**Docket #:** S23-555

# AI-Driven Solution for Automated and Efficient Patient-Provider Message Classification

Stanford researchers have developed an innovative AI-driven solution that leverages the BERT-based AI model to automatically classify patient-provider messages into 12 distinct categories, reducing clinician workload and enhancing workflow efficiency in healthcare settings.

In healthcare communication, there has been a dramatic rise in secure patient-provider messaging, particularly Patient Medical Advice Requests (PMARs), which enables patients to seek medical advice, request medication refills, schedule appointments, and discuss their health concerns directly with their healthcare providers. Currently, there is no effective way of sorting these messages without involving manual examination. Moreover, this surge in PMARs has introduced several challenges like the lack of efficient processing methods and workforce capacity to handle PMARs, leading to clinician burnout and inefficiencies in patient care.

To address these critical challenges, Stanford researchers from Quadrant Health and Stanford's Healthcare Applied Research Team have developed an innovative AI solution using the BERT algorithm to automate categorizing patient-provider messages. BERT is designed to understand the context and semantics of text, making it highly effective at categorizing unstructured and multidimensional messages like PMARs. The model was trained on PMARs from online patient portals to categorize patient-provider messages into 12 distinct classes including medication, scheduling, paperwork, orders, results, data entry, referral, and review level. By automating the classification of PMARs, we eliminate the need for manual review and sorting by clinicians, enhancing workflow efficiency and reducing burnout. In summary, our innovative AI solution addresses the critical problem of managing the surge in PMARs by automating the categorization process, thereby

reducing clinician workload and improving overall efficiency in patient-provider communication.

**Stage of Development:**

Software Prototype. The next steps include EHR integration with EPIC and patient portals.

**Poster Presentation of AI-Driven Solution for Automated and Efficient Patient-Provider Message Classification**

Stanford MEDICINE

Quadrant Health

# *On Completed Research:* Validation of Large Language AI Based Patient Message Classification to Automate Workflows and Reduce Inbox Burden

Timothy Tsai, DO, MMCi, Shreya Shah, MD, Krishna Gorrepati, MS, Julian Genkins, MD, Ryan Han, MS, Alan Safdi, MD, Theadora Sakata, MD, Kevin Tang, BA, Ayush Sangari, MS, Amelia Sattler, MD, Anna Devon-Sand, MPH, Anin Sayana, MS, Margaret Smith, MBA, Steven Lin, MD

## Background

- Adoption of patient portals and asynchronous care have led to a surge in patient message advice requests (PMARs) messages, which in turn have led to increased in-basket management burden and has been identified as one of the drivers contributing to clinician burnout.
- The purpose of our study is to validate a large language AI model and its ability to categorize patient messages to expand PMAR processing capacity, enabling electronic health record (EHR) integrated automations.

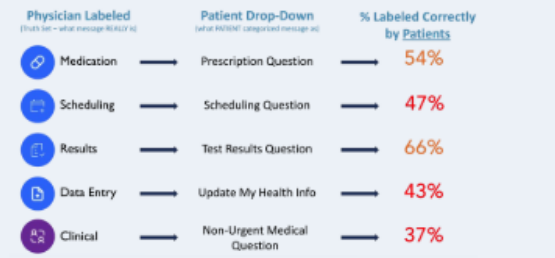
## Methods

- **Design:** Descriptive analysis of message categorization to comp patient generated labels, provider categorization, and AI catego
- **Dataset:** 1419 patient messages between Jan 2018 – July 2020
- **3 types of categorization:**
  - **Patient labeling:** Patient selected drop-down
  - **Provider labeling:** 5 physicians achieved 90% concord 30 PMARs then labeled 1419 messages
  - **AI labeling:** Large Language Model (LLM) with 12 ca

## Results

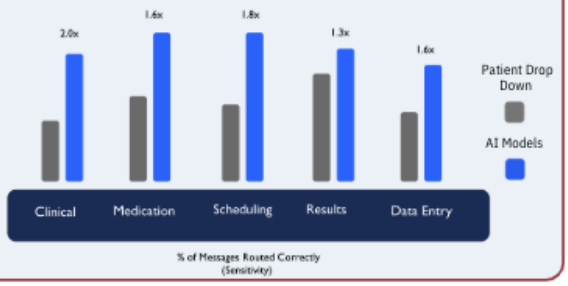
### Physician v Patient Labeled

- Physician labels are better in driving workflows or automation
- Patients are currently unable to label with multiple tasks




### Patient Labeled v AI Categorization

- AI model is more reliable than patient labeled categorization
- Achieves level of correctness required for downstream workflow automation



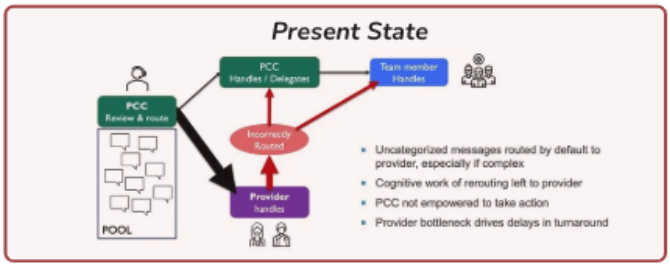

### AI Categorization

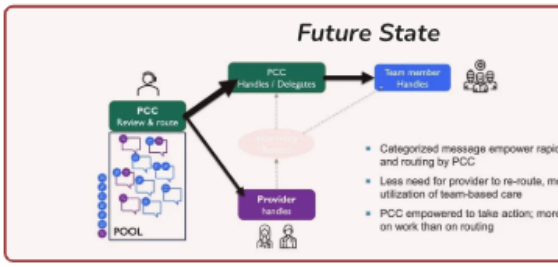
- 12 label classification with averag AUC >0.9
- Tested with average 100 message category

## Key Findings

- Physician labels are better tha patient generated categorizati driving downstream workflow
- AI categorization has the poten augment the process for workfl automation

## Potential impact




# Applications

- First-of-its-kind, comprehensive approach to patient message categorization

- Healthcare providers, hospitals and Electronic Health Record (EHR) system developers

## Advantages

- Integrates with EHR systems, allowing for automated workflows
- Reduction in clinician workload
- Improved workflow efficiency and minimizing delays in patient communication
- High accuracy and efficiency in patient message categorization
- Scalable and adaptable

## Innovators

- Institutional Work

## Licensing Contact


### David Mallin

Licensing Manager, Physical Sciences

Email