The Quality of Web-based Information for Osteoarthritis: A Cross Sectional Study

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**Word Count:** 3707

## The Quality of Web-Based Osteoarthritis Information on the Internet: A Cross- Sectional Study

**Background:**

Osteoarthritis (OA) is a long-term condition that affects over 8.75 million people in the United Kingdom (UK). Approximately 43% of people in the UK search for health and medical information online. However, health information on the internet is of variable quality. Research into the quality of online OA information is dated and there is a need to evaluate the existing information.

## Objectives:

To assess the quality of websites which provide educational information for patients with OA.

**Design:** Electronic cross-sectional survey.

## Methods:

The search term “Osteoarthritis” was entered into the five popular UK based search engines in order to identify 50 unique websites. Websites were then appraised by two assessors using criteria developed from available literature and recent OA NICE guidelines. The appraisal considered both general website quality and OA specific content.

## Results:

Most of the websites evaluated (34/50, 68%) scored more than half of the maximum available quality score (which was 59). The median total score was 41. For general website quality, the median score was 9 (range 3-16, out of 16) and for content specific to OA, the median was 31 (range 2-43, out of 43). Websites of higher quality were created more recently, disclosed sources of information, had external seals of approval and directed the reader onto other relevant websites.

## Conclusions:

The internet is a potentially useful tool for educating and empowering healthcare consumers. The websites evaluated were generally of a ‘high’ standard; however, there was a wide variation in the quality of information.

**Keywords:** Osteoarthritis, Internet, Patient education, websites

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6. approval and directed the reader onto other relevant websites.

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1. The internet is a potentially useful tool for educating and empowering healthcare
2. consumers. The websites evaluated were generally of a ‘high’ standard; however,
3. there was a wide variation in the quality of information.

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## CONTRIBUTION OF THE PAPER

1.  The quality of the online OA information evaluated in this study is of a high
2. standard, however, there is a wide variability in the quality that is available.

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1.  Due to the variation in the quality of online OA information, internet users may
2. find it difficult to consistently access information of a high quality.

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1.  Higher quality websites tended to be created more recently, disclosed sources of
2. information, had external seals of approval and directed the reader onto other
3. relevant websites.

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# Introduction

1. Osteoarthritis (OA) is the most common form of arthritis, affecting approximately
2. 15% of the population in the United Kingdom (UK) [1] and has been established as
3. one of the leading causes of pain, functional disability and impaired quality of life
4. worldwide [2]. The number of people affected by OA is expected to increase, with an
5. ageing population and an ever increasing prevalence of obesity meaning more
6. people are diagnosed with the disease every year [1]. In the UK alone over 8.75
7. million people are affected by the disease [3].
8. The range of treatments for OA varies from conventional modalities, including
9. pharmacological and surgical interventions, to non-pharmacological interventions
10. such as exercise, physical activity, education and self-management [4]. Healthcare
11. providers and people diagnosed with OA are therefore faced with several
12. management decisions. Key to facilitating a shared decision making process is
13. effective patient education. Previous studies have shown that lack of knowledge of
14. one’s health can lead to depression, anxiety and poor coping strategies, while
15. effective health education can help to reduce pain and disability; highlighting its
16. importance as a vital component of self-management [5].
17. Healthcare professionals have traditionally relied upon printed sources of information
18. to help aid patient education [6]. However, since the early 2000’s there has been a
19. dramatic increase in access to, and usage of the internet. In the UK alone, 38 million
20. adults use the internet everyday [7], and 43% use it as a source of health and
21. medical information [8]. Online health information can educate patients about their
22. condition, support decision making, clarify unfamiliar medical terms and identify
23. treatment options [9]. Its accessibility and convenience make it a potentially useful
24. tool for managing long term conditions such as OA, as patients are often expected to
25. manage their disease independently beyond the physical health care setting [10, 11].
26. However, the quality of internet based medical information is extremely variable [12,
27. 13]. Unlike print media, there is a lack of editorial control of the internet as a
28. communication system; meaning anyone, regardless of qualification or motive can
29. place information online [4]. Issues with quality are exacerbated by the internet’s
30. continued growth as a communication system; new information appears faster than it
31. can be appraised. Therefore, the greatest barrier to the internet reaching its
32. potential, as a key health related educational resource is not the quantity of
33. information, but rather finding accurate, reliable and valid information [4].
34. To assist internet users distinguish between sites that provide health information, a
35. wide range of organisations have developed methods to evaluate and assess the
36. quality of websites [14]. Organisations such as Health on the Net (HoN) [15] and the
37. DISCERN instrument [16] are some of the most commonly used forms of regulation
38. for health and medical information. In total, as many as 273 unique evaluation tools
39. have been described within the literature [18]. Yet, it is currently unclear if these tools
40. can consistently and accurately identify quality information and there remains no
41. consensus on a single best method of appraisal [14].
42. Previous research has investigated the quality of online OA information via several
43. different methods including by use of the DISCERN instrument and a self-created
44. appraisal tool [4, 6]. However, no previous research has appraised OA websites
45. against clinical guidelines for the care and management of OA [19]. Additionally,
46. previous research was carried out over a decade ago, and was not based within the

91 UK [4, 6].

1. The primary objective of this study was to assess the quality of websites that a user
2. might access in search of information about OA. The secondary objective was to
3. identify any key characteristics that indicated quality information on the internet and
4. to identify any significant correlations between these characteristics.

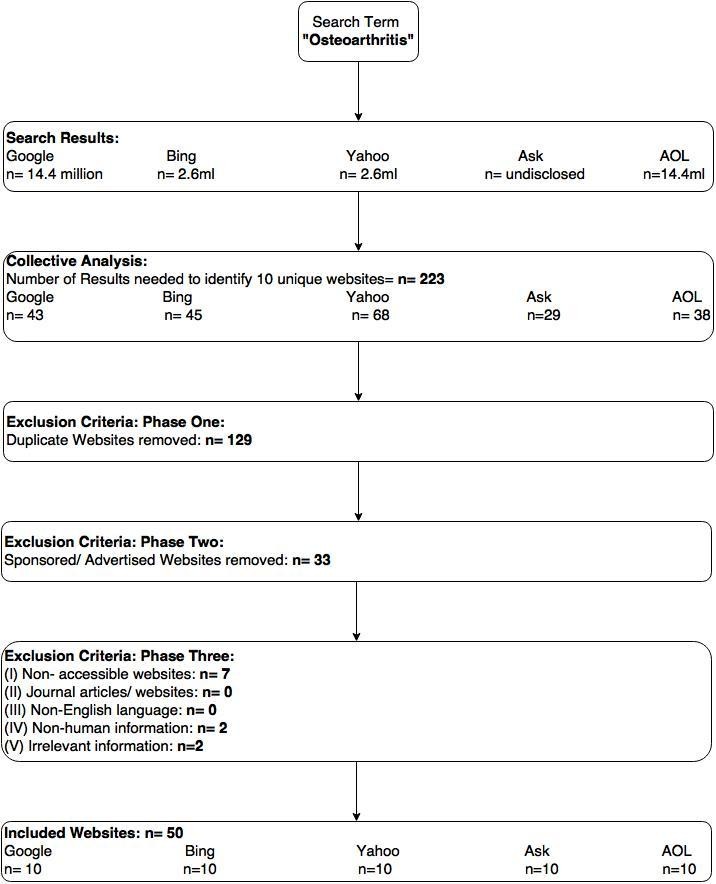
# Methods

1. *Website Identification:*
2. A key-word search of the internet was performed in January 2015 and all websites
3. identified by February 2015. The search term “Osteoarthritis” was entered into the
4. five most popular search engines used within the UK (‘Google’, ‘Bing’, ‘Yahoo’, ‘Ask’,
5. and ‘AOL’) [20]. The search term was chosen as previous research has also used
6. comparatively broad search terms to duplicate the type of search a patient may

106 make [4, 21].

1. A key word search of “Osteoarthritis” at the time of the study returned between 2.6
2. million to 14.4 million results, dependent upon the search engine used. However,
3. previous studies have found that sites listed on the first search results page generate
4. 92% of all traffic from an average search [22]. This indicated that individuals are
5. significantly more likely to visit websites found in the first ten matches from search
6. engines results [23]. It was therefore decided to identify 10 unique websites from
7. each of the five search engines in order to achieve a reliable sample of websites in
8. which patients would access in search of information about OA.
9. Following the initial search, a collective analysis involving all the researchers took
10. place in which the websites were subjected to exclusion criteria, consisting of three
11. phases in order to identify 50 unique websites (See Figure 1). Websites were initially
12. excluded if they were duplicates of another site that had already been identified
13. under a different search engine. Many of the search engines returned very similar
14. web results on the phrase ‘Osteoarthritis’. This required the researchers to go as far
15. as the sixth page in some cases in order to obtain unique websites. When websites
16. were present in more than one of the search engine results a random programme
17. generator [24] was used to determine which search engine the website would be
18. allocated to.
19. Once duplicate websites had been removed from the analysis, websites were also
20. excluded if they were sponsored or were advertisements (websites that pay for a
21. higher rank position within the top search results), as these are subject to change
22. with each search and would not be relevant to the studies aims.
23. Following this process websites were additionally excluded if (i) users were denied
24. direct access through password requirements or repeated server unavailability, (ii)
25. they were journal articles or journal websites, (iii) they were not in the English
26. language (iv) they provided information about OA in animals or (v) they contained
27. information irrelevant to the study’s aims.
28. This process was completed until 10 unique websites from each search engine were
29. identified. Screenshots were taken of relevant websites and associated URL’s were
30. saved within a Microsoft Excel spreadsheet to avoid any potential changes that may
31. have been made to the selected websites during the period of analysis.

## Figure 1: Website Search Strategy:



|  |  |
| --- | --- |
| 141 | *Assessment of Website Quality:* |
| 142 | To accurately measure and assess the quality of information that is available to a |
| 143 | ‘typical’ patient population, websites were appraised using the ‘Osteoarthritis Quality |
| 144 | Proforma’ (OQP) which was developed by the research team (Appendix A). In total, |
| 145 | it consisted of 18 criteria, which led to the calculation of three scores: |
| 146 | 1) *General quality content (criteria 1 to 8)* with a maximum score of 16. |
| 147 | 2) *Specific OA content (criteria 9 to 18)* with a maximum score of 43. |
| 148 | 3) *Total score (sum of all criteria)* with a maximum score of 59. |

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1. *General Quality Content:*
2. The general quality criteria were developed based upon several research papers and
3. reviews which have been published on the appraisal of online health and medical
4. information [21, 25, 26]. These were used in conjunction with other widely used
5. quality evaluation tools such as the JAMA benchmarks [27] and the DISCERN
6. instrument [16]. Key criteria that were included within the proforma were disclosure
7. of authorship (and credentials) and funding sources; currency and whether the
8. website was certified by an external organisation such as HoN [15] or the Information
9. Standard [17]. Additional criteria included whether a source of the websites
10. information was provided on the website and whether the site referred the reader
11. onto other useful sources.
12. *Specific OA Content:*
13. The criteria used to evaluate content specific to OA were framed around recent NICE
14. guidelines for the care and management of OA [18]. Additionally, International and
15. European guidelines [28, 29] and surrounding literature [30, 31] on the condition
16. were screened and changes made accordingly to ensure that a holistic and
17. comprehensive overview of the disease had been incorporated into the criteria.
18. A total of 10 sections were present within the OA criteria, including information about
19. (i) anatomy and physiology, (ii) risk factors, (iii) symptoms, (iv) diagnosis, (v) holistic
20. approach of the condition, (vi) self-management strategies, (vii) non-pharmalogical
21. treatment, (viii) pharmalogical treatment, (ix) Consideration of surgery and (x) The
22. follow up and review process of the condition.
23. Following an initial piloting stage to test the usability and application of the proforma,
24. an Osteoarthritis Quality Proforma (OQP) Guidance Document was produced for
25. assessors to use in conjunction with the OQP. This helped to assist in a more
26. standardised and reproducible process of data collection. Following initial piloting,
27. the OQP demonstrated consistency between assessors, therefore the decision was
28. made for each website to be independently appraised by two researchers and
29. average scores to be calculated. Websites were assessed during a three week
30. period in February 2015, marks were given for the presence of any correct
31. information, and no marks were provided if the information was incorrect.
32. For any websites which had a discrepancy of more than 6 marks between
33. assessors, the researchers met and discussed the websites as a group and any
34. marks which had been incorrectly awarded/ not awarded were discussed and
35. adjusted accordingly. Finalised copies of the OQP and OQP guidance document are
36. available on request to the corresponding author.
37. Data were entered into the IBM Statistical Package for the Social Sciences (SPSS)
38. Statistics Version 22 (IBM Corporation 2013). The data was found to be non-
39. normally distributed and therefore non-parametric analysis was used throughout. A
40. Wilcoxon test was used to identify if there were any statistically significant
41. differences between assessors in their use of the OQP tool. Mann-Whitney tests
42. were used to determine if there were statistically significant differences in the overall
43. website quality score in the presence of different website quality indicators (for
44. example between those websites which had or had not received certification from an
45. external organisation).

# Results

## Overall Quality Scores:

1. Of the 50 websites that were assessed the highest score overall was 57 from an
2. available 59 and the lowest was 5. The median total score was 41/59 (69%). The
3. Wilcoxon test highlighted that there was no significant difference between the two
4. assessors’ scores (p=0.192), supporting the *a priori* decision to use the mean score
5. for analysis. Table 1 gives a complete list of assessed websites and their overall
6. scores. Table 2 reports the analysis of specific quality criteria on overall website
7. quality scores.

## Table 1: Details of Websites Evaluated and Overall Scores:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **N**  **o.** | **Website Publisher/ Author** | **Uniform Resource Locator (URL):** | **General Score (max 16)** | **OA**  **Score (max 43)** | **Quality Score (max 59)** | **OQP**  **Grading Scale** |
| 1 | NICE (National Institute for Health and Care Excellence) | <http://www.nice.org.uk/guidance/cg177> | 14 | 43 | 57 | Excellent |
| 2 | eMedicine Health | <http://www.emedicinehealth.com/osteoarthritis/page2_em.htm> | 15 | 38 | 53 | Excellent |
| 3 | About | [http://osteoarthritis.about.com/od/osteoarthritis101/a/what\_is\_](http://osteoarthritis.about.com/od/osteoarthritis101/a/what_is_OA.htm) [OA.htm](http://osteoarthritis.about.com/od/osteoarthritis101/a/what_is_OA.htm) | 11 | 40 | 51 | Excellent |
| 4 | Healthline | <http://www.healthline.com/health/osteoarthritis> | 14 | 37 | 51 | Excellent |
| 5 | Arthritis Care | <http://www.arthritiscare.org.uk/Home> | 11 | 39 | 50 | Excellent |
| 6 | Boots WebMD | <http://www.webmd.boots.com/arthritis/> | 14 | 36 | 50 | Excellent |
| 7 | NHS (National Health Service) | [http://www.nhs.uk/conditions/osteoarthritis/Pages/Introduction.](http://www.nhs.uk/conditions/osteoarthritis/Pages/Introduction.aspx) [aspx](http://www.nhs.uk/conditions/osteoarthritis/Pages/Introduction.aspx) | 13 | 36 | 49 | Excellent |
| 8 | NLM- NIH (National Library of Medicine- National Institutes  of Health) | <http://www.nlm.nih.gov/medlineplus/osteoarthritis.html> | 14 | 34 | 48 | Good |
| 9 | NIAMS (National Institute of Arthritis and Musculoskeletal  and Skin Disorders) | <http://www.niams.nih.gov/Health_info/Osteoarthritis/default.asp> | 10 | 38 | 48 | Good |
| 10 | Medical News Today | <http://www.medicalnewstoday.com/articles/27871.php> | 11 | 36 | 47 | Good |
| 11 | Patient UK | <http://www.patient.co.uk/health/osteoarthritis-leaflet> | 16 | 31 | 47 | Good |
| 12 | The New York Times | [http://www.nytimes.com/health/guides/disease/osteoarthritis/ov](http://www.nytimes.com/health/guides/disease/osteoarthritis/overview.html) [erview.html](http://www.nytimes.com/health/guides/disease/osteoarthritis/overview.html) | 10 | 37 | 47 | Good |
| 13 | eMedicine Medscape | <http://emedicine.medscape.com/article/330487-overview> | 13 | 34 | 47 | Good |
| 14 | Mayo Clinic | [http://www.mayoclinic.org/diseases-](http://www.mayoclinic.org/diseases-conditions/osteoarthritis/basics/definition/CON-20014749) [conditions/osteoarthritis/basics/definition/CON-20014749](http://www.mayoclinic.org/diseases-conditions/osteoarthritis/basics/definition/CON-20014749) | 14 | 32 | 46 | Good |
| 15 | Bupa | [http://www.bupa.co.uk/health-](http://www.bupa.co.uk/health-information/directory/o/osteoarthritis)  [information/directory/o/osteoarthritis](http://www.bupa.co.uk/health-information/directory/o/osteoarthritis) | 13 | 33 | 46 | Good |

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| --- | --- | --- | --- | --- | --- | --- |
| 16 | NHS Direct Wales | [http://www.nhsdirect.wales.nhs.uk/encyclopaedia/o/article/oste](http://www.nhsdirect.wales.nhs.uk/encyclopaedia/o/article/osteoarthritis/) [oarthritis/](http://www.nhsdirect.wales.nhs.uk/encyclopaedia/o/article/osteoarthritis/) | 9 | 37 | 46 | Good |
| 17 | Arthritis Foundation | [http://www.arthritis.org/arthritis-facts/disease-](http://www.arthritis.org/arthritis-facts/disease-center/osteoarthritis.php)  [center/osteoarthritis.php](http://www.arthritis.org/arthritis-facts/disease-center/osteoarthritis.php) | 9 | 36 | 45 | Good |
| 18 | almostadoctor | [http://almostadoctor.co.uk/content/systems/orthopaedics-and-](http://almostadoctor.co.uk/content/systems/orthopaedics-and-rheumatology/arthritis/osteoarthritis) [rheumatology/arthritis/osteoarthritis](http://almostadoctor.co.uk/content/systems/orthopaedics-and-rheumatology/arthritis/osteoarthritis) | 13 | 32 | 45 | Good |
| 19 | WebMD | <http://www.webmd.com/osteoarthritis/default.htm> | 8 | 36 | 44 | Good |
| 20 | Arthritis Research UK | [http://www.arthritisresearchuk.org/arthritis-](http://www.arthritisresearchuk.org/arthritis-information/conditions/arthritis.aspx)  [information/conditions/arthritis.aspx](http://www.arthritisresearchuk.org/arthritis-information/conditions/arthritis.aspx) | 6 | 38 | 44 | Good |
| 21 | MedicineNet | <http://www.medicinenet.com/osteoarthritis/article.htm> | 14 | 30 | 44 | Good |
| 22 | Spine-health | [http://www.spine-health.com/conditions/arthritis/osteoarthritis-](http://www.spine-health.com/conditions/arthritis/osteoarthritis-spine) [spine](http://www.spine-health.com/conditions/arthritis/osteoarthritis-spine) | 8 | 35 | 43 | Good |
| 23 | Arthritis Ireland | [http://www.arthritisireland.ie/go/information/booklets/living\_with](http://www.arthritisireland.ie/go/information/booklets/living_with_osteoarthritis)  [\_osteoarthritis](http://www.arthritisireland.ie/go/information/booklets/living_with_osteoarthritis) | 5 | 38 | 43 | Good |
| 24 | Everyday Health | [http://www.everydayhealth.com/arthritis/osteoarthritis/index.as](http://www.everydayhealth.com/arthritis/osteoarthritis/index.aspx) [px](http://www.everydayhealth.com/arthritis/osteoarthritis/index.aspx) | 8 | 35 | 43 | Good |
| 25 | Wikipedia | <http://en.wikipedia.org/wiki/Osteoarthritis> | 11 | 31 | 42 | Good |
| 26 | American College of  Rheumatology | [http://www.rheumatology.org/practice/clinical/patients/diseases](http://www.rheumatology.org/practice/clinical/patients/diseases_and_conditions/osteoarthritis.asp)  [\_and\_conditions/osteoarthritis.asp](http://www.rheumatology.org/practice/clinical/patients/diseases_and_conditions/osteoarthritis.asp) | 11 | 29 | 40 | Good |
| 27 | NIH Senior Health | [http://nihseniorhealth.gov/osteoarthritis/whatisosteoarthritis/01.](http://nihseniorhealth.gov/osteoarthritis/whatisosteoarthritis/01.html) [html](http://nihseniorhealth.gov/osteoarthritis/whatisosteoarthritis/01.html) | 9 | 31 | 40 | Good |
| 28 | Orthopaedics and Sports Medicine- University of  Washington | <http://www.orthop.washington.edu/?q=patient-> care/articles/arthritis/osteoarthritis.html | 11 | 26 | 37 | Good |
| 29 | University of Maryland Medical Centre (UMM) | <http://umm.edu/health/medical/altmed/condition/osteoarthritis> | 9 | 28 | 37 | Good |
| 30 | Age UK | [http://www.ageuk.org.uk/health-wellbeing/conditions-](http://www.ageuk.org.uk/health-wellbeing/conditions-illnesses/osteoarthritis/) [illnesses/osteoarthritis/](http://www.ageuk.org.uk/health-wellbeing/conditions-illnesses/osteoarthritis/) | 9 | 27 | 36 | Fair |
| 31 | Medical Dictionary | <http://medical-dictionary.thefreedictionary.com/osteoarthritis> | 3 | 33 | 36 | Fair |
| 32 | Drugs.com | <http://www.drugs.com/osteoarthritis.html> | 9 | 27 | 36 | Fair |
| 33 | Arthritis.com | <http://www.arthritis.com/osteoarthritis_symptoms> | 5 | 31 | 36 | Fair |

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| --- | --- | --- | --- | --- | --- | --- |
| 34 | Johns Hopkins Arthritis  Center | [http://www.hopkinsarthritis.org/patient-corner/disease-](http://www.hopkinsarthritis.org/patient-corner/disease-management/role-of-body-weight-in-osteoarthritis/) [management/role-of-body-weight-in-osteoarthritis/](http://www.hopkinsarthritis.org/patient-corner/disease-management/role-of-body-weight-in-osteoarthritis/) | 10 | 25 | 35 | Fair |
| 35 | NHS- British Dietetic  Association (BDA) | [http://www.nhs.uk/ipgmedia/National/British%20Dietetic%20As](http://www.nhs.uk/ipgmedia/National/British%20Dietetic%20Association/assets/DietandOsteoarthritis.pdf) [sociation/assets/DietandOsteoarthritis.pdf](http://www.nhs.uk/ipgmedia/National/British%20Dietetic%20Association/assets/DietandOsteoarthritis.pdf) | 13 | 16 | 29 | Fair |
| 36 | Medinfo | <http://www.medinfo.co.uk/conditions/osteoarthritis.html> | 9 | 20 | 29 | Fair |
| 37 | Health.com | [http://www.health.com/health/gallery/0,,20443612,00.html](http://www.health.com/health/gallery/0%2C%2C20443612%2C00.html) | 8 | 20 | 28 | Fair |
| 38 | The College of Podiatry | [http://www.scpod.org/foot-health/common-foot-](http://www.scpod.org/foot-health/common-foot-problems/osteoarthritis/) [problems/osteoarthritis/](http://www.scpod.org/foot-health/common-foot-problems/osteoarthritis/) | 7 | 21 | 28 | Fair |
| 39 | Sports Injury Clinic | [http://www.sportsinjuryclinic.net/sport-injuries/knee-](http://www.sportsinjuryclinic.net/sport-injuries/knee-pain/osteoarthritis-of-the-knee)  [pain/osteoarthritis-of-the-knee](http://www.sportsinjuryclinic.net/sport-injuries/knee-pain/osteoarthritis-of-the-knee) | 4 | 24 | 28 | Fair |
| 40 | AposTherapy | [http://apostherapy.co.uk/en/conditions-we-treat/knee-](http://apostherapy.co.uk/en/conditions-we-treat/knee-osteoarthritis) [osteoarthritis](http://apostherapy.co.uk/en/conditions-we-treat/knee-osteoarthritis) | 4 | 24 | 28 | Fair |
| 41 | Better Health Channel | [http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/](http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Osteoarthritis)  [Osteoarthritis](http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Osteoarthritis) | 10 | 17 | 27 | Fair |
| 42 | Centers for Disease Control  and Prevention (CDC) | <http://www.cdc.gov/arthritis/basics/osteoarthritis.htm> | 10 | 16 | 26 | Fair |
| 43 | Acupuncture.org | [http://www.acupuncture.org.uk/a-to-z-of-conditions/a-to-z-of-](http://www.acupuncture.org.uk/a-to-z-of-conditions/a-to-z-of-conditions/osteoarthritis.html) [conditions/osteoarthritis.html](http://www.acupuncture.org.uk/a-to-z-of-conditions/a-to-z-of-conditions/osteoarthritis.html) | 6 | 19 | 25 | Fair |
| 44 | Stannah | [http://www.stannahstairlifts.co.uk/news/osteoarthritis-uk-closer-](http://www.stannahstairlifts.co.uk/news/osteoarthritis-uk-closer-look)  [look](http://www.stannahstairlifts.co.uk/news/osteoarthritis-uk-closer-look) | 8 | 14 | 22 | Poor |
| 45 | Imperial College London | <http://www3.imperial.ac.uk/osteoarthritis> | 9 | 9 | 18 | Poor |
| 46 | The Telegraph | [http://www.telegraph.co.uk/news/science/science-](http://www.telegraph.co.uk/news/science/science-news/11346259/Killer-heels-could-lead-to-osteoarthritis-in-knees-warn-scientists.html) [news/11346259/Killer-heels-could-lead-to-osteoarthritis-in-](http://www.telegraph.co.uk/news/science/science-news/11346259/Killer-heels-could-lead-to-osteoarthritis-in-knees-warn-scientists.html)  [knees-warn-scientists.html](http://www.telegraph.co.uk/news/science/science-news/11346259/Killer-heels-could-lead-to-osteoarthritis-in-knees-warn-scientists.html) | 8 | 10 | 18 | Poor |
| 47 | Daily Mail Online | [http://www.dailymail.co.uk/health/article-2839542/Running-](http://www.dailymail.co.uk/health/article-2839542/Running-GOOD-knees-actually-prevent-osteoarthritis-experts-claim.html) [GOOD-knees-actually-prevent-osteoarthritis-experts-claim.html](http://www.dailymail.co.uk/health/article-2839542/Running-GOOD-knees-actually-prevent-osteoarthritis-experts-claim.html) | 7 | 10 | 17 | Poor |
| 48 | Dictionary.com | <http://dictionary.reference.com/browse/osteoarthritis> | 8 | 8 | 16 | Poor |
| 49 | Institute of Inflammation and Repair- The University of  Manchester | [http://www.inflammation-](http://www.inflammation-repair.manchester.ac.uk/Musculoskeletal/research/CfE/roam/) [repair.manchester.ac.uk/Musculoskeletal/research/CfE/roam/](http://www.inflammation-repair.manchester.ac.uk/Musculoskeletal/research/CfE/roam/) | 5 | 6 | 11 | Very poor |
| 50 | Kennedy Institute of  Rheumatology - University of | <http://oacentre.kennedy.ox.ac.uk/patientinfo.html> | 3 | 2 | 5 | Very poor |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Oxford |  |  |  |  |  |

1. The research team developed an OQP grading scale. It was based upon the
2. DISCERN grading scale [32], but was modified accordingly to fit our scoring up to
3. 59, whereas the DISCERN grading scale grades websites up to a score of 75.
4. Using this scale, with the median of the data being 69% the average quality of the
5. information is categorised as ‘good’. Of the 50 assessed websites, seven were
6. categorised as ‘Excellent’ by the authors’ OQP Grading Scale. These websites,
7. which scored 48 or more, were NHSUK, Arthritis Care, BootsWebMD, NICE,
8. OA.About, Healthline and E-medicine health.

## General Website Quality:

1. The general quality scores ranged from 3 to 16 (median 9, 56%) from an available
2. 16 marks, indicating that the median was of a ‘fair’ quality when judged against the
3. authors’ OQP Grading Scale. In total 64% (32/50) of the websites scored more than
4. half of the available marks.
5. Of the 50 websites appraised, just under half (24/ 50, 48%) identified a named
6. author or their affiliations. In addition to this, 84% (42/50) of websites appraised
7. provided a date of website creation or when they were last updated; with 64%
8. (32/50) being created/ updated during or after 2014. Sites that had been updated
9. since 2014 had a higher median quality score than those that had not but this was
10. not statistically significant.
11. In total, 36% (18/50) of websites failed to provide a source for their information; with
12. 32% (16/50) quoting other sources (such as other websites), and the remaining 32%
13. (16/50) having peer review processes. Websites that had a peer review process had
14. higher median quality scores than those that quoted other sources or none. The
15. difference in quality between those quoting other sources or no sources was not
16. statistically significant.
17. Of the websites that were assessed, 32% (16/50) had been approved by an external
18. organisation such as HoN [16] or the Information Standard [17]. Those that had
19. received external approval had significantly higher median quality scores than those
20. that had not.
21. The majority of websites (39/50, 78%) referred the reader on to further OA
22. information, with 58% (29/50) of websites containing links to four or more relevant
23. sites. Sites that referred on to four or more websites received significantly higher
24. median quality scores than those that referred to none.

## Table 2: The influence of specific quality criteria on total quality scores. \* =

1. statistically significant (Mann Whitney test).

|  |  |  |  |
| --- | --- | --- | --- |
| **Quality criteria** | | **Median quality score**  **(max 59) (IQR)** | **Median difference**  **(95% CI), p-value** |
| Updated  since 2014 | Yes (n=32) | 44 (28, 47) | Yes v No: -4 (-11, 2),  p=0.108 |
| No (n=18) | 36 (28, 43) |
| Source of information | Peer (n=16) | 47 (44, 49) | Peer v Other: -9 (-16, -3),  **p=0.008\***  Peer v None: -17 (-26, -  8), **p<0.001\***  Other v None: -8 (-17, 1), p=0.081 |
| Other (n=16) | 36 (29, 44) |
| None (n=18) | 28 (18, 41) |

|  |  |  |  |
| --- | --- | --- | --- |
| External  approval | Yes (n=16) | 46 (42, 49) | Yes v No: -9 (-17, -3),  **p=0.004\*** |
| No (n=34) | 36 (26, 44) |
| Number of | 4+ sites | 46 (36, 47) | 4+ v 0 sites: -12 (-20, -5), |
| websites | (n=29) |  | **p=0.002\*** |
| referred to | 2-3 sites | 43 (26, 46) | Other statistical |
|  | (n=6) |  | comparisons not |
|  |  |  | conducted due to low |
| 1 site (n=4) | 32 (22, 38) |
|  |  |  | numbers |
| 0 sites (n=11) | 28 (21, 36) |

## OA Specific Quality Scores:

1. The OA specific quality scores ranged from 2 to 43 out of a possible 43, with a
2. median score of 31 (71%), indicating ‘good’ quality overall using the OQP grading
3. scale. Of the 50 websites, 72% (36/50) scored over 50% of the available marks.
4. Upon analysing specific criteria many websites scored highly (>half of available
5. marks) in the reporting of anatomy and physiology (42/50 websites, 84%), risk
6. factors (42/50 websites, 84%) and symptoms of OA (43/50 websites, 86%). In
7. addition to this, the diagnosis of OA (37/50 websites, 74%), self-management
8. strategies (37/50 websites, 74%) and pharmalogical management (38/50 websites,
9. 76%) was also well reported throughout. However, scoring at this level was less well
10. represented in relation to non- pharmalogical management (25/50 websites, 50%)
11. and consideration of surgery (24/50 websites, 48%). Furthermore, the holistic
12. management of OA (17/50 websites, 34%) and the follow up and review process
13. (5/50 websites, 10%) were the least well reported sections within the OA criteria.
14. Specific management strategies such as exercise and weight loss were the most
15. frequently documented throughout the assessed websites (84% (42/50) and 80%
16. (40/50) respectively). However, many websites failed to report upon OA effect on
17. sleep (30%, 15/50) and just 26% (13/50) mentioned the possible other medical
18. conditions associated with the disease. In addition to this just 15% (8/50) mentioned
19. the need for regular monitoring of the disease and only 11% (6/50) reported on the
20. importance of regular reviews by a healthcare professional, despite both being
21. highlighted as key recommendations in the NICE [18] guidelines.

# Discussion

1. The purpose of this study was to assess the quality of websites that are available to
2. the public searching for information about OA. Overall, the findings suggest an
3. improvement in the quality of OA websites as previous research had found the
4. quality of OA websites to be poor [4, 6].
5. However, while this study found the overall quality of information to be of a high
6. standard, it is also in accordance with previous research that has found there to be a
7. wide variability in the quality of OA information that is available to users [4, 6]. This
8. helps to highlight that there is a wide inconsistency of information available to users,
9. making it difficult for internet users to consistently access information of a high
10. quality. The reason for this wide discrepancy in quality is multifactorial, with
11. variations occurring in general and OA specific scores.
12. Many websites failed to disclose authorship or affiliations (52%, 26/50) and sources
13. of information (36%, 18/50), while just 32% (16/50) were certified by an external
14. organisation, such as HoN [16]. This highlighted that there were several of the
15. general criteria, which have previously been identified as indicators of quality
16. information [25, 26] which were not well documented by a large proportion of the
17. assessed websites. This is despite the fact that a number of general website
18. indicators were shown to have a significant relationship with the overall quality of a
19. website. Our findings are in accordance with previous research in that quality online
20. information is created more recently, discloses the source of information, has
21. external certification and directs the reader to other useful sites [4, 6].
22. Despite this, the researchers would advise that the results be treated with caution as
23. these relationships were not definitive. There were many websites which scored
24. highly, yet did not disclose these factors, suggesting that these indicators are not
25. pre-requisites to quality information.
26. Over 70% of websites scored over half of the available marks (22 marks or more) on
27. the OA section, indicating that many of the websites published information which
28. was in accordance with the current NICE guidelines [18]. Certain aspects of the
29. NICE guidelines such as anatomy and physiology, risk factors and self-management
30. were well documented throughout. In particular, treatment strategies such as
31. exercise and weight loss were the most frequently cited modalities of the websites
32. that were assessed, highlighting that core modalities recommended in NICE
33. guidelines were present within the appraised websites. Therefore, this information
34. may assist people diagnosed with OA and encourage them towards adhering to
35. healthy lifestyle habits [33].
36. Conversely, the reporting of factors associated with a holistic approach to OA and
37. the follow up and review process were not consistently documented. This is despite
38. the fact that several research papers [34, 35] and guidelines [19] have emphasised
39. the importance of a holistic, patient-centred approach for people affected by OA, with
40. evidence that this approach can help aid function, independence and enhance a
41. person’s attitudes towards their disease. It is therefore recommended that healthcare
42. professionals and website developers in the future ensure that sites incorporate a
43. greater range of holistic information for patients. This may include OA effect on sleep
44. and pain management, and a greater emphasis on how it can affect social life and
45. an individual’s moods and attitudes.

## Limitations:

1. The results of this study raise some important considerations regarding the quality of
2. OA material available to people online. However, due to several limitations, the
3. results of this study must be considered with caution. Firstly, it should be noted that
4. as the internet is a dynamic entity in which websites move, change or become
5. inaccessible on a continual basis [36], repetition of the current study is likely to result
6. in the identification of different websites. For that reason, while conclusions can be
7. made on the data obtained during February 2015, the results should not be
8. generalised to the quality of OA websites in the future.
9. There are also several limitations with the use of the OQP tool. The creation of the
10. proforma meant that the websites were appraised using a non-standardised and
11. non-validated tool; limiting the validity of the results. Despite this, the present study
12. found there to be good consistency with use of the tool; and so future research
13. would be recommended to assist in validation of the OQP tool.
14. Moreover, the manner in which the OQP appraised websites could also be criticised.
15. While the proforma did not award marks for incorrect information, it did not take into
16. account the level of detail or explanation that individual websites explored for certain
17. criteria and only commented on the presence or otherwise of information. Therefore,
18. to what degree this research accurately assessed the true ‘quality’ of information is
19. unclear.
20. A further limitation is that the study doesn’t reflect the way the general public search
21. for health and medical information. During website appraisal, assessors were using
22. the OQP and guidance document to appraise the information in a systematic and
23. reproducible manner. However, this process of searching for information is
24. somewhat artificial. Previous research has also found that healthcare professionals
25. and consumers evaluate online information in different ways [37]. In light of this,
26. future research may be targeted at facilitating a representative sample of patients or
27. service users to appraise online information as opposed to healthcare practitioners.

## Clinical Implications:

1. Within the internet era, the role of healthcare professionals in guiding patients
2. towards high quality health information has expanded into the digital setting. This
3. study helps to highlight the difficulty healthcare professionals have in recommending
4. an optimal approach to this complex and evolving environment.
5. The wide variability in the quality of OA information available has the potential to not
6. only limit the ability of the patient to become informed and to promote self-
7. management of their condition, but also to directly misinform and mislead healthcare
8. decisions.
9. Within the clinical health setting, more time spent in discussion with patients on
10. aspects such as education about OA may be a beneficial, individualised alternative
11. to online information. For computer literate patients, empowering and educating
12. internet users to find and recognise quality health information for themselves may be
13. a necessary step to help people navigate the myriad of information available to them.
14. Guidelines do not currently exist for the assessment of material online and it may be
15. that formal guidelines can be established or quality assessment criteria delineated
16. and standardised by organisations such as NICE. This would allow consensus of the
17. same method and standard of appraisal for general or specific condition based
18. information, which may be necessary in order to stay ahead of the growing body of
19. inaccurate material on the internet.

# Conclusion

1. The internet has the potential to be a useful tool for educating and empowering
2. healthcare consumers. It can help to facilitate improvements in health status
3. indicators, access to care and enhance communication between patients, families
4. and healthcare professionals [38]. However, if the internet is to assist patients in
5. making informed choices about their health, then digital information needs to be of
6. the highest possible quality.
7. The results of this study show that overall, websites available to a ‘typical’ population
8. searching for information on OA are of a high standard. However, as previous
9. research has found there is a wide variability in the quality of information available [4,
10. 6]. Internet users are therefore at risk of accessing material that is unsubstantiated
11. and unreliable, which can negatively impact upon patient decision making.
12. It is therefore of the upmost importance that healthcare professionals become
13. proactive in evaluating existing information online to help patients locate reliable and
14. accurate information. In addition to this, in the future practitioners should become
15. actively involved with website developers in establishing high quality, evidence
16. based websites.
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19. have been the sole responsibility of the researcher team.
20. *Conflict of interest:* None

# References

1. [1] Johnson, V.L. and Hunter, D.J. (2014) The epidemiology of osteoarthritis. Best
2. Practice & Research Clinical Rheumatology [online]. 28, pp. 5-15. [Accessed 06
3. December 2014].
4. [2] Larmer, P.J., Reay, N.D., Aubert, E.R. and Kersten, P. (2014) Systematic review
5. of guidelines for the physical management of osteoarthritis. Archives of Physical
6. Medicine and Rehabilitation [online]. 95, pp. 375-389. [Accessed 01 December

404 2014].

405 [3] Arthritis Research UK (2013) Osteoarthritis in General Practice. Data and

406 Perspectives. Available from: [http://www.arthritisresearchuk.org/arthritis-](http://www.arthritisresearchuk.org/arthritis-information/data-and-statistics/osteoarthritis.aspx)

407 [information/data-and-statistics/osteoarthritis.aspx](http://www.arthritisresearchuk.org/arthritis-information/data-and-statistics/osteoarthritis.aspx) [Accessed 26 March 2015].

408 [4] Maloney, S., Ilic, D. and Green, S. (2005) Accessibility, nature and quality of

409 health information on the internet: a survey on osteoarthritis. Rheumatology [online].

410 44 (3), pp. 382-385. [Accessed 01 December 2014].

1. [5] Pietrzak, E., Cotea, C., Pullman, S. and Nasveld, P. (2013) Self-management and
2. Rehabilitation in Osteoarthritis: Is There a Place for Internet-Based Interventions?.
3. Telemedicine and e-Health. 19 (10), pp. 800-805.
4. [6] Ansani, N.T., Vogt, M., Fedutes Henderson, B.A., McKaveney, T.P., Weber, R.J.,
5. Smith, R.B., *et al* (2005) Quality of arthritis information on the Internet. American
6. Journal of Health-systems Pharmacy [online]. 62 (11), pp. 1184-1189. [Accessed 03
7. December 2014].
8. [7] Office for National Statistics (2014) Internet Access- Households and Individuals,
9. 2014. Available from: <http://www.ons.gov.uk/ons/dcp171778_373584.pdf>[Accessed
10. 02 December 2014].
11. [8] Office for National Statistics (2013) Internet Access - Households and Individuals,
12. 2013. Available from: <http://www.ons.gov.uk/ons/dcp171778_322713.pdf>[Accessed
13. 02 December 2014].
14. [9] Sillence, E., Briggs, P., Harris, P. and Fishwick, L. (2007) Going online for health
15. advice: changes in usage and trust practices over the last five years. Interacting with

426 Computers. 19 (3), pp. 397-406.

427 [10] Stvilia, B., Mon, L. and Jeong Yi, Y. (2009) A model for online consumer health

428 information quality. Journal of the American Society for Information Science and

429 Technology. 60 (9), pp. 1781-1791.

430 [11] Williams, P., Huntington, P. and Nicholas, D. (2003) Health information on the

431 internet: a qualitative study of NHS direct online users. Aslib Proceedings [online]. 55

432 (5), pp. 304-312. [Accessed 02 December 2014].

1. [12] Baker, L., Wagner, T.H., Singer, S. and Bundorf, M.K. (2003) Use of the Internet
2. and e-mail for health care information: results from a national survey. JAMA: Journal
3. of the American Medical Association. 298 (18), pp. 2400-2406.
4. [13] Diaz, J.A., Griffith, R.A., Ng, J.J., Reinert, S.E., Friedmann, P.D. and Moulton,
5. A.W. (2002) Patients' Use of the Internet for Medical Information. Journal of General
6. Internal Medicine. 17 (3), pp. 180-185.
7. [14] Kitchens, B., Harle, C.A. and Li, S. (2014) Quality of health-related online search
8. results. Decision Support Systems. 57, pp. 454-462.
9. [15] Health On the Net Foundation: HON (2013) Available from:
10. <https://www.healthonnet.org/pat.html>[Accessed 24 March 2015].
11. [16] British Library and The University of Oxford (1997) The DISCERN Instrument.
12. Available from: <http://www.discern.org.uk/discern_instrument.php>[Accessed 24

445 March 2015].

1. [17] NHS England (2014) *The Information Standard.* Available from:
2. <https://www.england.nhs.uk/tis/>[Accessed 04 January 2016].
3. [18] Bernstam, E.V. (2005) Instruments to assess the quality of health information
4. on the world wide web: what can our patients actually use?. International Journal of
5. Medical Informatics. 74 (1), pp. 13-19.
6. [19] National Institute for Health and Care Excellence: NICE (2014) Osteoarthritis:
7. Care and Management in Adults. Available from:
8. <http://www.nice.org.uk/guidance/cg177/resources/guidance-osteoarthritis-pdf>
9. [Accessed 02 December 2014].
10. [20] Gesenhues, A. (2014) Search Engine Land- Study: Top 5 Search Engines See
11. Search Traffic Drop By As Much As 31% Since December 2013 .Available from:
12. [http://searchengineland.com/study-google-bing-yahoo-ask-aol-see-17-32-decline-](http://searchengineland.com/study-google-bing-yahoo-ask-aol-see-17-32-decline-search-traffic-last-6-months-194634)
13. [search-traffic-last-6-months-194634](http://searchengineland.com/study-google-bing-yahoo-ask-aol-see-17-32-decline-search-traffic-last-6-months-194634) [Accessed 09 December 2014].
14. [21] Butler, L. and Foster, N.E. (2003) Back pain online: a cross sectional survey of
15. the quality of web-based information on low back pain. Spine. 28 (4), pp. 395-401.
16. [22] Chitika (2013) Chitika Insights: *The value of Google Result Positioning*.
17. Westborough, Massachusetts: Chitika.
18. [23] Eysenbach, G. and Kohler, C. (2002) How do consumers search for and
19. appraise health information on the world wide web? qualitative study using focus
20. groups, usability tests, and in-depth interviews. BMJ: British Medical Journal. 324,

466 pp. 573-577.

467 [24] Urbaniak, G.C., Plous. C., (2008) Social Psychology Network. *Research*

468 *Randomizer.* Available from: <http://www.randomizer.org/form.htm>[Accessed 24

469 March 2015].

1. [25] Gagliardi, A. and Jadad, A. (2002) Examination of instruments used to rate
2. quality of health information on the Internet: chronicle of a voyage with an unclear
3. destination. British Medical Journal. 324, pp. 569-573.
4. [26] Kim, P., Eng, T.R. and Deering, M.J. (1999) Published criteria for evaluating
5. health related web sites: Review. British Medical Journal.318 (4), pp.647-649.
6. [27] Silberg, W.M., Lundberg, G.D. and Musacchio, R.A. (1997) Assessing,
7. controlling and assuring the quality of medical information on the internet. JAMA:
8. Journal of the American Medical Association. 277, pp. 1244-1245.
9. [28] Fernandes, L., Hagen, K.B., Bijlsma, J.W.J., Andreassen, O., Christensen, P.,
10. Conaghan, P.G., *et al* (2013) EULAR recommendations for the nonpharmacological
11. core management of hip and knee osteoarthritis. Annals of the Rheumatic

481 Diseases.10 (1136), pp.1-11.

482 [29] National Guideline Clearinghouse (2012) Recommendations for the use of Non-

483 pharmacologic and Pharmacologic Therapies in Osteoarthritis of the Hand, Hip, and

484 Knee. Available from: <http://www.guideline.gov/content.aspx?id=36893>[Accessed 05

485 April 2015].

486 [30] Ashford, S. and Williard, J. (2014) Osteoarthritis: A review. The Nurse

487 Practitioner. 39 (5), pp. 1-8.

488 [31] Hunter, D.J. and Felson, D.T. (2006) Osteoarthritis. British Medical Journal.

489 332, pp. 639-642.

490 [32] Hargrave, D.R., Hargrave, U.A. and Bouffet, E. (2006) Quality of health

491 information on the internet in paediatric neuro-oncology. Neuro-oncology. 8 (2), pp.

492 175-182.

493 [33] Bennell, K.L. and Hinman, R.S. (2011) A review of the clinical evidence for

494 exercise in osteoarthritis of the hip and knee. Journal of Science and Medicine in

495 Sport. pp. 4-9.

496 [34] Huskisson, E.C. (2010) Modern Management of Mild-to- Moderate Joint Pain

497 due to Osteoarthritis: a Holistic Approach. The Journal of International Medical

498 Research. 38 (4), pp. 1175-1212.

499 [35] Oliver, S.M. (2008) Holistic management of osteoarthritis. Practice Nursing. 19

500 (6), pp. 298-304.

1. [36] Sandvik, H. (1999) Health information and interaction on the internet: a survey of
2. female urinary incontinence. BMJ: British Medical Journal. 319, pp. 29-32.
3. [37] Stanford, J., Tauber, E., Fogg, B.J., Marable, L. (2002) Experts vs. online
4. consumers: a comparative credibility study of health and finance web sites. Available
5. from: [https://consumersunion.org/wp-content/uploads/2013/05/expert-vs-online-](https://consumersunion.org/wp-content/uploads/2013/05/expert-vs-online-consumers.pdf)
6. [consumers.pdf](https://consumersunion.org/wp-content/uploads/2013/05/expert-vs-online-consumers.pdf) [Accessed 13 April 2015].
7. [38] Fahy, E., Hardikar, R., Fox, A. and Mackay, S. (2014) Quality of patient health
8. information on the internet: reviewing a complex and evolving landscape.
9. Australasian Medical Journal. 7 (1), pp. 24-28.
10. [39] UWE Research Ethics Committee (2012) Research Ethics Committees: Policy
11. and Procedures for Research Ethical Approval. Available from:
12. [http://www2.uwe.ac.uk/services/Marketing/research/doc/ethicsandprocedures/Resea](http://www2.uwe.ac.uk/services/Marketing/research/doc/ethicsandprocedures/Research_Ethics_Policy_and_Procedures.docx)
13. [rch\_Ethics\_Policy\_and\_Procedures.docx](http://www2.uwe.ac.uk/services/Marketing/research/doc/ethicsandprocedures/Research_Ethics_Policy_and_Procedures.docx) [Accessed 30 November 2015].

**Supplementary**

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