



Miscarriage information available on the internet: a content analysis of leading consumer websites

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ABSTRACT

Objective: The objective of this content analysis was to explore the accuracy and completeness of information provided about miscarriage on consumer-facing websites.

Study design: We identified the most popular consumer websites for health information and the leading medical and nursing professional association websites. We reviewed each website for content on miscarriage aimed at consumers and compared the website content to the information contained in the American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin on Early Pregnancy Loss. We used a simple scoring method to compare the accuracy and completeness of the content on each website with the ACOG Practice Bulletin.

Results: Sixty percent ($n = 9$) of the top 15 consumer websites for health information had dedicated webpages on miscarriage. Of the nine leading professional association websites, two had dedicated pages on miscarriage. On average, each site provided information on 64% of the key messages from the ACOG Practice Bulletin. Sites commonly emphasized and provided overall accurate and complete information on risk factors of miscarriage. The key messages with the most limited or inaccurate information pertained to diagnosis of miscarriage; treatment, including medical management with mifepristone and misoprostol; instructions postmiscarriage and prevention of miscarriage.

Conclusions: The majority of popular health websites include consumer-facing content on miscarriage, and the information presented is a mostly complete and accurate representation of the ACOG Practice Bulletin. The lack of information on treatment options may affect patients' ability to make informed choices about their care. The missing information points to areas that patients may feel underprepared to discuss with healthcare providers.

Implications: More effort is needed to ensure that internet-based consumer information about miscarriage reflects the best scientific evidence.

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1. Introduction

Each year, over one million women in the United States experience a miscarriage [1]. While the general public believes miscarriage to be uncommon [2], at least 1 in 10 clinically confirmed pregnancies results in early pregnancy loss, typically in the first trimester [3]. Miscarriage can be stigmatizing [4], and many people are uninformed about what to expect during and after a miscarriage. Women may feel uncomfortable or embarrassed discussing their symptoms with their partner,

friends or family. The internet can be a valuable resource to provide immediate information, help patients feel prepared to see a provider and empower them to ask questions about treatment options.

Consumer-facing health information on the internet has become of particular interest to public health professionals. The availability of information on the internet may have important implications for improving knowledge and healthcare-seeking behaviors, as well as the spreading of misconceptions and misinformation. A 2013 national survey on public perceptions of the incidence and causes of miscarriage showed that the general public commonly believed in falsehoods about causes of miscarriage [2]. Among survey participants ($n = 1084$), the majority (76%) falsely believed miscarriage could be caused by a stressful event, and over half (64%) falsely believed lifting heavy objects could cause a miscarriage [2].

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Because the techniques for vacuum aspiration and medication management are essentially identical for miscarriage and abortion care, family planning clinicians commonly provide both services and have advocated for the implementation of evidence-based management of early pregnancy loss. As providers of this care, family planning clinicians need to have an understanding of the information their patients are exposed to on the internet.

The objective of this content analysis was to explore the accuracy and completeness of information provided about miscarriage on consumer-facing websites. For our analysis, we compared website content to the information contained in the American College of Obstetricians and Gynecologists (ACOG) Practice Bulletin on Early Pregnancy Loss [3].

2. Materials and methods

2.1. Identification of websites and search terms

In October 2016, we compiled a list of the 15 most popular health sites as derived from *eBizMBA Rank*, a continually updated average of each website's *Alexa Global Traffic Rank*, and U.S. Traffic Rank from both *Compete* and *Quantcast*. We also identified the websites of nine leading medical and nursing professional associations likely to have information about women's health: ACOG; American Academy of Family Physicians; American Academy of Nurse Practitioners; American Academy of Nursing; American College of Nurse Midwives (ACNM); American Medical Association; American Nurses Association; Association of Women's Health, Obstetric and Neonatal Nurses; and Nurse Practitioners in Women's Health.

We searched each website for a dedicated webpage on miscarriage aimed at consumers. Websites were excluded from our review if the only information provided on miscarriage was presented in the format of nonbranded or nonsystematic content. Nonbranded information included webpages in which the website did not provide copyright or directed the consumer to another organization's website. Examples of nonbranded or nonsystematic information for consumers include editorials, articles, opinion pieces, provider directories or content aimed toward medical professionals.

According to ACOG, the terms miscarriage, spontaneous abortion and early pregnancy loss can all be used interchangeably in the first trimester of pregnancy [3]. We entered the words *miscarriage*, *early pregnancy loss* and *spontaneous abortion* in the search engine of each website. If we did not find a webpage dedicated to miscarriage through this method, we reviewed the website for a list of health issues related to pregnancy, such as an A-Z Health Issues list, and reviewed the list manually for our search terms.

2.2. Early pregnancy loss key messages

We reviewed the ACOG Practice Bulletin on Early Pregnancy Loss, which was issued in May 2015 and reaffirmed in 2018, to identify the key messages contained in the document that would be relevant to patients. Our review was based on the Practice Bulletin issued in 2015. We categorized and summarized these key messages to serve as the gold standard for our review of the websites (Table 1). The ACOG Practice Bulletin did not provide information on emotional response, which we added as a key message for our review based on evidence that miscarriage can elicit a range of emotional responses, including anxiety and depression [2,5], and some women who experience miscarriage may benefit from counseling or support groups.

2.3. Website review

We conducted this review in two phases. We conducted the original review between October 2016 and February 2017. We reviewed the 15 most popular health sites and the 9 professional association websites to

identify existing webpages dedicated to miscarriage. We updated our review in June and July 2018 to capture any changes made to website content.

Among the websites that mentioned miscarriage, we identified the webpages that included consumer-facing information. We reviewed the eligible webpages and categorized the information according to the framework of the ACOG Practice Bulletin key messages.

2.4. Scoring

We developed a simple scoring method to compare each website's content on miscarriage with the ACOG Practice Bulletin. We gave scores for accuracy and completeness of each key message on a scale of 0 to 3. Two reviewers independently scored each website. Reviewers discussed any discrepancies, and a third reviewer verified all scores. We gave accuracy and completeness scores of 0 for key messages that were not included on a webpage. We gave an accuracy score of 1 if the information was available but was inaccurate or included some accurate with mostly inaccurate information, and a completeness score of 1 if information on the topic was available but lacked the majority of information included in the ACOG Practice Bulletin for the respective key message. We gave scores of 2 for information that was mostly accurate or mostly complete and scores of 3 when the information provided was fully accurate or complete. We noted also when there was additional information on the website that was not in the Practice Bulletin (e.g., additional risk factors). If the additional information was accurate and evidence based, this did not diminish either score. We calculated mean scores for each reviewed website, along with mean scores across all websites for each key message.

3. Results

3.1. Inclusion screening results

According to *eBizMBA Rank*, the top 15 consumer websites for health information in order of popularity were WebMD, NIH, Yahoo! Health, Mayo Clinic, Medicine Net, *Drugs.com*, Everyday Health, Healthline, Mercola, Health, Mind Body Green, Medscape, Rx List and Medical News Today. Of the top 15 websites, 60% ($n = 9$) had dedicated webpages with miscarriage information (Tables 2 and 3). Twenty-seven percent ($n = 4$) contained only provider directories or hyperlinks to online articles about miscarriage (Yahoo! Health, Mercola, Health and Mind Body Green). Medscape contained systematic information on miscarriage aimed at healthcare professionals, not consumers, and was excluded from our review. Health Grades contained systematic consumer-facing information on miscarriage; however, the webpage was accessible only via a *miscarriage* hyperlink in nonsystematic articles and was excluded from our review because it was not apparently accessible for consumer access on the website.

Of the nine leading medical and nursing professional association websites, only ACOG and ACNM included branded, consumer-facing content on miscarriage. Nurse Practitioners in Women's Health and American Academy of Family Physicians provided links to information on other websites but did not include branded content. The remaining 56% of the nine professional association websites ($n = 5$) did not contain any consumer information on miscarriage.

Eleven websites met the criteria for inclusion in our analysis. In total, we reviewed nine consumer-facing websites and two professional association websites.

3.2. Scoring results

On average, 64% of key messages ($n = 14$ of 22) were included in the websites. Overall mean scores were greatly diminished by missing content. The 11 sites scored a mean accuracy of 1.7 across all key messages (Table 2) and a mean completeness score of 1.4 (Table 3). The majority

Table 1
Key messages from ACOG Practice Bulletin on Early Pregnancy Loss

| Message title | Message content |
|---------------------------------|---|
| Definition | Nonviable, intrauterine pregnancy with either an empty gestational sac or a gestational sac containing an embryo or fetus without fetal heart activity within the first 12 6/7 weeks of gestation. |
| Incidence | Miscarriage occurs in 10% of all clinically recognized pregnancies, and approximately 80% of all pregnancy loss occurs in the first trimester. |
| Risk factors | <p>Common</p> <ul style="list-style-type: none"> • 50% of miscarriages are due to fetal chromosome abnormalities. • Advanced maternal age and prior early pregnancy loss. • Risk significantly increases with maternal age. <p>Other^a</p> <ul style="list-style-type: none"> • Genetic polymorphism. • Endocrine disorders such as poorly controlled diabetes, polycystic ovary syndrome, hypothyroidism, subclinical thyroid disorder, thyroid autoimmunity. • Uterine malformations. • Autoimmune-based. |
| Symptoms | Similar to normal pregnancy symptoms, ectopic pregnancy and molar pregnancy (e.g., vaginal bleeding and cramping). |
| Diagnosis | <p>Evaluation with ultrasound</p> <p>Ultrasonography is preferred modality to verify the presence of a viable intrauterine gestation, along with medical history, physical examination and serum β-hCG.</p> <p>Needing additional time</p> <p>In some instances, a single serum β-hCG or ultrasound may not be sufficient, and additional time and tests may be needed.</p> <p>Other clinical factors</p> <p>It is important to include the patient in the diagnostic process and to individualize these guidelines to patient circumstances.</p> <p>Considerations include:</p> <ul style="list-style-type: none"> • Patient's desire to continue the pregnancy. • Willingness to postpone intervention to achieve 100% certainty. • Patient anxiety. |
| Treatment | <p>Expectant management/watchful waiting</p> <ul style="list-style-type: none"> • Limited to first trimester, 80% effective within 8 weeks. • Patient may experience moderate to heavy bleeding and cramping. • If the miscarriage does not complete on its own, surgery or medication^b may be necessary. <p>Medical management</p> <ul style="list-style-type: none"> • Treatment with misoprostol administered orally, vaginally or sublingually. • A dose of mifepristone 24 h before misoprostol administration should be considered when mifepristone is available.^c • 71% of women experience complete expulsion in 3 days. <p>Medical management dosing</p> <ul style="list-style-type: none"> • Recommended initial dose of misoprostol is 800 mcg vaginally. One repeat dose may be administered as needed, no earlier than 3 h after the first dose and typically within 7 days if there is no response to the first dose. • Recommended dose of mifepristone is 200 mg orally, 24 h before misoprostol administration.^c • Prescriptions for pain medications should be provided to the patient. • Women who are Rh(D) negative and unsensitized should receive Rh(D)-immune globulin within 72 h of the first misoprostol administration. <p>Medical management follow-up</p> <ul style="list-style-type: none"> • Follow-up to document the complete passage of tissue can be accomplished by ultrasound examination, typically within 7–14 days. • Serial serum β-hCG measurements may be used instead in settings where ultrasonography is unavailable. • Patient-reported symptoms also should be considered when determining whether complete expulsion has occurred. • Bleeding will be heavier than a normal period. • If misoprostol fails, the patient may opt for expectant management, for a time determined by the woman and her obstetrician-gynecologist or other gynecologic provider, or suction curettage. <p>Surgical management</p> <ul style="list-style-type: none"> • May be preferable for women with any comorbidities (anemia, cardiovascular disease) and used in urgent situations like hemorrhage or signs of infection. • Surgical management provides immediate completion with less follow-up. • Your doctor may give you antibiotics to prevent infection. <p>Surgical management may be performed in an office setting under local anesthesia with or without sedation. Patients often choose surgical management in the office for its convenience and scheduling availability.</p> <p>Choice</p> <p>Patient preference should be strongly considered, and patients should be counseled about the risks and benefits of each option.</p> <p>Risks</p> <p>While very rare, intrauterine adhesion formation can occur with surgical management, and hemorrhage and infection can occur with any of the treatment options.</p> |
| After miscarriage | <p>Conception</p> <p>There are no quality data to support delaying conception after miscarriage to prevent subsequent miscarriages or other pregnancy complications.</p> <p>Intercourse</p> <p>Generally recommended to abstain from vaginal intercourse for 1–2 weeks after complete passage of the pregnancy tissue to avoid infection, although not evidence based.</p> <p>Contraception</p> <p>Contraception can be initiated immediately after an early pregnancy loss if pregnancy avoidance is desired. Intrauterine devices can be placed immediately after surgical treatment.</p> <p>Management of Rh(D) negative patients</p> <p>Patients who are Rh(D) negative and unsensitized should receive a shot of Rh(D) immediately after surgical management of pregnancy loss or within 72 h of the diagnosis of early pregnancy loss with planned medical management or expectant management in the first trimester.</p> |
| Repeat miscarriage | Patients who have experienced at least three prior pregnancy losses may benefit from progesterone therapy in the first trimester. Additional workup or testing may be done if a woman has more than two early pregnancy losses. |
| Preventing miscarriage | There are no effective interventions to prevent miscarriage. Bed rest should not be recommended for the prevention of miscarriage. Women who have experienced at least three prior pregnancy losses may benefit from progesterone therapy in the first trimester. |
| Emotional response ^d | Some women report emotional difficulty after miscarriage and may benefit from counseling or support groups. |

^a Other risk factors were not included in the ACOG Practice Bulletin itself, and were cited in the references of the Practice Bulletin

^b Use of medication added by authors, not included in ACOG Practice Bulletin

^c The use of mifepristone combined with misoprostol for medical management of miscarriage was incorporated into the ACOG Practice Bulletin in November 2018

^d Not included in ACOG Practice Bulletin.

Table 2
Accuracy of website content

| Key messages (n = 22) | WebMD | NIH | Mayo Clinic | Medicine Net | Drugs.com | Everyday Health | Healthline | Rx List | Medical News Today | ACNM | ACOG Patient Education | Mean | Number of websites including key message (n) (%) |
|---------------------------------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|----------------|--------------------|----------------|------------------------|----------------|--|
| Definition | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2.9 | 11 (100) |
| Incidence | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 2.4 | 11 (100) |
| Risk factors | | | | | | | | | | | | 2.6 | |
| Common risk factors | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2.9 | 11 (100) |
| Other risk factors | 3 | 3 | 3 | 0 | 3 | 0 | 3 | 3 | 2 | 3 | 3 | 2.4 | 9 (82) |
| Symptoms | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2.9 | 11 (100) |
| Diagnosis | | | | | | | | | | | | 1.2 | |
| Evaluation with ultrasound | 2 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 3 | 3 | 3 | 2.6 | 10 (91) |
| Needing additional time | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 0.5 | 2 (18) |
| Other clinical factors | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 (9) |
| Treatment | | | | | | | | | | | | 1.3 | |
| Expectant management/watchful waiting | 0 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 2 | 2.5 | 10 (91) |
| Medical management | 3 | 3 | 2 | 0 | 3 | 3 | 0 | 0 | 0 | 3 | 3 | 1.8 | 7 (64) |
| Medical management dosing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 (0) |
| Medical management follow-up | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0.4 | 2 (18) |
| Surgical management | 1 | 2 | 3 | 3 | 3 | 3 | 0 | 1 | 3 | 2 | 3 | 2.2 | 10 (82) |
| Treatment choice | 3 | 0 | 3 | 0 | 3 | 3 | 0 | 0 | 0 | 3 | 2 | 1.5 | 6 (55) |
| Treatment risks | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 1.0 | 4 (36) |
| After miscarriage | | | | | | | | | | | | 1.2 | |
| Conception | 1 | 2 | 3 | 2 | 1 | 0 | 1 | 2 | 0 | 2 | 3 | 1.5 | 9 (82) |
| Intercourse | 3 | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 3 | 1.2 | 5 (45) |
| Contraception | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0.8 | 3 (27) |
| Rh(D) management | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 2 | 3 | 1.3 | 5 (45) |
| Repeated miscarriage | 2 | 3 | 3 | 2 | 3 | 3 | 0 | 3 | 0 | 3 | 3 | 2.3 | 9 (82) |
| Preventing miscarriage | 2 | 2 | 3 | 2 | 2 | 3 | 1 | 2 | 2 | 0 | 3 | 2.0 | 10 (91) |
| Emotional response | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3.0 | 11 (100) |
| Mean score | 1.7 | 1.8 | 2.2 | 1.4 | 1.9 | 1.8 | 1.0 | 1.5 | 1.1 | 2.2 | 2.6 | 1.7 | |
| Key messages included (n) (%) | 15 (68) | 14 (64) | 17 (77) | 12 (55) | 15 (68) | 13 (59) | 10 (45) | 13 (59) | 10 (45) | 18 (82) | 20 (91) | 14 (65) | |

Table 3
Completeness of website content

| Key messages (n = 22) | WebMD | NIH | Mayo Clinic | Medicine Net | Drugs.com | Everyday Health | Healthline | Rx List | Medical News Today | ACNM | ACOG Patient Education | Mean | Number of websites including key message (n) (%) |
|---------------------------------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|----------------|--------------------|----------------|------------------------|----------------|--|
| Definition | 3 | 3 | 2 | 3 | 2 | 1 | 2 | 3 | 3 | 2 | 2 | 2.4 | 11 (100) |
| Incidence | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2.6 | 11 (100) |
| Risk factors | | | | | | | | | | | | 2.3 | |
| Common risk factors | 3 | 3 | 3 | 3 | 1 | 2 | 3 | 3 | 1 | 3 | 2 | 2.5 | 11 (100) |
| Other risk factors | 3 | 3 | 3 | 0 | 3 | 0 | 2 | 3 | 3 | 2 | 1 | 2.1 | 9 (82) |
| Symptoms | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2.9 | 11 (100) |
| Diagnosis | | | | | | | | | | | | 1.0 | |
| Evaluation with ultrasound | 2 | 3 | 3 | 3 | 3 | 2 | 0 | 3 | 3 | 2 | 3 | 2.5 | 10 (91) |
| Needing additional time | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 0.5 | 2 (18) |
| Other clinical factors | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 (9) |
| Treatment | | | | | | | | | | | | 0.8 | |
| Expectant management/watchful waiting | 0 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.4 | 10 (91) |
| Medical management | 1 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 0.8 | 7 (64) |
| Medical management dosing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 (0) |
| Medical management follow-up | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 0.5 | 2 (18) |
| Surgical management | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 3 | 1.3 | 10 (82) |
| Treatment choice | 1 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 0 | 3 | 2 | 1.0 | 6 (55) |
| Treatment risks | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.5 | 4 (36) |
| After miscarriage | | | | | | | | | | | | 1.0 | |
| Conception | 1 | 2 | 3 | 2 | 1 | 0 | 1 | 2 | 0 | 3 | 3 | 1.6 | 9 (82) |
| Intercourse | 1 | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 2 | 0.9 | 5 (45) |
| Contraception | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0.6 | 3 (27) |
| Rh(D) | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 2 | 2 | 0.9 | 5 (45) |
| Repeated miscarriage | 2 | 2 | 3 | 2 | 3 | 2 | 0 | 2 | 0 | 2 | 2 | 1.8 | 9 (82) |
| Preventing miscarriage | 3 | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 0 | 2 | 1.9 | 10 (91) |
| Emotional response | 3 | 1 | 3 | 3 | 3 | 2 | 3 | 1 | 1 | 3 | 3 | 2.4 | 11 (100) |
| Mean score | 1.5 | 1.4 | 2.0 | 1.3 | 1.4 | 1.0 | 0.9 | 1.3 | 0.9 | 1.9 | 2.0 | 1.4 | |
| Key messages included (n) (%) | 15 (68) | 14 (64) | 17 (77) | 12 (55) | 15 (68) | 13 (59) | 10 (45) | 13 (59) | 10 (45) | 18 (82) | 20 (91) | 14 (65) | |

of accuracy scores tended to have equal or lower completeness scores, on average scoring approximately 0.5 point higher on accuracy than completeness.

All 11 sites included the definition, incidence, common risk factors, symptoms and emotional response of miscarriage, some of which directly quoted or referenced the ACOG Practice Bulletin in these categories. No site scored lower than 2 for accuracy in these categories. Several sites overestimated the incidence by 5%–15%, and some accurately acknowledged that miscarriage can occur prior to a woman confirming pregnancy.

3.3. *Emphasis on risk factors*

The majority of sites devoted longer sections to risk factors of miscarriage compared to other key messages, and some listed more risk factors than those included in the ACOG Practice Bulletin, such as smoking, radiation exposure, maternal weight and alcohol misuse. Most additional risk factors that were not included in the ACOG Practice Bulletin are supported by published evidence [6]. Sites overall scored high on accuracy (mean = 2.6) and completeness (mean = 2.3) for their information on risk factors. Two sites scored a 1 for completeness because they did not include maternal age or prior miscarriage.

3.4. *Limited or missing information on diagnosis and treatment*

All but one site provided accurate and complete information on diagnosing miscarriage. Most sites scored high on accuracy for the content included on diagnosis yet scored low on completeness. Many sites omitted key messages pertaining to treatment and diagnosis, resulting in low overall accuracy and completeness scores in these categories.

For diagnosis, all but one site provided overall accurate and complete information on the use of ultrasound for diagnosis. However, very few sites included information on other key messages related to diagnosis, such as needing additional time and tests in some cases before diagnosing miscarriage with complete clinical certainty. Only one site mentioned other clinical factors to be considered, which, according to the ACOG Practice Bulletin, include the patient's preference in the diagnostic process, which should incorporate considerations of her desire to continue the pregnancy, her willingness to postpone treatment to achieve more certainty that a miscarriage has occurred and her anxiety [3].

Most sites included information on expectant management as a treatment option for miscarriage. Sixty-four percent ($n = 7$) of websites provided accurate but incomplete information on the use of medication as a treatment option. No website provided any information on medication dosing, and only the two professional association websites provided content on follow-up for medication management. Only two sites named misoprostol as a medication that can be used in miscarriage management, and no site mentioned use of mifepristone. About half (55%) of sites acknowledged that patients may have a choice in treatment options; only 36% ($n = 4$) of websites provided fairly accurate but incomplete information about treatment risks, with the remaining 64% ($n = 7$) of websites providing no information at all.

3.5. *Limited or misleading information on postmiscarriage instructions or prevention of miscarriage*

Sites received overall low scores for information pertaining to conception, intercourse and contraception following a miscarriage. Some sites recommended waiting several weeks to months before attempting to conceive after a miscarriage, which the ACOG Practice Bulletin states is not supported by evidence [3]. The majority of sites did not mention the use of contraception after miscarriage, which the Practice Bulletin says can be initiated immediately after a miscarriage. The Practice Bulletin additionally recommends abstaining from vaginal intercourse for 1 to 2 weeks following a miscarriage, although it recognizes that this is

not evidence based. Fifty-five percent ($n = 6$) of websites did not mention intercourse after miscarriage, and the remaining sites received a range of scores for accuracy and completeness. While about half (55%) of sites did not mention Rh(D) management with miscarriage, those that did provided fairly accurate and complete information.

Few sites provided information pertaining to what to expect after miscarriage. The majority provided content on conception after miscarriage, yet sites overall scored low for accuracy and completeness. Less than half (45%) provided information on intercourse after miscarriage with varying degrees of accuracy and completeness.

According to the ACOG Practice Bulletin, there are no effective interventions to prevent early pregnancy loss, with the exception of progesterone therapy in the first trimester for women who have experienced at least three prior pregnancy losses [3]. Some sites recommended progesterone therapy without clarifying that this recommendation is specific to women who have experienced recurrent pregnancy loss; other sites did not include this recommendation at all. Many sites lost points for misrepresenting suggestions for a healthy pregnancy as ways to prevent miscarriage since it is inaccurate to imply certain lifestyle changes can reduce the risk of miscarriage [3].

4. Discussion

The majority of popular health websites include consumer-facing content on miscarriage, and the information presented is a mostly complete and accurate representation of the ACOG Practice Bulletin on Early Pregnancy Loss. The majority of reviewed websites included over half of the 22 key messages and scored on average above 2 for the content included. Some websites provided overall high-quality information across the majority of key messages. However, consumers searching for information about diagnosis, treatment and what to expect after miscarriage are exposed to incomplete or missing information. Some key messages had broad variability in the quality of information represented across sites, which is consistent with previous research concluding that the quality of reproductive health information available on the internet is variable across websites [7–9].

We identified several topics in particular that were absent or inaccurate on the consumer websites, including information about how the diagnosis of miscarriage may require multiple evaluations over time, about how the patient's preference for the pregnancy should influence management and about medical management. These are all important topics that could help prepare patients to understand what to expect, to be more involved in making decisions about their care and to ask their healthcare providers more informed questions. Previous research has shown that patients who are more educated about their treatment and healthcare options are more likely to express decisional certainty about their treatment choice [10,11].

Information on medical management should additionally reflect the findings of recent evidence demonstrating that the combination of mifepristone and misoprostol is more effective than misoprostol alone for treating early pregnancy loss [12]. These findings were incorporated into the ACOG Practice Bulletin in November 2018 [3], after we conducted this review. While we did not expect sites to include information on mifepristone for medical management prior to its incorporation into the ACOG Practice Bulletin, only two sites referenced misoprostol, and all sites could improve in this area. For most patients, any of the three treatment modalities is appropriate [3], and patients who are well informed about their options may be more likely to advocate for their preferences and to make a decision together with their provider.

The vast majority of websites did not acknowledge that women may be experiencing pregnancy loss of an unintended or unwanted pregnancy, or may want to prevent future pregnancy. Patient feelings related to whether the pregnancy is desired are important to consider in the treatment plan. Patients with unwanted pregnancies or who are ambivalent may prefer to move more quickly toward treatment even though the miscarriage has not been confirmed with absolute certainty.

Many women may also find it helpful to know that the time of miscarriage treatment is a safe and effective time to adopt a contraceptive option, including an intrauterine device [3]. Clinicians focused on family planning services have an important role in providing miscarriage management and follow-up care, as well as postmiscarriage contraception.

This study has several limitations. We used a simple scoring method and presented the results using mean calculations, which do not provide any statistical significance or predictive measurements between website characteristics and content. We additionally treated all key messages as equally important and did not assign different weights to scores when calculating means. While arguments can be made for certain key messages being more relevant for consumers to be able to access on the internet, we considered all key messages to be equally important.

Other limitations include that our review only examined the most popular websites for health information in English, which may not be representative of information being accessed by non-English-speaking populations in the United States. While these websites were ranked as the most popular websites through the criterion of website traffic, they may also be nonrepresentative of the websites women most frequently visit when searching specifically for information on miscarriage. Additionally, this review has only examined branded webpages with written, systematic information on miscarriage and is unable to provide a quality assessment of other webpages or resources on miscarriage that are widely available to consumers, such as online articles, editorials or videos. Nonsystematic information on miscarriage available on the internet may affect knowledge or misconceptions of miscarriage among the general public who are unable to judge the quality of information available on the internet [13]. Website content may also change regularly, and this review does not capture any changes made by the websites after July 2018.

We hope these findings will be used to update the information on consumer-facing websites to reflect evidence-based information on miscarriage. Healthcare providers may additionally find this review helpful in understanding the level of accurate and complete information across key messages widely available to patients prior to seeking professional medical care.

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