

Use of the Updated Google Translate Algorithm for Spanish and Chinese Discharge Instructions

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Importance: The health disparities experienced by limited English proficient (LEP) patients are well-documented. Despite the benefits of written instructions on communication, clinicians have few resources to provide free-texted written instructions to LEP patients. Google Translate is a tool commonly used for this purpose. Since a 2017 change in its translation algorithm, no previous study has assessed Google Translate's accuracy for medical purposes.

Objective: To determine the accuracy and potential harm of Google Translate for emergency department discharge instructions.

Methods: Discharge instructions for 100 adult patients at two urban emergency departments, oversampled for common chief complaints, were translated using Google Translate and back-translated by bilingual translators. The primary outcome was accuracy of translations. The secondary outcome was potential harm associated with inaccurate translations. Two clinician review adjudicated both outcomes. Logistic regression analyses were used to determine instruction characteristics (sentence type, Flesh-Kincaid readability score, use of medical jargon, and four subtypes of non-standard English) associated with inaccurate translations and potential for significant harm.

Results: The 100 instructions contained 647 sentences, of which 42% contained medical jargon. Overall, 92% of Spanish and 81% of Chinese translations were accurate; potential for significant clinical harm was identified in 2% and 8% of translations, respectively. In multivariable logistic regression analyses, only spelling/grammar anomalies were associated with inaccurate translations: (Spanish - odds ratio [OR] 2.6, 95% confidence interval [CI] 1.1-5.8, $p=0.025$; Chinese - OR 2.6, 95% CI 1.3-5.0, $p=0.005$). Potentially significant harm was identified in Spanish translations if instructions had a readability score $> 8^{\text{th}}$ grade (OR 4.0, 95% CI 1.2-13.5, $p=0.026$) or sentences were follow-up instructions (OR 3.5, 95% CI 1.2-10.2, $p=0.021$). Potentially significant harm was identified in Chinese translations of sentences with medical terminology (OR 2.4, 95% CI 1.2-4.9, $p=0.012$), spelling/grammar anomalies (OR 3.1, 95% CI 1.4-7.2, $p=0.006$), or colloquial English (OR 5.9, 95% CI 1.4-24.7, $p=0.015$).

Conclusions: The updated Google Translate can accurately convey the majority of free-texted, written emergency department discharge instructions into Spanish and Chinese, but there is possibility of significant error, particularly in Chinese. Clinicians using Google Translate should adhere to clear communication guidelines to minimize translation errors.

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