A Readability Assessment of Online Stroke Information

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Background: Patients and carers increasingly access the Internet as a source of health information. Poor health literacy is extremely common and frequently limits patient's comprehension of health care information literature. We aimed to assess the readability of online consumer-orientated stroke information using 2 validated readability measures. *Methods:* The 100 highest Google ranked consumer-oriented stroke Web pages were assessed for reading difficulty using the Flesch–Kincaid and Simple Measure of Gobbledygook (SMOG) formulae. *Results:* None of the included Web pages complied with the current readability guidelines when readability was measured using the gold standard SMOG formula. Mean Flesch–Kincaid grade level was 10.4 (95% confidence interval [CI] 9.97-10.9) and mean SMOG grade 12.1 (95% CI 11.7-12.4). Over half of the Web pages were produced at graduate reading levels or above. Not-for-profit Web pages were significantly easier to read ($P = .0006$). The Flesch–Kincaid formula significantly underestimated reading difficulty, with a mean underestimation of 1.65 grades (95% CI 1.49-1.81), $P < .0001$. *Conclusions:* Most consumer-orientated stroke information Web sites require major text revision to comply with readability guidelines and to be comprehensible to the average patient. The Flesch–Kincaid formula significantly underestimates reading difficulty, and SMOG should be used as the measure of choice. **Key Words:** Stroke—readability—Internet—online—literacy.

Introduction

Stroke is a common condition affecting over 150,000 people in the United Kingdom per year.[1] It is a major cause of chronic neurologic disability and may be considered to be the most common cause of complex disability in the United Kingdom.[2] Patient education is important in stroke and helps patients, their families, and carers to manage the long-term effects of a stroke and its treatment. Although patients receive information from health care staff, many seek further information independently, with the Internet being one of the most commonly used sources.

There is a huge volume of stroke-related information available on the Internet, with a Google search for "stroke" returning 228 million Web pages. It is well recognized that the general population is increasingly turning to the Internet for health care information. In the United States, 82% of adults use the Internet,[3] and of these, 72% sought online health information in the past year, with a total of 59% of American adults having browsed online for health information in the past year. Most of these users (77%) began their search for health information with an online search engine such as Google.[4]

Health information provision is 1 major function of the Internet with over 80% of American Internet users searching online for health information at some time. This is more than have been online to check the news (78%), buy products (71%), watch online video content (71%), or use social networking sites (69%).[3] There is also evidence that those with chronic conditions and disability, such as stroke survivors, are more likely to search for health information than others.[5]

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No peer-reviewed published estimates of UK Internet use for health care information or specifically by stroke patients are available. However, the number of households in the United Kingdom with Internet access has risen from around 42% to 80% in the past decade.[6]

Although the Internet is a popular and convenient source of consumer-oriented health care information, these resources are only useful if the consumer is able to comprehend the information presented. This is even more pertinent in stroke patients, where the capacity for language comprehension is often affected.

Health literacy is "the constellation of skills, including the ability to perform basic reading and numerical tasks, required to function in the health care environment" as defined by the American Medical Association's Ad Hoc Committee on Health Literacy in 1999.[7] Similarly, a 2011 systematic review defined health literacy as "the degree to which individuals can obtain, process, and understand the basic health information and services they need to make appropriate health decisions." Subsequently, it demonstrated that poor health literacy is associated with increased hospitalization, emergency care use, and among older people, poorer overall health status and higher mortality.[8]

Reading ability is an integral component of health literacy. Those with inadequate literacy have difficulty reading and understanding material written at the sixth-grade level (age 11-12 years), whereas those with marginal literacy have difficulty comprehending information written at the 10th-grade level (age 15-16 years).[9] A national survey has shown that around 1 in 6 people in the United Kingdom have levels of general literacy below that expected of an 11-year old.[10]

A study of nearly 8000 older patients in the United Kingdom showed that almost a third had difficulties reading and understanding basic written health information. This study also demonstrated that those with lower health literacy had significantly higher mortality rates.[11] A pooled analysis of 85 American studies representing 31,129 subjects showed a prevalence of poor health literacy of 26% and also demonstrated a significant association between older age and low health literacy with a third of the population older than 50 years having inadequate heath literacy skills.[12]

These findings have been supported by data published by the US National Center for education statistics, which undertook its National Assessment of Adult Literacy in 2003. Again adults in the oldest age group (older than 65 years) had the lowest levels of health literacy.[13]

In view of this, health literacy is a particular public health concern in stroke medicine as the incidence of stroke increases with advancing age.

To date, there is only 1 small published study that has investigated health literacy in stroke patients. This Australian study of 57 patients found stroke patients to have a mean reading level of seventh to eighth grade, although those with combined aphasia, as would be expected, read at a significantly lower level.[14]

In view of this high level of inadequate health literacy, the US Department of Health and Human Services (USDHHS) recommends that patient-orientated literature should be written at or below the sixth-grade level (age 11-12 years) and has developed an action plan to promote patient literacy.[15]

The USDHHS literacy classification system categorizes material as "easy to read" only if written at or below a sixth-grade level. Material between the 7th- and 9th-grade level is "average" and above the 9th-grade level is regarded as difficult.

The United Kingdom currently has no quantitative guidelines regarding levels of readability for patient orientated literature; hence, the USDHHS guidelines outlined above have been taken as the international gold standard for the purpose of this study.

Ours is the only study of readability in consumer-orientated online general stroke literature of which we are aware. However, a recent study of 51 Web sites pertaining to patients with speech and language difficulties after a stroke showed that only 6% of Web sites had a reading level suitable for the sixth grade or below.[16]

Methods

Sampling Method

We analyzed the text content of the 100 highest ranked consumer-orientated Web pages, selected on the basis of Google search ranking and consumer orientation. A full description of the sampling method is given below.

We performed a Google search on January 31, 2013, for the term "Stroke." This returned about 228,000,000 Web page results. Google was selected as it is the most popular search engine, accounting for more than 90% of UK consumer health-related search activity in 2012, with a number of other search engines making up the remaining 10%.[17]

Starting with the highest ranking nonsponsored Web page link, each of the Web page results returned by this Google search was reviewed by a single researcher (A.T.). Initially, a decision was made as to whether the Web page contained consumer-orientated health care information (aimed primarily at lay persons) or was aimed at health care professionals (journal articles, textbooks, and so on). Only consumer-orientated Web pages containing health care information regarding stroke were included for further assessment.

Each consumer-orientated Web page was then classified by the following criteria:

1. Commercial or not-for-profit—Not-for-profit was defined as a Web site of a registered charity, educational institution, or governmental organization.