



# Obstetric anal sphincter injury: a systematic review of information available on the internet

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Received: 15 May 2018 / Accepted: 8 August 2018 / Published online: 29 August 2018  
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## Abstract

**Objective** There is no systematic evaluation of online health information pertaining to obstetric anal sphincter injury. Therefore, we evaluated the accuracy, credibility, reliability, and readability of online information concerning obstetric anal sphincter injury. **Materials and methods** Multiple search engines were searched. The first 30 webpages were identified for each keyword and considered eligible if they provided information regarding obstetric anal sphincter injury. Eligible webpages were assessed by two independent researchers for accuracy (prioritised criteria based upon the RCOG Third and Fourth Degree Tear guideline); credibility; reliability; and readability.

**Results** Fifty-eight webpages were included. Seventeen webpages (30%) had obtained Health On the Net certification, or Information Standard approval and performed better than those without such approvals ( $p = 0.039$ ). The best overall performing website was <http://www.pat.nhs.uk> (score of 146.7). A single webpage (1%) fulfilled the entire criteria for accuracy with a score of 18: [www.tamesidehospital.nhs.uk](http://www.tamesidehospital.nhs.uk). Twenty-nine webpages (50%) were assessed as credible (scores  $\geq 7$ ). A single webpage achieved a maximum credibility score of 10: [www.meht.nhs.uk](http://www.meht.nhs.uk). Over a third (21 out of 58) were rated as poor or very poor. The highest scoring webpage was <http://www.royalsurrey.nhs.uk> (score 62). No webpage met the recommended Flesch Reading Ease Score above 70. The intra-class coefficient between researchers was 0.98 (95% CI 0.96–0.99) and 0.94 (95% CI 0.89–0.96) for accuracy and reliability assessments.

**Conclusion** Online information concerning obstetric anal sphincter injury often uses language that is inappropriate for a lay audience and lacks sufficient accuracy, credibility, and reliability.

**Keywords** Accuracy · Credibility · Obstetric anal sphincter injury · Online information · Quality · Systematic review

**Electronic supplementary material** The online version of this article (<https://doi.org/10.1007/s00192-018-3753-9>) contains supplementary material, which is available to authorized users

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## Introduction

Obstetric anal sphincter injuries (OASI) following vaginal deliveries include severe perineal tears and encompass third-degree tears, injuries involving the anal sphincter complex, fourth-degree tears, and injuries involving the anal sphincter complex and anal mucosa [1]. The risk of such injuries is estimated to be 5% in nulliparous women and over 7% in higher risk groups [2]. Short-term management of obstetric anal sphincter injuries requires immediate surgical repair. Repairs are performed by an appropriately trained clinician, preferably in an operating theatre under regional analgesia [3]. Post-operatively, analgesia, antibiotic prophylaxis, laxatives, and pelvic floor physiotherapy are recommended [3]. Obstetric anal sphincter injuries are associated with significant morbidity including anal incontinence, urinary incontinence,

and sexual dysfunction [4–6]. Potential long-term morbidity, difficulties during the convalescence period, and anxieties regarding future births often motivate women, partners, and families to seek online information regarding obstetric anal sphincter injuries.

The internet is perceived to be an important source of health information among patients [7]. More recently, journals are encouraging patient involvement and participation in scientific publishing [8, 9]. Patients therefore require adequate information and validated knowledge in lay language to be able to contribute efficiently in scientific papers as co-authors. This is in addition to the obvious need for valid public and patient information extensively discussed in most guidelines. Young women are more likely to use the internet for this purpose, with pregnancy and childbirth accounting for over a fifth of all health-related searches [10]. Patients can access information about their condition, share experiences with others, and utilise support networks anonymously and conveniently. However, the quality of information online can be variable and inaccurate information can be related to adverse outcomes and poor decisions regarding treatment [11].

To date, there is no systematic evaluation of online health information pertaining to obstetric anal sphincter injury. Therefore, we assessed the accuracy, credibility, reliability, and readability of webpages providing information on the diagnosis and management of obstetric anal sphincter injury.

## Materials and methods

### Sources

A protocol with explicitly defined objectives, criteria for World Wide Web page selection, and approaches to assessing accuracy, credibility, reliability, and readability was developed.

The protocol is registered with the International Prospective Register of Systematic Reviews (PROSPERO), registration number: CRD42017078212. This systematic review was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidance [12].

### Identification of webpages

A comprehensive search strategy was developed. During September 2017, we searched five popular search engines: [aol.com](http://aol.com), [ask.com](http://ask.com), [bing.com](http://bing.com), [google.com](http://google.com), and [yahoo.com](http://yahoo.com).

### Search term selection

[Google.com](http://Google.com) keyword planner and [semrush.com](http://semrush.com) were used to define, select, and evaluate the most relevant keywords related

to obstetric anal sphincter injury. A long list of terms and phrases were evaluated within [google.com](http://google.com) keyword planner, terms yielding fewer than 100 monthly searches were excluded. We used the following search terms:

1. Perineal trauma (1,000 searches per month)
2. Perineal tear (100,000 searches per month)
3. Perineal laceration (10,000 searches per month)
4. Obstetric trauma (1,000 searches per month)
5. Third-degree tear (10,000 searches per month)
6. Fourth-degree tear (1,000 searches per month)
7. Vaginal tear (100,000 searches per month)
8. Obstetric anal sphincter injury (100 searches per month)

We reviewed webpages identified by search terms on the first three pages per search engine. The search was limited as the vast majority of internet users do not seek information from webpages listed past the first three pages returned by a search engine [13]. Location services were disabled to reduce geographical bias.

We organised the webpages and two researchers (VG and VP) screened the webpages for eligibility based on predetermined eligibility criteria. Webpages were considered eligible if they provided information about obstetric anal sphincter injury such as the classification of tears, associated risk factors, preventative methods, diagnosis, treatment by surgical repair, prognosis, post-operative management, follow-up, and mode of delivery in future pregnancies. Websites were excluded for the following reasons: language other than in English; citations of scholarly articles; advertisements for products, hospitals, and clinicians; personal experience or blogs; videos resources; password protected sites; and material aimed at medical professionals. Discrepancies were resolved by a third reviewer (SKD).

Eligible webpages were saved in an electronic form and duplicates removed. Two independent researchers (VG and VP) extracted webpage characteristics and assessed accuracy, credibility, reliability, and readability.

### Webpages characteristics

Two researchers (VG and VP) independently extracted website characteristics using a piloted data extraction Microsoft Excel sheet. Webpage characteristics extracted included country of origin, listed authors, disease-specific, patient-focused, presence of a patient forum, privacy statement, source of funding, and external editorial approvals. Discrepancies were resolved by a third reviewer (SKD).

### Quality assessment

Webpages were assessed for accuracy, credibility, reliability, and readability. Researchers were trained to evaluate:

1. Accuracy: prioritised criteria based upon the Royal College of Obstetricians and Gynaecologists (RCOG) *Third and Fourth Degree Tear* guideline, range 0–9 [3]
2. Credibility: White Paper instrument, range 0–10 [14]
3. Reliability: DISCERN instrument, range 0–85 [15]
4. Readability: Flesch–Kincaid instrument, range 0–100 [16]

Two researchers (VG and VP) independently assessed each webpage.

Accuracy of information presented on webpages was assessed by a prioritised nine-item criterion (Table 1). This was formulated and guided by evidence-based recommendations from the Royal College of Obstetricians and Gynaecologists guideline, *Third and Fourth Degree Tears 2015* [3]. Recommendations pertaining to classification, risks, preventative strategies, diagnosis, surgical treatment, and further management of obstetric anal sphincter injury were extracted from the guideline. With regard to surgical repair, details of the standardised repair technique were omitted. Each criterion was scored as follows: 0 for not mentioned or incorrectly mentioned, 1 for partially mentioned and 2 for correctly mentioned; total scores ranged from 0 to 18.

The White Paper instrument was developed for healthcare users to critically appraise the credibility of online information using the following criteria [14]. Credibility was assessed using ten criteria: source; context; currency; utility; editorial review process; hierarchy of evidence; statement of original source; disclaimer, which included ownership, sponsorship, funding, and advertising; omissions; and feedback. Each criterion was scored 0 if absent and 1 if present; total scores ranged from 0 to 10. Webpages were considered credible if they achieved scores  $\geq 7$  [17].

The DISCERN instrument developed by the National Health Service Executive Research and Development Programme consists of 16 questions and is used to assess the reliability of written information regarding treatment choices [15]. Questions 1–8 assess the reliability and dependability of information; questions 9 to 13 and 15 specifically assess information on treatment options. For this study, question 14 was excluded, as no treatment is not a recommended management strategy in the event of an obstetric anal sphincter injury. Question 16 is an overall global rating. These questions are scored on a Likert scale anchored between 1 (low quality) and 5 (high quality). Total scores ranged from 15 to 75 and were arbitrarily grouped: very poor (15–26), poor (27–38), moderate (39–50), good (51–62), and excellent (63–75) [18].

The Flesch Reading Ease Score and the Flesch–Kincaid grade level, were used to assess the readability of webpages. The Flesch Reading Ease score was calculated using a validated formula by an online readability calculator (<https://readable.io>). Flesch Reading Ease scores ranged from 0 to 100, with higher scores indicating easier reading [16]. It has

been recommended that health information should achieve a Flesch Reading Ease score above 70. Flesch–Kincaid grade levels are based on the United States grade levels and range from 1 to 12 and were calculated using an online readability calculator (<https://readable.io>). It has been recommended that health information should not exceed a level above the seventh grade [19].

## Ethical approval

This study used information freely available on the internet and therefore ethical approval was not required.

## Data analysis

Scores obtained for accuracy, credibility, reliability, and readability from each researcher were averaged and presented as means, standard deviation (SD), and percentages. A Mann–Whitney test was performed to compare groups of data that were not normally distributed. Inter-rater reliability of assessments was tested for agreement using intra-class coefficients. Scores less than 0.2 indicated poor agreement, 0.6 to 0.8 indicated good, and greater than 0.8 indicated very good agreement [20]. Spearman’s rho correlation was calculated to identify and test the strength of the relationship between accuracy and reliability using the DISCERN questionnaire.

## Results

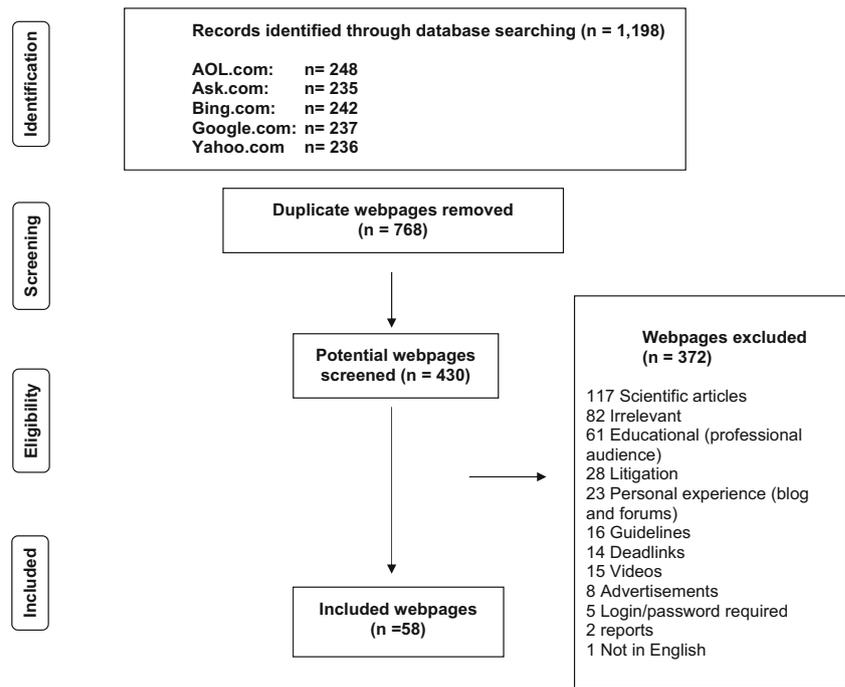
Our search strategy identified 1,198 webpages. After excluding 768 duplicate records, 430 webpages were screened. Fifty-eight webpages met the study’s inclusion criteria (Fig. 1; Table 2).

## Webpage characteristics

Twenty-seven webpages (47%) were published in the United Kingdom. Most webpages (54 out of 58; 93%) stated a privacy statement, 20 webpages (34%) attributed authorship, and 27 webpages (46%) were government-funded. Seventeen webpages (30%) had obtained Health On the Net (HON) certification or Information Standard approval (Table 3). Overall, these webpages performed better than webpages without such approvals (unapproved webpages median 109.4, Q1–Q3 96.6–120.0 vs HON- or Information Standard-approved webpages median 122.2, Q1–Q3 102.85–137.0.  $p = 0.039$ ). The best overall performing website was <http://www.pat.nhs.uk> with a score of 146.7.

**Table 1** Showing nine-point criteria for assessment of accuracy

Criteria	Description
1	<p>Definition of obstetric and anal sphincter injury</p> <ul style="list-style-type: none"> <li>– Clearly states the definition of third- and fourth-degree tears</li> <li>– Includes involvement and injury of the anal sphincter complex and/or anal mucosa</li> <li>– Third-degree tear: injury to anal sphincter complex. 3a tear less than 50% of external anal sphincter torn, 3b more than 50% of external anal sphincter torn, 3c external anal sphincter and internal anal sphincter torn</li> <li>– Fourth-degree tear: injury to anal sphincter complex and anal mucosa</li> </ul>
2	<p>Identification of risk factors for obstetric anal sphincter injury</p> <ul style="list-style-type: none"> <li>– Asian ethnicity</li> <li>– Nulliparity</li> <li>– Birthweight more than 4 kg</li> <li>– Shoulder dystocia</li> <li>– Occipito-posterior position</li> <li>– Prolonged second stage</li> <li>– Instrumental delivery forceps</li> </ul>
3	<p>Prevention of obstetric anal sphincter injury</p> <ul style="list-style-type: none"> <li>– Episiotomy conflicting evidence</li> <li>– Slow delivery of head</li> <li>– Perineal protection at crowning and warm compression</li> <li>– Perineal massage</li> </ul>
4	<p>Assessment and diagnosis of third- and fourth-degree tear</p> <ul style="list-style-type: none"> <li>– Systematic examination of tears including a vaginal and digital rectal examination before repair</li> </ul>
5	<p>Treatment of third- and fourth-degree tear</p> <ul style="list-style-type: none"> <li>– Includes details regarding location of repair in theatre</li> <li>– With regional/general anaesthesia</li> <li>– By an experienced obstetrician</li> <li>– Reasonable to delay repair for an experienced surgeon if the patient is stable</li> </ul>
6	<p>Post-operative management of third- and fourth-degree tear</p> <ul style="list-style-type: none"> <li>– Includes details including mechanism of action</li> <li>– Use of antibiotics to reduce infection and dehiscence</li> <li>– Use of analgesia such as non-steroidal-anti-inflammatory drugs to reduce pain and inflammation</li> <li>– Use of laxatives, specifically not bulking agents to reduce dehiscence</li> <li>– Physiotherapy to strengthen pelvic floor muscles</li> </ul>
7	<p>Prognosis of third- and fourth-degree tear</p> <ul style="list-style-type: none"> <li>– Contains information on the long-term risk of anal incontinence</li> <li>– Advises that 60–80% of women are asymptomatic at 12 months following delivery and external anal sphincter repair.</li> </ul>
8	<p>Follow-up in the third- and fourth-degree tear</p> <ul style="list-style-type: none"> <li>– Information regarding follow-up including an appointment with a specialist 6–12 weeks postpartum</li> <li>– Information regarding referrals to appropriate specialists such as a urogynaecologist and colorectal surgeon if experiencing pain or incontinence</li> </ul>
9	<p>Future births and third- and fourth-degree tear</p> <ul style="list-style-type: none"> <li>– Information details the risk of further third- and fourth-degree tears in future vaginal deliveries</li> <li>– The role of episiotomy is not protective</li> <li>– Elective caesarean section is recommended if the patient is symptomatic, or has an abnormal endoanal ultrasound and/or manometry</li> </ul>

**Fig. 1** Flow chart of the webpages included

## Accuracy

The intra-class coefficient between researcher VG and VP was 0.98 (95% CI 0.96–0.99). A single webpage (1%) fulfilled the entire criteria for accuracy with a score of 18: [www.tamesidehospital.nhs.uk](http://www.tamesidehospital.nhs.uk). Other high scoring webpages included: <http://sydney.edu.au> (score 17), <http://www.royalberkshire.nhs.uk> (score 17), <http://www.nlg.nhs.uk> (score 16) and [www.poole.nhs.uk](http://www.poole.nhs.uk) (score 16). The definition of obstetric anal sphincter injury was among the criteria communicated most frequently and accurately by webpages (53 webpages, 91%). Webpages performed poorly when considering preventative strategies (23 webpages; 39%), risk factors (23 webpages; 39%), diagnosis (16 webpages; 27%), and prognosis (12 webpages; 20%). Webpages frequently reported information regarding surgical treatment (43 webpages; 74%) and post-operative management (44 webpages; 75%), and future childbirth (25 webpages; 43%; Table 4).

## Credibility

Twenty-nine webpages (50%) were assessed as credible (scores  $\geq 7$ ). A single webpage achieved a maximum credibility of score 10: [www.meht.nhs.uk](http://www.meht.nhs.uk). Other high-scoring webpages included: <https://www.babycenter.com> (score 9.5), <http://kiwifamilies.co.nz> (score 9), <http://www.pat.nhs.uk> (score 9), <http://www.royalsurrey.nhs.uk> (score 9), <http://www.swbh.nhs.uk> (score 9) and <https://www.news-medical.net> (score 9). A third of webpages (17 webpages, 30%) were accredited by the Information Standard or HON. All

webpages provided information regarding the source of information. Fifty-one webpages (87%) were frequently assessed as being useful and fit for purpose and 44 webpages (75%) presented evidence for the information provided. Webpages performed well with regard to content (53 webpages; 91%) and data of publication and intentions to update (42 webpages; 72%). Over half of webpages (30 webpages, 52%) were assessed as containing information regarding author credentials including affiliations. Thirty webpages (51%) provided an opportunity for users to provide feedback. Funding and sponsorship was infrequently reported (16 webpages; 27%; Table 4).

## Reliability

The intra-class coefficient between researchers VG and VP was 0.94 (95% CI 0.89–0.96). No webpage consistently performed well across assessment domains. Highest scoring webpages included: <http://www.royalsurrey.nhs.uk> (score 62), <https://www.tamesidehospital.nhs.uk> (score 61.5), <http://www.nlg.nhs.uk> (score 61), <http://www.pat.nhs.uk> (score 61), <http://www.gloshospitals.nhs.uk> (score 59) and <https://www.rcog.org.uk> (score 58.5). Twenty-one webpages (36%) were assessed as poor or very poor. Forty-nine webpages (84%) explained the operative technique for obstetric anal sphincter injury repair. Forty-three webpages (74%) described the benefits of operative repair and 38 webpages (65%) described the risks. Forty-three webpages (74%) described aspects of quality of life. Fifty-five webpages (94%) were assessed as providing no information regarding long-term morbidity associated with no treatment (Table 4).

**Table 2** Webpages included with sequential number

Webpage number	URL
1	<a href="http://autoprac.com">http://autoprac.com</a>
2	<a href="http://brochures.mater.org.au">http://brochures.mater.org.au</a>
3	<a href="http://c.ymcdn.com">http://c.ymcdn.com</a>
4	<a href="http://gynaeonline.com/perineal_tear.htm">http://gynaeonline.com/perineal_tear.htm</a>
5	<a href="http://kiwifamilies.co.nz">http://kiwifamilies.co.nz</a>
6	<a href="http://sydney.edu.au">http://sydney.edu.au</a>
7	<a href="http://theconversation.com">http://theconversation.com</a>
8	<a href="http://www.bbc.com">http://www.bbc.com</a>
9	<a href="http://www.cardiffandvaleuhb.wales.nhs.uk">http://www.cardiffandvaleuhb.wales.nhs.uk</a>
10	<a href="http://www.gloshospitals.nhs.uk">http://www.gloshospitals.nhs.uk</a>
11	<a href="http://www.jpaget.nhs.uk">http://www.jpaget.nhs.uk</a>
12	<a href="http://www.kidspot.com.au">http://www.kidspot.com.au</a>
13	<a href="http://www.maternalmothers.org.au">http://www.maternalmothers.org.au</a>
14	<a href="http://www.mayoclinic.org">http://www.mayoclinic.org</a>
15	<a href="http://www.med.umich.edu">http://www.med.umich.edu</a>
16	<a href="http://www.medicaldaily.com">http://www.medicaldaily.com</a>
17	<a href="http://www.momjunction.com">http://www.momjunction.com</a>
18	<a href="http://www.nlg.nhs.uk">http://www.nlg.nhs.uk</a>
19	<a href="http://www.parents.com">http://www.parents.com</a>
20	<a href="http://www.pat.nhs.uk">http://www.pat.nhs.uk</a>
21	<a href="http://www.royalberkshire.nhs.uk">http://www.royalberkshire.nhs.uk</a>
22	<a href="http://www.royalsurrey.nhs.uk">http://www.royalsurrey.nhs.uk</a>
23	<a href="http://www.skepticalob.com">http://www.skepticalob.com</a>
24	<a href="http://www.swbh.nhs.uk">http://www.swbh.nhs.uk</a>
25	<a href="http://www.totalpregnancycare.com">http://www.totalpregnancycare.com</a>
26	<a href="http://www.uhs.nhs.uk">http://www.uhs.nhs.uk</a>
27	<a href="http://www.winchesterhospital.org">http://www.winchesterhospital.org</a>
28	<a href="https://doclibrary-rcht.comwall.nhs.uk">https://doclibrary-rcht.comwall.nhs.uk</a>
29	<a href="https://en.wikipedia.org">https://en.wikipedia.org</a>
30	<a href="https://medium.com">https://medium.com</a>
31	<a href="https://patient.info">https://patient.info</a>
32	<a href="https://thewomens.r.worldssl.net">https://thewomens.r.worldssl.net</a>
33	<a href="https://www.ashfordstpeters.info">https://www.ashfordstpeters.info</a>
34	<a href="https://www.babycenter.com">https://www.babycenter.com</a>
35	<a href="https://www.babycentre.co.uk">https://www.babycentre.co.uk</a>
36	<a href="https://www.babymed.com">https://www.babymed.com</a>
37	<a href="https://www.beingtheparent.com">https://www.beingtheparent.com</a>
38	<a href="https://www.bundoo.com">https://www.bundoo.com</a>
39	<a href="https://www.cancercarewny.com">https://www.cancercarewny.com</a>
40	<a href="https://www.drugs.com">https://www.drugs.com</a>
41	<a href="https://www.health.qld.gov.au">https://www.health.qld.gov.au</a>
42	<a href="https://www.healthline.com">https://www.healthline.com</a>
43	<a href="https://www.healthline.com">https://www.healthline.com</a>
44	<a href="https://www.healthpoint.co.nz">https://www.healthpoint.co.nz</a>
45	<a href="https://www.hey.nhs.uk">https://www.hey.nhs.uk</a>
46	<a href="https://www.kopabirth.com">https://www.kopabirth.com</a>
47	<a href="https://www.lancsteachinghospitals.nhs.uk">https://www.lancsteachinghospitals.nhs.uk</a>
48	<a href="https://www.nct.org.uk">https://www.nct.org.uk</a>
49	<a href="https://www.news-medical.net">https://www.news-medical.net</a>

**Table 2** (continued)

Webpage number	URL
50	<a href="https://www.nuh.nhs.uk">https://www.nuh.nhs.uk</a>
51	<a href="https://www.rcm.org.uk">https://www.rcm.org.uk</a>
52	<a href="https://www.rcog.org.uk">https://www.rcog.org.uk</a>
53	<a href="https://www.tamesidehospital.nhs.uk">https://www.tamesidehospital.nhs.uk</a>
54	<a href="https://www.todayparent.com">https://www.todayparent.com</a>
55	<a href="https://www.wwl.nhs.uk">https://www.wwl.nhs.uk</a>
56	<a href="http://www.meht.nhs.uk">www.meht.nhs.uk</a>
57	<a href="http://www.ouh.nhs.uk">www.ouh.nhs.uk</a>
58	<a href="http://www.poole.nhs.uk">www.poole.nhs.uk</a>

### Readability

When considering the Flesch Reading Ease Score for the webpages included, none of the webpages met the recommended Flesch Reading Ease Score above 70. When considering the Flesch–Kincaid grade level for the webpages included, two webpages [mayoclinic.org](http://www.mayoclinic.org) and [babycentre.co.uk](http://www.babycentre.co.uk) met the recommended seventh grade reading level (Table 4).

### Correlation

Spearman's rho correlation coefficient was calculated and demonstrated a strong positive relationship between reliability and accuracy assessment scores (0.72,  $p$  value <0.01), thereby indicating that webpages with higher reliability scores were associated with higher accuracy scores.

## Discussion

### Main findings

A minority of webpages had obtained HON certification or Information Standard approval. None of the webpages performed consistently well over the four domains of assessment. One webpage provided accurate information. Most webpages provided no information regarding risk factors, diagnosis, and prognosis. Webpages performed better with regard to credibility, for example, webpages were frequently assessed as being useful, highlighted research evidence relevant to the information being presented, and provided information regarding author credentials and affiliations. Over a third were assessed as unreliable; however, many webpages did describe the benefits of operative repair, discussed quality of life, and provided information with regard to future health. Only two webpages were assessed as being written in plain English.

**Table 3** Characteristics of the webpages included

Webpage number	Country	Authors	Disease specific	Patient focused	Patient forum	Privacy statement	Source of funding	Approvals
1	Global	Not stated	No	Yes	No	Yes	Commercial	
2	Australia	Not stated	No	Yes	No	Yes	Commercial	
3	Global	Not stated	Yes	No	No	Yes	NGO	
4	Global	Stated	No	Yes	No	No	Commercial	
5	New Zealand	Stated	No	Yes	Yes	Yes	Commercial	
6	Australia	Not stated	Yes	Yes	No	No	Commercial	
7	United Kingdom	Not stated	No	Yes	Yes	No	NGO	
8	UK	Stated	No	No	No	Yes	Commercial	
9	UK	Not stated	No	Yes	No	Yes	Government	
10	UK	Not stated	No	Yes	No	Yes	Government	
11	UK	Not stated	No	Yes	No	Yes	Government	
12	Australia	Stated	No	Yes	No	Yes	Commercial	
13	Australia	Not stated	No	Yes	No	Yes	Commercial	HON certified
14	USA	Not stated	No	Yes	No	Yes	NGO	
15	USA	Not stated	No	Yes	No	Yes	NGO	
16	Global	Stated	No	Yes	No	Yes	Commercial	
17	Global	Stated	No	Yes	Yes	Yes	Commercial	
18	UK	Not stated	No	Yes	No	Yes	Government	
19	USA	Stated	No	Yes	Yes	Yes	Commercial	
20	UK	Not stated	No	Yes	No	Yes	Government	Information Standard
21	UK	Not stated	No	Yes	No	Yes	Government	
22	UK	Not stated	No	Yes	No	Yes	Government	Information Standard
23	USA	Stated	No	Yes	Yes	No	Commercial	
24	UK	Not stated	No	Yes	No	Yes	Government	Information Standard
25	Global	Stated	No	Yes	No	Yes	Commercial	
26	UK	Not stated	No	Yes	No	Yes	Government	
27	UK	Not stated	No	Yes	No	Yes	Government	
28	UK	Stated	No	Yes	No	Yes	Government	
29	Global	Not stated	No	No	No	Yes	NGO	
30	Global	Stated	No	Yes	Yes	Yes	Commercial	
31	UK	Stated	No	Yes	Yes	Yes	Commercial	Information Standard
32	Australia	Not stated	No	Yes	No	Yes	Government	
33	UK	Not stated	No	Yes	No	Yes	Government	
34	Global	Not stated	No	Yes	Yes	Yes	Commercial	
35	UK	Not stated	No	Yes	Yes	Yes	Commercial	HON certified
36	USA	Stated	No	Yes	Yes	Yes	Commercial	
37	Global	Not stated	No	Yes	No	Yes	Commercial	
38	USA	Stated	No	Yes	No	Yes	Commercial	
39	USA	Stated	No	Yes	No	Yes	Commercial	
40	USA	Not stated	No	Yes	No	Yes	Commercial	HON certified
41	Australia	Not stated	No	Yes	No	Yes	Government	
42	Global	Stated	No	Yes	No	Yes	Commercial	HON certified
43	Global	Stated	No	Yes	No	Yes	Commercial	HON certified
44	New Zealand	Not stated	No	Yes	No	Yes	Commercial	
45	UK	Not stated	No	Yes	No	Yes	Government	

**Table 3** (continued)

Webpage number	Country	Authors	Disease specific	Patient focused	Patient forum	Privacy statement	Source of funding	Approvals
46	USA	Not stated	No	Yes	No	Yes	Commercial	
47	UK	Not stated	No	Yes	No	Yes	Government	Information Standard
48	UK	Not stated	No	Yes	Yes	Yes	NGO	
49	Global	Stated	No	No	No	Yes	Commercial	HON certified
50	UK	Not stated	No	Yes	No	Yes	Government	Information Standard
51	UK	Stated	No	No	No	Yes	NGO	
52	UK	Not stated	No	Yes	No	Yes	NGO	Information Standard
53	UK	Not stated	No	Yes	No	Yes	Government	
54	Canada	Stated	No	Yes	No	Yes	Commercial	
55	UK	Not stated	No	Yes	No	Yes	Government	
56	UK	Not stated	No	Yes	No	Yes	Government	Information Standard
57	UK	Not stated	No	Yes	No	Yes	Government	
58	UK	Not stated	No	Yes	No	Yes	Government	Information Standard

NGO non-governmental organisation, HON Health On the Net

### Comparison with existing literature

Our results are comparable with findings from previous studies evaluating online information [17, 18, 21, 22]. The quality of online health information is inadequate across a range of medical specialities and languages [23, 24, 25, 26].

Concerns such as poor readability and inaccurate information are a persistent criticism of webpages and limits their ability to act as effective health resources [17, 21, 22]. This was observed by Fioretti et al., who assessed webpages written in Portuguese pertaining to caesarean section. They reported poor quality information and deemed webpages unsuitable as decision-making tools [18]. This study did not perform a sub-analysis to determine a relationship between the quality of online literature and types of organisation producing this information. However, Tirlapur et al. demonstrated that specialist sites produce higher quality information than non-specialist sites [22].

### Strengths and weaknesses

To our knowledge, this is the first study to examine the accuracy, credibility, reliability, and readability of online information concerning obstetric anal sphincter injury. We used a comprehensive search strategy to identify webpages relevant to obstetric anal sphincter injury. Validated instruments were used to assess credibility, reliability, and readability. Webpage assessment was undertaken by two researchers independently, with evidence of good inter-rater agreement. This study is

significant to patient-centred outcomes research. Results have indicated that online information fails to effectively inform and empower patients regarding their health decisions and choices. We have identified areas for improvement in online literature pertaining to obstetric anal sphincter injury. This may be useful to organisations or individuals in the future producing online information related to this topic.

Several study limitations exist. We limited our search to webpages written in English, it is challenging to draw any firm conclusions regarding webpages written in other languages. We limited our search to the first three pages of search results, potentially missing webpages eligible for inclusion. We cannot comment on the impact of the included webpages on the knowledge acquired or health-related decision influenced. We did not perform an assessment of webpage design or the impact of factors, including presentation and ease of navigation, on patient experience and education.

### Interpretation

Websites that spread misinformation will always exist. We need to equip women with critical questions to assess the quality of information and arm themselves against poor and biased information. At present, there are no tools available for patients to utilise and identify high-quality information to support health-related decisions.

As clinicians, we must be aware of the limitations of online literature and the language used to convey information. Due to shorter consultation times, patients may refer to online

**Table 4** Assessments of the webpages included

Webpage number	Flesch–Kincaid grade	Flesch Reading Ease score	Credibility score	Discern score	Accuracy score
1	7.90	55.2	3	18.5	6.0
2	9.1	55.8	6	43	7.0
3	8.4	61.1	6	50.5	12.0
4	9.3	53.3	5	27	6.0
5	9.9	55.8	9	47.5	13.5
6	9.1	55.6	4	49.5	17.0
7	11.3	48.7	6	32	4.0
8	9.2	59.9	5	29	2.0
9	8.7	58.9	7	41.5	2.0
10	8.5	61	8	59	14.0
11	9.4	56	8	52	4.0
12	10	55.2	8	48.5	8.0
13	10.7	52.7	6	42	10.0
14	7	64.4	8	25	6.0
15	8.6	58	7	30	6.0
16	11.4	47.8	6	26.9	4
17	10.5	38.1	7	30.5	8.5
18	10.6	53.4	7	61	16.0
19	9.4	58.6	3	32.5	3.0
20	8.7	62.7	9	61	14.0
21	9.2	56.8	7	57	17.0
22	9.7	50.1	9	62	11.0
23	8.4	60.6	5	27	3.0
24	8.7	63.8	9	49	14.0
25	7.8	63.2	4	25.5	7.0
26	10.6	53.2	7	46	12.0
27	9.4	41.8	6	35.5	7.0
28	12.3	45	6	44	14.0
29	10	46.8	8	33	8.0
30	7.1	64	5	29	3.0
31	11.5	34.6	8	42	7.0
32	8.9	60.2	6	38	6.0
33	11	52.3	6	45	7.0
34	9.2	60.8	9.5	38.5	5.0
35	6.2	68.2	8	50	12.0
36	9.1	56	2.5	29.3	4
37	8.8	56.5	4	33.5	7.0
38	8.3	63.4	5	32.5	6.0
39	8.3	53.2	6.5	29.9	7.0
40	7.7	58	5.5	33	6.0
41	8.8	61.4	8	42	5.0
42	9.5	54.9	8.5	31.7	6.0
43	9.8	55.6	8.5	32.1	7.0
44	8.4	61.2	4	40	11.5
45	7.1	69.2	5	41	6.5
46	6.5	66.1	7	41.5	5.0
47	9.1	61.4	6	53.5	10.0
48	9.4	53.7	6	47.5	6.0
49	10.7	47.3	9	42	8.0
50	8.4	61.9	7	56.5	15.0
51	11.8	35.1	6	42	14.0
52	9	59.2	8.5	58.5	14.0
53	8.6	61	7.5	61.5	18.0
54	10.4	59	3	30	7.0
55	7.8	61.4	8	46	12.0
56	13.6	45.2	10	54	13.0
57	7.6	64.1	8	51	12.0
58	8.1	63.1	8	45	16.0

resources for further information and peer-to-peer support [27]. However, as demonstrated by this study and as previously reported by others, online information uses language that exceeds the basic literacy levels of adults [17]. Thereby, online information can fail in its very purpose to inform and educate patients regarding their condition and treatment options. To effectively utilise the internet as a health resource, clinicians should refer patients to webpages that communicate information that can be understood clearly by a lay audience.

The internet can influence and have an impact on our patients' decisions, beliefs and attitudes towards their health. In clinical practice, medical advice is given by qualified professionals; however, online information may be produced by individuals and groups that do not have such credentials. Online content can lack an evidence base, failing to reflect current practice and opinion. Patients do not have the skills to critically appraise health literature to detect unreliable, inaccurate and biased information. Such information can leave patients vulnerable and may be used to inform health decisions potentially causing harm [28, 29]. Most concerning is that a large proportion of patients fail to discuss the knowledge acquired from the internet, as they feel confident about the credibility of the source [30]. For this reason, it is imperative that health professionals encourage discussion regarding internet findings to provide clarification or rationales for management plans that may differ from those read online. Failing to do so may result in poor adherence to treatments and a breakdown in the doctor–patient relationship.

The governance of online health information has inherent difficulties. Currently, online information is not subject to mandatory requirements or standards, including a peer review process. However, codes of conduct have been developed, such as the HONcode and Information Standard. Although, accreditation is voluntary, they aim to guide internet users by highlighting reliable, relevant and trustworthy sources of health and medical information. The HON Foundation is a non-profit organisation that provides accreditation to medical and health webpages in 35 languages. The HONcode is based on eight principles: authoritative, complementarity, attribution, justifiability, transparency, financial disclosure and advertising policy. The HONcode is aimed at providing quality, objective and transparent medical information tailored to the needs of the audiences. The Information Standard has been developed by NHS England and is based upon six core principles: information production, evidenced sources, user understanding and involvement, end-product, feedback and review. Member organisations include: NHS trusts, charities and local authorities. The Information Standard quality mark ensures that organisations have undergone rigorous assessment, thereby producing high-quality information that can be used to inform health decisions. The Information Standard is applicable to printed and online information.

This study evaluated written information; however, the method of delivering online health information is changing. Increasingly, online videos are being used to deliver information. There are few studies that have appraised the quality or effectiveness of information delivered using modalities such as video, and there are currently no validated tools for such purposes. Further research is required to develop validated instruments to assess the quality and effectiveness of online information delivered by video.

In summary, the information provided on the internet at present does not effectively inform women about obstetric anal sphincter injury. Key aspects including long-term morbidity and prognosis are often absent in current health literature. Healthcare professionals should clearly communicate risks and benefits in addition to areas of uncertainty regarding diagnostic or therapeutic options. Women who have sought online information should be encouraged to discuss the accuracy of information, during which, patients should be made aware of the dangers of inaccurate online information and the potential adverse outcomes. Health professionals can advise patients of organisations and websites that provide high-quality online information. This allows for shared decision-making during discussions that will inform women regarding future health and lifestyle choices.

It is in the interest of professional bodies and clinicians to contribute to the development of webpages. This ensures that the content published is credible, reliable and accurate. Furthermore, producers of online health information should be encouraged to adhere to regulations such as the HONcode and Information Standard. Patient-centred interventions are required to enhance online literacy and allowing patients to identify high-quality health information [31].

## Conclusion

Information currently available on the internet concerning obstetric anal sphincter injury often uses language that is inappropriate for a lay audience and lacks sufficient accuracy, credibility, and reliability. Healthcare professionals should be aware that online information pertaining to obstetric anal sphincter injury is of poor quality. Providers of online information should be strongly encouraged to adhere to regulations such as the Health on the Net Foundation accreditation.

## Compliance with ethical standards

**Conflicts of interest** None.

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