



Archived at the Flinders Academic Commons:

<http://dspace.flinders.edu.au/dspace/>

This is the authors' version of an article published in the *Australian Journal of Primary Health*. The original publication is available by subscription at:

<http://www.publish.csiro.au/nid/261/aid/11548.htm>

doi:[10.1071/PY13030](https://doi.org/10.1071/PY13030)

Please cite this article as:

Tieman J, Bradley SL. Systematic review of the types of methods and approaches used to assess the effectiveness of healthcare information websites. *Australian Journal of Primary Health*. 2013;19(4):319-24.

Journal compilation © La Trobe University 2013. All rights reserved. **Please note** that any alterations made during the publishing process may not appear in this version.

1        *Abstract (Word Count=199)*

2

3        The objective of this systematic review was to identify types of approaches and methods  
4        used to evaluate the effectiveness of healthcare information websites. Simple usage  
5        data may not be sufficient to assess if the desired healthcare outcomes were achieved or  
6        to determine the relative effectiveness of different web resources on the same health  
7        topic. To establish the state of the knowledge base on assessment methods used to  
8        determine the effectiveness of healthcare websites, a structured search of the literature  
9        was conducted in Ovid Medline resulting in 1,611 articles retrieved, of which 240 met the  
10       inclusion criteria for this review. Results of this review found that diverse evaluation  
11       methods were used to measure the effectiveness of healthcare websites. These  
12       evaluation methods were used during development, prior to release, and after release.  
13       Economic assessment was rare and most evaluations looked at content issues such as  
14       readability scores. A number of studies did try to assess the usefulness of websites but  
15       few studies looked at behaviour change or knowledge transfer following engagement  
16       with the designated health website. To assess the effectiveness of the knowledge  
17       transfer of healthcare information through the online environment, multiple methods may  
18       need to be used to evaluate healthcare websites and may need to be undertaken at all  
19       stages of the website development process.

24 Summary Statement (n=95)

25

26 What is known about the topic?

27 There is increasing use of online resources such as health websites.

28 More studies on website usage and assessments of their impact are being published.

29 This research can be used to improve the functionality and contribution of these  
30 resources.

31

32 What does this paper add?

33 This paper establishes an evidence base of evaluation methods used to assess the  
34 effectiveness of healthcare websites.

35 The evaluation methods identified in this review were diverse and applied at different  
36 stages of development and production.

37 There is a limited evidence base relating to economic assessment and behaviour  
38 change.

39 *Introduction (N=734)*

40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75

Given the diversity of information needed by health professionals and health consumers within a diversity of care settings, the online environment offers a powerful means in which to disseminate and maintain information currency as well as encourage engagement with healthcare knowledge. Information seekers now have an unprecedented ability to access vast amounts of information on any health issue via a keyboard or touch screen. Online healthcare information dissemination is powerful because of its reach, its relative cost advantages and its immediate availability. As a result, there is growing interest in the role of e-health and telehealth within the healthcare system, particularly within primary healthcare (Australian Government, 2010).

Statistics provide evidence of the rapid uptake and use of the Internet by all age groups, geographic regions and countries for accessing information, including healthcare information. Figures from the Internet World Stats website showed that in June 2012, there were 2.45 billion people, or 34.3% of the world's population, with access to the Internet (Internet World Stats, 2013). According to the Australian Bureau of Statistics in Australia, during the same time period there were over 12 million Internet users in Australia, and the number of users is increasing at around 10% annually (Australian Bureau of Statistics, 2012). A significant proportion of this Internet activity relates to health issues. A study by Eysenbach and Kohler examined the prevalence of health related searches on the web by analysing search terms entered into popular search engines. Results of this research showed that an estimated 4.75% of all searches were health related (Eysenbach and Kohler, 2003). The Pew Internet & American Life Project report, Health Online 2013, indicated that 72% of Internet users have looked online for health information of one kind or another within the past year. Three quarters of these searches began at a search engine such as Google or Bing (Fox and Duggan, 2013).

This demand for online health information highlights the importance of information being derived from credible sources. While the technological capabilities to create online resources are becoming increasingly easier, developing high quality content that is readily accessible draws upon a complex range of skills and knowledge. The types of skills and knowledge required can be most readily seen in the US usability guidelines (US Department of Health and

76 Human Services, 2006) or the Australian Government’s web publishing  
77 guidelines (Australian Government, 2012). An integral part of determining the  
78 “value” of a website is to formally investigate the resource in a structured,  
79 purposeful manner. This form of investigation, or evaluation, can support design  
80 integrity, successful development and delivery, and appropriate modification and  
81 recognition of the website (or other form of online information dissemination).

82 Patton has described evaluation as:

83 The systematic collection of information about the activities, characteristics, and  
84 outcomes of program services, policy or processes, in order to make judgements  
85 about the program or process, improve effectiveness, and /or inform decision  
86 about future development (Patton, 2008, p. 27).

87  
88 Evaluation activities in the online environment are particularly important for  
89 enhancing the functionality of resources for users and maximising the  
90 contribution of online information to outcomes in the health system. By doing so,  
91 evaluation can demonstrate the value of the online information and the delivery  
92 platform to policy makers, funders and health organisations. Nevertheless, there  
93 are challenges in evaluating online health resources. These challenges include  
94 different users having different requirements and perspectives on what is a  
95 successful outcome (Pawson et al 2011, Greenhalgh & Russell 2010). In  
96 addition, there are human, organisational and technical factors relating to system  
97 design, development and use that may also impact on appropriate evaluation  
98 (Yusof, et al. 2008; Pagliari, 2007, Catwell & Sheikh, 2009).

99  
100 Regardless of these obstacles, however, there is an increasing recognition of the  
101 value of such studies both to the individual resource and to the body of  
102 knowledge that supports online resource development (Eysenbach, 2011).  
103 However, the landscape of approaches used in evaluating health information  
104 websites during design, development and production remains unclear. This  
105 systematic review maps the different evaluation approaches being used to  
106 assess the effectiveness of healthcare websites and, in so doing, provides  
107 baseline knowledge not only of the evaluation methods being used but also of  
108 aspects of website and information development that appear to be under-  
109 evaluated.

110  
111 *Methods (n=416)*

112

113 The study was conducted between January and April 2012.

114

115 A literature search of the Ovid SP database was conducted on 7 February 2012.

116 The search comprised two constructs: website (Internet/ OR website\$.mp.) and

117 evaluation (Evaluation Studies as a Topic/ OR “Outcome and Process

118 Assessment (Health Care)”/ OR assessment.mp. OR “Outcome Assessment

119 (Health Care)”/ OR Quality Indicators, Health Care/ OR Quality Assurance,

120 Health Care/ OR “Quality of Health Care”/ OR quality.mp. OR Quality

121 Improvement/). The following limits were applied: English language, yr=1995-

122 current. Retrievals were restricted to the following Publication Types: evaluation

123 studies OR case reports OR clinical trials OR comparative study OR meta

124 analysis OR randomized controlled trial. The literature search retrieved 1,611

125 references that were downloaded into the electronic reference manager Endnote

126 for screening.

127

128 Included articles needed to meet the following inclusion criteria: discusses a

129 website; describes a study; the study relates to evaluation; and the website

130 provides healthcare information. Exclusion criteria were: not being an online

131 resource; not being a website (social media platforms were excluded); describes

132 online healthcare professional education; not being a study; not relating to health;

133 or the article not being able to be retrieved.

134

135 Abstracts of the retrieved articles were screened by a research assistant (SB)

136 against the inclusion and exclusion criteria. Three sets of randomly selected

137 articles (n=70) were screened by a second rater (JT) to determine inter-rater

138 reliability. Inter-rater reliability ranged from 76% to 92% for the three sets. After

139 each exercise, the two raters met to discuss the sources of variability and refine

140 decision making.

141

142 Two hundred and forty articles met the criteria for inclusion. A flow chart of

143 retrievals, exclusions and included studies is outlined in Figure 1.

144

145 The Data Extraction Form comprised a set of commonly recorded items such as author

146 and citation details, abstract, name of online resource and web address (where

147 provided), healthcare content area, intended audience, year study conducted,

148 description of the evaluation, methods of data collection, and details of any statistical

149 analysis undertaken. In addition, four specific review categories were developed

150 (Website Type, Measurement Focus, Stage of Development, and Evaluation Emphasis).  
151 They are described below. A trial extraction of data from a random selection of 10% of  
152 included studies was jointly undertaken (JT, SB) to finalise the Data Extraction Form and  
153 to determine its workability. Weekly meetings were held across the project allowing  
154 review of coding issues in data extraction.

155

156 Four additional extraction categories were created to provide a further basis for  
157 organising the included studies:

158 Website Type: This categorisation indicated whether the included study looked at one or  
159 more websites and whether it was evaluating the same or different content areas at a  
160 single or multiple time points.

161

162 Measurement Focus: This item categorised the included study by using the focus of  
163 measurement reported in the article. The categories represented specific components of  
164 evaluation activity and focus across the design, development, implementation, and  
165 maturity phases of a website's life cycle. The initial categories were developed from  
166 reports in the literature that covered developmental and technical perspectives and user  
167 needs (Cunliffe, 2000; Calero et al, 2005; Elling et al, 2007; Tankeleviviene &  
168 Damasevicius, 2009). In a joint data extraction exercise, the categories and descriptors  
169 for the Measurement Focus items were expanded, refined and documented. The  
170 categories reflect the outcome measures being examined in the evaluation method (eg  
171 usability testing, web metrics, behaviour change, and economic assessment).

172

173 Stage of Development: This categorisation relates to phase of website development with  
174 3 pre-release categories and 3 post-release categories. The Australian Government  
175 Information Office's range of Better Practice Checklists & Guidance materials highlights  
176 the need for consideration of the lifecycle of a website from concept to decommissioning  
177 (Australian Government Information Office, 2013).

178

179 Evaluation Emphasis: This categorisation utilises an evaluation framework developed to  
180 guide evaluation activities for the CareSearch website ([www.caresearch.com.au](http://www.caresearch.com.au)). The  
181 framework was developed following a program logic activity to outline the role of  
182 evaluation within the development of the CareSearch website (Tieman & Martin, 2009).  
183 The three levels of emphasis relate to enhancing access, measuring use, and assessing  
184 usefulness or impact.

185

186 Descriptive statistical analysis was conducted using SPSS, Version 19.0.01 (2010).

187  
188  
189  
190  
191  
192  
193  
194  
195  
196  
197  
198  
199  
200  
201  
202  
203  
204  
205  
206  
207  
208  
209  
210  
211  
212  
213  
214  
215  
216  
217  
218  
219  
220  
221  
222

## Results (n=262)

Results of the review found that over half of the studies evaluated a particular group of websites on a single topic (e.g. breast cancer information) at single time point (59.2%, 142/240). Forty-four studies compared the performance of a group of websites across different healthcare topics (18.3%) and ten studies looked at a particular group of websites (e.g. mental health advice) at different time points (4.2%). Fifteen studies looked at one website at a single time point (6.3%) and a further 31 looked at a single website at multiple time points (12.9%).

Cancer, mental health, reproductive health and paediatrics were the most common health content areas of the websites included in evaluation studies.

When appraising the measurement focus of the evaluation studies, assessment of content quality areas such as accuracy and currency of the information (68.8%, 165/240) and structural elements such as menu systems, navigation or hyperlinks (43.3%, 104/240) were the two most commonly assessed areas as can be seen in Table 1. Project evaluation and economic assessment were the least common types of measurement focus.

Most of the studies in this review were conducted after the release of the designated website (80.8%, 194/240). Approximately 30% looked at studies prior to release during the concept analysis/needs analysis phase (14.2%, 34/240) or the development phase (17.5%, 42/240) as illustrated in Table 2.

Though more than 80% of the studies (199/240) addressed issues relating to enhancing access to the website, less than a third attempted to assess the usefulness of the resource in terms of whether it had actually changed practice or outcomes (Table 2).

## Discussion

Throughout the screening and analysis, it became clear that the evaluation methods being described were extensive and variable. Understanding the range and nature of approaches being used, and possible issues associated with implementing particular



223 approaches, is important to ensure that the most appropriate types of studies are  
224 undertaken to meet different evaluation purposes, and that they reflect the different  
225 stages of website development. Eysenbach (2011) has highlighted the need to improve  
226 and standardise the quality of reporting in this field to facilitate the use and dissemination  
227 of this published research.

228  
229 The significant number of articles reporting on the findings of evaluations of health  
230 information websites suggest that evaluation of online resources is feasible and of  
231 interest. Even though there was considerable diversity in terms of the focus of the  
232 measurement of the studies, very few studies addressed the economics of online health  
233 information provision, or the costs and benefits of information transfer within this  
234 environment independently or compared to other forms of information transfer. Most  
235 studies also described work that was conducted at a single time point limiting the ability  
236 to assess the impact of changes to individuals or to websites over time. Studies around  
237 the assessment of the quality of the information content provided in the website and  
238 readability levels, reports on changes to structural aspects of the website and issues in  
239 search and search engine retrieval were much more commonly published than studies  
240 addressing behaviour change or knowledge transfer. While ensuring functionally  
241 accessible websites is extremely important, more emphasis is needed on assessing the  
242 impact that engagement with these online resources has on individuals and on the health  
243 system.

244  
245 Relatively few studies focused on program evaluations. Hence, there is only a limited  
246 amount of published material available to web developers and project managers in  
247 assessing the performance of the online resource against specified criteria from funding  
248 agencies or policy makers. The apparent paucity of evaluation research in this field may  
249 also reflect the reality of decision making processes involved in committing to creating an  
250 online resource which may restrict the time and capacity to articulate and define the  
251 purposes and intended contributions of the resource to health outcomes. For groups  
252 commissioning or creating websites or webpages, the review would indicate that more  
253 needs to be done in articulating desired outcomes of the project not just outlining the  
254 product specification. Partners in web planning and development need to consider who  
255 the intended users are, the capacities and experience of these users, and the  
256 circumstances in which they will seek, find and use the provided health information. The  
257 information needs of the intended audience should guide planning and inform decision  
258 making about formats, presentation, design and navigation to enhance knowledge  
259 transfer and knowledge use.

260

261 There were some indications that different methods have been used at different stages  
262 of the website development process. User testing activities and usability studies were  
263 reported in a number of studies suggesting that formative evaluation prior to launch has  
264 been seen as a valuable aspect of the web development process. However, it is worth  
265 noting that although there were many studies looking at issues around the quality and  
266 accessibility of the online content, very few explicitly explored issues around access for  
267 marginalised groups such as online options for non-English speaking groups or  
268 enhancements for use of information by intellectually disabled groups. Previous research  
269 on a “digital divide” highlights the importance of not only providing resources in  
270 appropriate forms but of facilitating and supporting access by the whole community (Choi  
271 et al, 2013; Kruse et al, 2012; Reinfeld-Kirkmann et al, 2010). Given that many see  
272 online information provision as a remedy that enables equitable distribution of health  
273 information, this remains an area for further study.

274 Most post-release studies reported on visitor numbers and usage statistics, or provided  
275 the results of visitor surveys and user satisfaction scales. However, there was often little  
276 interpretation of the possible meaning of these metrics other than as trend indicators of  
277 use. The possibility of web metrics acting as surrogates of individual and health system  
278 actions needs to be explored. Further research around the meaning of usage patterns  
279 could add great value to these readily available metrics. For example, commercial  
280 enterprises will assess the relationship between product views and orders, and then use  
281 these web metrics to assess the impact of marketing strategies or product releases.  
282 Identifying and evaluating possible relevant metrics for health information would be a  
283 valuable piece of research. For example, does time of use correlate with different  
284 environmental circumstances for users such as no colleagues available for advice during  
285 night duty? Or what number of page views correlate to actual visitor action such as  
286 booking a GP appointment? Glyn et al (2012) have already used a web metric system,  
287 Google Insights, to show a relationship between an annual breast cancer awareness  
288 campaign and online breast cancer activities. Similarly, comparative data on usage  
289 rates and penetration are needed for health websites to provide background information  
290 against which to assess the effectiveness of strategies and approaches used in website  
291 development and delivery.

292

293 It is interesting to note that many of the evaluation studies were not undertaken by the  
294 agencies responsible for the online resource. This suggests that the study of online  
295 health information has become an area of research interest in its own right. For many  
296 health agencies, assessing the quality of online resources is important as patients,

297 carers and families are using this information for self-diagnosis, decision making about  
298 treatment options or as part of their engagement with health professionals (Boucher,  
299 2010; Sillence et al 2007; McMullan 2006; Rubenstein, 2012).

300

301 Finally, this review developed several evaluation variables to differentiate between the  
302 focus measures being used, the website types under review, the stage of website  
303 development and the actual emphasis of the evaluation. This highlights the need for a  
304 common language to describe not only the design characteristics of evaluation studies  
305 but the contribution of the evaluation research in terms of stage of development and the  
306 focus of the evaluation with respect to the information users, funders and the health  
307 system.

308

#### 309 *Limitations to this review*

310 This review only included articles published after 1995 from a single biomedical  
311 bibliographic database. It is likely that there are substantial numbers of unpublished  
312 reports and conference presentations looking at evaluations of health websites. It should  
313 be noted that no quality assessment of the individual studies was undertaken. The focus  
314 of the analysis was on the purpose of the study not on the conduct of the study.

315

316 This study employed several evaluation schemas developed for the review. These  
317 categories have not been independently validated and assessed as website evaluation  
318 scales; so, additional examination of the value of these schemas is warranted.

319

320 This study only looked at health information provided through a website. The reality is  
321 that the web is no longer a vast library of web pages accessed through discrete  
322 websites; it is a complex mix of information sources and formats, online interfaces,  
323 searching tools and brokers, and participation and management gateways. It is unknown  
324 whether similar approaches to evaluation can be used for other types and forms of online  
325 information dissemination and exchange.

326

#### 327 *Conclusion*

328 Healthcare information is no longer the providence of the local doctor or nurse. Just as  
329 the nature of medical technology has changed, so too has provision of healthcare  
330 information. The online environment has changed the ways in which health consumers  
331 and health professionals seek and engage with health information, but our understanding  
332 of how effectively information is being provided and used through this medium is still  
333 limited. There is a need for further research that looks beyond the creation and access of

334 health websites to the impact that health websites have on outcomes for health  
335 consumers and their effects on health professionals and health services.

336

337 Evaluation activities and studies of evaluation processes are an essential part of the  
338 process of understanding the contribution these resources can make. Evaluation  
339 activities undertaken during planning and development can assist in developing  
340 accessible and usable websites. Evaluation undertaken following release of a website  
341 can help not only to demonstrate use of these online resources but also help to assess  
342 the effect of these online resources on individuals and, potentially, on services and  
343 organisations and the health system. Commissioning agencies need to ensure that web  
344 developers and content providers are aware of best practice requirements and  
345 encourage research to direct the effective preparation and use of web-based healthcare  
346 information.

347

348 Acknowledgements: The authors would like to acknowledge the contribution of Amanda  
349 Adams who created the SPSS file and was responsible for data entry, data cleansing  
350 and data outputs. Dr Tieman and Ms Bradley are part of the CareSearch Project staff.  
351 CareSearch is funded by the Australian Government Department of Health and Ageing.

352

353  
354 References (n=457)  
355  
356 Australian Bureau of Statistics (2012) Internet Activity, Australia, (Australian Bureau of  
357 Statistics: Canberra) Available at  
358 [http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8153.0Main+Features1Jun%20201](http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8153.0Main+Features1Jun%202012?OpenDocument)  
359 [2?OpenDocument](http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8153.0Main+Features1Jun%202012?OpenDocument) [Verified 21 February 2013].  
360  
361 Australian Government (2012) 'The Australian Government Web Guide'. (Department of  
362 Finance and Deregulation) Available at <http://webguide.gov.au/> [Verified 25 February  
363 2013].  
364  
365 Australian Government (2010) Building a 21st Century Primary Health Care System:  
366 Australia's First National Primary Health Care Strategy Department of Health and Ageing  
367 Available at  
368 [http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/report-](http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/report-primaryhealth/$File/NPHCS-Foreword-intro.pdf)  
369 [primaryhealth/\\$File/NPHCS-Foreword-intro.pdf](http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/report-primaryhealth/$File/NPHCS-Foreword-intro.pdf) [Verified 21 February 2013]  
370  
371 Australian Government Information Office (2013) Better Practice Checklists & Guidance  
372 Available at [http://agict.gov.au/policy-guides-procurement/better-practice-checklists-](http://agict.gov.au/policy-guides-procurement/better-practice-checklists-guidance/)  
373 [guidance/](http://agict.gov.au/policy-guides-procurement/better-practice-checklists-guidance/) [Verified on 27 July 2013]  
374  
375 Boucher J (2010) Technology and Patient-Provider Interactions: Improving Quality of  
376 Care, But Is It Improving Communication and Collaboration? *Diabetes Spectrum*  
377 23(3):142-144  
378  
379 Calero C, Ruiz J, Piattini M (2005) Classifying web metrics using the web quality model  
380 *Online Information Review* 29(3): 227-248  
381  
382 Catwell L, Sheikh A (2009) Evaluating eHealth Interventions: The Need for Continuous  
383 Systemic Evaluation *PLOS* 6(8):e1000126  
384  
385 Choi NG, Dinitto DM (2013) The digital divide among low-income homebound older  
386 adults: Internet use patterns, eHealth literacy, and attitudes toward computer/Internet  
387 use. *Journal of Medical Internet Research* 15(5):e93  
388  
389 Cunliffe, D. (2000) Developing usable websites- a review and a model *Internet Research*  
390 10(4):295-308  
391  
392 Ekeland AG, Bowes A, Flottorp S. (2012) Methodologies for assessing telemedicine: a  
393 systematic review of reviews. *International Journal of Medical Informatics* 81(1), 1-11.  
394  
395 Elling S, Lentz L, de Jong M. (2007) Website Evaluation Questionnaire: Development of  
396 a Research-Based Tool for Evaluating Informational Websites *Lectures in Computer*  
397 *Science*. 4656:293-304  
398 Eysenbach G, Kohler C. (2003) What is the prevalence of health-related searches on the  
399 World Wide Web? Qualitative and quantitative analysis of search engine queries on the  
400 Internet. *AMIA Symposium Proceedings*, 225-9.  
401  
402 Eysenbach G. (2011) CONSORT E-HEALTH: Improving and standardizing evaluation  
403 reports on web-based and mobile health interventions. *Journal of Medical Internet*  
404 *Research* 13 (4), 126.  
405

406 Fox S, Duggan M (2013) 'Health Online 2013' (Pew Internet & American Life Project)  
407 Available at <http://pewinternet.org/Reports/2013/Health%E2%80%90online.aspx>  
408 [Verified 21 February 2013]  
409  
410 Glynn RW, Kelly JC, Coffey N, Sweeney KJ, Kerin MJ. (2011) The effect of breast  
411 cancer awareness month on internet search activity - a comparison with awareness  
412 campaigns for lung and prostate cancer. *BMC Cancer* **11**(1):422.  
413  
414 Greenhalgh T, Russell J. (2010) Why Do Evaluations of eHealth Programs Fail? An  
415 Alternative Set of Guiding Principles. *PLOS Medicine* **7**(11), e1000360.  
416  
417  
418 Internet World Stats. (2013) World Internet Usage and Population Statistics June 30,  
419 2012 Available at <http://www.internetworldstats.com/stats.htm> [Verified 21 February  
420 2013].  
421  
422 Kruse RL, Koopman RJ, Wakefield BJ, Wakefield DS, Keplinger LE, Canfield SM, Mehr  
423 DR. (2012) Internet use by primary care patients: where is the digital divide? *Family*  
424 *Medicine* **44**(5),342-7.  
425  
426 McMullan M. (2006) Patients using the Internet to obtain health information: how this  
427 affects the patient-health professional relationship. *Patient Education Counselling* **63**(1-  
428 2),24-8.  
429  
430 Pagliari C (2007) Design and Evaluation in eHealth: Challenges and Implications for an  
431 Interdisciplinary Field. *Journal of Medical Internet Research* **9**, 2.  
432  
433 Patton, MQ (2008) *Utilization-focused evaluation*, 4th edition. Sage: Thousand Oaks, CA  
434  
435 Pawson R, Wong G, Owen L. (2011) Known Knowns, Known Unknowns, Unknown  
436 Unknowns : The Predicament of Evidence-Based Policy. *American Journal of Evaluation*  
437 **32**:518.  
438 Reinfeld-Kirkman N, Kalucy E, Roeger L. (2010) The relationship between self-reported  
439 health status and the increasing likelihood of South Australians seeking Internet health  
440 information. *Australian New Zealand Journal of Public Health* **34**(4):422-6.  
441  
442 Rubenstein EL. (2012) Things My Doctor Never Told Me. *American Society for*  
443 *Information Science and Technology*. Available at  
444 <https://www.asis.org/asist2012/proceedings/Submissions/126.pdf> [Verified 27 July 2013]  
445  
446 Sillence E, Briggs P, Harris PR, Fishwick L. (2007) How do patients evaluate and make  
447 use of online health information? *Social Science & Medicine*, **64**(9):853-1862.  
448  
449 SPSS Inc. (2010) IBM SPSS Statistics (Version 19.0.0.1) Somers, NY: IBM Corporation.  
450  
451 Tankelevivienne L and Damasevicius R. (2009) Characteristics of Domain Ontologies for  
452 Web Based Learning and their Application for Quality Evaluation. *Informatics in*  
453 *Education*, **8**(1): 131–15.  
454  
455 Tieman, J and Martin, P. (2009) Metrics, measures and meanings: evaluating the  
456 CareSearch website. In: Positioning the Profession: the Tenth International Congress on  
457 Medical Librarianship, Brisbane, Australia, (1-9). August 31-September 4, 2009.  
458 Available at [http://espace.library.uq.edu.au/eserv/UQ:179705/n2\\_2\\_Wed\\_Tieman\\_77.pdf](http://espace.library.uq.edu.au/eserv/UQ:179705/n2_2_Wed_Tieman_77.pdf)  
459 [Verified 27 July 2013]U.S. Dept. of Health and Human Services. (2006) The Research-

460 Based Web Design & Usability Guidelines, Enlarged/Expanded edition. Washington:  
461 U.S. Government Printing Office.  
462  
463 Yusof, M, Papazafeiropouloub, A, Pualb, R, Stergioulasb L.(2008) Investigating  
464 evaluation frameworks for health information systems. *International Journal of Medical*  
465 *Informatics* **77**, 377-385.

466  
467  
468  
469  
470  
471  
472  
473  
474  
475  
476  
477  
478  
479  
480  
481  
482  
483  
484  
485

Figure 1: Schematic representation of articles screening

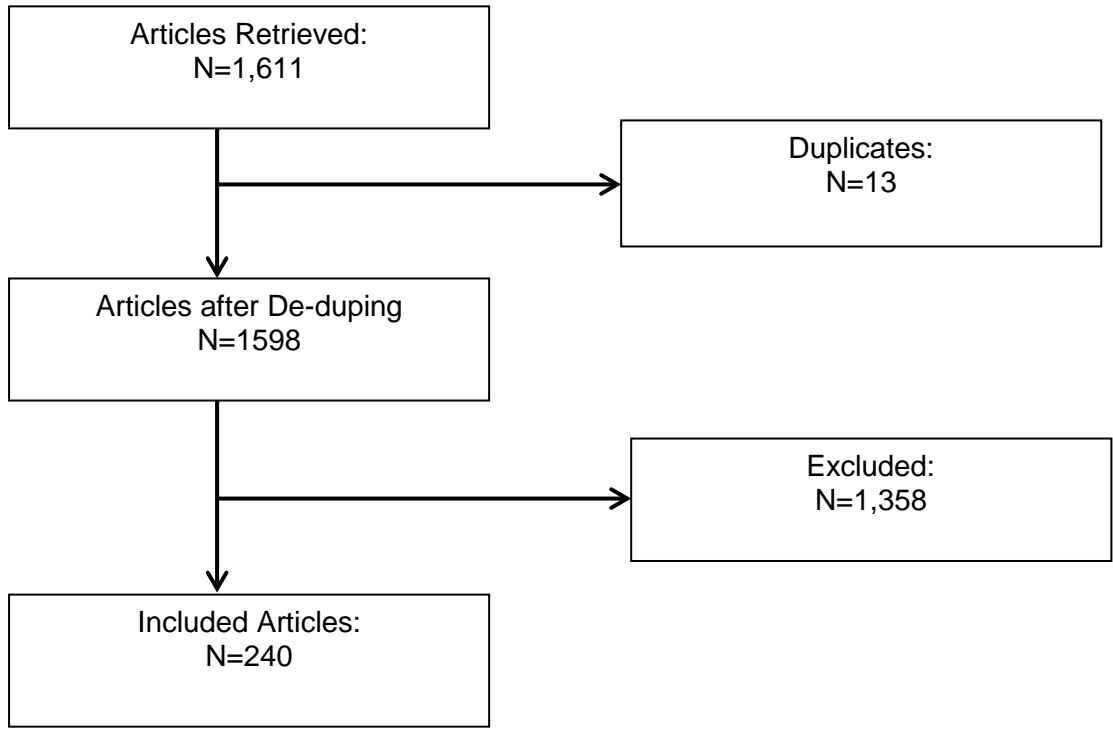




Table 1: Number and percentage of studies by Measurement Focus		
Measurement Focus	No.	%
Feasibility Formative evaluation identifying need, consideration of audience, items for inclusion etc	29	12.1%
Heuristic Systematic inspection of a user interface design for usability by an expert	22	9.2%
User testing Feedback of the prototype website by intended users	32	13.3%
Text content assessment Includes readability assessment, literacy testing, text analysis	56	23.3%
Content Quality Studies of the accuracy, currency and quality of the website content. Can include automated assessment	165	68.8%
Structural Elements Measures structural elements of the website such as navigability, menu systems, hyperlinks	104	43.3%
Visuals/Graphic Identity Studies looking at presentation of the website (e.g. inclusion of high quality pictures)	47	19.6%
Metric Analysis Retrieval and analysis of site metrics such as visitor numbers, referrals	37	15.4%
Search engine optimisation Studies that assess the effectiveness of page tagging, search term analysis etc that lead a user to the website	61	25.4%
Visitor Satisfaction Surveys Online/offline surveys of satisfaction with the resource	25	10.4%
Knowledge Transfer Studies that assess that whether access and engagement with the website has led to an increase in knowledge or understanding by the web visitor	29	12.1%
Behaviour change Studies that assess whether visitor 's health behaviours have changed due to engagement with a website (eg stopped smoking, anxiety reduced etc)	32	13.3%
Project Evaluation Assessment by funders, policy makers of the value of their website project	7	2.9%
Economic Assessment Cost benefit analysis, economic analysis, cost pricing of an individual website	7	2.9%

Table 2: Number and percentage of studies by stage of website development and by evaluation emphasis		
<i>Stage of Website Development</i>	<i>No</i>	<i>%</i>
Concept Analysis, Needs Assessment	34	14.2
Development Phase	42	17.5
Release/Launch	8	3.3
Post Release Effectiveness	194	80.8
Iterative Enhancements	6	2.5
Redesign	5	2.1
Other	1	0.4
<i>Evaluation Emphasis</i>	<i>No.</i>	<i>%</i>
Access (Facilitating the ability of users to be able to access the resource)	199	82.9
Use (Tracking if, and how, the resource is being used)	68	28.3
Usefulness (Addressing whether the resource has made a difference to use or practice)	72	30.0

490