GCU
Glasgow Caledonian
University

University for the Common Good

The quality of English-language websites offering falls-prevention advice to older members of the public and their families

Whitehead, Sarah H.; Nyman, Samuel R.; Broaders, Freya; Skelton, Dawn; Todd, Chris

The quality of English language websites offering falls prevention advice to older members of the public and their families

Sarah H Whitehead, Samuel R Nyman, Dawn A Skelton, Freya Broaders, Chris J Todd

Sarah Whitehead, Research Fellow, Cardiff Institute of Society and Health, School of Social Sciences, Cardiff University, 1-3 Museum Place, Cardiff, CF12 3BD, UK. Telephone: 02920 875360, fax: 02920 879054, email: whiteheadsh@cardiff.ac.uk

Samuel Nyman, Lecturer in Psychology, School of Design, Engineering & Computing, Bournemouth University, Poole House, Talbot Campus, Poole, Dorset, BH12 5BB, UK. Telephone: 01202 968179, fax: 01202 965314, email: snyman@bournemouth.ac.uk

Dawn Skelton, Reader in Ageing and Health, School of Health, Glasgow Caledonian University, Cowcaddens Road, Glasgow, G4 0BA, UK. Telephone: 0141 331 8792, fax: 0141 331 8112, email: dawn.skelton@gcu.ac.uk

Freya Broaders, Graduate, School of Design, Engineering & Computing, Bournemouth University, Poole House, Talbot Campus, Poole, Dorset, BH12 5BB, UK

Chris Todd, Professor of Primary Care and Community Health, School of Nursing, Midwifery and Social Work, University of Manchester, Manchester Academic Health

Sciences Centre, Jean McFarlane Building, University Place, Oxford Road,

Manchester, M13 9PL, UK. Tel: 0161 306 7865, fax: 0161 306 7894, email:

chris.todd@manchester.ac.uk

Abstract

Falls among older people are a major public health issue. Increasing numbers of older people are accessing the internet for health-related information including information on falls risk and prevention. However, we are aware of no study that has assessed the quality of such websites. Using techniques for conducting systematic literature reviews, we evaluated English language websites offering falls related advice to members of the public. Forty-two websites were identified using popular search engines; these were assessed using evidence-based guidelines and codes of conduct on coverage of falls-related information, credibility, and senior friendliness. Overall, scores were poor for coverage of falls information and credibility, although they were higher for senior friendliness. Few of the websites had been recently updated, and none provided individually tailored advice. We conclude that websites have fallen short of their potential to provide accessible evidence-based information on the risks of falls and their prevention.

Word count: 3919

Introduction

Rapid increases in life expectancy and declines in fertility rates observed during the twentieth century have led to an increase in the percentage of older people in today's societies. Associated with this is the issue of whether health can be preserved in later years so that older people can retain their independence and quality of life. Central to this issue is the problem of falls among older people, which has now reached global recognition (1). Some 30% of community-dwelling people over 65 fall each year. About 20% of falls require medical attention (2, 3) and around 5% result in fractures (4), which poses substantial economic costs (5, 6). Falls are also associated with social and psychological consequences, with individuals restricting their activity owing to loss of confidence and fear of further falls (7). As well as leading to isolation, this reduction in activity can contribute to further deconditioning, weakness and abnormal gait, and so eventually increase the risk of future falls (4, 8).

Providing information to older people and their families on falls and their prevention is an important step in helping them change their behaviour and environment to reduce their risk of falling. One way of doing this is via the internet. The internet can be an effective and efficient way of making information available to the general population (9-11) to facilitate health promotion and self management of long-term conditions. Older people are increasingly accessing the internet: in 2010, 40% of UK adults aged 65 and over reported having ever used it (12), a huge increase on the corresponding figure of 10% reported in 2000 (13). The proportion of older Americans reporting using the internet in 2010 was similar, at 42% (14). People are also increasingly using the internet to access health information for themselves and their families (15): in 2010, 36% of UK internet users aged 65 and older and 44% of

those aged 55-64 had looked for health information online (12). It is unlikely that internet users currently in their 50s will give up their "wired ways" as they get older and retire (16), so the internet will become even more important as a source of information for older people over the coming decades.

The unregulated nature of the internet, however, means that the quality of advice offered is difficult to monitor. Information may be incomplete, inaccurate, or misleading (17). Furthermore, problems such as small font sizes or inappropriate use of multimedia may seriously hinder older people's internet use (11). Although information concerning falls risk and prevention is widely available to the public via the internet, we have found no study assessing the quality and credibility of online information, and usability of falls-related websites. Studies evaluating websites in other health-related areas, however, have generally found them to be of poor quality (18-23). The aim of this study, therefore, was to identify websites offering advice on falls risk and prevention to older members of the public, and to evaluate their coverage of evidence-based advice, credibility, and usability.

Methods

Using techniques drawn from systematic literature review methodology (24, 25) we searched the internet for websites that provide older members of the public and their families with advice on falls risk and prevention.

Search strategy

Nielsen NetRatings monitors and measures more than 90% of global internet activity and provides insights about the online environment, including the search behaviour of

internet users. The top three search engines at the time we conducted our searches (August 2010) were Google (65%), MSN/Windows/Bing (14%), and Yahoo! (13%) (26). These three search engines were used to perform 18 searches each, giving a total of 54 searches. Six keywords were used: "*falls*", "*preventing falls*", "*falls prevention*", "*reducing falls*", "*improving balance*", and "*balance training*". These six terms were used in isolation, and then in combination with "*older people*" and "*elderly*". The keywords reflect the fact that although many websites target their audience using a falls prevention message, research suggests that older people reject the notion that they are personally at risk of falls but respond to messages about improving balance (27). We also sought advice on our search strategy from three user representatives, who were all aged over 65 and had experience of using the internet, to check that our search terms reflected those that might be used by this age group. This advice took the form of face-to-face discussions and observations of the user representatives' own searching behaviour.

The total number of websites returned for each search was recorded. However, since research shows that internet users explore only the first few links on search engines (28, 29), only the first 20 hits identified by each search were examined. Duplicate sites and those that did not satisfy the inclusion criteria were removed to provide the sample for evaluation. Inclusion and exclusion criteria are shown in Table 1. Both websites offering generic advice on falls risk and prevention and those allowing the user to complete questions on their own risk of falling and offering individually-tailored advice in response to the answers provided were acceptable for inclusion. Links to internal pages that met the inclusion criteria were followed and included in the review. Links to external sites were not followed. A random selection of 10% of

the websites was assessed independently by two reviewers (FB, SW) to confirm their

inclusion/exclusion status. Any disagreement was resolved by discussion, using a

third reviewer (SN) where necessary, until mutual agreement was reached. The

remaining websites were then assessed by a single reviewer (FB).

[Table 1 about here]

Assessment of websites

In line with systematic review techniques and evaluation of other health-related

information, we assessed the sites using clear assessment criteria (24, 25, 30, 31). We

designed an evaluation form (Appendix 1) to record coverage of falls information,

credibility, and the senior friendliness of each site. This form was also used to collect

general information on each site.

Coverage of falls information

Coverage of advice related to falls risk and prevention was assessed by comparing

information on the websites to that provided in the joint American Geriatrics Society

and British Geriatrics Society Guideline for the Prevention of Falls in Older Persons

(32) and NICE Guidelines on the Assessment and Prevention of Falls in Older People

(33). For each item a summary statement was prepared detailing what information the

website should present, based on best current evidence contained within these two sets

of guidelines. If information was included accurately for each item, one point was

scored, whereas if the information was included inaccurately, was insufficient or

incomplete, or was not mentioned at all, zero points were scored. Based on the

strength of the evidence to support the conclusions made within the two sets of

guidelines, information was categorised into three grades: A - good evidence for strong recommendations (3 items); B - fair evidence for recommendations (6 items); and C - fair evidence but no clear recommendations (11 items). This gave a total score range of 0 to 20 points across the three categories.

Credibility

Credibility of the websites was assessed using the Health on the Net Code of Conduct for Medical and Health Websites (HONCode) (34). The code consists of eight principles assessing: (1) authority of information, (2) clarity of purpose, (3) treatment of confidential information, (4) referencing and dating of information provided, (5) justification of claims regarding commercial products, (6) provision of contact details, (7) disclosure of funding sources, and (8) disclosure of advertising policy. For each principle one point was allocated if the criterion was satisfied, and zero points were allocated if the criterion was not satisfied. However, it was noted that criterion five, relating to justification of claims regarding commercial products, was not applicable to any of the websites that we assessed and so this item was not used. The score range for credibility was therefore 0 to 7.

"Senior friendliness"

"Senior friendliness", or usability, was assessed against guidelines developed by the National Institute on Aging and the National Library of Medicine (35). The aim of this checklist is to provide research-based design guidelines that will make websites more accessible to all adults. Guidance is provided on 40 items across five categories of organising information (8 items), writing online text (11 items), designing readable online text (9 items), making information easy to find (9 items), and including other

media (3 items). For each item one point was scored if the requirement was satisfied, and no points were scored if the requirement was not satisfied, giving a score range of 0 to 40. The total possible score across all three categories (coverage of falls information, credibility, and senior friendliness) was therefore 0 to 67.

Reviewer agreement and statistical analysis

All sites were assessed by two raters independently (SW and SN for coverage of falls information, SW and FB for credibility and senior friendliness). For each website scores were compared across each of the three assessment categories. For coverage of falls information, scores were deemed to be in suitable agreement if they were within two points of one another. For credibility, only a one point difference was deemed to be acceptable. For senior friendliness, a difference of four points was allowable. This effectively represented an allowable difference of as close as possible to 10% between the two raters for each of the assessment categories. Where scores differed by more than these agreed limits, discussion took place between the raters to resolve differences of opinion.

The two raters' mean scores were calculated, and intra-class correlations (ICC) were performed for each of the three assessment categories, as well as for the overall score. A two way random effects model was used, using an absolute agreement definition. The single measure ICC is reported along with their 95% confidence intervals (95% CIs). After checking that scores were normally distributed, mean scores and standard deviations were calculated for total scores, and for each of coverage of falls information, credibility, and senior friendliness, as well as for the sub-categories within these. Analyses were initially carried out both across all websites and

comparing scores according to organisation type and country of origin of the website.

We hypothesised that scores might vary here as previous reviews of health-related

websites have found such differences to exist (21-23). However, exploratory analyses

showed there to be no significant differences in scores according to either

organisation or country of origin and so scores are presented for all websites together.

All statistical analyses were carried out using SPSS v.16.0.

Results

The searches each returned between 124,000 and 885,000,000 websites (mean

=53,634,963). Based on the first 20 websites returned by each of the 54 searches,

1,080 websites were examined, and 1,038 were either duplicates or did not fulfil the

inclusion criteria, leaving 42 sites to be assessed more fully. Figure 1 shows how

studies were identified and reasons for exclusion.

[Figure 1 about here]

The characteristics of the 42 websites retained for assessment (Appendix 2) are

summarised below (Table 2). The majority of websites originated from the USA

(48%) or the UK (31%), with a leaning towards sites provided by government (41%)

or commercial organisations (38%).

[Table 2 about here]

Eight websites (19%) were updated during 2010, and seven (17%) were updated

during 2009. A further seven sites (17%) were updated between 2005 and 2008.

Sixteen (38%) did not state when the last update took place. Only three of the 42 websites were dedicated falls websites, with the vast majority of websites covering a variety of health topics. All of the websites offered static and generic advice on falls risk and prevention; none provided the opportunity for individuals to complete questions relating to their own risk of falling or provided advice tailored to the individual on the basis of his or her answers to such questions.

Agreement between the raters was high for falls-related information (ICC=0.97, 95% CI=0.94-0.98, p<.001), and for credibility (ICC=0.90, 95% CI=0.79-0.95, p<.001). It was slightly lower for senior friendliness, although still at a more than acceptable level (ICC=0.81, 95% CI=0.68-0.90, p<.001). Overall agreement for the total score was high (ICC=0.92, 95% CI=0.83-0.96, p<.001).

Scores for coverage of falls information, agreement with the HONCode, and senior friendliness are presented in Table 3. Scores for coverage of falls information were generally poor, with a mean total score of only 3.92 (SD 3.60) out of a possible 20. Further investigation revealed that scores were poor across all categories of evidence, and five of the 42 websites failed to score any points at all.

Compliance with the HONCode was slightly better, although scores were still fairly poor overall. The mean score across all websites was 3.86 (SD 1.65) out of a possible 7. Six of the sites assessed stated that they were HONCode compliant, and a Mann Whitney U-test showed that mean scores were significantly better among these websites than those that did not state they were HONCode compliant (U=36.00. p=.008).

Senior friendliness scores were reasonably high. The mean score was 31.69 (SD 2.69) out of a possible 40, and scores were high across all of the categories, with the exception of including other media. It was noted, however, that few of the websites we assessed incorporated other media; for these websites this in effect gives a maximum possible score of 37. This should be kept in mind when considering the overall scores.

[Table 3 about here]

The mean score overall was 39.46 (SD 5.40) out of a maximum possible 67. To give a further indication of the overall quality of the websites, total scores were converted into percentages. So that each of the categories of coverage of falls-related information, credibility, and senior friendliness were equally represented in the overall percentage score, scores for each of these categories were first converted into an individual percentage before a total average percentage was calculated. The mean percentage score across all websites was 51.30 (SD 10.64).

Websites were given an overall grade based on their percentage score. Websites were categorised as being poor overall if they scored less than 50%, fair if they scored 50-74.99%, and excellent if they scored 75% or greater. Twenty two of the 42 websites were classified as being poor overall, and 19 were classified as being fair. Only one of the websites was rated as being excellent. This was a USA based website originating from a government department.

Discussion

The purpose of this study was to systematically identify and evaluate websites offering advice on falls risk and prevention to older members of the public and their families. Forty-two websites were identified that fulfilled the search criteria and these were evaluated in terms of coverage of falls-related information, credibility, and senior friendliness.

Scores for coverage of falls-related information were generally very poor, and there was no single area where websites scored particularly well. This suggests that providers of web-based information need to work towards providing more comprehensive information on all the evidence-based risk factors and interventions. Reasons for the poor quality of information could include competing interests of the authors, lack of peer review, and failure to update information (36), and indeed, 38% of the websites did not provide a date of the most recent revision. Information on many of the websites was also very scant, with many of the falls-related topics either not being covered at all or being afforded only a short statement. Depth of coverage for key topics has also been found to be minimal in a review of smoking cessation websites (37). It is important that enough information is provided so that members of the public are able to be pro-active in making positive changes to their lifestyles and their environments. On the other hand, too much information could prove overwhelming (38), leading to users missing important content (37) or looking elsewhere for information that, whilst incomplete or inaccurate, may prove to be more readable. Bock et al. (37) suggest that it may be useful to design websites in such a way that users can drill down to their desired level of detail on any given topic. Qualitative research similar to that of Yardley et al. (38) would be helpful in

examining the needs and requirements of older internet users so that the amount of

falls-related information provided can be pitched at an appropriate level.

It is also possible that websites might score poorly on coverage of falls-related

information due to the author not having suitable knowledge or qualifications to

provide such information. The HONCode was developed to avoid such problems and

websites that are HONCode compliant should provide details on the training of the

author and where the information provided comes from. Compliance with the

HONCode was fairly poor overall, however, and only six of the sites assessed stated

that they were HONCode compliant. It may be the case that many providers of

health-related information on the internet are still unaware of available standards to

demonstrate the credibility of their websites. With so much information now

available on the internet, and with very limited opportunities for policing of this

information, members of the public need to know that the information they are

accessing is of good quality. It is vitally important, therefore, that health

professionals with relevant expertise are involved in the production of health-related

information online (39). In addition, evidence-based information should be clearly

visible online and easily identifiable as reliable and from a reputable source. A key

challenge, however, is to raise awareness of such standards as the HONCode to both

website providers and members of the public. Research has shown, for example, that

when accessing health information on the internet, users do not attempt to find out

who the authors or owners of the site are, nor do they read disclaimers or disclosure

statements (28). Unless awareness of standards for demonstrating and assessing the

credibility of websites increases, the internet may continue to be saturated with poor

quality information provided by individuals and organisations with a lack of sufficient

authority and knowledge. Members of the public, meanwhile, may continue to accept such poor quality information, possibly jeopardising their own health in the process.

One of the main advantages of the internet is its ability to instantly provide individually tailored feedback and advice (10, 37, 40), and it was disappointing that no website provided any form of tailoring. A recent review of web-assisted tobacco interventions similarly found that only a minority of websites provided interactive features or personalised treatment (37). However, support exists for tailoring falls prevention advice to older people from a website promoting strength and balance training (41). A pooled analysis of two experiments also showed that compared to a generic control, tailored advice was perceived to be more personally relevant, and older people reported greater intention to act on the advice in response to the tailored version (42). Tailoring could therefore be a cost-effective way of encouraging positive behaviour change and yet it appears that it is being under-utilised in current falls and health-related web provision (10).

It was promising to note, however, that the websites scored generally well in terms of senior friendliness. Now that the World Wide Web is well established, it seems likely that good design principles will have become more entrenched. Older members of the public may well have different requirements, however, and it is encouraging that the websites reviewed seem to be for the most part attending to these requirements.

There are several limitations to this study. Owing to the sheer size and dynamic nature of the World Wide Web, it is impossible to identify all of the falls-related websites that are available, and so good quality websites may have been missed.

Even amongst those websites that were identified, the internet moves so rapidly that websites can change or even disappear (43). The search terms were also designed to reflect those that might be used by members of the public, and so websites using more medical or specialist keywords may have been missed. On the other hand, the searches and evaluations were carried out by academic researchers and so we cannot draw conclusions about what members of the public themselves encounter when they search for falls-related information, or how well they are able to interpret the information they find (18). Only English language websites were reviewed and so the findings may not be reflective of websites written in other languages. We are aware, for example, of a Dutch language website offering falls prevention advice to older members of the public (44) that is theoretically informed, provides evidence-based information, and that was developed in consultation with both users and health professionals (45). Unfortunately as this website is not written in English we were unable to assess it. The quality of falls prevention websites therefore needs to be evaluated across a number of languages to assess whether it is similarly poor in languages other than English. Currently there is no accepted and validated way of measuring the quality of health-related websites (20) and so an evaluation sheet was developed specifically for this study, following techniques used in previous research (19, 21-23). The evaluation sheet has not been tested extensively and was perhaps not able to capture more subtle differences in the level of detail of information provided by the various websites.

Despite these limitations, this is the first study to our knowledge to have examined the quality of falls-related websites aimed at members of the public. Other reviews have examined websites in areas such as back pain (19), breastfeeding (23), fever in

children (22), treatment of depression (21), and across various health-related topics (18), and have on the whole found the information provided to be poor and inconsistent (18, 20). There is clearly a need for better evidence-based information on the internet, and for greater exploitation of the capacity of the internet to use interactive features and to personalise information. Standardised methods should also be developed for assessing the quality of health-related websites and for demonstrating to members of the public that the information provided is reliable, comprehensive, and up to date.

Future research should evaluate falls prevention websites on other quality indicators in addition to those included in this study. For example, websites have been evaluated on the basis of readability, relevance of content to terms entered into search engines, and accuracy using an international expert panel (18). Further research should also investigate with older people how they search for websites, appraise advice and its credibility, and which features of online content and presentation style motivate positive health behaviour change. This will enable websites to be designed in the most useful and appropriate manner for their intended target audiences. Finally, research should explore whether brief training with older people can enhance their ability to search for and evaluate online health advice.

Given that falls are associated with frailty and predicted by a range of risk factors (46), enabling older people to address these risk factors and take up evidence-based preventive strategies will also enable them to prevent / reduce the symptoms of chronic illnesses and improve their general health and wellbeing (47) (48).

Conclusions

Our review of websites offering falls-related advice to older members of the public

found that although much of the information was presented in a user friendly manner,

coverage of falls-related information was generally inadequate and lacking in

credibility, and information was frequently out of date. Furthermore, none of the

websites took advantage of the interactive nature of the web to offer self-assessment

of an individual's risk of falling or personally tailored advice. The danger is that

older people and their carers are currently accessing and interpreting inaccurate

information to the detriment of their own health.

References

1. World Health Organization. WHO Global Report on Falls Prevention in Older
    Age. 2007: Available from:
    http://www.who.int/ageing/publications/Falls_prevention7March.pdf.

2. Gillespie LD, Robertson MC, Gillespie WJ, Lamb SE, Gates S, Cumming RG, et
    al. Interventions for preventing falls in older people living in the community
    (Review). Cochrane Database of Systematic Reviews. 2009, Issue 2.

3. Skelton DA, Todd C. What are the main risk factors for falls amongst older people
    and what are the most effective interventions to prevent these falls? 2004:
    Available from:
    http://www.euro.who.int/__data/assets/pdf_file/0018/74700/E82552.pdf.

4. Rubenstein LZ. Falls in older people: epidemiology, risk factors and strategies for
    prevention. Age and Ageing. 2006; 35: ii37-ii41.

5. Davis JC, Robertson MC, Ashe MC, Liu-Ambrose T, Khan KM, Marra CA.
    International comparison of cost of falls in older adults living in the community: A
    systematic review. Osteoporos International. 2010; 21: 1295-306.

6. Scuffham P, Chaplin S, Legood R. Incidence and costs of unintentional falls in
    older people in the United Kingdom. Journal of Epidemiology and Community
    Health. 2003; 57: 740-4.

7. Zijlstra GAR, van Haastregt JCM, van Eijk JT, van Rossum E, Stalenhoef PA,
    Kempen GIJM. Prevalence and correlates of fear of falling, and associated
    avoidance of activity in the general population of community-living older people.
    Age and Ageing. 2007; 36: 304–9.

8. Scheffer AC, Schuurmans MJ, van Dijk N, van der Hooft T, de Rooij SE. Fear of falling: Measurement strategy, prevalence, risk factors and consequences among older persons. Age and Ageing. 2008; 37: 19-24.

9. Al-Busaidi A, Gray A, Fiddian N. Personalising web information for patients: Linking patient medical data with the web via a patient personal knowledge base. Health Informatics Journal. 2006; 3: 27-39.

10. Bennett GG, Glasgow RE. The delivery of public health interventions via the Internet: Actualizing their potential. Annual Review of Public Health. 2009; 30: 273-92.

11. Nahm E, Preece J, Resnick B, Mills ME. Usability of health websites for older adults. Computers, Informatics, Nursing. 2004; 22: 326-34.

12. Office for National Statistics. Internet Access 2010: Households and Individuals. 2010 [cited 2010 22nd December]; Available from: http://www.statistics.gov.uk/pdfdir/iahi0810.pdf.

13. Office for National Statistics. Adults who have ever used the Internet by sex/age (Great Britain): Individual Internet Access. 2006 [cited 22nd December 2010]; Available from: http://www.statistics.gov.uk/statbase/ssdataset.asp?vlnk=6928&More=Y.

14. The Pew Research Center's Internet and American Life Project. Demographics of internet users. 2010 [cited 22nd December 2010]; Available from: http://www.pewinternet.org/Static-Pages/Trend-Data/Whos-Online.aspx.

15. Oermann MH, Pasma J. Evaluation by consumers of quality care information on the internet. Journal of Nursing Care and Quality. 2001; 15: 50-8.

16. Fox S. Older Americans and the internet. 2004 [cited 23rd December 2010]; Available from: http://www.pewinternet.org/Reports/2004/Older-Americans-and-the-Internet.aspx.

17. Helwig AL, Lovelle A, Guse CE, Gottlieb MS. An office-based internet patient education system. Journal of Family Practice. 1999; 48: 123-7.

18. Berland GK, Elliott MN, Morales LS, Algazy JI, Kravitz RL, Broder MS, et al. Health information on the Internet: Accessibility, quality, and readability in English and Spanish. Journal of the American Medical Association. 2001; 285: 2612-20.

19. Butler L, Foster NE. A cross-sectional survey of the quality of web-based information on low back pain. Spine. 2003; 28: 395-401.

20. Eysenbach G, Powell J, Kuss O, Sa E. Empirical studies assessing the quality of health information for consumers on the World Wide Web: A systematic review. Journal of the American Medical Association. 2002; 287: 2691-700.

21. Griffiths KM, Christensen H. Quality of web based information on treatment of depression: cross sectional survey. British Medical Journal. 2000; 321: 1511-5.

22. Impicciatore P, Pandolfini C, Casella N, Bonati M. Reliability of health information for the public on the world wide web: systematic survey of advice on managing fever in children at home. British Medical Journal. 1997; 314: 1875-9.

23. Shaikh U, Scott BJ. Extent, accuracy, and credibility of breastfeeding information on the internet. Journal of Human Lactation. 2005; 21: 175-83.

24. Green S, Higgins J. Cochrane Reviewers' Handbook. 2006 [cited 22nd December 2010]; Available from: http://www.cochrane.org/resources/handbook/Handbook4.2.6Sep2006.pdf.

25. Khan KS, Riet G, Glanville J, Sowden AJ, Kleijnen J, editors. Undertaking systematic reviews of research on effectiveness. CRD's guidance for those carrying out or commissioning reviews. 2nd edition ed. 2001.

26. The Nielsen Company. Nielsen Wire. 2010 [cited 30th November 2010]; Available from: http://blog.nielsen.com/nielsenwire/online_mobile/bing-overtakes-yahoo-as-the-2-search-engine/.

27. Yardley L, Donovan-Hall M, Francis K, Todd C. Older people's views of advice about falls prevention: a qualitative study. Health Education Research. 2006; 21: 508-17.

28. Eysenbach G, Kohler C. How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews. British Medical Journal. 2002; 324: 573-7.

29. Spink A, Jansen BJ, Wolfram D, Saracevic T. From e-sex to e-commerce: Web search changes. Computer. 2002; March: 107-9.

30. Coventry PA, Grande GE, Richards DA, Todd CJ. Prediction of appropriate timing of palliative care for older adults with non-malignant life-threatening disease: a systematic review. Age and Ageing. 2005; 34: 218-27.

31. Fitzpatrick R, Dovey C, Buxton MJ, Jones DR. Evaluating patient-based outcome measures for use in clinical trials. Health Technology Assessment. 1998; 2: 14.

32. American Geriatrics Society and British Geriatrics Society. Prevention of Falls in Older Persons: AGS/BGS Clinical Practice Guideline. 2009 [cited 22nd December 2010]; Available from: http://www.medcats.com/FALLS/frameset.htm.

33. National Institute for Clinical Excellence. Falls: the assessment and prevention of falls in older people. Clinical Guideline 21. London. 2004.

34. Health on the Net Foundation. HON Code of Conduct (HONcode) for Medical and Health Websites. [cited 22nd December 2010]; Available from: http://www.hon.ch/HONcode/Conduct.html.

35. National Institute on Aging and the National Library of Medicine. Making your web site senior friendly: a checklist. 2009 [cited 22nd December 2010]; Available from: http://www.nia.nih.gov/HealthInformation/Publications/website.htm.

36. Silberg WM, Lundberg GD, Musacchio RA. Assessing, controlling, and assuring the quality of medical information on the Internet: caveant lector et viewor - let the reader and buyer beware. Journal of the American Medical Association. 1997; 277: 1244-5.

37. Bock BC, Graham AL, Whiteley JA, Stoddard JL. A review of web-assisted tobacco interventions (WATIs). Journal of Medical Internet Research. 2008; 10: e39.

38. Yardley L, Morrison LG, Andreou P, Joseph J, Little P. Understanding reactions to an internet-delivered health-care intervention: Accommodating user preferences for information provision. BMC Medical Informatics and Decision Making. 2010; 10: e52.

39. Benigeri M, Pluye P. Shortcomings of health information on the Internet. Health Promotion International. 2003; 18: 381-6.

40. Nyman SR, Yardley L. Tailoring: A tool to enhance computer-based health interventions. Health Psychology Update. 2007; 16: 45-7.

41. Nyman SR, Yardley L. Usability and acceptability of a website that provides tailored advice on falls prevention activities for older people. Health Informatics Journal. 2009; 15: 27-39.

42. Nyman SR, Yardley L. Web-site based tailored advice to promote strength and balance training: An experimental evaluation. Journal of Aging and Physical Activity. 2009; 17: 210-22.

43. Cline RJ, Haynes KM. Consumer health information seeking on the Internet: the state of the art. Health Education Research. 2001; 16: 671-92.

44. Alpay L, Toussaint P, Ezendam N, Rovekamp T, Westendorp R, Verhoef J, et al. The Dutch website 'SeniorGezond': an illustration of a road map for the informed patient. Managed Care. 2007; 2: 1-11.

45. Alpay LL, Toussaint PJ, Ezendam NPM, Rovekamp TAJM, Graafmans WC, Westendorp RGJ. Easing Internet access of health information for elderly users. Health Informatics Journal. 2004; 10(3): 185-94.

46. Martin FC. Falls risk factors: Assessment and management to prevent falls and fractures. Canadian Journal on Aging. 2011; 30(1): 33-44.

47. Oliver D. Preventing falls and falls-injuries in hospitals and long-term care facilities. Reviews in Clinical Gerontology. 2007; 17(2): 75-92.

48. Department of Health Physical Activity, Health Improvement, & Protection. Start active, stay active: A report on physical activity for health from the four home countries' chief medical officers. London. 2011.

Figure 1: Flow diagram of identification and retention of sites for review
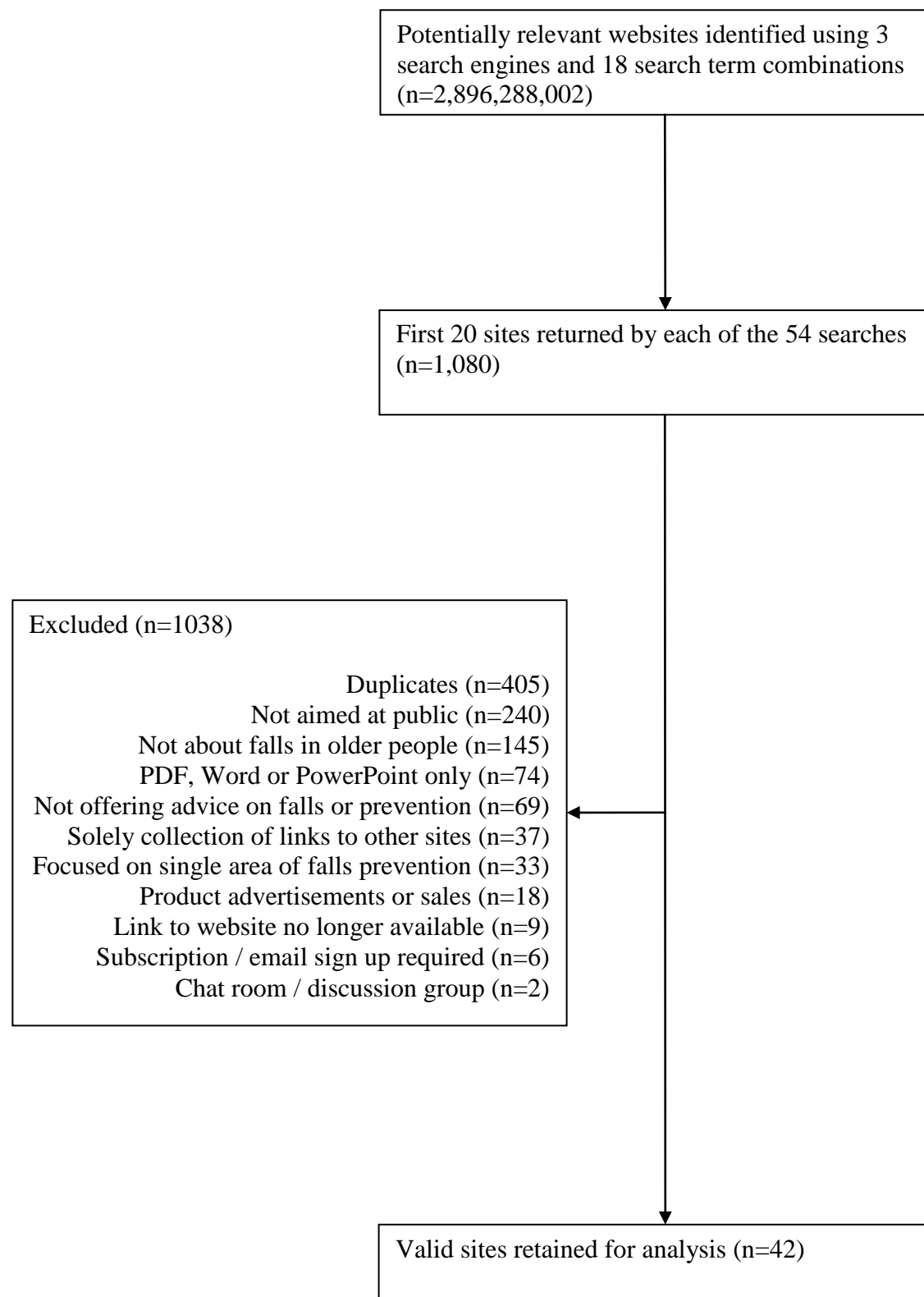
Table 1: Website inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
(i) Main topic of falls and/or falls prevention in older people	(i) Chat rooms, clubs or discussion groups
(ii) Aimed at the public	(ii) Solely advertisements for products or organisations
(iii) Offering advice on falls risk factors and/or falls prevention	(iii) Specialised only in a single area of falls prevention
(iv) Written in the English language	(iv) Aimed at health care professionals or scientists
(v) Unlimited access with no membership fees	(v) Solely collection of links to other sites
	(vi) Wholly downloadable PDF, PowerPoint or Word documents

Table 2: Frequency (%) of reviewed websites according to country of origin and type of organisation

	USA	UK	Canada	Australia/NZ	Hong Kong	Switzerland	Unknown	**Total**
Government	4 (9.5%)	9 (21.4%)	0	3 (7.1%)	1 (2.4%)	0	0	**17 (40.5%)**
Commercial	10 (23.8%)	3 (7.1%)	3 (7.1%)	0	0	0	0	**16 (38.1%)**
Non-profit	4 (9.5%)	0	0	0	0	1 (2.4%)	1 (2.4%)	**6 (14.3%)**
Academic	2 (4.8%)	0	0	0	0	0	0	**2 (4.8%)**
Individual	0	1 (2.4%)	0	0	0	0	0	**1 (2.4%)**
Total	**20 (47.6%)**	**13 (31%)**	**3 (7.1%)**	**3 (7.1%)**	**1 (2.4%)**	**1 (2.4%)**	**1 (2.4%)**	**42 (100%)**

Table 3: Website scores for coverage of falls-related information, credibility, and senior friendliness

	Mean (SD)	Range
Coverage of falls-related information[1]		
Grade A (max score = 3)	0.67 (0.79)	0-2.5
Grade B (max = 6)	0.90 (1.11)	0-4.0
Grade C (max = 11)	2.33 (2.22)	0-9.5
Total (max = 20)	3.92 (3.60)	0-15.5
Credibility[2]		
All websites (max = 7)	3.86 (1.65)	0-6.5
HONCode compliant websites (n=6, max = 7)	5.58 (1.39)	3-6.50
Non-HONCode compliant websites (n=36, max = 7)	3.60 (1.53)	0-6.50
Senior friendliness[3]		
Organising information (max = 8)	7.26 (0.52)	5.5-8.0
Writing online text (max = 11)	8.39 (0.80)	6.5-10.0
Designing readable online text (max = 9)	8.32 (0.61)	7.0-9.0
Making information easy to find (max = 9)	7.33 (1.47)	4.0-9.0

Including other media (max = 3)	0.38 (0.62)	0.0-3.0
Total (max = 40)	31.69 (2.69)	26.5-37.5
Overall score (max = 67)	39.46 (5.40)	31-56

[1] Assessed against NICE Guidelines and AGS/BGS Guidelines: Grade A = good evidence for strong recommendations; Grade B = fair evidence for recommendations; Grade C = fair evidence but no clear recommendations (32, 33).

[2] Assessed against the Health on the Net Code of Conduct for Medical and Health Websites (HONCode) (34).

[3] Assessed against National Institute on Aging and the National Library of Medicine Guidelines (35)

Appendix 1: Website evaluation form

Name of website and URL: _____

_____

_____

Date site assessed: _____

Country of origin: _____

Type of organisation that created the site (circle):

Commercial   Individual   Academic   Government   Non-profit   Other

Date last modified: _____

_____

Is the site a dedicated falls site or does it offer information on a variety of topics?

_____

_____

Does the site offer self-assessment of falls risk or advice only?

_____

_____

Coverage of falls-related information:

Criteria	Acc.	Inacc.	N/M
Grade A evidence			
Home hazard assessment / modification for those who have fallen or are at risk of falls			
Exercise, particularly strength training, and balance, gait and coordination training			
Supplemental vitamin D in those with proven deficiency			
Grade B evidence			
Supplemental vitamin D to all older adults, especially those with suspected deficiency or with an increased risk for falls			
Medication review and withdrawal / minimisation			
Psychoactive medication withdrawal / minimisation			
Management of postural hypotension			
Dual chamber cardiac pacing for those with cardioinhibitory carotid sinus hypersensitivity who experience unexplained recurrent falls			
Expedite cataract surgery for older women who require the procedure			
Grade C evidence			
Advice not to wear multifocal lenses while walking, particularly on stairs			
Identification of foot problems and appropriate treatment			
Advice that walking with shoes of low heel height and high surface contact area may reduce the risk of falls			
Previous history of falls			
Balance deficit			
Gait deficit			
Mobility impairment			
Fear of falling			
Muscle weakness			
Cognitive impairment			
Urinary incontinence			
Other information – list below:			

Credibility of the site according to the HON Code:

Criteria	Yes	No
Does the site state that it is HON Code compliant? (not to be used in overall scoring of this section)		
Attribute medical info to author and mention their training		
Describe purpose of website, reason for presenting info, and intended audience		
Address issues of confidentiality, e.g. email addresses and contents, database storage		
State where info comes from, what lit used to gather it, refs where possible, date of last modification		
Back up claims regarding (non) effectiveness of commercial products, give balanced information on alternative therapies or generic products	N/A	N/A
Provide a way to contact the editor, easy to access from anywhere on the site		
Declare sources of funding, even if there are none		
Display policy with regard to advertising, make adverts easily identifiable		

Criteria to make the website senior friendly according to the NIA guidelines:

Criteria	Yes	No
Organising information		
Make it clear how the information on the website is organised		
Keep the website structure simple and straightforward		
Break information into short sections		
Group related topics visually		
Write a clear, informative heading for each section		
Put key information first		
Put the sections in a logical order		
Provide a site map		
Writing online text		
Limit the number of points		
Put the key message first		
Keep paragraphs and sentences short		
Write in the active voice		
Write in the positive		
Explain clearly; don't make people guess what you mean		
Give specific instructions; if instructions have more than one step, number them		
Address the users by using "you"		
Choose words the users will know		
Define unfamiliar terms		
Provide summary information		
Designing readable online text		
Allows sufficient space on the page, between paragraphs, and around clickable targets		
Use a sans serif typeface that is not condensed		
Use a 12 or 14 point type size		

Criteria	Yes	No
Use a medium or bold typeface		
Put all text in uppercase and lowercase letters		
Avoid using italics		
Use left justification		
Use appropriate backgrounds and contrast		
Use appropriate colour combinations		
Making information easy to find		
Clear and consistent layout		
Consistent navigation that is easy to use and requires the fewest possible clicks		
Easy to use menus		
Clear links that are easy to read and understand and that are obviously clickable		
Large, bright icons and buttons that stand out from the background		
Single mouse clicks to access information		
Avoid unnecessary scrolling, both of text and through pages		
Use a search box for sites with many pages		
Provide a way to contact the site owners; offer a telephone number for those who need it and an email address for questions or comments		
Including other media		
Appropriate use of illustrations and photographs		
Short animation, video and audio clips		
Text alternatives or access to static versions of text for all animation, video and audio		

Additional comments: _____

_____

Appendix 2: Websites reviewed

1. Medline Plus: Falls

   http://www.nlm.nih.gov/medlineplus/falls.html#cat11

2. Cornwall Falls Prevention

   http://www.fallsprevention.co.uk/

3. Falls – NHS Choices

   http://www.nhs.uk/Conditions/Falls/Pages/Introduction.aspx

   http://www.nhs.uk/Conditions/Falls/Pages/Prevention.aspx

4. Independent Living: Fall prevention

   http://www.independentliving.co.uk/fall-prevention.html

5. Northern Health and Social Care Trust

   http://www.northerntrust.hscni.net/livewell/164.htm

6. Ezine Articles: Fall Prevention for the Elderly

   http://ezinearticles.com/?Falls-Prevention-For-Elderly&id=4223548

7. Ezine Articles: Preventing Falls Among Elderly Patients

   http://ezinearticles.com/?Preventing-Falls-Among-Elderly-Parents&id=2685371

8. Directgov: Keeping Mobile and Preventing Falls

   http://www.direct.gov.uk/en/Pensionsandretirementplanning/Over50HealthAndWellBeing/Healthandfitness/DG_10028039

9. Family Doctor

   http://familydoctor.org/online/famdocen/home/healthy/safety/safety/245.html

10. American Academy of Family Physicians: What Causes Falls in the Elderly?

    http://www.aafp.org/afp/20000401/2173ph.html

11. Net Doctor

    http://www.netdoctor.co.uk/health_advice/facts/osteoporosisfalls.htm

12. National Institute of Arthritis and Musculoskeletal and Skin Diseases: What Are Ways to Prevent Falls and Related Fractures?

    http://www.niams.nih.gov/Health_Info/Bone/Osteoporosis/Fracture/prevent_falls_ff.asp

13. National Centre for Injury Prevention and Control: Preventing Falls Among Seniors

    http://www.cdc.gov/ncipc/duip/spotlite/falls.htm

14. NHS Peterborough: Falls Prevention in Peterborough

    http://www.peterborough.nhs.uk/default.asp?id=66

15. Colorado State University: Preventing Falls in the Elderly

    http://www.ext.colostate.edu/pubs/consumer/10242.html

16. Suite101.com: Preventing Falls in the Elderly

    http://patient-health-education.suite101.com/article.cfm/preventing_falls_in_the_elderly

17. Suite101.com: Preventing Falls Among Seniors

    http://patient-health-education.suite101.com/article.cfm/preventing_falls_among_seniors

18. Merck Source: Preventing Falls in the Elderly

    http://www.mercksource.com/pp/us/cns/cns_health_a_to_z.jspzQzpgzEzzSzppdocszSzuszSzcnszSzcontentzSzatozzSzosfallszPzhtml

19. Tips to Prevent Falls in the Elderly

    http://www.wright.edu/nursing/practice/falls/

20. ACT Health: Reducing Falls Risk

    http://www.health.act.gov.au/c/health?a=da&did=10135884&pid=1168215838

21. International Osteoporosis Foundation

    http://www.iofbonehealth.org/patients-public/about-osteoporosis/how-to-reduce-the-risk-of-falls.html

22. Nottinghamshire County NHS: Falls in Older People

    http://www.nottspct.nhs.uk/healthy-living-advice/older-people/falls-in-older-people.html

23. ACC: Preventing Falls – Information for Older People

    http://www.acc.co.nz/preventing-injuries/at-home/older-people/information-for-older-people/index.htm

24. Aetna InteliHealth: Frequently Asked Questions About Falls

    http://www.intelihealth.com/IH/ihtIH/WSIHW000/22030/23724/353819.html?d=dmtContent

25. NHS Oxfordshire

    http://www.oxfordshirepct.nhs.uk/your-health/health-promotion/older-people/avoiding-falls.aspx

26. Minnesota Falls Prevention

    http://www.mnfallsprevention.org/

27. Isle of Man Government: Falls Prevention

    http://www.gov.im/dhss/about/Public_Health/hi/Accident_Prevention/fp.xml

28. Mayo Clinic: Healthy Aging

    http://www.mayoclinic.com/health/fall-prevention/HQ00657

29. Better Health Channel

    http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Falls_prevention_for_older_people

30. Fall Prevention for Elderly Parents and Caregivers

   http://www.boomers-with-elderly-parents.com/fall-prevention.html

31. Elderly Fall Prevention

   http://hubpages.com/hub/elderly-fall-prevention

32. Surgery Door: Preventing Falls

   http://www.surgerydoor.co.uk/advice/preventing-accidents/preventing-falls/

33. E-How: How to Prevent Falls in the Elderly

   http://www.ehow.com/how_2340616_prevent-falls-elderly.html

34. E-How: How to Help the Elderly Prevent Falls

   http://www.ehow.com/how_2255718_help-elderly-prevent-falls.html

35. Suite101.com: Preventing Falls in the Elderly

   http://seniorsafety.suite101.com/article.cfm/preventing_falls_in_the_elderly

36. Articlesbase: Preventing Falls for the Elderly

   http://www.articlesbase.com/health-articles/preventing-falls-for-the-elderly-
   105493.html

37. Health Writer: Elderly Falls

   http://www.healthwriter.co.uk/elderly-falls.html

38. Self Help Tips for the Elderly

   http://www.info.gov.hk/elderly/english/healthinfo/selfhelptips/falls.htm

39. Senior Health: Preventing Falls

   http://seniorhealth.about.com/cs/safety/qt/fall_safe.htm

40. Senior Helpers

   http://www.seniorhelpers.com/pages/preventing-falls-elderly

41. Reducing Falls Among the Elderly

   http://www.thefreelibrary.com/Reducing+falls+among+the+elderly.-a0118953917

42. Buckinghamshire Falls Prevention

http://www.buckinghamshirefallsprevention.co.uk/