

Identifying Patient Satisfaction from Electronic Health Record Data - A Retrospective Register Study

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Abstract. The aim of this study was to review the potential of electronic health record (EHR) data to automatically identify key concepts related to patient satisfaction in cardiac care. A randomised sample of EHR data from 500 cardiac patients were screened for feature extraction, identifying 187 terms describing patient satisfaction. The predictive positive value (PPV) for positive descriptions was high, indicating the value of EHRs and narrative documentation when developing tools to measure patient satisfaction. The high number of false positives resulting from the automated screening and the low PPVs for negative descriptions call for more sophisticated methods to identify not only the used terms, but also their context to increase the reliability of future tools aimed at automated monitoring of patient satisfaction.

Keywords. Patient satisfaction, electronic health records

1. Introduction and Methods

Patient satisfaction is an important indicator of the quality of nursing and medical care, guiding the provision of effective health care services [1]. Even the most cost-effective measurement methods require time and resources, calling for automated and resource effective ways to measure patient satisfaction. The aim of this study was to explore the potential of using EHR data as a source to automatically identify key concepts related to patient satisfaction.

A retrospective observational study was conducted using a randomised sample of pseudonymised EHR data from 500 cardiac patients treated at a university hospital in one well-being county in Finland in 2022. A list of positive and negative terms describing patient satisfaction was assembled in a previous manual EHR annotation study [1]. A custom Python script screened through the EHR data set, and the produced list of matches

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was manually screened and verified by two domain experts. The results were quantified, and predictive positive values (PPV) were calculated, with values over 0.80 considered favourable. The study obtained a statement by the Ethics Committee of the Human Sciences, Health Care Division at the University of Turku, (9/2020, J. Kuha) and an administrative approval from the wellbeing services county (T95/2020-1).

2. Results

A total of 320 matches were found by the algorithm-based screening. The manual screening of the results verified 187 matches and identified 133 false positives. All matches originated from narrative entries. The overall PPV of the verified matches was 0.58, with a PPV for positive 0.86 and 0.32 for negative descriptions of patient satisfaction. The verified matches were predominantly positive descriptions of patient satisfaction (n=134, 71.7%), including variations of “*satisfied*”, “*glad*”, “*thankful*”, and “*pleased*”. 94 (70.7%) of the false positives were related to different inflections of the term “*irritation*”.

3. Discussion

EHR data contains valuable information regarding patient satisfaction. The high PPV for positive descriptions indicates high potential of using narrative data in capturing different aspects of patient centred care. However, PPV for negative descriptions was low, calling for more research to accurately capture different aspects of patient satisfaction from the EHR data, but also on developing EHR systems to better incorporate the patient perspective. More research complemented with more nuanced methods are needed to capture also indirect information related to the phenomenon. Study limitations include the small data set gathered from a single university hospital in Finland, the nature and primary use of EHR data and the simplicity of the automated screening method.

4. Conclusions

Narrative EHR data entries are a prominent source to identify terms related to patient satisfaction and emotional state of the patient. Current documentation practices could be enhanced to provide a more holistic view of patient care, complemented with methods to include the patient perspective. Future research should explore using more advanced natural language processing methods. Information systems utilising real-time EHR data could be used to provide fast responses to emerging patient needs and to enhance the monitoring of patient satisfaction to improve the overall quality of care.

References

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