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Title

Frailty Prediction Using Doctor's Communications in Primary Care System: eConsult

Priority 1 (Research Category)

Healthcare informatics

Presenters

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Abstract

Context

The eConsult service is an online system that primary care practitioners (PCP) submit questions concerning their patients' care to specialists and receive a response within one week. Responses can include suggestions for treatment, recommendations for referral, or requests for additional information.

Objective

The objective is to examine the use of natural language processing (NLP) in automatic identification of frailty in patient cases and explore semantic characteristics of such cases that distinguished them from non-frailty cases to help refine and inform the definition of frailty and provide its reusable knowledge.

Study Design

We conducted a machine learning (ML) experimentation using NLP to assess frailty in a dataset of cases submitted through eConsult Service. We used text data prepared and vetted by the experts, as training material to achieve accurate prediction of "frail" cases automatically.

Setting or Dataset

In this study, we selected contrasting samples from eConsult cases submitted in the Champlain health region between 2018 and 2019 and filtered them by patient's age 65 and the use of term frail or frailty in their case description. Non-frailty cases were selected among younger patients below 65 years old in whom PCP did not refer to as frail.

Population Studied

PCPs can keep communicating with the specialist until they are satisfied with the answers to close the case. The population is an unbiased random sample of PCP communications, that were then labeled.

Outcome Measures

We used 10-fold cross-validation to measure precision, recall, F1 and accuracy to evaluate the results.

Results

Using text from electronic conversations between primary care providers and specialists we developed a champion algorithm (Random Forest with Bag-of-Words as data representation) that predicted frailty cases with an accuracy of 94% (+/- 0.12). This study also provided evidence of semantic characteristics that were specific to frail cases. Among several frail cases, the most frequent topic-terms were related to medications: daily dose, recommended medication and best treatment.

Conclusion

It was possible to automatically identify Frailty cases in eConsult system with high accuracies using NLP. Noteworthy is that no other patient data were required. The predictions can inform and assist practitioners recognize frailty in patient cases and as a result, provide organized and reusable knowledge to enhance the quality of service for frail patients.