

# Internet use by parents of children attending a dedicated scoliosis outpatient clinic

Joseph F. Baker · Brian M. Devitt · Sam Lynch ·  
Connor J. Green · Damien P. Byrne · Patrick J. Kiely

Received: 10 December 2011 / Revised: 23 May 2012 / Accepted: 1 July 2012 / Published online: 21 July 2012  
© Springer-Verlag 2012

## Abstract

**Purpose** No information exists on the level of internet use among parents of pediatric patients with scoliosis. The internet may represent a medium through which to provide information to augment the outpatient consultation. The aim of this research was to establish the prevalence of internet use amongst a cohort of parents attending a pediatric scoliosis outpatient clinic.

**Methods** A previously used questionnaire (Baker et al., Eur Spine J, 19:1776–1779, 2010) was distributed to parents attending a dedicated scoliosis outpatient clinic with their children. Demographic data and details about use of the internet were collected.

**Results** Fifty-eight percent of respondents had used the internet to search for information on scoliosis, and 94 % were interested in a local internet provided information provision. A positive history of corrective surgery and possession of health insurance were independent positive predictors of internet use.

**Conclusions** As surgeons we need to be aware of our patients' use of the internet, and there is the opportunity to use this medium to provide additional education.

**Keywords** Internet · Pediatric · Scoliosis · Information provision · Outpatient

## Introduction

The internet has revolutionized the way we exchange information. Access to an enormous quantity of information on any topic is available to anyone who has a computer connected to the World Wide Web. If one searches for the term 'scoliosis' using the Google search engine, 6.87 million results are declared in only 0.1 s (search performed 31 August 2011). This is a remarkable increase in volume of information available in less than a decade [1].

Previously it has been noted that approximately one-quarter of patients attending orthopedic outpatient clinics for spinal related complaints had used the internet to search for information on their condition [2]. While providing accurate and comprehensible information, internet sites can equally provide misleading or difficult to understand information that can cause undue anxiety, appropriately termed 'cyberchondria' [1, 3, 4]. This raises concerns for both patient and doctor alike as the patient–doctor relationship can potentially be altered on the basis of the internet search [5–7].

We aimed to ascertain the level of internet use to search for information regarding scoliosis by parents of children attending the outpatient service in our hospital. We hypothesized that the level of use would be greater than that previously reported in other local studies. Secondly we aimed to determine whether the search for information was useful or otherwise and also whether further information provision via this medium was desired.

---

J. F. Baker (✉) · B. M. Devitt · S. Lynch ·  
C. J. Green · D. P. Byrne · P. J. Kiely  
Department of Orthopaedic Surgery,  
Our Lady's Children's Hospital,  
Crumlin, Dublin, Ireland  
e-mail: joseph.f.baker@gmail.com

## Materials and methods

A questionnaire based on a previously used model by Baker et al. [2] was used to collect basic demographic information and information regarding internet use and access. The new questionnaire was initially trialed on 20 parents attending the outpatient clinic to test for readability. Minor modifications were made following this piloting and these questionnaires were discarded (see Appendix 1 for full version of the questionnaire). Ethical board approval was waived.

Questionnaires were distributed over a 3-month period in early 2010 to all parents attending the scoliosis outpatient clinic. Our hospital is a national tertiary referral center for pediatric scoliosis and the population attending can therefore be assumed to be representative national demographics.

Three consultant spinal surgeons with a special interest in pediatric spinal deformity staff the clinic. Consecutive parents attending with their child(ren) were invited to participate. Consent was obtained at the time of distribution.

Information gathered included basic demographics, highest level of education, history of corrective surgery and whether the visit was an initial consult or a follow-up visit. Details were sought regarding the possession of insurance, access to the internet at home or at work and whether they had used the internet specifically to search for information on scoliosis. We enquired whether the internet search was helpful; if it induced a greater degree of anxiety and whether it stimulated further questions. Finally, we asked if they were enthusiastic for a local internet site that provided information scoliosis.

**Table 1** Results from demographic details and assessment of parental use of the internet to search for information on scoliosis

Demographic/question	Responses (N)	Answers	Sample <i>p</i> -value (95 % CI)
Gender	167	32 = male 135 = female	0.19 (0.14, 0.26) 0.81 (0.74, 0.87)
Age	155	18 parents <20 11 parents 20–35 116 parents 35–50 10 parents 50–65	0.12 (0.07, 0.18) 0.07 (0.04, 0.12) 0.75 (0.67, 0.82) 0.07 (0.03, 0.12)
Age of child	164	11.9 (SD 4), range 1.1–19 years old	
Highest level of parent education	161	14 parents = primary 87 Parents = secondary 6 Parents = trade 54 Parents = third level	0.09 (0.05, 0.14) 0.54 (0.46, 0.62) 0.04 (0.01, 0.08) 0.34 (0.26, 0.41)
Visit type	164	18 First visit 118 Results/investigation 28 Return visit	0.11 (0.07, 0.17) 0.72 (0.64, 0.79) 0.17 (0.12, 0.24)
Waiting time to first consultation (months)	29	6.24, range 1–24 months	
Has your child had corrective surgery?	164	34 = yes 130 = no	0.21 (0.15, 0.28) 0.79 (0.72, 0.85)
Were there any post-operative complications?	41	36 = no 5 = yes	0.88 (0.74, 0.96) 0.12 (0.04, 0.26)
Do you have private health insurance?	154	90 = no 64 = yes	0.58 (0.50, 0.66) 0.41 (0.34, 0.50)
Do you have internet access at home?	159	152 = yes 7 = no	0.96 (0.91, 0.98) 0.04 (0.02, 0.09)
Is your internet access only at work?	99	93 = no 6 = yes	0.94 (0.87, 0.98) 0.06 (0.02, 0.13)
Have you searched the internet for information on scoliosis?	165	97 = yes 69 = no	0.58 (0.50, 0.66) 0.42 (0.34, 0.5)
Had you searched prior to your first consultation?	163	98 = no 65 = yes	0.6 (0.52, 0.68) 0.4 (0.32, 0.48)
Did you search only after the first clinic visit?	146	114 = no 32 = yes	0.78 (0.71, 0.85) 0.22 (0.16, 0.30)

Test and confidence interval (CI) for one proportion is based on the number of answers (i.e. excludes the number of blank responses)

All sample *p* values and CI rounded to the nearest two decimal places

## Statistics

All data were collated on an Excel spreadsheet and statistical analysis performed using Minitab (ver. 16). Basic descriptive data are used to report results, as are proportions with 95 % confidence intervals when reporting responses to questions regarding internet use. A multiple-regression model was used to determine the relationship between internet use and basic demographical information as well as web access. In order to include categorical variables with more than two levels (e.g. level of education) in the multiple-regression prediction model, additional steps were taken to insure that the results are interpretable. These steps include recoding the categorical variable into a number of separate, dichotomous variables. This recoding is called “dummy coding”.

## Results

One hundred and sixty-eight parents attending the out-patient service completed the questionnaire, of which 32 were males. One hundred and sixteen were aged between 35 and 50 years, 11 between 20 and 35 years, 18 below 20 years and 10 were aged over 50 years. The average age of the child attending was 11.9 (SD 4) with a range of 1–18 years.

The highest level of education varied amongst parents: 14 attained a primary education, 93 had either a secondary education or a trade qualification, while 54 achieved tertiary level education. One hundred and eighteen were making a return visit either for scheduled follow-up or to receive results of investigations. Sixty-four respondents (41 %) held private health insurance. Previous corrective

**Table 2** Results from questions assessing the way in which parents used the internet and their experiences in doing so

Demographic/question	Responses ( <i>N</i> )	Answers	Sample <i>p</i> (95 % CI)
How did you find websites on scoliosis?	85	12× friend	0.14 (0.08, 0.23)
		2× physician/surgeon	0.02 (0.00, 0.08)
		70× search engine	0.82 (0.73, 0.90)
		1× another patient	0.01 (0.00, 0.06)
Search engine used	62	1× auntminnie.com	0.02 (0.00, 0.09)
		57× Google	0.92 (0.82, 0.97)
		1× Google/Yahoo	0.02 (0.00, 0.09)
		1× Google scholar	0.02 (0.00, 0.09)
		2× Yahoo	0.03 (0.00, 0.11)
Was the internet helpful?	103	79 = yes 24 = no	0.77 (0.67, 0.84) 0.23 (0.16, 0.33)
How helpful was the internet?	97	Average 58 (range 0–100)	
Did the internet search create more anxiety?	132	38 = yes 94 = no	0.29 (0.21, 0.37) 0.71 (0.63, 0.79)
Did you encounter confusing websites?	104	73 = no 31 = yes	0.70 (0.60, 0.79) 0.30 (0.21, 0.40)
Could you recommend sites after your search?	90	53 = no 37 = yes	0.59 (0.48, 0.69) 0.41 (0.31, 0.52)
Did the search prompt more questions for this visit?	107	68 = no 39 = yes	0.64 (0.54, 0.73) 0.36 (0.27, 0.46)
Are you interested in an Irish scoliosis site?	138	8 = no 130 = yes	0.06 (0.03, 0.11) 0.94 (0.89, 0.98)
Were you satisfied with information provided at last clinic visit?	126	10 = neutral 1 = not satisfied at all 4 = somewhat dissatisfied 41 = somewhat satisfied 70 = totally satisfied	0.08 (0.04, 0.14) 0.01 (0.00, 0.04) 0.03 (0.01, 0.08) 0.33 (0.25, 0.42) 0.56 (0.46, 0.64)
Reasons for searching the internet			
To gain a clearer explanation	56	56 = yes	
To find additional information	84	84 = yes	
To answer further questions	33	33 = yes	
To search for a visual explanation	50	50 = yes	

Test and CI for one proportion is based on the number of answers (i.e. excludes the number of blank responses)

All sample *p* values and CI rounded to the nearest two decimal places

**Table 3** Results from the multiple-regression prediction model

Term	Coefficient	SE Coefficient	<i>T</i>	<i>P</i>
Constant	0.554	0.658	0.84	0.401
Parent gender	0.022	0.106	0.21	0.832
Parent age group	0.006	0.058	0.11	0.913
Child age (years)	0.015	0.01	1.6	0.113
Parent education	−0.029	0.041	−0.71	0.48
Visit type	0.011	0.114	0.1	0.922
Corrective surgery	0.233	0.146	1.6	0.112
Private health insurance	−0.078	0.089	−0.88	0.383
Home internet access	0.318	0.216	1.48	0.142

Work only web access and post-op complications are ‘essentially’ constants in the regression equation as there were a number of blank responses. This regression analysis was used to understand how/if parents searching the internet changes when any one of the independent variables (parent gender, age group, etc.) is varied, while the other independent variables are held fixed.

surgery had been performed in 34 children (21 %) attending the clinic.

The responses to demographic questions and details regarding access to the internet are displayed in Table 1. Results from questions assessing parental experience of using the internet for seeking information on scoliosis are displayed in Table 2.

Fifty-eight percent of those surveyed had used the internet to search for information on scoliosis. Fifty-six parents (34 %) reported that they used the internet to gain a better understanding of their child’s spinal condition, 33 (20 %) used the internet to answer further questions they had encountered after the clinic visit and 50 (30 %) used the internet to find a visual explanation of the condition.

A regression analysis was used to explore if participants’ gender, age group, child age, education, private health insurance, visit type, history of corrective surgery for the scoliosis, post-operative complications or internet access (home or at work) had an impact on whether the parents of children with scoliosis searched the internet (see Table 3). Work only web access and post-operative complications were omitted from the analysis, as there were a number of blank responses—69 and 127, respectively.

Overall 138 cases were used in the analysis while 30 contained missing values. In order to account for missing values, individual regression analyses were carried out to investigate the specific relationships between internet use and ‘corrective surgery’ ( $p = 0.039$ , 164 cases used), ‘post-op complications’ ( $p = 0.154$ , 41 cases used) and ‘private health insurance’ ( $p = 0.017$ , 154 cases used).

## Discussion

The internet has influenced many facets of life. Healthcare has not been immune to this phenomenon with both

patients and physicians alike using the internet to their advantage [8]. We first aimed to determine the level of internet use in our cohort of parents of children attending the scoliosis outpatient clinic. Confirming our hypothesis we found that the prevalence of internet use of almost 60 % was much greater than that previously encountered in an adult population with spinal complaints [2]. It was also higher than the 39 % prevalence in a general pediatric outpatient population reported in 2002 [9]. It was, however, still somewhat less than the 84 % prevalence reported by Aslam et al. [10], although it is noted that their response rate to the questionnaire was only 67 %.

A majority of those who used the internet found the exercise useful and the search prompted further questions in a number of parents. This is a consistent finding with Aslam et al. [10] also reporting that most of their study cohorts found the search useful and just over a quarter found that the internet search generated new questions to ask at their next clinic visit.

We noted that almost a third of those who searched the internet found sites either confusing or had a greater feeling of anxiety afterwards. Anxiety after searching the internet for health-related information is not new but is of concern as it can alter the patient–doctor relationship [3]. Potentially it can result in increased time spent in the outpatient setting correcting misconceptions. Increased anxiety may not only be due to inaccurate information but could also be simply due to miscomprehension of the information provided. Badarudeen et al. [4] found that internet-based education materials provided by the Pediatric Orthopaedic Society of North America had readability scores considered too high for the general population.

A notable proportion of parents responded positively to the question on delivery of a locally provided internet site on scoliosis. It has already been determined that the

currently available information on the internet about scoliosis is of concerning quality [1]. This represents an opportunity to engage positively with both the pediatric patient and their parent using the internet for greater information provision—a benefit increasingly suggested in the age of the internet [11]. On a European level efforts are already being made to engage patients via the internet to provide the best possible evidence and information available—this includes information specifically on scoliosis [8]. However, we need to be mindful of ensuring that the readability of information provided is suitable for the target audience as often the comprehension level the information is provided at is too high [4].

It appears that visual explanations should be included in any internet-based information effort with almost one-third searching specifically for a visual explanation of their child's scoliosis condition. This may play a role, especially for those requiring surgery, as this was one of the few independent variables that predicted a parent had searched for information on the internet. We propose that any site development should include an interactive module to explain the deformity and what is involved in correction.

We acknowledge that this study has certain weaknesses, as do many questionnaire-based studies. There is the potential for selection bias when a 100 % response rate is not achieved for a certain question and this can result in an over estimation of a positive or negative result. The search skills of those using the internet and the quality of the internet sites visited is impossible to control—we acknowledge that a more skilled internet user may be more likely to access better quality sites and hence not suffer the same anxiety as a less skilled individual. This clearly has a potential impact on the results. Furthermore, as this is an initial study we have not sought certain information that may be of interest. Subsequent development of a local internet site and auditing of outpatient attendees will determine whether we are able to reduce under anxiety and confusion in our patients.

In conclusion, parents of children attending our scoliosis outpatient clinic reported a higher than average prevalence of internet use to search for information on their child's condition. There is a clear suggestion that parents desire an internet-based educational tool. We believe that this is an opportunity to improve the patient–doctor relationship and reduce undue anxiety and confusion among our patients.

**Conflict of interest** None.

## Appendix 1: Scoliosis internet questionnaire

Please circle or tick the box next to the most correct answer for each question.

Are you:                    male                    female

Which age group are you in:

<20 years            20-35            35-50            50-65            65-80            >80

What age is your child?: \_\_\_\_\_ years old

What is your highest level of education:

Primary                    Secondary                    Trade                    Tertiary

Which situation best applies to you and your child:

- This is our first visit
- This is a return visit following surgery
- This is return visit for results/further assessment

When was your first visit to this outpatient service:

\_\_\_\_\_(month) \_\_\_\_\_(year)

If this is your first visit, how long have you been waiting for this appointment?

\_\_\_\_\_(years)\_\_\_\_\_(months)

Has your child had corrective spinal surgery for scoliosis?                    Yes                    No

If yes to the above question, was there any complication following surgery?

Yes                    No

Do you have private health insurance:                    Yes                    No

Do you have access to the internet at home?                    Yes                    No

Do you have access to the internet, but only at work                    Yes                    No

Have you sought any information on the internet about your child's spinal condition?

Yes                    No

Did you search the internet before your first visit to this clinic?

Yes                    No

Did you search the internet only after a clinic visit?

Yes                    No

If yes to the above question, did this lead to more questions than answers?

Yes                    No

How did you find websites? Please indicate all that apply.

- Search engine (please indicate which one): \_\_\_\_\_
- Suggested to me by a friend
- Suggested to me by a physician/surgeon
- Suggested to me by another patient

What words or terms did you search for when using the search engine?

Please list: \_\_\_\_\_

Overall, did you find your internet search helpful?

Yes                    No

On the scale below, please indicate with an 'X' how useful the internet was in answering your questions.

0%      Not at all |-----| Totally  
100%

Did you, at any stage, visit websites that made you more anxious regarding your child's spinal condition?

Yes      No

Did you find any of the websites confusing or difficult to read?

Yes      No

Would you recommend any of the websites visited to other parents?

Yes      No

If yes, which one(s): \_\_\_\_\_ -

Did any of the websites visited prompt you to ask the surgeon questions you otherwise wouldn't have?

Yes      No

If we suggested a website to visit that provided information about scoliosis surgery in Ireland, would you be interested?

Yes      No

Did you search the internet to: (tick all that apply)

- Explain things more clearly
- Provide more information
- Answer further questions arising from the clinic visit
- Provide a visual explanation of the surgery/spinal condition

How satisfied were you with information provided at your last visit: (please tick one)

- Totally satisfied
- Somewhat satisfied
- Neutral
- Somewhat dissatisfied

How do you think we could improve your experience in this clinic?:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Thank you for your time. You have helped us improve the way we may provide health care to you, your child and others in the future.*

## References

1. Mathur S, Shanti N, Brkaric M, Sood V, Kubeck J, Paulino C, Merola AA (2005) Surfing for scoliosis: the quality of information available on the internet. *Spine (Phila Pa 1976)* 30:2695–2700. doi:0007632-200512010-00016
2. Baker JF, Devitt BM, Kiely PD, Green J, Mulhall KJ, Synnott KA, Poynton AR (2010) Prevalence of internet use amongst an elective spinal surgery outpatient population. *Eur Spine J* 19:1776–1779. doi:10.1007/s00586-010-1377-y
3. Davidson B (2012) Cyberchondria. <http://sciencereview.org/pdfs/4.pdf>. Accessed 23 May 2012
4. Badarudeen S, Sabharwal S (2008) Readability of patient education materials from the American Academy of Orthopaedic Surgeons and Pediatric Orthopaedic Society of North America web sites. *J Bone Joint Surg Am* 90:199–204. doi:10.2106/JBJS.G.00347
5. Kim GR, Lehmann CU (2003) The impact of the internet on pediatric medicine. *Paediatr Drugs* 5:433–441
6. Wyatt JC (2000) Knowledge and the internet. *J R Soc Med* 93:565–570
7. Hungerford DS (2009) Internet access produces misinformed patients: managing the confusion. *Orthopedics* 32. doi:10.3928/01477447-20090728-04
8. Pellise F, Sell P (2009) Patient information and education with modern media: the Spine Society of Europe Patient Line. *Eur Spine J* 18(Suppl 3):395–401. doi:10.1007/s00586-009-0973-1
9. Beall MS 3rd, Golladay GJ, Greenfield ML, Hensinger RN, Biermann JS (2002) Use of the internet by pediatric orthopaedic outpatients. *J Pediatr Orthop* 22:261–264
10. Aslam N, Bowyer D, Wainwright A, Theologis T, Benson M (2005) Evaluation of internet use by paediatric orthopaedic outpatients and the quality of information available. *J Pediatr Orthop B* 14:129–133. doi:01202412-200503000-00014
11. Shuyler KS, Knight KM (2003) What are patients seeking when they turn to the internet? Qualitative content analysis of questions asked by visitors to an orthopaedics web site. *J Med Internet Res* 5:e24. doi:10.2196/jmir.5.4.e24