

# The Utilization of Natural Language Processing in Predicting Emergency Department Overcrowding: A Literature Review

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## Background

- Emergency Department (ED) over-utilization and crowding hinders patient care and is associated with increased morbidity and mortality<sup>3,5</sup>
- Traditional forecasting of ED length of stay and discharge disposition is based upon provider experience and existing practices
- Natural language processing (NLP) methods are highly promising in optimizing care practices to reduce burden in the ED<sup>1,2,3,4,5,6</sup>

## Purpose

To explore the existing utilization of NLP methods to address overcrowding in the ED



<http://www.emdocs.net/edcrowding/>

## Methodology

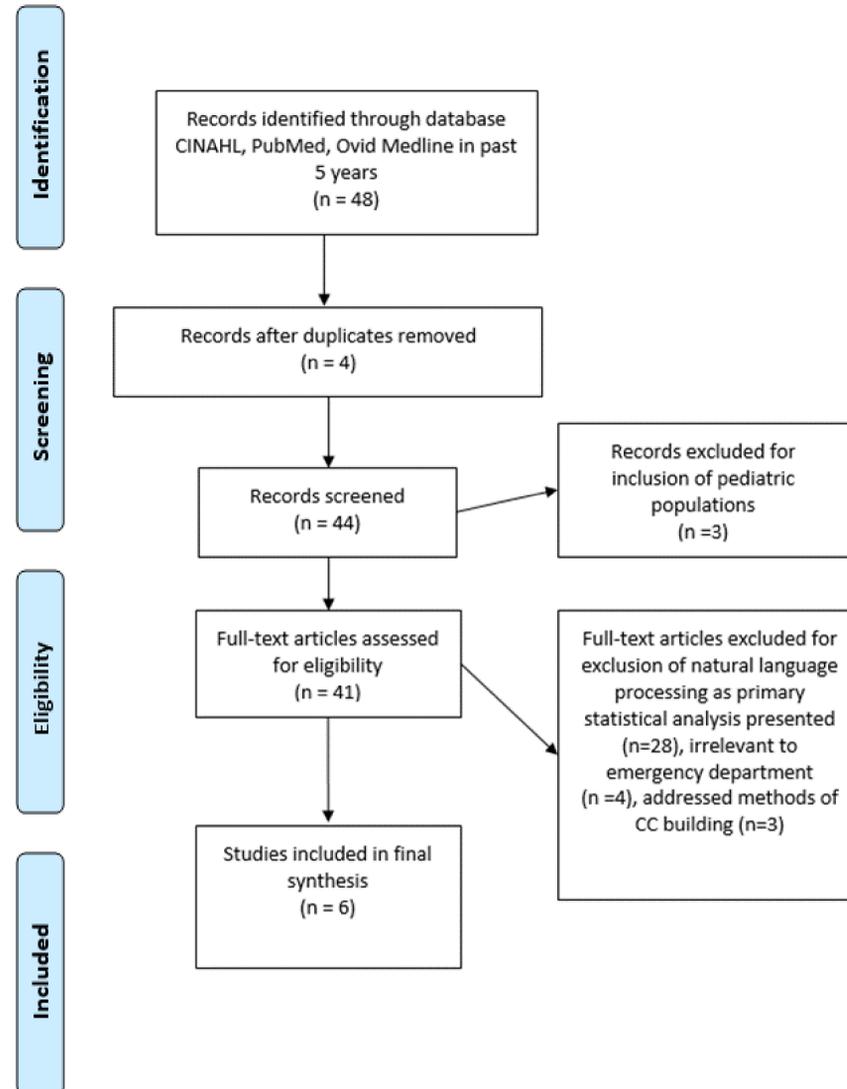


Figure 1. PRISMA Flow Diagram for article selection and synthesis

## Implications for Research and Practice

- Free text data in the electronic medical record is just as, if not more valuable, than traditional clinical predictors of outcomes in the ED
- Further research is needed to determine optimal model run timing and what set of free text clinical documentation contribute most in prediction of ED outcome.
- Utilizing NLP in the ED has the potential to streamline clinical practice: reducing burden on both patient and providers alike

## Conclusion

- Number of arrivals, patient waiting times, and inaccurate resource planning contribute to overcrowding in the ED
- Current interventions including triage rank tools and traditional regression models have failed to mitigate this issue
- NLP can be integrated in ED clinical decision-making to decrease overcrowding by focusing on mitigating the risk for its contributing factors

## Results

### Superiority of NLP Techniques



- NLP may be able to better identify predictors of ED patient outcomes which helps facilitate decision making in the ED<sup>1,2,3,4,5,6</sup>

### Variation in Methodologies



- Utilization of free text + structured data in analysis<sup>2,3,6</sup>
- Free text only included in analysis<sup>1,4,5</sup>
- Model run timing variation (e.g., on arrival, intervals after arrival, post-discharge)

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