INTRODUCTION

Patient education is an important component of modern health care. Pew research reports 80% of people using the internet have looked online for health-related information. Though extensive resources are available for health information, most health resources available are written in a language that is too complex to be understood clearly by an average person.2,3 Several tests are available to assess the complexity of patient education materials (PEMs) of which readability is the most common. However, it is widely acknowledged readability formulas do not assess whether or not a written material is understandable to the target audience.4

Due to the limitations of available readability tests, the Patient Education Materials Assessment Tool (PEMAT) was recently developed by the Agency for Healthcare Research and Quality (AHRQ) to assess the understandability of a text.5 Zenker’s Diverticulum (ZD) is a debilitating condition commonly encountered in Otolaryngology-Head and Neck surgery practice. Currently, there are several surgical treatment options available for ZD. Therefore the quality of PEMs regarding surgical options, outcomes, and complications is immensely important.

The objective of this study was to evaluate the quality of online PEMs on ZD using both readability tests and the PEMAT and to analyze the association between readability and understandability. Our primary hypothesis was that the reading levels of online PEMs on ZD would be significantly higher than the guidelines established by AMA and NIH. We also hypothesized that materials with low readability grade levels would be more understandable than ones with higher readability grade levels. The relationship between the readability and understandability of articles on Zenker’s Diverticulum (ZD) was analyzed by comparing their readability grade level and PEMAT scores.

MATERIALS AND METHODS

PEMs Selection

Internet-based PEMs on ZD were identified from an online search in February 2015. The first 50 search results were collected.

Readability analysis

The readability score each article was determined using the Flesch-Kincaid Reading Ease (FRE), Flesch-Kincaid Grade level (FKGL), Gunning-Fog Score (GFS), Coleman-Liau Index (CLI), SMOG index and Automated Readability Index (ARI), and an online readability calculator accessible at http://readability-score.com. The final reading grade level for each article was the average of the readability scores derived from each of the six readability formulas.

PEMAT analysis

Four individuals of different medical education backgrounds subsequently reviewed each article and used the 17-item PEMAT to evaluate the understandability of the PEMs. The scores for each article were averaged and used as the final understandability score.

Statistical analysis

Data were analyzed using statistical software available through Microsoft Excel 2011 (Microsoft Corporation, Redmond, WA). Using Fleiss Kappa statistic, an inter-rater reliability analysis was performed to determine consistency among raters. The correlation between reading grade level and PEMAT understandability scores was calculated using Microsoft Excel 2011, (Redmond, WA) and analyzed.

RESULTS

Twenty-one articles had content relevant for patients and were analyzed.

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<thead>
<tr>
<th>Readability formula</th>
<th>Average Score</th>
<th>Interpretation</th>
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<tbody>
<tr>
<td>FRE</td>
<td>38.74</td>
<td>Difficult</td>
</tr>
<tr>
<td>FKGL</td>
<td>11.06</td>
<td>Grade 11</td>
</tr>
<tr>
<td>GFS</td>
<td>13.48</td>
<td>Grade 14</td>
</tr>
<tr>
<td>CLI</td>
<td>15.07</td>
<td>Grade 15</td>
</tr>
<tr>
<td>SMOG</td>
<td>9.68</td>
<td>Grade 10</td>
</tr>
<tr>
<td>ARI</td>
<td>9.74</td>
<td>Grade 10</td>
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<table>
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<tr>
<th>Average Readability Grade level</th>
<th>Grade level</th>
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<tbody>
<tr>
<td></td>
<td>Grade 12</td>
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Table 1: Average Readability Grade Levels

The mean readability score was grade 12 with a range from 10th to 15th grade (SD=1.76).

There is a paucity of easily readable and understandable online materials on ZD. There was not a significant relationship between an article’s understandability and readability. The correlation between reading grade levels and PEMAT scores was 0.64 (95% CI=0.4925 to 0.7966) suggesting moderate agreement between the four raters.

CONCLUSION

Internet-based patient education materials (PEMs) on Zenker’s Diverticulum are written at a much higher grade level than the recommended sixth-grade level. There was a weak negative relationship between an article’s readability and understandability demonstrating materials written at a lower reading level were not significantly more understandable. Thus, authors should not rely on reading grade levels alone to determine if materials are appropriate for patient education. Any one test by itself is not sufficient to evaluate an educational material directed to patients. The use of the PEMAT along with traditional readability tests will help in evaluating articles more thoroughly and help in constructing more comprehensible literature. There is a need for more understandable PEMs on ZD.

DISCUSSION

Zenker’s Diverticulum (ZD) is an uncommon but debilitating condition with significant social and psychological impacts on the patient. Even before their first visit to a physician, patients frequently peruse the Internet to understand this condition and learn about various treatment options. This study examined the readability and understandability of online PEMs on ZD using both readability tests and the PEMAT.

Readability is calculated from formulas, primarily based on length of words and sentences and numbers of words per sentence.6 Conversely, PEMAT scores are determined by reading and evaluating materials using a 17-item checklist and are based on layout, content, length of the material and presence or absence of visual aids.

There were important findings from this study. First, the patient education materials examined were well above the sixth grade reading level recommended by the AMA and NIH.7,8 This finding is consistent with existing literature.9 One notable reason for this may be because medical jargon often consists of multi-syllabic words (e.g. Zenker’s Diverticulum), which will raise the readability grade level. Second, an article with low reading grade level was not necessarily more understandable. This is highlighted in Figure 3 where five articles with readability grade level of 11 had PEMAT scores ranging from 30 to 75%. Therefore, for PEMs to be more understandable, one should not rely solely on the “grade level” of the document.

PEMAT is a useful tool for authors creating PEMs since it provides a framework to make materials easier for the reader. For example, it suggests that articles should have an introduction, which clearly describes the material’s intent, as well as a summary at the end; use of active voice to convey content in a direct, clear and concise manner; using common, everyday terms in place of complicated ones; and consistently defining medical terms when they are used. The tool also emphasizes the use of illustrations that reinforce the information without distracting the reader from the main purpose of the article.

An ideal situation would be to test the written material on actual patients and obtain their feedback, as they can best judge an article’s ease of reading and understanding. There is certainly a need for more readable and understandable patient education materials especially for diseases like VCP with its complex anatomy, etiologies and treatment options.

REFERENCES