

Improving Patient Education Materials for Total Hip & Knee Arthroplasty Patients

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INTRODUCTION: Orthopaedic PEMs related to total hip and total knee arthroplasty have repeatedly been shown to not meet AMA recommendations for readability. PEMs that are written with too much complexity limit the ability of some readers to comprehend the material. These complex PEMs also limit the health literacy of patients, one of the key determinants in overall health status and health outcomes. The purpose of this study is to improve the readability of total hip and total knee arthroplasty-related PEMs by limiting the use of sentences with > 15 words and limiting the use of words with > 3 syllables.

METHODS: The readability of all 26 PEMs in this study was assessed before and after editing by finding Flesch-Kincaid Grade Level, Coleman-Liau Index, SMOG Index, total number of words, average words per sentence, and percent of words with 3+ syllables using the free Automatic Readability Checker available online. Editing of articles included limiting the use of sentences with > 15 words and limiting the use of words with > 3 syllables while preserving PEM content. Paired-sample t-tests were used to evaluate for statistically significant differences between original PEMs and edited PEMs. The cut-off for statistical significance was set at $p < 0.05$. Additionally, the percentage of PEMs at or below sixth-grade reading level and the mean reading level for original and edited PEMs were calculated.

RESULTS SECTION: A total of 26 PEMs were available for use in this study after the application of inclusion and exclusion criteria. The percentage of original PEMs at or below the sixth-grade reading level was 0% (0 out of 26), while the percentage of edited PEMs at or below the sixth-grade reading level was 50% (13 out of 26). The mean Flesch-Kincaid Grade Level for original articles was 10.8 ± 1.9 compared to 6.7 ± 1.3 for edited articles ($p = 2.3 \times 10^{-14}$). The mean Coleman-Liau Index for original articles was 11.5 ± 1.6 compared to 10.1 ± 2.5 for edited articles ($p = 0.002$). The mean SMOG Index for original articles was 10.4 ± 1.5 compared to 6.7 ± 1.2 for edited articles ($p = 2.5 \times 10^{-14}$). The mean total number of words for original articles was $1,680 \pm 726$ compared to $1,563 \pm 735$ for edited articles ($p = 5.1 \times 10^{-5}$). The mean number of words per sentence for original articles was 17.9 ± 2.1 compared to 12.2 ± 1 for edited articles ($p = 2.7 \times 10^{-14}$). The mean percent of words with 3+ syllables for original articles was $18\% \pm 4\%$ compared to $10.7\% \pm 4\%$ for edited articles ($p = 4.5 \times 10^{-11}$).

DISCUSSION: The results of this study suggest that we are able to accept our hypothesis that applying this formula will significantly improve the readability of PEMs as assessed by the Flesch-Kincaid Grade Level, Coleman-Liau Index, and SMOG Index. All 26 original articles (100%) were above the AMA-recommended sixth-grade reading level cut-off that was put in place to improve patient comprehension and health literacy. After applying this formula which involves reducing sentence length to < 15 words whenever possible and limiting the use of words with > 2 syllables, 13 of the 26 articles (50%) met AMA recommendations. There were significant improvements in all three readability formulas investigated, including Flesch-Kincaid Grade Level, Coleman-Liau Index, and SMOG Index. Further, there were significant reductions in all article statistics investigated, including total number of words, average words per sentence, and percent of words with 3+ syllables. There are several potential limitations to this study. First, PEMs used in this study were only taken from a single source. This was done to ensure that the writing style was consistent among articles. However, it does open the possibility that using other sources of PEMs may have resulted in different findings. With that said, OrthoInfo is a highly reputable source and one of the most prominent sources of PEMs for orthopaedic patients. Second, objective readability formulas were the primary outcome measure of this study. While they objectively measure readability, these formulas may not accurately measure the comprehensibility of the articles in this study. The primary goal of this research is to increase patient comprehension and health literacy, so future studies will aim to subjectively measure patient comprehension of original and edited articles. Third, there were variable changes made based on the editor of each article. While this variability exists, editors were careful to follow the same instructions and use similar strategies when editing. Further, editors were only given one chance to go through each article in an effort to limit compounded changes and to ensure that key content wasn't removed from PEMs.

SIGNIFICANCE/CLINICAL RELEVANCE: Using this standardized method of reducing sentence length to < 15 words and limiting the use of words with > 2 syllables, while preserving key content, significantly improved the readability of PEMs related to THA and TKA. Improving the readability of PEMs to meet recommendations is a simple and highly important goal for maximizing patient comprehension, and potentially improving total hip and total knee arthroplasty outcomes.