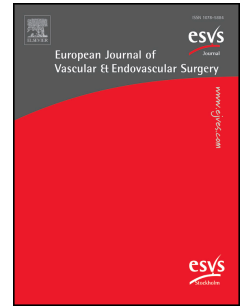# Journal Pre-proof

Assessment of the Quality of Elective Abdominal Aortic Aneurysm Repair Patient Information on the Internet Using the Modified Ensuring Quality Information for Patients Tool

James Budge, Lorenzo Lenti, Bilal Azhar, Iain Roy, Ian Loftus, Peter Holt

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ORIGINAL ARTICLE: OTHER

Assessment of the Quality of Elective Abdominal Aortic Aneurysm Repair Patient Information on the Internet Using the Modified Ensuring Quality Information for Patients Tool

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Running titles:

Assessing the Quality of AAA Repair Patient Information on the Internet Using the MEQIP Tool

James Budge et al.

WHAT THIS PAPER ADDS

Internet based patient information is becoming a large part of the pre-operative education for patients in many fields of surgery. This study highlights the low quality of most websites pertaining to patient information for elective abdominal aortic aneurysm repair, as measured by the validated MEQIP tool. It also showed that search engines cannot be relied on to prioritise websites of higher quality as assessed by the MEQIP tool. Health practitioners need to be aware of the poor average quality of online patient information and be able to direct patients to high quality material.

Objective: This study aimed to assess the quality of patient information material regarding elective abdominal aortic aneurysm (AAA) repair on the internet using the Modified Ensuring Quality Information for Patients (MEQIP) tool.

Methods: A qualitative assessment of internet based patient information was performed. The 12 most used search terms relating to AAA repair were identified using Google Trends, with the first 10 pages of websites retrieved for each term searched. Duplicates were removed, and information for patients undergoing elective AAA were selected. Further exclusion criteria were marketing material, academic journals, videos, and non-English language sites. The remaining websites were then MEQIP scored independently by two reviewers, producing a final score by consensus.

Results: A total of 1 297 websites were identified, with 235 (18.1%) eligible for analysis. The median MEQIP score was 18 (interquartile range [IQR] 14, 21) out of a possible 36. The highest score was 33. The 99th percentile MEQIP scoring websites scored > 27, with four of these six sites representing online copies of hospital patient information leaflets, however hospital sites overall had lower median MEQIP scores than most other institution types. MEQIP subdomain median scores were: content, 8 (IQR 6, 11); identification, 3 (IQR 1, 3); and structure, 7 (IQR 6, 9). Of the analysed websites, 77.9% originated from the USA (median score 17) and 12.8% originated in the UK (median score 22). Search engine ranking was related to website institution type but had no correlation with MEQIP.

Conclusion: When assessed by the MEQIP tool, most websites regarding elective AAA repair are of questionable quality. This is in keeping with studies in other surgical and medical fields. Search engine ranking is not a reliable measure of quality of patient information material regarding elective AAA repair. Health

practitioners should be aware of this issue as well as the whereabouts of high quality material to which patients can be directed.

Keywords: AAA, Abdominal aortic aneurysm, EQIP, EVAR, MEQIP, Patient information

INTRODUCTION

The internet has become the most commonly sought and used resource for medical treatment education in many patient groups.[1,2] Although it is often routine for healthcare professionals to provide written information during pre-operative contact with patients, further information on the internet may be sought without guidance. Previous studies have demonstrated that the quality of these resources can be variable.[3,4] However, the utilisation of this information may be associated with improved compliance and can affect health outcomes,[5,6] so as a resource it should not be ignored by medical practitioners. It can also support informed patient treatment choices, therefore relevant and high quality information is needed whilst irrelevant or low quality information may mislead patients. Furthermore, it has been shown that patients often wish to have guidance from their physicians on reliable resources of information, both traditional written information and internet resources.[7–9]

Due to the asymptomatic nature and current age restrictions on screening protocols, the true prevalence of abdominal aortic aneurysm (AAA) is difficult to estimate. However, studies suggest a prevalence of 1.3 – 12.7% depending on age and the criteria used to define AAA. The elective repair of these can be undertaken either with open surgical repair or endovascular aneurysm repair (EVAR). Currently EVAR accounts for 59% of elective infrarenal AAA repairs in the UK.[10]

Various methods have been described to assess the quality of patient information materials,[11,12] and most of these were originally designed for printed patient information. The Ensuring Quality Information for Patients (EQIP) tool[11] has been

expanded since its conception to satisfy guidelines from the British Medical Association and the International Patient Decision Aids Standards.[13,14] This expansion allowed for a more granular look at the presence of information on the purpose, benefits, and complications of procedures as well as reordering the questions into content, identification, and structure domains. In its current form as the Modified Ensuring Quality Information for Patients (MEQIP) tool,[15] it is a 36 item checklist that assesses the quality of content (18 points), identification of the publishing persons or body (6 points), and structure (12 points). It has already been used to assess the quality of patient information material in a wide variety of surgical and medical fields,[4,16–20] but has yet to be used to assess patient information within vascular surgery.

Previous studies that have looked at the quality of internet based patient information available to vascular surgery patients have found it to be of generally poor quality.[21–23] Only one of these studies used a recognised analysis tool,[21] all only analysed a maximum of 50 results, and none used more than a single search term to identify websites. It has also been found that the readability of online patient information pertaining to AAA repair is also poor.[24] The current study aimed to address the limitations of these previous studies in assessing the quality of internet based patient information on the management of elective AAA repair to be able to provide actionable information to help clinicians guide patients towards high quality information. This will be achieved by using a systematic search strategy and validated assessment tool (MEQIP).

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METHODS

Search term selection

A series of presumed patient search terms was created by discussion between the authors and was tested using Google Trends (https://trends.google.com/) to identify those that had significant past search volumes regardless of geographical location. The identified terms were "Triple A surgery", "EVAR", "Aortic aneurysm", "Endovascular aneurysm surgery", "Endovascular aneurysm repair", "Endovascular aneurysm operation", "Aorta surgery", "Aorta repair", "Aorta operation", "Aneurysm surgery", "Aneurysm repair", and "Aneurysm operation" (Supplementary Table S1).

These search terms were used to collect the first 10 pages of search items on Google (search date March 2020). The first 10 pages of websites were selected as per previously published methodology,[4,20] with the rational that patients are unlikely to go beyond this point in the search log.[25]

Google was selected as in April 2020, 86% of searches performed on the web were done using Google,[26] therefore it represents the majority experience of patients performing searches.

Eligibility of website inclusion

Websites identified using the above search criteria were deduplicated before screening. The remaining websites were screened for the inclusion criteria of any website with information intended for patients undergoing elective AAA repair and the exclusion of: (1) academic journals; (2) marketing material; (3) articles not written

in English; and (4) videos, where no further information was provided beyond the video.

Data collection

All websites identified after filtering and screening were assessed using the MEQIP tool. Each website was assessed by two reviewers. Any disagreement in results was rectified via consensus discussion and review by a third author to reach consensus. The 36 item MEQIP criteria were applied to each website and the results collected (see Supplementary Tables S2 – S4 for full MEQIP criteria). The checklist items covered three domains: content (items 1 – 18); identification (items 19 – 24); and structure (items 25 – 36). All items were answerable with (i) yes, (ii) no, or (iii) not applicable, allowing for more objectivity and following previously published methodology.[4,18–20] This allowed each website to receive a score between 0 and 36, comprised of up to 18 for content, 6 for identification, and 12 for structure. Websites that achieved an MEQIP score of > 21 (75th percentile score) were deemed to be high score websites as per previously used methodology in multiple studies.[4,16–18,20]

Statistical analysis

Statistical analysis was performed using R version 3.6.0 (https://www.r-project.org/), in R Studio version 1.3.1056 (https://rstudio.com/; R Studio PBC, Boston, MA, USA).

All continuous variables were reported as the median and interquartile range (IQR), and categorical variables were reported as numbers with proportions as percentages. Proportions were compared with the Fisher's exact test, and

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continuous variables were compared the Kruskal–Wallis test. All *p* values were two-tailed and were considered statistically significant at *p* < .050.

RESULTS

Results of web search and screening

All 12 search terms identified above were used to collect a total of 1 297 websites (see Supplementary Table S1 for number of sites collected by search term). After duplicates were filtered, a total of 726 websites were screened using the eligibility criteria described above. A total of 235 websites were then assessed using the MEQIP tool (Fig. 1).

The median overall MEQIP score in the websites studied was 18 (IQR 14, 21), with the 75th percentile score being 21 (Table 1).

MEQIP content questions

The median MEQIP score for the content questions (items 1 – 18; Supplementary Table S2) was 8 (IQR 6, 11), with the 75th percentile score being 11. Moreover, 97% of the websites provided a description of the medical issues (item 3), and 91% explained the purpose of the intervention (item 4). However, only 63% mentioned conservative/non-operative management as an option (item 5). Details and discussion of the surgical procedure or procedural steps were present in 83% of sites (item 6). Only 65% discussed the benefit to the patient in a qualitative manner (item 7) and even less (6%) quantitatively (item 8), and 60% did not mention quality of life issues (item 11). Risks and complications were equally poorly covered, with

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only 40% discussing them in a qualitative manner (item 9) and 14% in a quantitative one (item 10), with only 19% addressing how these complications are addressed (item 12). Very few sites (29%) also provided any details of other reliable sources of information (item 17).

MEQIP identification questions

The median score for the MEQIP identification questions (Supplementary Table S3) was 3 (IQR 1, 3) out of a total of 6, with a 75th percentile score of 3 (see Table 1). Almost all (98%) sites provided an identification logo (item 20), although far fewer provided the date or identified who produced or funded the site (items 19, 21, and 22, with 35%, 54%, and 38%, respectively). In only 18% of the sites was a bibliography provided on the data used (item 23), and none of the sites stated if or how patients were involved or consulted in the document's creation (item 24).

MEQIP structure questions

The median score for the MEQIP structure questions (Supplementary Table S4) was 7 (IQR 6, 9) out of a possible 12, with the 75th percentile score being 9. Most websites were found to use everyday language (91%; item 25), short sentences (83%; item 27) with a respectful tone (98%; item 29) and thus felt to provide clear information according to the MEQIP criteria (96%; item 30).

A clear layout and a logical order were also found to be present in most sites (items 33 and 32, with 86% and 89%, respectively). Of note, 64% of sites did not contain

any figures or graphs, but where they were present they were generally clear and relevant with only 3% not being so (item 34).

Country of origin

The breakdown of the country of origin of websites included in the study can be seen in Table 2. Many of the websites included in the study were from the USA (77.9%), followed by the UK (12.8%), with other countries making up the remaining 9.4% (Table 2). Websites originating from the USA had a mean MEQIP score of 17.2, while those from the UK had a mean score of 21.8.

Sources of patient information

The organisation type that provided the websites reviewed can be seen in Table 3. It should be noted that the vast majority (66.8%) of websites identified were from hospitals (7.7%), with a mean score of 17.3. The next most prevalent was professional societies, with a mean score of 20.3. These professional societies were the Radiological Society of North America, Vascular Society of Great Britain and Ireland, American Heart Association, American College of Cardiology, American Academy of Family Physicians, Society for Vascular Surgery, British Society of Interventional Radiology, Cardiovascular and Interventional Radiological Society of Europe, Canadian Society for Vascular Surgery, and Australian and New Zealand Society for Vascular Surgery.

MEQIP score and search ranking

No relationship was noted between MEQIP score and search engine ranking (Fig. 2). Therefore, search engines were not shown to be reliable in offering up websites with high MEQIP scores within the first few results.

There was, however, a difference seen between different sources of patient information and their search engine ranking (Fig. 3), with webpages that were part of larger websites such as online encyclopaedias often having better search engine rankings.

Top rated websites

The websites that were rated to be in the 99th percentile using the overall MEQIP score are listed in Table 4. Of the six sites identified, four represent online copies of the patient information leaflets from large vascular surgery units in the UK and Canada, with the other two coming from the US Department of Health and a medical information website called News-Medical.Net (https://www.news-medical.net/). In keeping with their MEQIP score, all of these sites were well structured, identified the source of this information, and were written in simple and understandable language.

DISCUSSION

The internet is an important resource for patients looking for health information, and this study focuses on the quality of internet based patient information for the treatment of AAAs. Overall, this study found that the average MEQIP score for all sites included was 18 out of a possible 36 points. This demonstrates that as a whole

the quality of the available information is poor when assessed using the MEQIP tool. This is in keeping with previous studies that have reported a median MEQIP score between 15 and 19 in various fields of medicine.[16–18,20,27,28] This is also in keeping with smaller studies that have examined vascular surgery patient information in the past using less well validated methodologies.[21–23]

However, as seen in Table 4, within the search results the 99th percentile in this study achieved scores > 27. Thus, it is clear from our findings that good patient resources are available, and physicians should be aware of these. National and international professional societies are well placed to lead on identifying or providing this information, as some already do with good mean MEQIP scores as assessed in this study. This could allow a single point of high quality information for patients tailored to a country's unique health challenges.

Although this study has focused on internet based patient information resources, it would be remis not to mention that many patients will receive paper based information from their healthcare professionals along with verbal discussion to support their treatment decisions. This information may be the impetus for searching for more information on the internet and thus it may be prudent to supply trusted internet sources, especially as conflicting information may affect the trust that patients have in their healthcare professionals.

Out of the three major components of the MEQIP (content, identification, and structure), and in keeping with previous studies, the identification score was the lowest (median 3 out of a possible 6, 50% of possible total). Due to the unregulated

nature of the internet, this should be concerning to physicians as this may mean that data with strong bias are hard for patients to identify. The structure section achieved the highest median percentage of the possible score at 58%, and the content section achieved a median of 44% of the possible score. This is again in keeping with studies in other areas of medicine.[4,19,20,27]

Along with the poor quality of the data as assessed by MEQIP, it is concerning to note the limited information on risk provided by the reviewed sites. As assessed using the MEQIP tool in items 9 and 10, only 40% had any qualitative discussion of risks and complications, with even less (14%) quantifying these either for the procedure or the condition. This is extremely important as the risk profile of both EVAR and open surgical repair are part of the reasons a patient may opt for a chosen type of repair or conservative management.

As can be seen in Figure 2, no relationship was seen between the search ranking of websites by the search engine and their MEQIP score in the searches performed. This is important to note as patients may not continue to search through more than the first few websites recommended by a search, and thus they may not come across high quality pages without direction.

Several limitations have been identified in this study. First, due to the everchanging nature of the internet, the results presented are only accurate for the time that the search was conducted. However, the authors believe that the trends presented are likely to continue to be true, and the importance of being able to direct patients to reputable sources of information is likely to become increasing important over time.

Second, the searches for this study were only performed using the Google search engine, thus other search engines may rank web pages differently or give different pages all together. However, in April 2020, 86% of searches performed on the web were done so using Google, thus the authors feel that even if there were differences with other search engines, this would only affect a small number of the overall patient population.[26] Furthermore, the websites reviewed in this study are only those that achieve higher search engine optimisation and thus ranking. This means that many pages for specialist groups, e.g., genetic aortic syndromes such as Marfan's disease, have not been reviewed and thus comment cannot be made on them.

The EQIP tool was originally designed for use with printed patient information leaflets, although in the form of the MEQIP it has been used in a variety of medical fields for the assessment of internet patient information. Furthermore, MEQIP has been designed as a general tool for the assessment of patient information and is not specifically validated for the assessment of AAA patient information. However, as a general tool it does highlight the large discrepancy in the quality of the sources identified in this study. The methodology of this study is also limited as the websites have not been assessed by patients and thus it is unknown if patient ranking of pages correlates with MEQIP score.

The study has not examined patient information from social media and as such cannot comment of the quality of the resources produced by the many active groups and individuals on multiple platforms in the area of elective AAA repair. Furthermore, the study has not assessed the output of new artificial intelligence (AI) models, including popular large language models such as ChatGPT, that may be an

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important part of future patient pre-operative education and should be an active area of research in future studies. The assessment of the patient information provided by the AI models will also pose new challenges to the academic community as they are likely to require new assessment tools as well as thought on the need to identify where the information they provide has come from.

Conclusion

The internet has become an important source of patient information, and vascular physicians must have an awareness of the benefits, risks, and limitations of this resource.

This study shows that the average quality of patient information in the surgical management of AAA when assessed by the MEQIP is poor. This is in keeping with findings in other areas of medicine. However, there are pockets of high quality information that vascular surgery physicians should be aware of and be able to direct their patients towards, especially due to the effect these can have on patient attitudes, compliance, and thus health outcomes.

CONFLICTS OF INTEREST

None declared.

FUNDING

None.

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ETHICAL APPROVAL

No ethical review was sought for this study.

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Figure 1. Flowchart showing the selection of included websites and the search terms used. EVAR = endovascular aneurysm repair.

Figure 2. Box plot grouping of websites by Modified Ensuring Quality Information for Patients (MEQIP) tool score against the website search engine ranking. A search engine ranking of one describes the first eligible website shown during a search and thus the information most likely to be viewed. Dots represent suspected outliers (≥ 1.5 interquartile range).

Figure 3. Box plot grouping of websites by website category against the website search engine ranking. All statistically significant differences between groups shown with associated *p* value. Dots represent suspected outliers (≥ 1.5 interquartile range).

	Overall MEQIP	Content data	Identification data	Structure data
Table 1. Overall Modified Ensuring Quality Information for Patients (MEQIP) tool score and domain scores of included websites.				
Median	18	8	3	7
Minimum	6	1	0	2
Maximum	33	17	5	12
Quartile 1	14	6	1	6
Quartile 3	21	11	3	9
IQR	7	5	2	3
75th percentile	21	11	3	9

IQR = interquartile range.

Table 2. Included websites results by country of website origin (all websites were written in English).		
Country	**Websites (*n* = 235)**	**Mean MEQIP score**
USA	183 (77.9)	17.2
UK	30 (12.8)	21.8
Australia	5 (2.1)	19.4
Canada	4 (1.7)	21.8
New Zealand	3 (1.3)	15.7
Germany	2 (0.9)	18
Republic of Ireland	2 (0.9)	16.5
Europe	1 (0.4)	24
India	1 (0.4)	20
International	1 (0.4)	21
Israel	1 (0.4)	19
Netherlands	1 (0.4)	13
Switzerland	1 (0.4)	20

Data are presented as *n* (%) or Modified Ensuring Quality Information for Patients

(MEQIP) score.

Table 3. Included websites results by publishing organisation type.		
Source of information	**Websites (*n* = 235)**	**Mean MEQIP score**
Hospital	157 (66.8)	17.3
Professional society	18 (7.7)	20.3
Industry	16 (6.8)	17.2
Academic centre	10 (4.3)	17.4
Encyclopaedia	9 (3.8)	21.6
News service	9 (3.8)	20.2
Health department	6 (2.6)	21.5
Charity	5 (2.1)	20
Practitioner	3 (1.3)	17.7
Other	2 (0.9)	11.5

Data are presented as *n* (%) or Modified Ensuring Quality Information for Patients

(MEQIP) score.

Table 4. Websites with a Modified Ensuring Quality Information for Patients (MEQIP) score >27 (99th percentile).		
Rank	**Website**	**MEQIP score**
1	The Dudley Group NHS Foundation Trust AAA patient information leaflet. https://www.dgft.nhs.uk/wp-content/uploads/2022/02/Information-about-abdominal-aortic-aneurysms-V7.pdf	33
2	North Bristol NHS Trust endovascular aneurysm repair (EVAR) leaflet. https://www.nbt.nhs.uk/sites/default/files/attachments/Endovascular%20Aneurysm%20Repair%20%28EVAR%29_NBT002075.pdf	29
=3	US Department of Health and Human Services AAA information site. https://health.gov/myhealthfinder/topics/health-conditions/heart-health/talk-your-doctor-about-abdominal-aortic	28
=3	Patient and family guide to endovascular aneurysm repair (EVAR) at Toronto General Hospital. https://www.uhn.ca/PatientsFamilies/Health_Information/Health_Topics/Documents/EVAR_TGH.pdf?utm_source=EndovascularAneurysmRepair&utm_medium=Click&utm_campaign=EndovascularAneurysmRepair-EVARTGH	28
=3	East Kent Hospitals University NHS Foundation Trust patient information leaflet. https://www-archive.ekhuft.nhs.uk/patients-and-visitors/services/vascular-surgery/patient-leaflets/index262d.html?entryid103=419121&p=2	28
=3	Abdominal aortic aneurysm (AAA): causes, symptoms, & management. Information site by News-Medical.Net. https://www.news-medical.net/health/Abdominal-Aortic-Aneurysm-(AAA)-Causes-Symptoms-Management.aspx	28

MEQIP = Modified Ensuring Quality Information for Patients; AAA = abdominal aortic aneurysm; EVAR = endovascular aneurysm repair.

Websites from searches

n = 1 297

Search terms:

"EVAR", "Aortic aneurysm", "Endovascular aneurysm surgery", "Endovascular aneurysm repair", "Endovascular aneurysm operation", "Aorta surgery", "Aorta repair", "Aorta operation", "Aneurysm surgery", "Aneurysm repair", "Aneurysm operation" and "Triple A surgery"

Websites after deduplication

n = 726

Websites not meeting inclusion criteria (*n* = 491)

- Professional text *n* = 312

- Other topic *n* = 124

- Not available *n* = 25

- Video *n* = 15

- Duplicate *n* = 11

- Not in English *n* = 4

(2 German, 1 Portugese, 1 French)

Websites included in study

n = 235

1