

Original Research

Delivering Healthcare Information via the Internet: Cardiac Patients' Access, Usage, Perceptions of Usefulness, and Web Site Content Preferences

Jenny Jones, PhD,¹ Sarah Cassie, BSc,² Maimie Thompson,²
Iain Atherton, PhD,¹ and Stephen J. Leslie, PhD²

¹University of Stirling, Highland Campus, Inverness,
United Kingdom.

²Raigmore Hospital, Inverness, United Kingdom.

Abstract

Objectives: To assess patients' usage of the Internet as a source of personal healthcare information and patients' perceptions of usefulness and content preferences of more locally focused online health-related material. **Materials and Methods:** A paper-based survey was undertaken by a convenience sample of cardiac outpatients. Age, gender, Internet access, Internet usage, perception of usefulness of online information, predicted intention to use a local cardiology Web site if available, and preferred components to be included were recorded. Univariate and bivariate statistics were used. **Results:** Two hundred thirty-seven patients responded (62.1% males). One hundred seventy-six (74.3%) used the Internet, with 126 (63%) using it daily. For patients who did not have direct access to the Internet, 26 (50%) had a family member to do this on their behalf. Thus, the majority of patients (202 [85%]) had access to the Internet at home or someone who could access it on their behalf. Internet usage declined with age (Kendall's $\tau_b = 0.321$, $p < 0.001$). There was no difference in use with gender ($p = 0.235$). There was considerable interest expressed in a locally delivered Web-based information service. **Conclusions:** Online healthcare information services have the potential to reach the vast majority of cardiac patients either directly or through family support. The most elderly patients are less likely to use these services. Despite apparent satisfaction with existing online resources, there appears to be an unmet need for more information and considerable support for a locally based cardiac patient Web resource to deliver this. These findings may help guide future patient information Web site redesign.

Key words: cardiology/cardiovascular disease, technology, telecommunications

Background

Many healthcare services use the Internet to provide healthcare information for patients.^{1,2} One of the key aims of this form of information delivery is to support people with long-term conditions.³ Although there has

been a huge investment in Web-based patient information services,^{4,5} there is a lack of convincing evidence for the effectiveness of online healthcare interventions in managing chronic diseases.⁶ Therefore it is important to assess whether Web-based patient education helps those with chronic disease manage their illness.

Cardiac patients represent the largest potential chronic patient user group. Chronic heart disease is the number one cause of death in the world, resulting in an estimated 30% of all deaths.⁷ This mortality rate is expected to increase until 2030.⁸ It is also the greatest cause of death in the United Kingdom,⁹ and an estimated 2.6 million cardiac patients live with the condition.¹⁰ Self-management and concordance with therapies are key goals in managing chronic heart disease in this patient group, both of which require patients to develop a degree of disease-specific knowledge.¹¹

Previous evidence indicates that many cardiac patients use the Internet as a source of healthcare information about their condition.¹²⁻¹⁴ However, levels of access and extent of current usage remains unclear, particularly in the older cardiac patient population.^{13,15} Age has previously been found to be a potential barrier to Internet access.¹⁶ This has implications for the cardiac patient population, as the average age of cardiac patients is 65 years for men and 70 for women.¹⁷ Thus, although the Internet may provide a means of making information more accessible to cardiac patients, it risks excluding older patients. There is a clear need to determine current levels of cardiac patient use of the Internet to search for health-related topics and to assess the degree to which findings are influenced by sociodemographic status.

For cardiac patients in the United Kingdom who do access the Internet, there are a large number of national health Web sites that deliver information for patients with cardiac disease.^{10,18,19} This information is delivered using a mass media format, generalizable across a diverse social population. However, evidence indicates that the most effective healthcare communications are tailored to local interests,²⁰⁻²² particularly in reducing instances of heart disease.¹¹ This raises the possibility that cardiac patients may have a preference for more locally focused quality-controlled health information.

This survey had two aims: (1) to determine current levels of cardiac patient Internet access and usage and to identify any socio-demographic group that may not have access to online resources and (2) to identify the content preferences of patients with a view to guiding future patient information Web site redesign, specifically, to assess patients' perception of usefulness of more locally focused online information services, predicted intention to use local online

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patient education services, and preferred components to be included in such a local online information resource, if available.

Materials and Methods

SETTING

Raigmore Hospital is a remote regional center situated in the north of Scotland (in the Highland Region) and serves a population of over 300,000 dispersed over a large geographical area (10,085 square miles). Approximately 4,000 patients visit the cardiology outpatient clinics per year, and 1,500 patients have a cardiac procedure.

PARTICIPANTS

A convenience sample of patients attending a general cardiology clinic or day-case cardiac catheterization facility during November and December 2012 was enrolled. These were adult cardiac patients, including "new" and "return" patients.

QUESTIONNAIRE DESIGN

In the absence of a validated instrument, a bespoke questionnaire was developed in several iterative stages (see Appendix). This questionnaire comprised 14 questions. These included age, gender, Internet access and usage, medical condition, perception of usefulness of online information, predicted intention to use local cardiology Web site if available, and preferred components to be included in such a local online information resource.

DATA COLLECTION AND STATISTICAL ANALYSIS

Data were transposed from self-completed paper questionnaires into an Excel® (version 10; Microsoft®, Redmond, WA) spreadsheet and SPSS (version 21; SPSS Inc., Chicago, IL) software for further analysis. Univariate and bivariate statistics were used to estimate the degree of Internet utilization and the extent to which responses differed by age or gender. Significance was taken at the 5% level.

ETHICAL CONSIDERATIONS

The opinion of the local quality team was that this survey represented service evaluation rather than a research study, and therefore full ethical approval was not required.

Results

There were 237 respondents. All were day-case attendees for either a cardiology procedure ($n = 51$ [21.5%]) or to the outpatient clinic ($n = 186$ [78.5%]). Of the 227 who reported their gender, 141 (62.1%) were male. The majority of patients (163 [68.8%]) were over the age of 60 years. A more detailed age distribution is shown in Table 1.

CURRENT INTERNET USAGE/ACCESS

The majority of respondents (176 [74.3%]) had Internet access at home. Of those with no access to the Internet, 26 (42.6%) had someone else who could do so on their behalf. Thus, the majority of patients (202 [85%]) had access to the Internet. Of the 165 patients who reported frequency of Internet usage, 126 (76.4%) used it daily, 23 (13.9%) weekly, 5 (3.0%) weekly, and 11 (6.7%) a few times per year. A more detailed breakdown based on age is shown in Table 1.

Table 1. Age Demographics, Home Computer Ownership, and Usage

AGE (YEARS) RANGE ^a	N (%)	% HOME COMPUTER OWNERSHIP	% INTERNET USAGE "DAILY" OR "WEEKLY" IN THOSE WITH A HOME COMPUTER
<30	6 (2.6)	100.0	100.0
30–39	9 (3.8)	77.8	85.7
40–49	12 (5.1)	91.7	90.9
50–59	44 (18.7)	93.2	90.2
60–69	71 (30.2)	74.6	88.7
70–79	68 (28.9)	63.2	79.1
80+	24 (10.2)	50.0	58.3

^aAge data were missing for 2 patients.

SOCIODEMOGRAPHIC CHARACTERISTICS ASSOCIATED WITH INTERNET ACCESS

Statistical analysis indicated that age was associated with using the Internet and that usage declined with age (Kendall's tau_b = 0.321, $p < 0.001$). Gender did not make a difference ($p = 0.235$).

USE OF THE INTERNET TO SEARCH HEALTH-RELATED TOPICS

Ninety-eight patients (41.3%) had searched on the Internet for specific information about their condition. Of these patients, 91.7% found the available information useful; however, only 64.3% found all the information they were looking for, and only 64.3% reported that it had helped them prepare for seeing the doctor. A small proportion of patients (19.4%) felt more anxious after gaining Internet-based information.

OPINIONS ON CONTENT PREFERENCES FOR MORE LOCALLY FOCUSED INFORMATION

One hundred fifty patients (74.3%) of the Internet users said that they would use a locally focused cardiology information online resource, with 114 (57.9%) expressing interest in online communication with other local cardiac patients. One hundred fifty-one patients (75.5%) reported that they would like to post comments or questions about managing their condition to their cardiologist, and 145 (61.2%) requested more information about managing their condition from a locally focused cardiology Web site service, with 154 (74.8%) stating that they would use this service if available. Patient support for various features of a local Web site is detailed in Table 2.

Discussion

This survey addressed two aims: (1) to identify current levels of cardiac patient Internet access and usage and to assess use of Internet

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Table 2. Patient-Reported Views on a Local Cardiology Web Site and Potential Content

	"YES" [N (%)]
If there was a NHS Highland cardiac Web site, would you like it to offer any of the following:	
• Directions to the various Raigmore Hospital cardiology treatment areas?	100 (42.2)
• Local medical guidelines?	96 (40.5)
• More information about managing your condition or symptoms?	145 (61.2)
• Local cardiac patients sharing their own experiences and information?	76 (32.1)
• More information about your hospital facilities?	95 (40.1)
• An online forum where local cardiac patients can post comments or question each other or the hospital medical team?	76 (32.1)
If there was such an NHS Highland cardiac Web site, do you think you would use it?	154 (65.0)
NHS, National Health Service.	

to search for health-related topics and (2) to identify the content preferences of patients with a view to guiding future patient information Web site redesign, specifically, to determine potential levels of interest in more locally focused cardiology Web site services and preferred components to be included in such a local online information resource if available.

With regard to Internet access, the results of this survey demonstrate that, at this time, there is widespread access to, and use of, the Internet for health-related information in this relatively elderly patient population. Even in patients without direct access, family or friends provided Internet access for many. Nonetheless, age was still associated with using the Internet: specifically, usage appears to decline with age. In this respect, our findings in relation to older age are consistent with previous recent research in cardiac patients. A survey in 68 cardiac patients (median age, 67 years) carried out in 2010 identified that patients less than 65 years of age were over twice as likely to have Internet access ($p=0.0001$).¹³ However, this survey also reported that the use of the Internet for healthcare information by cardiac patients overall was low. In contrast, our larger dataset indicates that although usage declines with age, from 88.7% to 58.3% of those surveyed regularly access the Internet. Furthermore, the majority of cardiac patient respondents in the 60–80+ years age range have a home computer.

Our finding of an overall increase of use in this relatively older patient group since the 2010 survey is perhaps not surprising, given the yearly exponential growth of the Internet.^{13,23} Up to 85% of United Kingdom households now have Internet access, and the majority of United Kingdom adults in all age groups under 75 years old

have used the Internet at least once.²³ Computer ownership appears to be increasing in older age groups,²⁴ and the older age group's Internet use is growing incrementally.²⁵ Moreover, mobile phone ownership and Internet take-up has continued to increase across all demographic groups, particularly those living in rural areas.²⁶

Nevertheless, the fact that usage appears to decline with age has important implications for equity of access to online healthcare resources for older cardiac patients, particularly as online patient education and other forms of telehealth and telemedicine interventions are being increasingly rolled out to support people with long-term conditions^{3,4} and government and businesses are transferring more of their services online.²⁷ Existing barriers in the older age group have been identified as a lack of the requisite knowledge or skills to use Internet-based resources.²⁷ Also, despite a positive perception of Internet usefulness in the older age group, perceived complexity of Web site navigation has been found to be a barrier.²⁸ This is reflected in the fact that older adults who currently use the Internet for healthcare information have been found to be more likely to have attained a higher level of education.¹³ Therefore, there is a clear need to review the effectiveness of existing online healthcare resources for the older age group, so that healthcare providers can develop more effective strategies to remove potential barriers that some older cardiac patients may face in using the Internet. This could be achieved by developing simpler, more user-friendly online services²⁹ and providing appropriately tailored educational interventions²⁷ to help older nonusers gain sufficient knowledge and skills to use the Internet in ways that would benefit their chronic disease self-management.

With regard to use of the Internet to search for health-related topics, our results indicate that just under half of the respondents had searched for specific information about their cardiac disease. This indicates that many cardiac patients are seeking additional health information to make informed choices about their treatment and self-management of their condition. This finding is consistent with other survey data in cardiac patients, which indicated a high level of interest in obtaining health education from the Internet,¹⁵ including a desire for "...more of an education on topic than doctor has time to give."¹⁴ However, despite a relatively high satisfaction with current online services, only 64.3% of our respondents found all the information for which they were looking, and only 64.3% reported that it had helped them prepare for seeing the doctor. Perhaps more worrying is that 19% reported increased anxiety after using current online sources. This suggests that despite widespread access and generally high satisfaction with existing information, there is a need to evaluate the impact of existing services in terms of addressing unmet information needs and reducing patient anxiety.

Finally, in light of evidence indicating that the most effective healthcare communications are tailored to local interests,^{20–22} particularly in reducing instances of heart disease,¹¹ our survey aimed to determine levels of interest in more locally focused cardiology Web site services (if available) and to identify components that a cardiac patient would like to be included in such a local online information resource. The Internet provides immediate open access to a large

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number of quality-controlled national health Web sites that deliver information for patients with cardiac disease.^{10,18,19} This information is delivered using a mass media format, generalizable across a diverse social population. Yet, evidence indicates that the most effective healthcare communications are tailored to local interests,^{20–22} particularly in reducing instances of heart disease.¹¹

Despite the commitment by national healthcare information providers to deliver more effective online patient education³⁰ and the huge investment in these national healthcare Web sites,⁵ little is known about cardiac patients' perceptions of usefulness and satisfaction with this form of mass media delivery. This raises the possibility that cardiac patients may have a preference for more locally focused, quality-controlled health information. Yet, local healthcare providers have been slow to assess patient satisfaction with existing online services or identify if there is a preference for more locally focused content.

Our results indicate a high level of support for further development of local Internet-based healthcare information, with 42% of our cohort reporting that they would use a local Web site if available. Information on self-management was the most supported feature of a future local Web design, again suggesting that existing generic Internet resources are insufficient to meet our patients' needs. Patient education, defined as empowering patients to understand, evaluate, and use health information to make informed choices about their treatment and self-management, is a National Health Service strategic priority.^{31–33} And, the British Heart Foundation recently acknowledged that targeting local distinctiveness in healthcare information is an important feature of reducing the gap in risk and incidence of heart disease in the United Kingdom.¹¹ Therefore the question of whether a more locally focused Internet-based healthcare information service would be able to address this unmet cardiac patient need for more information warrants further study.

Conclusions

Web-based information services have the potential to reach the vast majority of cardiac patients either directly or through family support. In the small proportion of patients without direct access, half had someone else who could access the Internet of their behalf. Although high proportions of our cardiac patients have access to online resources, further research is needed to identify potential barriers that older cardiac patients may face in using the Internet in order to ensure fair access. Furthermore, despite apparent satisfaction with current Web resources there appears to be considerable support for more locally based Web resources for patients.

Disclosure Statement

No competing financial interests exist.

REFERENCES

1. American Telemedicine Association. *Telemedicine, telehealth, and health information technology: An ATA issue paper*. Washington, DC: American Telemedicine Association, 2006.
2. World Health Organization, International Telecommunication Union. *National ehealth strategy toolkit*. Geneva: World Health Organization, 2010.
3. NHS Scotland. About eHealth. 2012. Available at www.ehealth.scot.nhs.uk/ (last accessed August 27, 2012).
4. The Scottish Government, Technology Strategy Board, Highlands and Islands Enterprise, National Institute for Health Research. DALLAS—Delivering Assisted Living Lifestyles at Scale: SBRI competition for development contracts. 2011. Available at <https://www.innovateuk.org/documents/1524978/2274828/DALLAS+-+Delivering+Assisted+Living+Lifestyles+at+Scale+-+Competition+brief/29e8d709-453b-4e91-ab04-dfba03d0362b> (last accessed April 14, 2013).
5. The Scottish Government. *eHealth strategy 2011–2017*. Edinburgh: The Scottish Government, 2011.
6. Wootton R. Twenty years of telemedicine in chronic disease management—An evidence synthesis. *J Telemed Telecare* 2012;18:211–220.
7. World Health Organization. The top 10 causes of death: Fact sheet No. 310. June 2011. Available at www.who.int/mediacentre/factsheets/fs310/en/index.html (last accessed November 2, 2011).
8. World Health Organization. Cardiovascular diseases: Fact sheet No. 317. September 2012. Available at www.who.int/mediacentre/factsheets/fs317/en/index.html (last accessed December 6, 2012).
9. British Heart Foundation. Mortality. Available at www.bhf.org.uk/publications/view-publication.aspx?ps=1002097 (last accessed March 15, 2013).
10. National Health Service. Coronary heart disease. Available at www.nhs.uk/Conditions/Coronary-heart-disease/Pages/Introduction.aspx (last accessed April 22, 2013).
11. British Heart Foundation. *Hearty lives. Final evaluation report: National evaluation of the British Heart Foundation Hearty Lives Programme*. London: British Heart Foundation, 2012.
12. Lear S, Araki Y, Maric B, Kaan A, Horvat D. Internet use study: Assessment of computer and Internet use in cardiac in-patients. Internet access survey. British Columbia Alliance on Telehealth Policy and Research. 2006. Available at www.bcatpr.ca/internet_use_study (last accessed December 17, 2012).
13. Lim J, Phillips AW, Sayeed R. Use of the world wide web by cardiac surgery patients. *Interact Cardiovasc Thorac Surg* 2010;10:719–720.
14. Diaz JA, Griffith RA, James J, Reinert SE, Friedmann PD, Moulton AW. Patients' use of the Internet for medical information. *J Gen Intern Med* 2002;17:180–185.
15. Lear SA, Arakj Y, Maric B, Kaan A, Horvat D. Prevalence and characteristics of home Internet access in patients with cardiovascular disease from diverse geographical locations. *Can J Cardiol* 2009;25:589–593.
16. Kiel JM. The digital divide: Internet and e-mail use by the elderly. *Med Inform Internet Med* 2005;30:19–23.
17. British Heart Foundation. The national audit of cardiac rehabilitation: Annual statistical report 2010. London: British Heart Foundation, 2010.
18. National Health Service. NHS Inform. Coronary angiography: Why coronary angiographies are used. Available at www.nhsinform.co.uk/health-library/articles/c/coronaryangiography/whyitisused (last accessed April 15, 2013).
19. British Heart Foundation. Cardiovascular disease. Available at www.bhf.org.uk/heart-health/conditions/cardiovascular-disease.aspx (last accessed October 20, 2012).
20. Wilson-Stronks A, Lee KK, Cordero CL, Kopp AL, Galvez E. *One size does not fit all: Meeting the health care needs of diverse populations*. Oakbrook Terrace, IL: The Joint Commission, 2008.
21. Kreps GL. Strategic use of communication to market cancer prevention and control to vulnerable populations. *Health Market Q* 2008;25:204–216.
22. Kreps GL, Neuhauser L. New directions in eHealth communication: Opportunities and challenges. *Patient Educ Couns* 2010;78:329–336.
23. European Travel Commission. New media trend watch: Usage patterns and demographics. Available at www.newmediatrendwatch.com/markets-by-country/18-uk/148-usage-patterns-and-demographics (last accessed November 22, 2012).

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24. Gandiya T, Dua A, King G, Mazzocco T, Hussain A, Leslie S. Self-reported 'communication technology' usage in patients attending a cardiology outpatient clinic in a remote regional hospital. *Telemed J E Health* **2012**; 18:219–224.
25. Office for National Statistics. Internet access 2010; households and individuals. **2010**. Available at www.ons.gov.uk/ons/search/index.html?newquery=Internet+access+2010%3B+households+and+individuals.+Newport%2C+UK%3A+Office+for+National+Statistics (last accessed March 3, 2013).
26. Ofcom Independent Regulator and Competition Authority. Media literacy audit—Report on UK adults media literacy. 2008. Available at http://stakeholders.ofcom.org.uk/market-data-research/media-literacy/archive/medlitpub/medlitpubrss/ml_adult08/ (last accessed February 14, 2013).
27. National Seniors Australia Productive Ageing Centre, Australian Government Department of Health and Ageing. *Older Australians and the Internet: Bridging the digital divide*. Canberra: The Australian Government, **2011**.
28. Adams N, Stubb D, Woods V. Psychological barriers to Internet usage among older adults in the UK. *Med Inform Internet Med* **2005**;30:2–17.
29. Flynn KE, Smith M, Freese J. When do older adults turn to the Internet for health information? Findings from the Wisconsin Longitudinal Study. *J Gen Intern Med* **2006**;12:1295–1301.
30. Department of Health, Public Health, Adult Social Care and the NHS. Information strategy to give people more control over their care. **2012**. Available at www.dh.gov.uk/health/2012/05/information-strategy/ (last accessed November 22, 2012).
31. Jennifer Waterson Consultancy. *Health literacy—A scoping study final report*. Edinburgh: The Scottish Government, **2009**.
32. Education Scotland, Foghlam Alba. Literacies and health. Available at www.educationscotland.gov.uk/communitylearninganddevelopment/adultlearning/adultliteracies/adultliteraciesinpractice/health.asp (last accessed November 23, 2012).
33. National Health Service Improving Quality. Areas of care: Education. Available at www.diabetes.nhs.uk/areas_of_care/education/ (last accessed December 14, 2012).

Address correspondence to:

Jenny Jones, PhD
University of Stirling
Highland Campus
Old Perth Road
Inverness, IV2 3JH
United Kingdom

E-mail: jenny.jones@stir.ac.uk

Received: May 25, 2013

Revised: June 27, 2013

Accepted: June 27, 2013

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Appendix

CARDIOLOGY PATIENT SURVEY ON HEALTH WEB SITES

People are increasingly turning to the Internet (World Wide Web) to get advice and health information. We would like to improve patient care and access to health information and would like to ask you some questions about your use of the Internet.

The results will be anonymous and we hope will guide future service development.

Thank you for taking the time to complete this survey.

1. About you (*please tick the relevant box*):

Are you: Male ☐ Female ☐

Age:

- 30 or under ☐
 30–39 ☐
 40–49 ☐
 50–59 ☐
 60–69 ☐
 70–79 ☐
 80 or older ☐

2. About your Internet use:

Do you have Internet access at home? Yes ☐ No ☐

How often do you use the Internet?

- Daily ☐
 Weekly ☐
 Monthly ☐
 A few times a year ☐
 Never ☐

If you do not have access to the Internet—do you have someone who can do this on your behalf?

- Yes ☐
 No ☐

3. About your current medical condition:

Have you (or someone you know) searched for information about your current medical condition or your symptoms on the Internet?

- Yes ☐
 No ☐

If yes—was the information you found useful?

- Yes ☐
 No ☐

Did you find all the information you were looking for?

- Yes ☐
 No ☐

Did the information help you prepare for seeing your doctor?

- Yes ☐
 No ☐

Did the information make you more anxious?

- Yes ☐
 No ☐

4. About the information and support you receive:

If there was an NHS Highland cardiac Web site that had film interviews with your Raigmore Hospital doctor and clinical staff, giving you further information about how to manage your condition and symptoms, would you use the Web site?

- Yes ☐
 No ☐

If there was an NHS Highland cardiac Web site that had a local cardiac patient forum where you could get support from and communicate with other local cardiac patients, would you use the Web site?

- Yes ☐
 No ☐

If there was an NHS Highland cardiac Web site where you could post comments or questions about managing your condition to your Raigmore Hospital doctor, would you use the Web site?

- Yes ☐
 No ☐

5. About a future patient Web site:

If there was a NHS Highland cardiac website, would you like it to offer any of the following? (*Please tick ALL that apply.*)

Directions to the various Raigmore Hospital cardiology treatment areas? ☐

Local medical guidelines? ☐

More information about managing your condition or symptoms? ☐

Local cardiac patients sharing their own experiences and information? ☐

More information about your hospital facilities? ☐

An online forum where local cardiac patients can post comments or question each other or the hospital medical team? ☐

Is there anything else you would like to see (please comment below):

If there was such an NHS Highland cardiac Web site, do you think you would use it?

- Yes ☐
 No ☐