Heterogeneity and Intensity of Documentation of Lifestyle Counseling and Glycemic Control in Patients with Diabetes

Naoshi Hosomura DDS\(^1\), Savell I Goldberg PhD\(^2\), Maria Shubina ScD\(^3\), Alexander Turchin MD MS\(^{3,4,5}\)

\(^1\)Harvard School of Dental Medicine, \(^2\)Massachusetts General Hospital, \(^3\)Brigham and Women’s Hospital,
\(^4\)Harvard Medical School, \(^5\)Harvard Clinical Research Institute, Boston, MA

Introduction

- Most studies on Electronic Medical Record (EMR) use and quality of care have focused on structured EMR documentation.
- Very little is known about how characteristics of narrative EMR documentation reflect the quality of care delivered to the patient.
- We evaluated the relationship between quantitative characteristics of narrative EMR documentation of lifestyle counseling and blood glucose control in patients with diabetes.

Materials & Methods

- Design: Retrospective cohort study of 10,870 adult patients with diabetes followed for at least 2 years at primary care practices affiliated with two academic medical centers between 2000 and 2010.
- Previously validated natural language processing (NLP) system was used to abstract sentences documenting lifestyle counseling from narrative provider notes.
- We developed metrics of narrative EMR documentation: 1. Documentation heterogeneity, 2. Documentation intensity.
- Unit of analysis: Documentation heterogeneity
- We evaluated the relationship between quantitative characteristics of narrative EMR documentation of care delivered to the patient.
- EMR documentation.
- Most studies on Electronic Medical Record (EMR) use and quality of care have focused on structured indicators of quality of diabetes care.
- Heterogeneity and intensity of documentation of lifestyle counseling in narrative provider notes may be used as associated with faster achievement of A1c control.

Results

- 13,954 hyperglycemic periods were included in the analysis.
- The NLP software identified 183,611 sentences from 92,671 provider notes.
- Kaplan-Meier curves were plotted for tertiles by documentation heterogeneity and intensity. \(P < 0.001\) by log-rank test for all. \(^*\)Normalized Levenshtein distance. \#Number of characters per note

Effects of documentation characteristics on time to A1c control

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hazard ratio</th>
<th>(P) value ((\chi^2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation heterogeneity*</td>
<td>1.698</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Documentation intensity (100 characters/note)</td>
<td>1.698</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

Multivariable analysis adjusted for patient and treatment characteristics. \(^*\)Normalized Levenshtein distance.

Conclusions

- Both higher documentation heterogeneity and higher documentation intensity of lifestyle counseling are associated with faster achievement of A1c control.
- Heterogeneity and intensity of documentation of lifestyle counseling in narrative provider notes may be used as indicators of quality of diabetes care.

Acknowledgements and literature cited

- We would like to thank Dr. Anna Rumsziski, Dr. Steven Simon, Dr. Thomas Sequist, and Dr. Kenneth Mandl for their helpful feedback on this study.