Title: Sentiment analysis of patient interviews correlates with SRS-22 and SF36 scores in adult spinal deformity: a pilot study of 25 patients

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Summary: Health-related quality of life (HRQOL) metrics are important for quantifying disability and trending health-status over time. Tele-health provides unique opportunities to assess disability through natural language processing (NLP). We present a pilot study demonstrating the feasibility of sentiment analysis acquired through standard preoperative tele-health evaluation.

Hypothesis: Sentiment analysis of patient interviews correlates with HRQOL

Study design: Prospective, single center cohort

Introduction: NLP allows for conversion of unstructured data, such as text transcribed from patient interviews, into a structured form. Sentiment analysis builds upon this technique by assigning a quantitative value ranging from negative to positive. Classic HRQOL metrics are cumbersome, time intensive, and carry biases based on the subject's native language, educational level, and cultural values. The growth of tele-health has provided opportunities to develop and administer novel HRQOL instruments.

Methods: Adult deformity patients were prospectively enrolled preoperatively and administered a survey of 7 questions related to their spinal condition and quality of life during tele-health visits. Audio transcriptions were converted to text and scored using seven different sentiment lexicons (AFINN, Bing, QDAP, General Inquirer, Loughran - McDonald, and Henry). Scores across lexicons were normalized to a -1 (negative) to +1 (positive) range and overall sentiment represented by the median score. Cohen effect size was determined by computing the Pearson correlation coefficient between sentiment and HRQOL score. Conventional HRQOL metrics (ODI, SF36, SRS-22) were collected.

Results: Twenty-five patients were enrolled. Mean age was 65 years with 19 women. Responses to two questions - "What are your fears regarding treatment?" and "How does your condition affect your ability to enjoy life?" – demonstrated a moderate Cohen effect size between sentiment and HRQOL. Patient sentiment related to fears regarding treatment had a negative Pearson correlation with SRS-22 (-0.30) and SF36 (-0.39). Responses related to patients' ability to enjoy life also had a negative Pearson correlation with SRS-22 (-0.61) and SF36 (-0.47).

Conclusion: Sentiment analysis from patient responses regarding fear of treatment and ability to enjoy life showed a negative correlation with SRS-22 and SF36 scores. Evolution of this technology may allow for automated assessments of HRQOL during routine preoperative tele-health visits.

Take home message: Sentiment analysis can be performed on standard preoperative evaluations via tele-health. Responses to select questions demonstrate correlations with validated HRQOL metrics.