



# Examining the Accessibility of Online Patient Materials for Bariatric Surgery

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## Introduction

Bariatric surgery is an underused intervention for patients with obesity, in part due to weight-related stigmas and widespread reluctance to accept this life-saving therapy's safety and efficacy [1]. Online bariatric surgery materials address these barriers by connecting patients with critical information to make decisions about treatment, understand surgical approaches, and navigate post-operative care. Furthermore, bariatric surgery patients are known to trust hospital websites more than any other online resources including popular media (e.g., social, news or earned, video, audio, or podcast) and industry content [2]. It is therefore likely that the quality and content of a surgery center's online materials have direct impact on a patient's willingness to pursue bariatric surgery.

Effective online patient information requires that reading materials be accessible. Accessibility can be assessed by

measuring readability — the level of education necessary to fully understand a text. Appropriate readability improves comprehension of online health information, which is shown to improve shared decision-making and patient compliance [3]. Readability also has important implications for equitable access to healthcare interventions by reducing barriers to care for the 89 million Americans who have low health literacy [4]. Inappropriately high reading levels can lead to patient misinformation and confusion, disproportionately affecting groups such as those with less educational attainment or limited English proficiency. Thus, inaccessible materials perpetuate health disparities and limit access to care.

To ensure accessibility to the vast majority of US patients, the American Medical Association (AMA) recommends a 6th grade reading level for patient-facing online materials [4]. To determine the accessibility of online bariatric materials, we examined the readability of patient-facing online materials for all programs within a statewide bariatric surgery quality collaborative.

### Key Points

- Patients use online resources to inform the decision to pursue bariatric surgery.
- Appropriate reading levels improve accessibility particularly for patients with low literacy.
- Bariatric surgery centers' online patient materials are several grade levels above AMA recommendation.
- Multiple resources exist to improve readability and access for patients.

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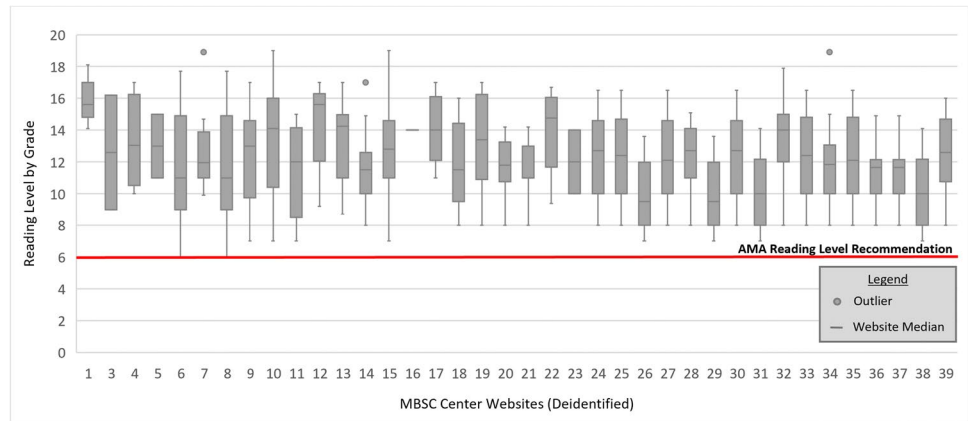
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## Methods

We examined the readability of publicly accessible patient-facing online materials for all programs within the Michigan Bariatric Surgery Collaborative, a statewide group encompassing 39 hospitals and centers focused on innovations and quality improvement in bariatric surgery [5]. We collected text from each program's website and excluded the following: phone numbers, email addresses, URLs, hospital and center addresses, headers, titles, videos, figures, advertisements, references, disclaimers, acknowledgements, and incomplete sentences (i.e., sentences not ending with punctuation). Each webpage was then analyzed using the software Readability Studio Professional Edition program

**Fig. 1** Distribution of webpage summary scores for MBSC-affiliated bariatric surgery center online patient education



version 2020 (Oleander Software, Ltd, Vandalia, OH). With the program, we calculated the reading grade level of individual webpages and websites with three commonly used measures available through the software: Flesch-Kincaid, Fry, and Simple Measure of Gobbledygook (SMOG). These measures assess grade level based on metrics such as sentence length and number of syllables in individual words as a proxy for complex sentence structure and vocabulary [6]. Each measure calculates a reading grade level for the body of text it scores, corresponding to the US grade level required to comprehend the text fully. We then calculated the median reading level for each webpage across the three reading measures, which we will refer to as the webpage’s summary score. We also found median grade levels for each website across all webpages from that site for each of the three scales used.

**Results**

Of the 39 centers included in the study, 38 were analyzed with readability software, as one provided no public patient-facing online materials. The number of webpages per website ranged from 1 to 60. Across the 38 centers analyzed, no website and only two individual webpages met the AMA recommendation of a 6th grade reading level [4]. Figure 1 is a box and whisker plot of webpage summary scores for each website with a line delineating the threshold for adherence to the AMA 6th grade recommendation. The median website grade levels were 10.2 for Flesch-Kincaid (range: 8.4–14.5), 14.0 for Fry (range: 9.5–17.0), and 12.9 for SMOG (range: 11.4–15.6).

**Fig. 2** Comparison of original and updated text from Michigan Medicine Bariatric Surgery website

Original Text	12.1 Reading Level	Updated Text	6.5 Reading Level
<p><b>Types of Bariatric Procedures</b></p> <p>Our surgeons are specialized in laparoscopic surgery (4-6 very small incisions in the abdomen). Laparoscopic surgeries allow you to recover quickly, with less pain and less risk for complications.</p> <p>See the illustration below for typical incision sites.</p> <p>Michigan Medicine performs two types of bariatric surgery procedures: gastric bypass and sleeve gastrectomy.</p> <p><b>Gastric Bypass (Roux-en-Y)</b></p> <p>Gastric bypass surgery divides the stomach to create a gastric pouch (about the size of an egg) and surgically connects the small intestine to the smaller stomach. This causes food to bypass the stomach and first part of the small intestine. The operation is typically 2-3 hours long.</p> <p><b>Sleeve Gastrectomy</b></p> <p>Sleeve gastrectomy surgery divides and removes approximately 80-85% of the stomach. The operation is typically 1-2 hours long.</p>		<p><b>Types of Surgery to Treat Obesity</b></p> <p>Our doctors are trained in surgery using 4-6 small cuts in the belly. This method allows you to recover quickly, with less pain and risk.</p> <p>See the picture below for typical cut sites.</p> <p>Michigan Medicine does two types of surgery for obesity treatment: stomach bypass and reduction.</p> <p><b>Stomach Bypass (Gastric Bypass or Roux-en-Y)</b></p> <p>This surgery cuts off part of the stomach and leaves a small pouch (about the size of an egg). We then connect the pouch to the small intestine. This makes food go past most of the stomach and some small intestine. The surgery is typically 2-3 hours long.</p> <p><b>Stomach Reduction (Sleeve Gastrectomy)</b></p> <p>This surgery removes about 80-85% of the stomach. The surgery is typically 1-2 hours long.</p>	

## Discussion

The discrepancy between AMA recommendations and surgery center webpages raises the question — why do bariatric programs struggle to create patient-friendly reading materials? Hospitals and centers may lack awareness of the importance of readability and have limited knowledge of their own resources' readability scores. Furthermore, programs may not know about the free resources they can use to improve website content or lack the capacity to implement these changes independently.

However, multiple methods and resources exist to help hospitals and centers address the readability of their online materials. Programs should first analyze their own webpages using readability tests. Tools such as online thesauruses specifically developed to translate medical terminology and third-party content developers specializing in readability and accessibility may be used to improve existing materials. Programs should aim to avoid medical jargon and simplify sentence structure and length. When possible, using an image to replace text can help communicate complex information. Here, we provide an example of simplified content from the Michigan Medicine Bariatric Surgery website, replacing jargon, breaking up long sentences into shorter phrasing, and avoiding multi-syllabic words (Fig. 2).

There is clear evidence that readability impacts patient comprehension, but further investigation is needed to determine the specific benefits of more accessible bariatric surgery materials. However, other domains, such as informed consent, have demonstrated that patients prefer and have greater understanding with improved document readability [7]. When extrapolated to bariatric surgery, these simple changes to online materials could have

meaningful impact on the use, long-term success, and accessibility of these potentially life-saving surgeries.

## Declarations

**Ethical Approval** This article does not contain any studies with human participants or animals performed by any of the authors.

**Informed Consent** Informed consent does not apply.

**Conflict of Interest** The authors declare no competing interests.

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