, RxLive, Inc., was funded by the NCPDP Foundation, and final results were provided to the NCPDP Foundation.

RxLive indicated that AI was utilized in the drafting and writing of the report provided to the NCPDP Foundation. This abridged results paper did not utilize AI.

As of the publication of this abridged report, and to the best knowledge of the NCPDP Foundation, the original report(s) generated by RxLive, Inc. are not available online.

## References

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