

Letter to the Editor

How readable are the American Academy of Allergy, Asthma & Immunology “Tips to remember” leaflets?

To the Editor:

It has long been recognized that good communication has a beneficial effect on clinical outcomes,¹ and patient information leaflets can improve knowledge.² However, the information must not only be accurate but also written at an appropriate reading level to be helpful. National literacy surveys conducted since the 1970s have consistently shown that many adult Americans (about 20%) are functionally illiterate and that the average adult reading level is between the seventh and ninth grade levels.^{3,4}

The American Academy of Allergy, Asthma & Immunology (AAAAI) “Tips to Remember” leaflets cover a wide range of topics for patients with asthma and allergic diseases, including diagnostic tests and the use of medication. To predict the level of educational attainment needed to understand and benefit from these, we analyzed the readability of the 29 English-language brochures by using the Simple Measure of Gobbledegook (SMOG).⁵ This formula was selected because it is simple, quick, and widely used and has been shown to be reliable and valid in determining reading level.⁶ The SMOG formula yields

a high correlation (0.985) with the grades of readers who had 100% comprehension of the set material. A score of 8 equates with completion of junior high school. Completed high school is needed for reading material with a score of 12, and tertiary education is required for a score of 13 and above (Table I). Texts with a SMOG score of less than 5 will be understood by most persons, and it has therefore been recommended that health literature should ideally be written at a SMOG score of 5 or less.⁷

To obtain a SMOG score, 30 sentences were selected (10 from the start, 10 from the middle, and 10 from the end of the brochure) and pasted into the SMOG Calculator (<http://www.wordcount.info>). We found that the “Tips to Remember” brochures have SMOG scores ranging from 12.27 to 16.78 (ie, requiring successful completion of education between high school graduation and university degree; Table I). For comparison, we scored the readability of 6 editorial and review articles from the *Journal of Allergy and Clinical Immunology*. We randomly selected one article from volumes 113 to 118. Original research articles were excluded, so that the text was relatively free of abbreviations, gene sequences, or numeric data. These editorials and reviews had SMOG scores of between 15.37 and 17.46 (mean, 16.55; Table I).

TABLE I. Distribution of SMOG scores of AAAAI leaflets in comparison with educational level, popular literature, and a sample of *Journal of Allergy and Clinical Immunology* editorial and review articles

SMOG grade*	No. of AAAAI leaflets	Educational level	Sample periodical	Sample JACI editorial [SMOG score]
0-6	0	Low-literate	<i>Soap Opera Weekly</i>	
7	0	Junior high school	<i>True Confessions</i>	
8	0	Junior high school	<i>Ladies' Home Journal</i>	
9	0	Some high school	<i>Reader's Digest</i>	
10	0	Some high school	<i>Newsweek</i>	
11	0	Some high school	<i>Sports Illustrated</i>	
12	4 (14%)	High school graduate	<i>Time Magazine</i>	
13-15	23 (79%)	Some college	<i>New York Times</i>	Colice GL. Small airway disease: a riddle wrapped in a mystery inside an enigma. 2006;118:337-9 [15.37]
				Casale TB. Status of immunotherapy: current and future. 2004;113:1036-9 [15.57]
16	2 (7%)	University degree	<i>Atlantic Monthly</i>	Bender BG, Leung DY. Sleep disorders in patients with asthma, atopic dermatitis, and allergic rhinitis. 2005;116:1200-1 [16.23]
17-18	0	Postgraduate studies	<i>Harvard Business Review</i>	Galli SJ. Pathogenesis and management of anaphylaxis: current status and future challenges. 2005;115:571-4 [17.28]
				Moffitt JE, Golden DBK, Reisman RE, Lee R, Nicklas R, Freeman T, et al. Stinging insect hypersensitivity: a practice parameter update. 2004;114:869-86 [17.38]
				Gold DR. Allergy: the price paid for longevity and social wealth? 2006;117:148-50 [17.46]
19+	0	Postgraduate degree	IRS code	

JACI, *Journal of Allergy and Clinical Immunology*.

Adapted from McLaughlin GH. SMOG grading: a new readability formula. *Journal of Reading* 1969;12:639-46. Available at: <http://harrymclaughlin.com/SMOG.htm>.

Accessed January 9, 2007.

*The SE of the estimated SMOG grade level is 1.52.

TABLE II. SMOG readability scores of AAAAI “Tips to Remember” brochures (listed alphabetically)

Brochure	SMOG score			
	No words excluded	Allergy and related words excluded	Defined words excluded	Defined words
Adverse reactions to medications	14.92	13.95	13.77	Anaphylaxis/active, dehydrated, immunoglobulin
Allergic skin conditions	14.27	13.58	12.64	Urticaria, eczema, angioedema, atopic dermatitis, histamine, rhinitis, irritant, urushiol, neomycin
Asthma and allergy medications	16.11	15.49	15.12	Stabilizer, leukotriene, bronchodilator, β -agonist, rhinitis, theophylline, anticholinergic, antihistamine, histamine, decongestant, corticosteroid
Asthma and pregnancy	13.63	13.00	12.17	Pregnancy
Asthma medications and osteoporosis	13.15	13.00	12.10	Osteoporosis, glucocorticosteroid
Asthma triggers and management	16.78	16.11	15.00	Esophagus, irritants, infection, rhinitis, sinusitis, exercise-induced, gastroesophageal, bronchodilator, corticosteroid, cromolyn, nedocromil, leukotriene modifiers, beta2agonist, methylxanthines, omalizumab
Childhood asthma	13.54	13.34	13.34	Atopic dermatitis
Cough in children	12.38	12.06	11.83	Rhinitis, sinusitis esophagus, pollutants
Exercise-induced asthma	14.79	14.53	14.49	Rhinitis, exercise induced, expiratory, Spirometer
Food allergy	15.33	14.27	13.86	Immunoglobulin, intolerance, cross reactivity, coincidental, atopic dermatitis, eczema, anaphylaxis, additives, challenges
Guide to health care plans	15.00	14.66	14.00	Formulary, gatekeeper, pre-existing, primary care provider
Indoor allergens	13.39	12.11	11.94	Perennial
Latex allergy	13.82	12.80	12.70	Dermatitis, anaphylaxis, cross reactivity, spina bifida
Occupational asthma	15.04	14.83	14.27	Isocyanates, histamine, acetylcholine, occupational
Outdoor allergens	12.54	11.60	11.25	Rhinitis, seasonal
Prevention of allergies and asthma in children	14.36	13.44	13.44	
Recurrent and unusually severe infections	12.59	12.54	12.33	Exposure, susceptibility, respiratory tract infection, rhinitis, immunodeficiency, antibodies, intravenous immunoglobulins
Rhinitis	14.18	13.25	12.11	Rhinitis, antihistamine, corticosteroid, leukotriene, immunotherapy
Role of the allergist/immunologist	14.22	12.95	12.70	Immunoglobulin, mediator, rhinitis, sinusitis, atopic dermatitis, urticaria, angioedema, anaphylaxis
Sinusitis	14.49	14.00	13.00	Sinusitis, subacute, respiratory infection, immunotherapy, rhinitis, recurrent
Stinging insect allergy	13.77	12.70	12.59	Immunoglobulin antibody, anaphylaxis, Africanized honeybees
The importance of clinical research trials	13.63	13.58	13.58	Placebo, investigator, electrocardiogram
Traveling with allergies	14.49	13.39	13.39	Immunotherapy
Use of inhaled asthma medications	15.73	15.57	15.33	Bronchodilator, glucocorticosteroid, β_2 -agonist, nonsteroidal anti-inflammatory medications
What are “allergy shots”?	15.08	13.20	13.00	Immunotherapy, sensitivity, anaphylaxis/active
What is allergy testing?	15.73	13.34	13.05	Anaphylaxis, immunoglobulin, mediators, histamine, intradermal
What is an allergic reaction?	13.91	12.27	11.37	Immunoglobulin, mediator, histamine, conjunctivitis, rhinitis, urticaria, atopic dermatitis, anaphylaxis, sinusitis, otitis media, immunotherapy
What is anaphylaxis?	14.75	13.77	13.00	Anaphylaxis/active, anaphylactoid, antihistamine, antibodies
What is a peak flowmeter?	12.27	12.22	12.17	Variability, expiratory
Mean	14.27	13.50	13.09	

Sometimes methods based on word length are criticized because they disregard patients' familiarity with the vocabulary that is associated with their illness, thereby overestimating the difficulty of the text. Because the word *allergy* and its many derivatives are polysyllabic, we assessed whether complexity of the text was reduced if familiar words such as *allergy*, *allergies*,

allergist(s), *allergic*, *allergenic*, and *allergen(s)* were excluded from the scoring. These exclusions had very little effect on the readability of the brochures. For example, the brochure showing the greatest shift in score (“What are allergy shots?”) decreased from 15.08 to 13.20 after removing these words (Table II). We then went on to exclude from the scoring all the polysyllabic

medical and technical terms defined within each brochure. The readability scores improved further, but the magnitude of shift makes very little difference to the educational attainment required, and patients would still require successful completion of high school to understand most brochures. To our knowledge, this is the first time that anyone has objectively addressed this frequent criticism of readability scores disregarding patient's potential knowledge.

Full comprehension of these AAAAI brochures requires an educational level equivalent to completion of high school, and the most demanding leaflets have SMOG scores similar to the editorials and review articles in the *Journal of Allergy and Clinical Immunology*. To attain high levels of reader comprehension, all of these brochures would require revision. Alternatively, it might be more realistic to match readers with existing materials and to devise alternative literature for those with lower reading abilities. In addition, it would be worthwhile to strive for lower readability scores when revising brochures.

Readability formulae do have limitations. Ideally, testing should be done with patients because reading is a complex process, and the ability to comprehend a text is influenced by presentation (organization, print, and illustrations), situation (eg, stress), and reader characteristics (eg, motivation and maturity). Such testing is very resource intensive, but a pragmatic solution for clinicians is to use readability formulas, such as SMOG, which correlate well with the reader's comprehension.⁵ The required grade level predicted by the SMOG formula does tend to be higher than other scoring methods because SMOG is based on 100% comprehension, whereas some other scores aim for lower levels of comprehension.

As educated health professionals, we might fail to realize just how much easier it is for us to read a text compared with many of our patients. Poor readability does not mean that the patient will obtain partial information: when texts exceed a person's literacy levels, he or she usually just stops reading altogether. Low levels of literacy are not confined only to immigrants, the elderly, or high school dropouts; the problem is ubiquitous and therefore very difficult to identify. The American Medical Association has recently developed an educational program to raise awareness of the health literacy problem.⁸ To avoid giving out "Tips to Remember" brochures inappropriately, we need to be alert to the varying literacy skills of patients. For less-literate patients, we need to use texts written for people with more diverse reading skills (eg, AAAAI Pediatric Asthma Handouts). Where alternative brochures are not currently available, we might need to meet

patients' information needs differently (discussion, video, and audiotapes). In the longer term, we should aim to develop a wider range of allergy and asthma patient information brochures enabling clinicians to provide the level and amount of information that best fits each patient's needs.

In conclusion, "Tips to Remember" brochures currently have readability scores requiring successful completion of education between high school and a university degree. As a result, this range of brochures is not accessible or comprehensible to all patients, and therefore we must adopt strategies for recognizing patients with lower levels of literacy and meet their information needs differently. Looking to the future, the range of information available for patients with asthma and allergic conditions needs to be widened, ensuring that the needs of patients with low and moderate literacy are also met.

Helen Smith, MD^a

Jo Wade, BSc^a

Anthony Frew, MD^b

From ^athe Division of Primary Care and Public Health, Brighton and Sussex Medical School, Brighton, United Kingdom, and ^bthe Department of Respiratory Medicine, Brighton General Hospital, Brighton, United Kingdom. E-mail: h.e.smith@bsms.ac.uk.

Disclosure of potential conflict of interest: The authors have declared that they have no conflict of interest.

REFERENCES

1. Ley P. Communicating with patients-improving communication, satisfaction and compliance. London: Croom Helm; 1988.
2. Kenny T, Wilson RG, Purves IN, Clark J, Newton LD, Newton DP, et al. A PIL for every ill? Patient information leaflets (PILs); a review of past, present and future use. *Fam Pract* 1998;15:471-9.
3. Forliza LA. Adult literacy in the United States today. Report for the Institute for the Study of Adult Literacy. University Park (PA): Penn State University; 1989.
4. National Center for Education Statistics (NCES) National assessment of adult literacy (NAAL): a first look at the literacy of America's adults in the 21st century. Jessup (MD): US Department of Education; 2006.
5. McLaughlin GH. SMOG grading: a new readability formula. *Journal of Reading* 1969;12:639-46.
6. Ley P, Florio T. The use of readability formulas in health care. *Psychology Health Med* 1996;1:7-28.
7. Estey A, Musseau A, Keehn L. Comprehension levels of patients reading health information. *Patient Educ Counsil* 1991;18:165-9.
8. American Medical Association and American Medical Association Foundation. Health literacy—a manual for clinicians. Chicago: American Medical Association; 2003.
9. Sherman AL. Analytics of literature: a manual from the objective study of English prose and poetry. Boston: Ginn & Co; 1893.

doi:10.1016/j.jaci.2007.09.035