A review of websites for perinatal anxiety:
Advice for healthcare professionals and users

Abstract

Background: There are many websites available with information and resources for perinatal anxiety, however, there is limited research on the quality and content of these sites.

Objective: To identify what sites are available on perinatal anxiety, identify any information and therapeutic advice given, and review its accuracy and website design.

Methods: This study conducted a systematic review of websites for perinatal anxiety. Eligible websites (n=50) were evaluated for accuracy of information, resources for mothers, website quality and readability.

Results: Information was often incomplete and focused on symptoms, rather than risk factors or impact of untreated perinatal anxiety. Websites often had information on treatment (92%), but much less on screening (38%). Most sites provided at least some resources to support mothers (98%) and active, guided support was infrequent (50%). Website quality was extremely variable, and mostly difficult to read (84%).

Conclusions: The study recommends the top 4 websites on perinatal anxiety for healthcare professionals and users. There is a need for websites to be developed that provide accurate evidence-based information that women can relate to with quality support resources. These sites should also be easy to use and readable.

Keywords: internet; perinatal; anxiety; female; postpartum; mood disorder

Introduction

The period surrounding childbirth is one of profound change and transition for women which can often be experienced as stressful and overwhelming. Indeed, research in this area suggests approximately 20% of women experience clinically significant levels of anxiety in the perinatal period [1]. Despite being treatable once recognised, most women experiencing perinatal anxiety (PNA) do not seek help for their symptoms [2].

There are a number of reasons why women with PNA may not seek help. While there is mass public awareness about postnatal depression (PND), knowledge about other aspects of perinatal mental health is lacking at both a public and healthcare professional (HCP) level [3,4]. Thus, symptoms may go unrecognised. For those who do recognise their symptoms, concerns about being regarded as a bad mother [5] and the perceived stigma attached to mental health issues in this period may mean women are less likely to seek treatment [6,7]. This is problematic, as untreated PNA may be associated with a variety of negative outcomes in both the mother and infant, including preterm delivery, low birth weight, PND, excessive infant crying, bonding issues, problematic feeding behaviours, and adverse developmental and mental health problems in children [1,8,9].

One of the challenges in raising awareness of PNA is that the concept is relatively new. While higher rates of diagnosable anxiety disorders, similar to those seen in the general population (including generalised anxiety disorder and obsessive-compulsive disorder) are evident around childbirth [10], a significant proportion of women who experience anxiety in the perinatal period do not meet the criteria for DSM-V diagnosis, instead presenting with distressing levels of “maternally focused worry”
Therefore, PNA may constitute a clinically distinct phenomenon that is not fully captured by traditional diagnostic methods and scales, resulting in poorer recognition of these context-specific symptoms.

One way to potentially increase public (and professional) awareness of PNA is to use web-based technology to deliver clinically helpful information, diagnostic and self-help strategies, and evidence-based treatments online. Internet-based methods of delivery may be particularly helpful to women in the perinatal period, who may not have the flexibility or time to attend face-to-face appointments with HCPs; and the anonymity the internet affords may circumvent issues associated with stigma [13]. Additionally, there is evidence that users who frequently search for health information online tend to be women [14]. Thus, the internet has the potential to break down barriers to help-seeking behaviours in the perinatal period, and empower women to self-diagnose and gain support [15,16]. Additionally, the internet can offer HCPs the opportunity to learn more about PNA, delivering up-to-date information about symptoms, risks and outcomes; as well as evidence based screening and treatment options. Despite this, little is known about the current state of online support and information available for PNA. Thus, women and HCPs need a means to identify which websites are most reliable and provide quality information and resources for PNA.

Literature on perinatal mental health websites is limited. There have been two extensive reviews of websites for PND. The first study rated the content and technology of 34 PNA-related websites using a general measure of depression, a measure of website quality and readability [17]. Websites rarely presented current and accurate information on depression, had technological shortcomings and were difficult to read. A significant number presented misleading information and some advocated alternative treatment over treatment from a HCP. The second review rated 114 websites using more detailed scales that specifically evaluated information on PND and identified online support resources for women with PND [18]. Findings revealed that information provided was inadequate and website quality was variable. While resources for women were often provided, they had limited availability and scope. To date there is no known review of PNA websites.

Using a similar review method to that of Moore and Ayers (2011), this study sought to identify and review current websites for PNA, and evaluate their accuracy and quality on a variety of dimensions. The aim of the study was three-fold:

1. identify what sites women searching for information about PNA might find
2. identify any information and therapeutic advice given, and its accuracy
3. review website design in terms of navigation, readability, presentation, accessibility

Methods

Search strategy

Lay search terms were used (see Table 1) to identify websites an individual looking for information on PNA might find. Thirty combinations of these teams were entered into UK versions of the four most popular search engines (Google, Bing, Yahoo and Ask) in February 2018 [19]. Browser history and cookies were deleted before conducting each search.

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<td>Perinatal</td>
<td>Worry</td>
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Table 1. Search terms used to identify websites

As web users rarely access sites after the first 20 results [20], the first 20 results and featured sites (those paid to appear at the top of the search list) were assessed for inclusion. To be included in the review, websites had to contain at least 500 words about PNA.

Websites that did not contain any information on PNA and that solely focused on any of the following were excluded: other perinatal mental illnesses (e.g. postnatal depression puerperal psychosis), stillbirth, bi-polar disorder, infant death, abortion and miscarriage. News items, blogs, forums, Facebook groups and other social media were excluded, as were videos, scholarly articles and broken links.

Website identification

Four thousand hyperlinks were screened for eligibility. Results yielded 47 websites that met criteria for inclusion and these were examined for hyperlinks to other websites. Resultant links were assessed for eligibility and yielded a further 3 websites for inclusion.

Website evaluation

Measures

There is currently no validated measure that can be used to evaluate websites specific to PNA. As such, the authors developed a rating scale using a modified version of the measure devised by Moore and Ayers (2011) to assess PND sites. This included the following 6 sections:

1. Accuracy of perinatal anxiety information

This section assessed the accuracy of information presented on the sites across three subscales:

Symptoms. This subscale examined whether accurate and appropriate information was given about common anxiety symptoms experienced by women in the perinatal period. Symptoms were extracted from the DSM-V [21] criteria for anxiety disorders (n=11), and those outlined in three validated PNA-specific measures (n=8): The Perinatal Anxiety Screening Scale [22], The Postpartum Specific Anxiety Scale [23] and the revised Pregnancy-Related Anxiety Questionnaire [11]. Websites scored 1 point per symptom listed, with a range of 0-19.

Risk Factors. The second subscale included items related to factors that research has found to be linked to PNA, including poor social support, previous mental illness and previous traumatic life event [9,24]. Again, websites scored 1 point for each risk factor given, with a range of 0-11.

Impact. The third subscale was divided into two sections (impact on mother, and impact on infant) and included items research has identified as potential consequences of PNA, including diminished responsiveness to infant cues, low birthweight and adverse developmental issues [25-27]. Using a similar method to those above, the range of scores were 0-13 (0-8 for maternal impact, and 0-5 for infant impact factors). Impact on the father and partner of the mother were excluded as there was insufficient evidence-based literature.
2. **Treatment and screening**

This section noted whether websites included (accurate) information about screening tools for PNA and its treatment. If accurate screening or evidence-based treatment options were described, they scored 1 for each dimension (max score=2). If websites included inaccurate or unsafe information that advocated alternative treatments over medical help, they received a negative score of -1 on the treatment dimension.

3. **Available resources**

Websites also received a score for the number of resources they offered. These were grouped into three categories:

- **Tools for mothers**, which encompassed self-directed information and tools, including help-seeking advice, self-help and coping strategies and relaxation techniques. Websites were awarded 1 point for each tool (range=0-14).

- **Support for mothers**, quantified the support websites offered that were guided (or monitored) by a HCP. This included online and offline support, including message-based counselling, helplines and group meetings. Again, 1 point was assigned for each resource available (range=0-12).

- **Additional resources**, scored any other resources that might be useful to mothers, including links to external sites, audio-visual resources, book reviews and leaflets (range=0-11).

The scoring criteria for each category was based on Moore and Ayers (2011). However, any additional resources that were identified as part of the review were added to the scoring criteria pro re nata.

4. **Website quality**

The quality of each website was examined using nine subscales, each scored on a scale of 0-2 (equating to poor, mediocre and good).

- **Contact-ability.** Websites scored points if (i) the author was identified, and (ii) contact information was provided.

- **Up-to-date.** Points were awarded if (i) there was evidence of regular website maintenance, and (ii) all of their links were functioning correctly.

- **Navigation.** Websites with a clear menu/index that linked to all pages on the site were awarded 2 points. Websites that were relatively easy to navigate, but needed several clicks to access all pages scored 1. If sites were difficult to navigate, they scored 0. Common reasons for scoring 0 were as lack of menu or index, the presence of many confusing or hidden links, a structure that causes users to get stuck in a navigation loop, or sites which necessitated the use of a search option to find relevant information.

- **Presentation.** Websites which looked 'clean', with clear, uncluttered pages, with a good balance between text and pictures were awarded 2 points. Conversely, websites scored 0 if they were confusing and overcrowded, with too much information on a page, and no pictures. A score of 1 was given to sites that fell between the two.
Advertisements can cause users to have a negative experience of a website, distracting them from the main purpose of the site, and disrupting its presentation and usability. The maximum points were awarded to sites without any advertisements, 1 point was given to sites that had some advertising, but which was relatively inconspicuous, and 0 was awarded to sites that contained adverts that impaired user experience.

Accessibility. Websites that required fees or special software to access information were awarded 0 points; those that required users to create an account (for free) before they could access information were rated 1; and sites where the majority of information was freely available and easy to access scored 2.

Credibility. Websites scored points if they (i) included evidence-based content (and not just anecdotal/personal opinion), and (ii) contained relevant references and citations.

Engagement. Points were awarded for sites that (i) included information that was well-targeted/personalised for the audience; and (ii) employed methods designed to hold user interest (e.g. presenting information in different formats, or containing a degree of interactivity).

5. Audience Relationship

This section considered qualitative information about the websites' relevance to a perinatal audience along four dimensions.

Website specificity

This section classified whether the PNA information identified belonged to websites dedicated to PNA or whether the PNA information was just a subsection of a site dedicated to other topics.

PNA specificity

This involved specifying whether the information provided about PNA was done so in its own right, or whether it conflated perinatal anxiety with perinatal depression.

Location

As the location of the web-owner may directly influence the relevance of content, and resources offered; each website was given a country code.

Author

Finally, as the nature and content (and even credibility) of a website is likely to be influenced by its authors, each website was coded as being authored by one of the following: health institute, charity, woman who had recovered from PNA, researcher, therapist and other.

6. Readability

Finally, the initial paragraph of each site was copied into Microsoft Word to establish its Flesch-Kincaid Grade Level. This measure indicates the level of education someone is likely to need (in years) to easily read the text.

Results
Measure reliability

In total, 50 websites were reviewed by the primary author. To ensure the reliability of ratings, 10% of the websites were selected using an online random number generator [28] and reviewed independently by the second author. Intraclass correlations revealed an excellent degree of reliability for the sub-scales perinatal anxiety information (ICC=.95), website quality (ICC=.94) and additional resources (ICC=.96); while treatment and screening displayed good reliability (ICC=.75). Discrepancies predominantly arose from missed information resulting from poor site navigation.

Accuracy of information

Figure 1 shows the distribution of scores for information on symptoms, risk factors and impact given by websites. All but two websites referred to at least one symptom of perinatal anxiety, although the number of symptoms reported by the sites was variable (range of 0-15, M=8.02, SD=3.97). None of the sites reported all 19 symptoms, and 20% percent reported fewer than 5. Where symptoms were described, the vast majority tended to be related to anxiety symptoms seen in the general population (M=5.60, SD=2.86), rather than PNA-specific symptoms (M=1.68, SD=1.25). The most frequently mentioned symptoms can be seen in Table 2, alongside frequently reported risks and impact information.

Confusingly, 20% of the websites included some of the symptoms on the rating checklist, but did so in relation to PND, and not PNA (these were not scored).

Figure 1. Distribution of information and resources provided by the different websites

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<tr>
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<tr>
<td>Symptoms</td>
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<td>Risk Factors</td>
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<td>Impact</td>
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<tr>
<td>Tools for Mothers</td>
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<tr>
<td>Support for Mothers</td>
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<tr>
<td>Additional Resources</td>
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</table>

Table 2. Frequency of the most commonly provided information and resources across the websites
The information presented for risk factors, was also variable (range of 0-10, M=3.16, SD=2.53). None of the sites reported all 11 risk factors, 98% reported fewer than 7, and 20% percent reported none.

Impact information occurred the least with 42% of sites failing to report anything on this scale (range=0-6, M=1.46, SD=1.74). Sixty percent of sites listed one or more impacts on the mother (range=0-4, M=1.18, SD=1.24); while only 22% mentioned infant outcomes (range=0-4, M=.48, SD=1.01).

A total score for information accuracy was created by summing symptoms, risk factors and impact scores, with a possible range of 0-43. However, actual range observed was 1-25 (M=12.64, SD=6.06).

**Treatment and Screening**

Most sites included information on treatment (92%); 37 treatments were suggested with the most common being medication (76%), Cognitive Behavioural Therapy (56%) and Cognitive Therapy (32%).

In contrast, only 38% of sites contained mental health screening information. Ten scales were mentioned overall, with the Edinburgh Postnatal Depression Scale (EPDS) most frequently cited (28%). All other scales were generic mental health scales, and not specific to the perinatal period. None appeared more than twice.

No sites contained inaccurate information or recommended alternative treatments over treatment from a HCP.

**Available Resources**

A range of help was provided across the sites, including 14 different tools for mothers with PNA (see Appendix 1 for full details). Of the sites reviewed, 98% contained information about at least one tool (range=0-14, M=5.36, SD=3.39). And one site presented all 14 support tools on the measure: www.maternalmentalhealthnow.org
In contrast, websites were relatively conservative in terms of the active support they offered, with only 50% of sites offering some form of guided support (range=0-4, M=0.94, SD=1.20). However, most provided links to additional resources (86% contained at least one complementary resource; range=0-9, M=3.20, SD=2.41). The most commonly supplied tools, support and resources can be seen in Table 2.

A total score for available resources was calculated by adding together the three sub-scales (range=2-23, M=9.50, SD=5.75).

**Website quality**

Website quality varied substantially between the reviewed sites (range=6-17, M=13.42, SD=2.55), although 60% of sites scored over 13 (out of 18). While none scored the total available points, four websites scored 17: www.panda.org.au, perinatal.anxietybc.com, www.pada.nz, www.bluebellcare.org.

Overall, the websites performed well on contactability (98%), accessibility (92%) and advertisements (84%). Sites tended to do a bit worse on up-to-dateness and credibility, with the majority of sites scoring in the mid-range on these dimensions (see Figure 3). Sites were more likely to receive a ‘poor’ rating on measures of navigation, clarity, advertisements and engagement.

![Figure 2. Variability of website quality across different dimensions](image)

**Audience Relationship**

Analysis of website specificity revealed 34% of PNA information belonged to sites that were dedicated to perinatal mental health specially, the remaining 66% were more general sites containing subsections (or pages) with information on PNA.

Additionally, PNA specificity was relatively low, with only 32% of the websites clearly separating out PNA and PND. This proportion was similar for both sites dedicated to perinatal illness (29.4%) and those covering a broader area (33.3%).
Half of the websites were located in the UK, 10 were in Australia, 9 in the USA, 5 in Canada and 1 was in New Zealand. Of the sites whose ownership was transparent, 21 were produced by a charity, 14 by a health institute, 4 by therapists, 3 by researchers, 2 by women who had experienced PNA themselves.

It was also noticed that websites tended to be aimed exclusively at mothers (48%) or both mothers and HCPs (26%). There were only 3 sites that were intended to be used solely by HCPs (6%) and the remaining websites addressed different combinations of mothers, HCPs and others (20%).

**Reading level**

Reading level ranged from 7.1 to 37.4 and had a mean of 11.67 (SD 4.75). Only 16% of sites had a reading level of 8 or below as recommended by health education experts [28].

**Top websites**

To be rated as a top website for HCPs and users, sites had to rank in the 75th percentile (or above) for information, website quality, available resources and accurate information about screening and treatment. Only 4 sites met these criteria, and can be seen in Table 3.

- perinatal.anxietybc.com
- www.pada.nz
- www.halton.ca
- www.mind.org.uk

* indicates websites conflated PNA and PND

Table 3. Recommended websites

**Discussion**

Website quality was extremely variable, with most sites presenting content that was difficult to read. Information was often incomplete and focused on symptoms, rather than risk factors or impact on the mother and infant. Websites often had information on treatment, but few contained perinatal mental health screening information. And while most sites provided at least some resources to support mothers, this was predominantly in the form of self-help or additional resources; active, guided support was infrequent.

This review identified 50 websites related to PNA, considerably fewer than the 114 sites identified by Moore and Ayers (2011) in their review of PND websites. This suggests PNA may still be comparatively under-recognised, under-resourced and under-researched [23,30]. The primary aims of this study were to identify sites women searching for information about PNA might find, evaluate the information given, resources provided and quality of the site. This was done using an adapted version of Moore and Ayers' (2011) original measure, tailored to PNA.

An additional aim of this study was to identify the current most useful websites for women with PNA and HCPs. No ‘gold standard’ website was identified. There was no single site that contained complete information, and resources alongside a high score for website quality. Mirroring the findings of Moore and Ayers (2011), websites that scored well for information did not always score well for support and vice versa. However, four websites have been recommended for women with PNA and HCPs.
The information provided by websites was frequently incomplete, predominantly focusing on symptoms related to general anxiety rather than those that may be specifically related to PNA. This could prevent women relating to the information presented and prevent healthcare professionals recognising symptoms, thus potentially presenting a barrier to help-seeking and treatment [12,31].

Conversely, while the most frequently mentioned symptom was ‘worry about infant safety and welfare’, sites rarely made the distinction between normal (and common) worries of this kind and those that are clinical in nature, which may result in readers pathologising normal behaviour or experience.

Websites often failed to deliver information on risk factors and impact. This could have negative repercussions for HCP users who need accurate information to help identify women at risk. Similarly, women might be assisted with preparing for prevention if they are informed of the risk factors and may be more likely to seek help if they are aware of the potential impact of untreated PNA on the mother and infant [18].

A key finding was that websites often conflated information on PNA with PND. This is concerning as women who access these sites may be looking to self-diagnose, and may not identify with lists that contain both anxiety and depression symptoms (especially as depressive features tended to outweigh those related to anxiety). Although it is recognised that depression and anxiety can present together, this is not always the case [30]. Therefore, women who experience PNA in the absence of PND may conclude they do not have a mental health problem (and therefore not seek help) because their anxious symptoms are not accurately represented by these websites. It is therefore noteworthy that only 1 of the 4 leading websites successfully separated out PNA and PND.

Most websites mentioned treatment options, with pharmacological interventions being cited most often. While an effective treatment option for PNA, current research has advocates non-pharmacological avenues as the first line of treatment [32]. Furthermore, pregnant and breastfeeding women may be reluctant to take medication in the perinatal period, so sites that fail to mention non-pharmacological options may put women off seeking help [33]. Positively, most websites did present alternatives to medication, with Cognitive Behavioural Therapy and Cognitive Therapy most frequently suggested. As a recent review has shown these types of therapy to be effective for PNA [34], the inclusion of these treatment options is likely to be beneficial to both women with PNA and HCPs. Users should be aware that there is currently a dearth of research into efficacious PNA treatment, so should ensure any treatment recommended by websites are supported by evidence.

In contrast to treatment information, screening tools were infrequently mentioned by the websites. When they were, the EPDS was the dominant screening tool. This raises some concerns, as the authors uphold that it does not measure anxiety [35] and other research suggests it does not reliably distinguish between anxiety and depression symptoms [36,37]. Thus, women self-screening might fail to recognise they have a problem and HCPs might be ill-advised on the best measures for screening their clients. Future websites should consider including validated PNA-specific measures, such as the PASS [22], PSAS [23] and PRAQ-R [11] to maximise their utility.

All but one site provided mothers with access to at least one self-help tool, the most common being information on how to seek help, standard self-help advice, and stigma reduction. Most sites also presented additional resources that users could access. However, only half of the sites offered some form of active or guided support. This disparity is likely due to the challenges and cost implications involved in staffing and managing helplines, forums, support groups etc. Whereas, additional resources (such as links, downloads, and generic social media pages) can be easily added to websites
in a cost-effective and timely manner. However, it is worth noting that only half of the websites were based in the country where the review took place, which is likely to have serious implications for the accessibility and applicability of the tools, support and resources offered.

Website quality was found to be extremely variable. Sites were most likely to score poorly on navigation, clarity, advertisement and engagement. In addition, and in line with previous research that has found online health information as difficult to read, most websites had a higher-than-recommended readability score [38,39]. These aspects are important to note, as they may prevent women engaging with the sites, and getting the information they need.

Limitations of the study are that recommended websites are likely to date quickly with the evolving nature of the internet and growth in research and public awareness about PNA. Therefore, the top sites are likely to change over time. It is recommended that another review is done in the next few years to provide accurate top websites. A further limitation is that the quality of the resources and efficacy of support tools provided were not established. This should be considered in future reviews. Further research is also needed to explore how women use PNA websites and what they find most relatable and useful.

This review is the first to rate a substantial number of websites for information that was specific to PNA and available resources for sufferers. The top 4 sites for women with PNA and HCPs are suggested. A key finding was that there is no one website that scored top for information, resources and website quality. It is concerning that websites often conflated information about PNA with PND as this could be misleading at best and at worst prevent women from seeking the help they need. To conclude, there is a need for websites to be developed that provide excellent evidence-based information that women can relate to and quality resources for women with PNA. They should clearly separate information on PNA and PND, be of sound quality for usability, easy to read and built around research that identifies what women with PNA want from websites.

Authors contributions

The first author initiated the design, carried out all website ratings, assisted in data analysis, interpretation and drafted the manuscript. The second author secured funding for the project, participated in the design, reviewed a selection of websites, initiated data analysis, interpretation and drafted the manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

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Abbreviations

HCP Healthcare professional
PASS Perinatal Anxiety Screening Scale
PNA Perinatal anxiety
PND Postnatal depression
PRAQ-R Pregnancy-Related Anxiety Questionnaire (Revised)
PSAS Postpartum Specific Anxiety Scale