



PROJECT TITLE: Leveraging technology to enhance communication in healthcare

PROPOSAL NUMBER: Tech2

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RESEARCH THEME: Analytics & Innovative Technologies

BUDGET: TBD

MULTI-UNIVERSITY PROJECT: NO

PROJECT YEAR: 1

DESCRIPTION:

With continuous advancements in technology, care providers have access to more tools than ever to combat breakdowns in communication with referring physicians and to ultimately play a greater role in improved patient care. Often overwhelmed with heavy workloads, care communication may suffer. For example, radiologists may be hesitant to assume additional responsibilities related to conveying test results and ensuring proper follow-up with patients. Certain symptoms discovered during surgical procedures by surgeons may be conveyed ineffectively to intensivists and bed-side teams. Yet those activities can play an important role in not only carefully interpreting images or making recommendations but also acting as a safe, patient-centered back-up system and ensuring that actionable results are not overlooked. In a similar manner, non-English speaking patients may require enhanced care coordination plan to ensure that they understand the discharged and home care process.

HOW THIS IS DIFFERENT THAN RELATED RESEARCH:

This study is the first study which utilizes machine learning, text mining, and deep learning techniques to hospital discharge notes to build an accurate automatic translation system which will facilitate discharge and home care process design, particularly for non-English speaking patients. In addition, it incorporates system design and human-device interaction technologies to offer real-time decision support providers.

EXPERIMENTAL PLAN:

We will first conduct literature review on existing machine translation systems and explore gaps in discharge and home care process. Various sites with lack of medical translation experts will be identified and their needs will be assessed. Machine learning and natural language processing techniques will be applied to build automatic translation systems using discharge notes. We will use the BLEU algorithm to evaluate the translation quality and further refine the system. In addition, we will design chatbox and virtual messaging to enhance family engagement and facilitate knowledge dissemination across sites.

EXPECTED MILESTONES:

- 1) Systematic literature review of a) existing machine translation algorithms and accuracies, b) indicators of lack of medical translation experts and where the most needs for them are.
- 2) Develop a machine learning / natural language processing framework using hospital discharge notes that can automatically and accurately translate clinical documents to foreign languages.
- 3) Evaluation and refinement of the translation system
- 4) Design and implementation of chatbox and virtual messaging systems

BENEFITS TO INDUSTRY:

- Enhanced care coordination plan
- Reduced workforce requirements for translation experts
- Improved discharged and home care process
- Enhanced family engagement
- Improved patient compliance and treatment outcome
- Reduced staff time and cost for treatment

EXPECTED DELIVERABLES:

- Aim 1: Improve communication, compliance and quality of care through automated machine translation. Initial focus will be the discharge procedure
- Aim 2: Design chatbox and virtual messaging to enhance family engagement, knowledge dissemination (e.g., feeding plan, compliance and awareness of hospital acquired infection, child health).