Poor Readability of Written Asthma Management Plans Found in National Guidelines

Shalini G. Forbis, MD*, and C. Andrew Aligne, MD, MPH‡

ABSTRACT. Objective. Written asthma management plans (WAMPs) for patients constitute a key component of current national asthma guidelines, but it is not known whether these plans meet the readability standards (of fifth-grade level or lower) recommended by health education experts. The objective of this study was to assess whether WAMPs presented in national guidelines are written at or below a fifth-grade reading level.

Methods. We used readability software to analyze 10 WAMPs. These included 7 from the national guidelines, 1 from the World Health Organization, and 2 local ones.

Results. The grade levels for the WAMPs ranged from 4.9 to 9.2. None of the national plans achieved a grade level equal to or below the fifth grade. However, the other plans had grade levels of 4.9, 5.7, and 5.9. The mean grade level for the national plans was 8.1, whereas the mean for the other 3 plans was 5.5. The difference between these 2 sets of WAMPs was significant.

Conclusion. WAMPs presented as part of the national guidelines are not written at or below a fifth-grade reading level. However, it is clear from this study that it is possible to achieve this level of readability. Increasing the availability and use of plans that meet recognized readability standards may help to improve asthma outcomes, especially in poor populations in which there is both low literacy and the greatest prevalence and severity of asthma.


ABBREVIATIONS. WAMP, written asthma management plan; NAEPP, National Asthma Education and Prevention Program; GINA, Global Initiative for Asthma; CI, confidence interval; ED, emergency department.

Asthma continues to be a significant problem for American children. In the past several years, the prevalence of this disease has been increasing, despite the development of new medications for asthma therapy and the creation of national asthma guidelines. These guidelines are designed to improve the diagnosis and management of this disease. One important component of the guidelines is the recommendation that health care providers give each patient a written asthma management plan (WAMP). However, in the United States, there has been poor compliance with the asthma guidelines in general and with this recommendation in particular. In other countries, WAMPs have been shown to improve asthma outcomes by increasing adherence with both day-to-day long-term care and with management of acute asthma exacerbations at home by patients. One characteristic of the WAMPs used abroad is that they are simpler to read than those featured in the US guidelines. Low readability of WAMPs may constitute an important barrier to overall implementation of the US asthma guidelines, because if the WAMP is not written at a reading level that would ensure comprehension by parents, then it will not be effective, and neither patients nor providers will be interested in using it.

Attention to readability of patient education materials is important because of the extent of illiteracy in the United States. The National Adult Literacy Survey (published in 1993) found that 21% to 25% of American adults (16 years and older) were functionally illiterate (roughly correlates with reading level of third grade or less) and another 25% to 28% were only marginally literate (at or below fifth-grade level). People at the lowest levels of literacy were also more likely to be living in poverty (43% in poverty vs 4% at the highest levels of literacy). Moreover, the prevalence and severity of asthma among those of low socioeconomic status are higher than those of the general population. Because the families that are at highest risk for asthma are also those that are at highest risk for low literacy, it is very important that WAMPs be designed for easy readability. Health literacy experts recommend that health education materials be written at or below a fifth-grade reading level. This study assessed whether several WAMPs, including those presented in the US national asthma guidelines, are written at or below a fifth-grade reading level.

METHODS

We evaluated the readability of 10 WAMPs. Five of the plans included were presented as a part of the National Asthma Education and Prevention Program Expert (NAEPP) Panel Report 2 1997 Asthma guidelines; 2 were from the 2000 Pediatric Asthma Guidelines (AAAAI 2000) produced cooperatively by NAEPP, the National Heart Lung and Blood Institute, the American Academy of Pediatrics, and the American Academy of Allergy, Asthma and Immunology; 1 plan was presented as part of the guidelines from the World Health Organization’s Global Initiative for Asthma (GINA), which was written in cooperation with National Heart Lung and Blood Institute; and the remaining 2 were developed by health care practitioners in Rochester, New York, and are currently being used in clinical practice. Readability formulas were used to analyze written documents.
POOR READABILITY OF ASTHMA MANAGEMENT PLANS

For the level of reading comprehension, which is expressed as grade level needed to read a document. Readability Calculations (Micro Power & Light Co, Dallas, TX), a computer program, is able to evaluate documents using 9 different readability formulas. Of these 9, we chose 6 as being most appropriate: Flesch grade level, Dale-Chall, Powers-Summer-Kearl, FOG, SMOG, and FORCAST formulas. The 6 readability assessment methods chosen complement each other well. The Dale-Chall is designed to assess upper elementary and secondary level materials. The Powers-Summer-Kearl is used to assess materials for primary grades. Formulas used for primary grades are unable to analyze a document as having a grade level above the seventh grade, which may have an end result of giving an artificially low grade level for a complex document while giving an accurate estimate for documents written at lower grade levels. The SMOG formula predicts the grade level on the basis of a requirement of 100% comprehension in contrast to the Flesch, which uses a requirement of 50% comprehension. We also chose to use the FORCAST formula as it is designed for documents that are not in prose form. For each WAMP, we then calculated the average grade level, as this would result in a grade level that took into account the strengths and weaknesses of each of the above formulas and arrived at an overall grade level that was a better representation of the individual WAMP’s readability. Formulas that are used to analyze materials for primary grades tend to deflate scores, whereas those intended for use with upper grade level materials tend to inflate scores. By using average scores, the composite is less likely to be a deflated/inflated score. These grade levels were then compared with health education standards of readability.

The data were then analyzed using the StataQuest 4 (Stata Corp, College Station, TX) statistical package for mean, standard deviation, 95% confidence interval (CI), and the Kruskal-Wallis test (nonparametric test for equality of populations). These were used to compare the 7 plans from national guidelines with the other 3.

RESULTS

The mean grade levels obtained for the 10 WAMPs ranged from 4.9 to 9.2. The highest average grade level (lowest readability) was observed for 1 of the plans presented as part of the NAEP guidelines (with similar results being achieved by the plan from the AAAAI 2000 pediatric guidelines and 2 other plans from NAEP). The lowest grade level (highest readability) was achieved by 1 of the locally designed plans and was closely followed by the GINA plan and the other locally designed plan. The mean grade level for these 3 plans was 5.5 (95% CI, 4.5–6.5), with average grade levels of 5.7, 5.9, and 4.9.

These results clearly showed a demarcation between the national plans and the other 3 studied that was statistically significant (P = .0003). The mean grade level for the 7 WAMPs in US guidelines was 8.1 (95% CI, 7.4–8.7) with average grade levels for individual plans ranging from 7.0 to 9.2. None of the national plans was written at or below the fifth-grade level. The plan in the NAEP 1997 guidelines specified for adults, adolescents, and children older than 5 years analyzed at a grade level of 7.5. The national plan that came closest to meeting the standard of fifth grade was from the Pediatric Asthma Guidelines and had a reading comprehension level of 7.0.

In addition to the overall reading grade level, Table 1 provides more detailed information on readability statistics of the 10 WAMPs studied. This includes the length of the document (number of words), percentage of monosyllabic and polysyllabic words (with 3 or more syllables), and percentage of difficult words as recognized using the FOG readability formula. Comparing these characteristics of WAMPs illustrates that making a document shorter does not necessarily ensure greater readability (lower grade level) if the proportion of “difficult words” remains high. For example, the shortest document is NAEP 5 with only 124 words. However, the grade level for this document is 9.2. Although it is shorter than Local 2 (grade level 4.9), 21% of the words are polysyllabic, whereas Local 2 has only 7% and therefore is more readable.

DISCUSSION

We found that WAMPs presented in the US national guidelines are written at grade levels between 7.0 and 9.2. However, it is possible for plans to be written at a level consistent with health literacy recommendations for a readability level of fifth grade. This was demonstrated by the international plan (GINA) and 2 local plans analyzed in this study.

This study had the strength of assessing all of the WAMPs presented in the national guidelines. Also, we used multiple standard readability formulas to arrive at an average grade level for each document. We believed that this would more accurately reflect the level of reading comprehension required to read the document because the biases of individual formulas would be balanced when the average grade level was derived. In addition to readability, which is the key characteristic to evaluate when assessing the usefulness of patient education materials, there are other components of a document, such as layout (use of color, visual cues, etc), use of active voice, common words, and short sentences, that influence comprehension. Although there are no standardized formulas to analyze these other components, health literacy experts do have many recommendations for

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**TABLE 1. Readability Statistics of the 10 WAMPs Studied**

<table>
<thead>
<tr>
<th>Action Plan</th>
<th>Number of Words</th>
<th>% Monosyllabic Words</th>
<th>% Words With 3+ Syllables</th>
<th>% Difficult Words (FOG)</th>
<th>Average Grade Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAEP 1</td>
<td>311</td>
<td>65</td>
<td>16</td>
<td>15</td>
<td>8.1</td>
</tr>
<tr>
<td>NAEP 3</td>
<td>279</td>
<td>55</td>
<td>13</td>
<td>13</td>
<td>8.2</td>
</tr>
<tr>
<td>NAEP 4</td>
<td>155</td>
<td>67</td>
<td>16</td>
<td>15</td>
<td>7.8</td>
</tr>
<tr>
<td>NAEP 5</td>
<td>124</td>
<td>56</td>
<td>21</td>
<td>19</td>
<td>9.2</td>
</tr>
<tr>
<td>NAEP 6</td>
<td>338</td>
<td>64</td>
<td>12</td>
<td>12</td>
<td>7.5</td>
</tr>
<tr>
<td>AAAI 1</td>
<td>257</td>
<td>57</td>
<td>20</td>
<td>19</td>
<td>8.7</td>
</tr>
<tr>
<td>AAAI 2</td>
<td>347</td>
<td>71</td>
<td>12</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>GINA</td>
<td>166</td>
<td>72</td>
<td>11</td>
<td>10</td>
<td>5.7</td>
</tr>
<tr>
<td>LOCAL 1</td>
<td>347</td>
<td>75</td>
<td>7</td>
<td>7</td>
<td>5.9</td>
</tr>
<tr>
<td>LOCAL 2</td>
<td>298</td>
<td>75</td>
<td>7</td>
<td>7</td>
<td>4.9</td>
</tr>
</tbody>
</table>
these features. The national plans, when compared with the others, are poor in regard to many of these other features as well, and including them in this study would not have substantially changed the overall findings.

Although we included all plans presented in current national guidelines, we did not have access to all plans that are currently in use nationwide. Also, we were not able to show in this study that poor readability of WAMPs is perceived as a barrier by parents and caregivers (who would be the ones to use them) or that it would hinder their use of these plans and thus lead to worse asthma outcomes. Although parents with years of experience in managing asthma may be able to read some complicated words relating to the disease, one would expect that any parent of a child with newly diagnosed asthma would find these words a barrier to their use of the document and that this would be especially true for those who are marginally literate. The caregiver who is completely illiterate may not be able to read WAMPs even with an improved readability level but could be helped if the clearer WAMP improves communication with other caregivers and health professionals and if other WAMP features, such as pictures and color coding, are sufficiently communicative with respect to key information. We are currently conducting a study to investigate these issues further.

There have been a few studies, in England (of adults) and in New Zealand (both of children and of adults), that have demonstrated that the use of WAMPs improves asthma outcomes (eg, peak flow measurements, nighttime symptoms, use of health care facilities for exacerbations). The 2 New Zealand studies used plans that were simply written and easy to use. A review of the adult literature showed that when asthma education is combined with a WAMP, there is an improvement in asthma outcomes in adults. However, a similar review of education-only interventions (ie, without written materials) for children showed no clear improvement in health outcomes. These results are consistent with the concept that a WAMP is a key component of effective asthma care.

A recent study, using focus groups of parents/caregivers to study barriers to asthma care in American urban settings, showed that parents believed that a WAMP could help them to improve the care of their children. However, most of the parents denied having been given such a plan. Of note, the barriers mentioned most frequently by parents involved lack of knowledge (about asthma, asthma medications [and their use], and environmental triggers). In a study by Warman et al, the management of asthma exacerbations by inner-city parents was compared with national guideline recommendations. This study found that only 51% of parents reported having been given a WAMP, and of those who received one, only 67% reported still having it available. When given a scenario, none of the parents said that they would have referred to a written plan. In a more recent study of children who presented to 1 emergency department (ED), 71% of children did not have a written plan. Only 7% of those with plans consulted it at the onset of wheezing and 4% consulted it before going to the ED.

How much of this lack of use of WAMPs among inner-city families in the United States is secondary to the poor readability of the documents in current use is unknown. Previous studies have shown that much of the patient literature currently available is written at a level of readability that often exceeds the literacy levels of patients treated in clinics or EDs. In a study by Davis et al, patients who were seen in adult clinics had an average reading level of grade 5.4 to 6.8 in contrast to 10.8 for those patients seen in private offices. In a similar study conducted in a pediatric clinic, parents’/caregivers’ reading ability was evaluated and the mean was found to be sixth grade, with 31% reading below a fourth-grade level. In contrast, the same study found that written materials developed for use in pediatric practices were written for those with mean comprehension levels of grade 9.9 to 11.5. Our study found that the same could be said of WAMPs presented as part of national guidelines.

There are many studies about the readability of patient education materials developed for use in EDs and oncology centers and for diabetes education. It has been shown that parents of all education levels prefer vaccine information materials that are written simply and with brevity. Also, this study demonstrated that comprehension was improved with the simpler materials. However, readability has never been addressed for materials developed for asthma education. The prevalence of asthma is increased for those of low socioeconomic status and for minorities, both of whom are at higher risk for lower literacy. It was shown in a previous study that adults with lower levels of literacy demonstrated less knowledge about their asthma and poorer metered-dose inhaler technique. Therefore, we expect that the literacy level of a child’s caregiver would affect the management of the child’s asthma and for this reason, it would be particularly important for patient education materials for asthma to be readable. We demonstrated that it is possible to develop a plan that is written with an improved level of readability.

WAMPs that are written with improved levels of readability are currently available. However, none of these is presented as part of the national asthma guidelines. Providing parents with materials that are simpler to understand should improve their knowledge base regarding asthma treatment and thereby improve the health outcomes of children with asthma. Additional research is needed to demonstrate the effectiveness of providing highly readable written instructional materials to parents of children with asthma in the United States. In addition, it would be useful to investigate whether increasing the readability of WAMPs would make practitioners more likely to use WAMPs and to follow the treatment recommendations set forth in the national guidelines.

CONCLUSION

None of the WAMPs presented as part of national asthma guidelines met the recommended standards
of readability set by health educators, but it is possible to develop a WAMP that does this. Low readability may constitute an important barrier to the effective use of these WAMPs. Therefore, including plans that are written at or below the fifth-grade level as part of the national guidelines may improve asthma management and outcomes, especially for those in the most vulnerable populations.

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REFERENCES

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