

Musculoskeletal Health Professional Use of Internet Resources for Personal and Patient Education: Results from an Online National Survey

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Abstract: *Objectives:* To study the current practice of computer use in musculoskeletal health professionals for their education and that of their patients.

Methods: A survey questionnaire, designed by a working group including representatives from Arthritis Research UK and the British Society for Rheumatology, was made available on surveymonkey.com and the link distributed by email.

Results: 190 health professionals responded. Rheumatology professionals made up two thirds of the participants. The modal age group of responders was under 40 years (37%). 97% had spent some educational time on a computer. Females were younger and spent more time using the computer for education purposes. The preferred learning modality was interactive online content (71%). The most common methods of educating patients were the Consultant and Specialist nurse while the web is used by 40% of the health professionals. The most common barrier to education was 'Insufficient resources for education groups'. Rheumatologists were more likely to log Continuous Professional Development (CPD) online, complete online modules and have mandatory training online. UpToDate and Arthritis Research UK were the highest rated websites for health professional and patient education respectively.

Conclusions: This is the first national survey of E-learning in the musculoskeletal health profession, with a large proportion of Rheumatologists. Almost all use computer based learning. Use of the internet for patient education is low. Highly rated educational websites are available for both professionals and patients.

Keywords: Computers, health, internet, musculoskeletal, education, e-learning.

INTRODUCTION

With advances in technology, easier accessibility and decreased costs, the internet has become a popular tool for learning. It has been reported by the Office of National Statistics that approximately 77% of the United Kingdom (UK) population in 2011 has access to the internet (web) [1]. Prior studies have suggested that e-learning (in this report it refers only to computer based learning) is an effective learning tool [2-5]. It has been used in medical education but there is no robust evidence to support its use by health professionals for their own or their patient's education within the musculoskeletal professions and specifically in Rheumatology.

Patient education plays a vital role in the health care of patients (especially for chronic diseases) and has been widely used [6-9]. It has been shown to improve their understanding about the disease process and its management

leading to improvements in clinical outcome and self-efficacy. A recent systematic review outlined the positive effects (clinical and psychological) of patient education on Rheumatoid Arthritis patients [9]. In this review apart from the improvement in disease-related knowledge, outcomes and the psychological advantage, it was reported that the use of patient education has been associated with improvements in self-management as well as a decrease in health costs.

E-learning as a means of educating patients is relatively new with a relatively low utilisation by health professionals. It was reported by a study in the United States (US) that 40-50% of the US population in 2003 obtained health information online and almost 50% of these individuals preferred searching the web first while only 10.9% went to the physician first [10]. A different report found that only 3% of patients received a doctor's advice to seek health information on the internet while 62% agreed that they should be guided by their doctor [11]. The low use of the internet for obtaining health information was linked to the variability in quality of information found on the internet. A patient based survey explored how participants used the internet for health information [12]. The population comprised adults older than 18 years attending outpatient clinics during a two week period in a major city

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(Nottingham) in the UK. They found that 63% of the study subjects (sample of 663) had access to the internet while 42% had used the internet to obtain health information in the past. Almost all of the subjects in this study who had used the internet felt that the information they obtained was above average while four out of five subjects reported that they would like to access trustworthy information.

Musculoskeletal healthcare involves dealing with chronic disease in which education is an important aspect of care and it is therefore of great interest to study how it is affected by e-learning. Reports in the past from a health professional perspective have shown benefits for the use of computer based learning in patient education and healthcare [13, 14]. There are no previous reports studying the use of computer based learning specifically in musculoskeletal healthcare from the medical professionals' perspective. This study addressed this issue and furthermore made an assessment of currently available patient and professional educational web resources in this field.

MATERIALS AND METHODOLOGY

A survey devised by a group of healthcare professionals with input from various Rheumatology and Orthopaedic organisations (British Society for Rheumatology (BSR), Arthritis Research UK (ARUK), British Health Professionals in Rheumatology, Primary Care Rheumatology, British Orthopaedic Association and trainees, including the Rheumatologists at Training & British Orthopaedic Trainees Association) was placed on an easily accessed website (surveymonkey.com). A link to the survey was placed in the BSR E-newsletter of 14 September 2010. Where feasible, reminders were sent electronically, either to the same mailing list, or by cascading emails through regional administrative leads. The survey ended on the 8th of November 2010.

Participants were anonymous and the survey consisted of 16 questions relevant to health professionals' educational practice and personal characteristics (Table 1). No confidential information pertaining to patients was requested. Two of the questions required rating of a number of websites listed by the British Society of Rheumatology for education purposes (for both health professionals and patients). Questionnaire responders had the option to suggest unlisted websites along with a rating. A Likert rating system (0=worst to 5=best) was used for rating the websites. The complete questionnaire can be accessed via "http://www.surveymonkey.com/s/BSR-Arthritis_Research_UK_National_E-Learning_Survey"

Statistical analyses were performed using Microsoft Excel, 2003. The chi-square statistic or two sample t-test were used for all comparisons. 95% Confidence Intervals (CI) about the mean were calculated for the website ratings. An alpha value of 0.05 was chosen for significance purposes.

RESULTS

192 individuals had completed the survey. Two were excluded because they reported a profession other than healthcare. The characteristics of the responders are presented in Table 2. Individuals from at least twelve health

professions relating to musculoskeletal care responded. There was almost equal representation of male and females and the majority were 50 years of age or younger. A higher proportion of females were noted in the younger age groups. 124 of the responders were within the Rheumatology profession

Table 1. Questions Asked in the e-Learning Survey

1. What best describes your position?
2. Gender
3. Age range
4. How much time spent on education is done using a computer?
5. Where do you prefer using a computer for your own education purposes?
6. Reasons for not using the computer for education purposes
7. Is any of your trust mandatory training online?
8. Have you ever completed an online module of any description?
9. Do you have a preferred format for e-learning material?
10. Do you have an online CPD Diary or Portfolio?
11. How do your patients currently receive education?
12. What barriers exist to educating patients?
13. Which resources are you aware of for professionals?
14. Which resources are you aware of for patients?
15. What is the single most important thing that defines a good online educational resource?
16. Please provide us with the first part of your postcode

Health Professional Computer Based Education

Most (>97%) health professionals use a computer for education purposes (Table 2). Almost 70% of the respondents stated that they used a computer for education purposes in 20% - 80% of their study time. The time devoted to computer use was inversely proportional to the age of the study participants with the younger individuals using the computer more than their older counterparts. More males reported using the computer for education purposes for shorter periods of time ($\leq 40\%$ of computer education time) while more females used the computer for education purposes for longer periods ($>40\%$ of computer education time). 69% of musculoskeletal health professionals responded that they use computers for education purposes at work and at home. The small percentage of respondents who did not use a computer stated that they preferred attending courses and reading books. They also cited time pressure and dislike of using a computer.

87% of the study participants had completed an online module. Three quarters reported doing mandatory training online at their employing trust. Two thirds (67%) kept a CPD Diary or Portfolio. The interactive online content format was the most frequently used (71%) while use of the Podcast (audio) was not listed by any respondents (Other responses to format included: Blogs/Forums 8%, Podcast-video 18%, PowerPoint 29%, RSS Feeds 3%, and Webcast 10%).

Table 2. Participant Characteristics, Education Time Using a Computer and Place of Computer Use

Characteristics	Website Use for Patient Education			χ^2 P-Value
	N (%Total)	Yes	No	
	Frequency (%)			
Profession	N=190	N=76	N=114	
Academic Rheumatologist	21(11)	11(15)	10(9)	0.220
Consultant Rheumatologist	58(31)	26(34)	32(28)	0.371
Consultant Orthopaedics	2(1)	0(0)	2(2)	0.240
General Practitioner	9(5)	5(7)	4(4)	0.325
GPwSIR	11(6)	4(5)	7(6)	0.817
Rheumatology Trainee	45(24)	15(20)	30(26)	0.294
General Practitioner Trainee	1(1)	0(0)	1(1)	0.407
Associate Specialist	1(1)	0(0)	1(1)	0.407
Specialist Nurse	10(5)	3(4)	7(6)	0.504
Physical Therapist	2(1)	2(3)	0(0)	0.084
Occupational Therapist	2(1)	2(3)	0(0)	0.084
Podiatrist	7(4)	1(1)	6(5)	0.152
Other	20(11)	7(9)	13(11)	0.628
Gender				
Male	91(48)	37(49)	54(47)	0.861
Female	96(51)	38(50)	58(51)	0.903
Age Group (Years)				
<40	70(37)	25(33)	45(40)	0.356
40 – 50	56(30)	23(30)	33(29)	0.836
50 – 60	49(26)	23(30)	26(23)	0.247
60 – 70	13(7)	4(5)	9(8)	0.487
>70	0(0)	0(0)	0(0)	1.000
Time Spent on Computer for Education Purposes				
0%	5(3)	2(3)	3(3)	1.000
1%-20%	43(23)	22(29)	21(18)	0.089
20%-40%	49(26)	20(26)	29(25)	0.892
40%-60%	43(23)	18(24)	25(22)	0.778
60%-80%	39(21)	11(14)	28(25)	0.092
80%-100%	7(4)	3(4)	4(4)	0.875
Place of Computer Use for Education Purposes				
Home	37(19)	9(12)	28(25)	0.028*
Work	18(9)	12(16)	6(5)	0.012*
Both	131(69)	55(72)	76(67)	0.468

Percentages may not sum up exactly to 100% due to missing values or rounding off.

*Statistically significant at $\alpha=0.05$.

GPwSIR = General Practitioner with Special Interest in Rheumatology.

Computer Based Patient Education

40% of the participants reported that their patients receive education *via* the web (either using their departmental website or some other website) (Table 3). The

most common consultation channels reported were the specialist nurse (83%) and the consultants (80%). Arthritis Research UK leaflets and booklets were used more often than other printed material. The most commonly reported barrier (60%) to patient education was insufficient resources

Table 3. Means by which Patients Receive Education and Barriers to Education

	Website Use for Patient Education			
	N (%Total)	Yes	No	χ^2 P-Value
	Frequency (%)			
Education Means				
<i>Consultations with</i>				
Consultant	151(80)	65(86)	86(75)	0.091
Trainee	115(61)	54(71)	61(54)	0.015*
GPwSIR	35(18)	17(22)	18(16)	0.250
Specialist Nurse	157(83)	65(86)	92(81)	0.392
Physical Therapist	124(65)	60(79)	64(56)	0.001*
Occupational Therapist	106(56)	53(70)	53(47)	0.002*
Podiatrist	84(44)	43(57)	41(36)	0.005*
<i>Written Information</i>				
Arthritis Research UK	156(82)	71(93)	85(75)	<0.001*
Arthritis Care	72(38)	33(43)	39(34)	0.200
Another source	77(41)	39(51)	38(33)	0.013*
Barriers to Education				
Insufficient resources for education groups	114(60)	52(68)	62(54)	0.054*
Poor access to computers	68(36)	28(37)	40(35)	0.811
Inconvenient time for patients	61(32)	23(30)	38(33)	0.664
Lack of suitable venues for education	55(29)	22(29)	33(29)	1.000
Inconvenient place for patients	41(22)	15(20)	26(23)	0.611
Lack of perceived need	48(25)	13(17)	35(31)	0.035*
Reading or writing difficulty for patients	55(29)	27(36)	28(25)	0.105

Percentage for each education modality and barriers are calculated from total N as each health professional may use multiple methods for their education.

All percentages are rounded off.

* Statistically significant at $\alpha=0.05$.

GPwSIR = General Practitioner with Special Interest in Rheumatology.

for education groups while literacy (reading or writing difficulties of patients) was seen as a barrier in 29% of the survey participants.

161 of the 190 respondents presented their post codes. 90 were coded as being from the south of the UK (areas south of Sheffield) and 71 were from the North of the UK (areas north of Sheffield). 39% of the participants from the south reported the internet as a mode of education for the patients while 42% did the same from the north of the UK. This difference was not statistically significant ($p=0.7$).

Health Professional Practices of Computer Based Learning Stratified by the Use of the Web

The study sample was stratified by the use of the web as a modality for patient education and compared in a number of questions. The frequencies of the characteristic variables (profession, gender and age group) did not differ among the two groups (see Table 2 for p-values). The amount of time using a computer in education was not associated with using the web for patient education ($p=0.479$). Furthermore no statistically significant differences in the time spent using the

computer for education among the web users and those that don't use the web for patient education was noted for any of the time subgroups (p-values shown in Table 2). No significant differences were also noted for CPD use, completing an online module and mandatory training online (p-values are shown in Table 4A). The choice of e-learning format did not differ among the two groups (p-values = 1.00, 0.750, 1.00, 0.540, 0.850, 0.170, 0.490 for Blogs/Forums, Interactive online content, Podcast-audio, Podcast-video, PowerPoint, RSS Feeds, and Webcast respectively).

Education Among Professions (Rheumatology vs Non-Rheumatology Professionals)

Due to the high proportion of Rheumatologists within our study participants, responses to all study questions were compared between the Rheumatologist group (N=124) and all other health professionals (N=66). A higher percentage of younger professionals was noted in the Rheumatology group (age group specific comparison of proportions by Chi-square: <40 years, $p<0.001$; 40-50 years, $p=0.482$; 50-60 years, $p<0.001$; 60-70 years, $p<0.001$). The amount of computer time for education purposes was not statistically

different between the Rheumatologist and Non-Rheumatologist groups ($p=0.835$). The percentage of Rheumatologists that used the computer for education purposes at home was lower than the percentage of Non-Rheumatologists. The opposite was noted for computer use at work or the combination of both home and work. Non-Rheumatologists preferred Blogs as a method of e-learning ($p=0.107$). There was a 9% higher completion of online modules by Rheumatologists ($p=0.066$) (Table 4B). Availability of mandatory training in the workplace was more common for the Rheumatologists ($p<0.001$) by almost 30%. Rheumatologists were also two times more likely ($p<0.001$) to have an online CPD Diary or Portfolio. The only significant difference in the barrier question was that Rheumatologists had listed 'lack of perceived need' less than the Non-Rheumatologists. There was no statistically significant association between profession and the use of the web for patient education ($p\text{-value}=0.504$) although a higher proportion of Rheumatologists used the web for patient education (42% vs 37%).

Table 4. Use of CPD, Mandatory Online Training and Online Modules Stratified by Web Use (A) and Profession (B)

A: Web Use

	Web Use for Education of Patients		χ^2
	Yes	No	P-Value
CPD			
Yes	55(73%)	72(64%)	0.194
No	20(27%)	40(36%)	
Mandatory Online Training			
Yes	58(77%)	80(73%)	0.480
No	17(23%)	30(27%)	
Online Module			
Yes	69(91%)	97(87%)	0.469
No	7(9%)	14(13%)	

B: Profession

	Rheumatologist		χ^2
	Yes	No	P-Value
CPD			
Yes	98(80%)	28(44%)	<0.001*
No	24(20%)	36(56%)	
Mandatory Online Training			
Yes	102(84%)	35(56%)	<0.001*
No	19(16%)	28(44%)	
Online Module			
Yes	112(92%)	53(83%)	0.066
No	10(8%)	11(17%)	

*Statistically significant at $\alpha=0.05$.

CPD = Continuous Professional Development.

Web Resources for Health Professional and Patient Education

Due to the small number of other websites that were listed by the participants only those offered by the survey were included in the results. There were 27 website resources for health professional education and 37 website resources for patient education. Multiple websites received more than a 50% response rate (range 14% - 82%). All websites received a rating of 2 and higher out of a maximum scale of 5 (best). The range of mean rating scores for the education of health professionals was 2.24 - 4.19 while that for patient education was 2.53 - 4.14. Among the list of websites for the education of health professionals UpToDate received the best rating with a mean score of 4.19 (95% CI 3.96-4.42) while for the education of patients, Arthritis Research UK was the highest ranked website with a score of 4.14 (95% CI 3.99-4.29). The complete list of ranked websites for health professional education is shown in Table 5 while those for patient education in Table 6. There were no significant differences in the website ratings among those that use the web for patient education and those that don't (results not shown). Similarly no statistical differences were noted when stratified by gender for both patient education and health professional education websites. There were multiple factors that Health professionals listed as the most important criterion that defines a good educational resource. The most common criteria were the user-friendliness of the website, clarity and accuracy as well as ease of access. The number of websites rated by a participant was not significantly associated with web use but a larger number of websites was noted to coincide with a higher proportion of individuals using the web for patient education.

DISCUSSION

This survey has shown that almost all musculoskeletal health professionals responding to an email invitation and completing an online survey use the computer for their own education purposes (both at home and at work). There is high use (>67%) of mandatory training online, CPD and completion of online modules. Females spent more time using computer-based education while younger responders tended to use the computer to a greater extent. This is consistent with existing literature indicating that older individuals use computers less (including those for obtaining health information) [15]. The preferred format for e-learning was interactive online content.

Although the web is used increasingly to obtain health information (greater than 50% of individuals that search the web seek health information) [16, 17], this study has shown that only 40% of musculoskeletal health professionals reported that their patients obtain health education *via* the web. This percentage although being the view of the musculoskeletal health professionals (which may not match the actual usage of the web by their patients) is below expectation. Patients may use the internet to obtain health information even though it is not an education method used by their health care professional (in which case their health care professional may or may not be aware) or they may not use the web to obtain health related information even though

Table 5. Health Professionals Ratings of Websites for Health Professional Education (0=Worst, 5=Best)

Website	Mean (95% CI)
Up-to-date (www.uptodate.com)	4.19 (3.96-4.42)
Pubmed (www.ncbi.nlm.nih.gov/pubmed)	3.77 (3.56-3.98)
Arthritis Research UK formerly arc (www.arthritisresearchuk.org)	3.68 (3.53-3.83)
Medscape (www.medscape.com)/Emedicine (http://emedicine.medscape.com)	3.53 (3.29-3.77)
BMJ Learning (http://learning.bmj.com)	3.47 (3.33-3.62)
EULAR On-line course (www.eular-onlinecourse.org)	3.41 (3.12-3.70)
NHS Evidence (www.evidence.nhs.uk)	3.40 (3.13-3.66)
NHS Clinical Knowledge Summaries (www.cks.nhs.uk/)	3.38 (3.16-3.60)
The British Society for Rheumatology (www.rheumatology.org.uk)	3.33 (3.16-3.49)
Google(www.google.co.uk)	3.20 (3.01-3.40)
RCGP 'online learning environment' (http://elearning.rcgp.org.uk)	3.11 (2.83-3.40)
Google Scholar (http://scholar.google.co.uk)	3.10 (2.90-3.30)
EULAR Compendium (http://ard.bmj.com/site/about/eularcompendium.xhtml)	3.07 (2.79-3.07)
EULAR On-line course on Connective Tissue Diseases (www.eular-ctd-onlinecourse.org)	3.06 (2.73-3.40)
National Institute for Health and Clinical Excellence (NICE) List (www.nice.org.uk)	3.05 (2.88-3.23)
EULAR (www.eular.org)	3.05 (2.86-3.23)
Doctors.net (www.doctors.net.uk)	3.02 (2.80-3.24)
Web Mentor (www.emis.ca/emr-system/emis-system/web-mentor-library)	2.94 (2.55-3.33)
GP Notebook (www.gpnotebook.co.uk)	2.91 (2.62-3.20)
Royal College of Physicians (www.rcplondon.ac.uk)	2.85 (2.61-3.08)
EULAR Training DVD (www.eular.org/edu_training_dvd.cfm)	2.74 (2.40-3.08)
e-Learning for healthcare (e-LfH) (www.e-lfh.org.uk)	2.65 (2.41-2.90)
Univadis (www.univadis.co.uk)	2.64 (2.37-2.91)
Map of medicine (www.mapofmedicine.com)	2.61 (2.26-2.96)
Wikipedia (www.wikipedia.org)	2.50 (2.28-2.73)
eGuidelines (www.eguidelines.co.uk)	2.45 (2.18-2.73)
British Orthopaedic Association (www.boa.ac.uk)	2.24 (1.83-2.65)

CI = Confidence Interval.

they have been advised to do so. It is though comparative to prior studies from a patient perspective who have reported percentages ranging from 20% – 50% [13, 18, 19]. In a doctor based survey completed in the UK in 2001 with a majority of General Practitioners found that only 1%-2% of their patients had used the internet to obtain health information in the month prior to the study [14]. Demographic location based on the subdivision of North and South of the UK revealed no difference in computer based patient education. No further stratifications in location were attempted due to small sample size. Insufficient resources for education groups, poor computer access and reading and writing difficulties were perceived to be the most common obstacles to patient education. No gender differences were noted among those that use the web versus those that don't use the web for patient education. The degree of computer use was not associated with the use of web-related material for patient education. There were several characteristics (questionnaire responses) of the participants that may be

associated (although not statistically significant in this sample) with the use of the web in their patient education practices (CPD, barriers to education such as 'Insufficient resources for education groups', 'lack of perceived need' and 'reading and writing difficulties').

This survey also showed differences in education practices among the Rheumatology professionals and other professionals within the musculoskeletal field. A larger percentage of Rheumatologists used online education, mandatory training at their trust and continuing professional education (although this may partly be accounted for by the small number of study subjects from the other professional groups and also that the Rheumatologist groups were of a younger age). Nevertheless, this finding may need to be investigated further in a larger and more representative sample.

One of the greatest concerns about using computers and the web for patient education has been the variable quality of

Table 6. Health Professional Ratings of Websites Available for Patient Education (0=Worst, 5=Best)

Website	Mean (95% CI)
Arthritis Research UK formerly arc (http://www.arthritisresearchuk.org/)	4.14 (3.99-4.29)
National Rheumatoid Arthritis Society (NRAS) (http://www.rheumatoid.org.uk/)	3.97 (3.78-4.15)
National Ankylosing Spondylitis Society (NASS) (http://www.nass.co.uk/)	3.80 (3.62-3.98)
National Osteoporosis Society (http://www.nos.org.uk/NetCommunity/Page.aspx?pid=183&srcid=-2)	3.75 (3.55-3.95)
Patient UK (www.patient.co.uk)	3.73 (3.45-4.00)
Arthritis Care (http://www.arthritiscare.org.uk)	3.70 (3.53-3.86)
Lupus UK (http://www.lupusuk.org/)	3.50 (3.31-3.69)
Raynaud's and Scleroderma Association (http://www.raynauds.org.uk/potioncms/viewer.asp?a=117&z=25)	3.39 (3.13-3.65)
Scleroderma Society (http://www.sclerodermasociety.co.uk/newsite/index.php)	3.35 (3.06-3.65)
Back Care (http://www.backcare.org.uk/)	3.33 (2.99-3.67)
Vasculitis (http://www.vasculitis-uk.org.uk/)	3.27 (2.93-3.61)
The British Society for Rheumatology (www.rheumatology.org.uk)	3.22 (3.01-3.42)
British Sjogren's Syndrome Association (http://www.bssa.uk.net/)	3.21 (3.01-3.40)
Fibromyalgia Association UK (http://www.fibromyalgia-associationuk.org/)	3.14 (2.88-3.40)
Behcets Syndrome Society (http://www.behcets.org.uk/)	3.13 (2.85-3.41)
Choices - for Families of Children with Arthritis (http://edit.arthritiscare.org.uk/LivingwithArthritis/Youngpeople)	3.09 (2.66-3.51)
Hypermobility Syndrome Association (http://www.hypermobility.org/)	3.09 (2.77-3.41)
British Scoliosis Society (http://www.liv.ac.uk/HumanAnatomy/phd/bss/bss.html)	3.04 (2.74-3.34)
National Institute for Health and Clinical Excellence (NICE) (www.nice.org.uk)	3.01 (2.75-3.28)
Ehlers-Danlos Support Group (http://www.ehlers-danlos.org/)	3.00 (2.67-3.23)
Marfan Association UK (http://www.marfan-association.org.uk/)	3.00 (2.66-3.34)
Paget's Association (http://www.paget.org.uk/)	3.00 (2.61-3.39)
Psoriasis Association (www.psoriasis-association.org.uk/)	2.96 (2.54-3.37)
National Association for the relief of Paget's disease (http://www.paget.org.uk/)	2.92 (2.58-3.25)
NHS Choices (www.nhs.uk)	2.91 (2.54-3.27)
UK Gout Society (http://www.ukgoutsociety.org/)	2.91 (2.55-3.27)
Myositis Support Group (http://www.myositis.org.uk/)	2.89 (2.60-3.18)
Psoriasis and Psoriatic Arthritis Alliance (http://www.psoriasis-association.org.uk/)	2.88 (2.57-3.18)
Society for Back Pain Research (http://www.sbpr.info/)	2.86 (2.35-3.37)
Contact a Family (http://www.cafamily.org.uk/)	2.85 (2.47-3.23)
RADAR: The Disability Network (http://www.radar.org.uk/radarwebsite/)	2.71 (2.26-3.17)
Sick Children's Trust (http://www.sickchildrenstrust.org/)	2.71 (2.15-3.26)
Perthes Association (www.perthes.org.uk/)	2.63 (2.23-3.03)
Psoriasis Scotland (www.psoriasisScotland.org.uk/)	2.61 (2.16-3.06)
FibroAction (http://www.fibroaction.org/)	2.59 (2.26-2.92)
Palindromic Rheumatism Society (www.palindromicrheumatism.org/)	2.53 (2.07-2.99)
Scoliosis Society (http://www.britscoliosissoc.org.uk/)	2.44 (2.05-2.84)

CI = Confidence Interval.

information [20-23]. Some have suggested using a validation system in grading the websites available. This is challenging in that there is a continuously expanding number of websites and also that medical information changes so rapidly that the information would need to be validated at least every few months. It was shown by this survey that musculoskeletal health professionals have rated most website resources listed on the survey as above average with a few obtaining

excellent scores (UpToDate and Arthritis Research UK). More than half of the websites attained a score above 3 (best=5).

This is the first national survey of the use of computers in the education of musculoskeletal health professionals and how they utilise learning resources for their patients. As this is the current practice of musculoskeletal health professionals the results should be compared with patients'

responses to questions about e-learning so that provision of material will have the best chance of meeting patients' needs. Furthermore it gives an assessment of current web resources that can be utilised for patient education, recommended by health professionals. The questionnaire used in this survey was newly devised by a multidisciplinary team of musculoskeletal health professionals (with good content validity). It was not possible to calculate the exact response rate since the survey was open to everyone (excluding the 45 trainee Rheumatologists the responses obtained represent approximately a 12% response rate. The gender (male to female ratio of 2 to 1) and age distribution (Royal College of Physicians *vs* survey participants: <40, 16% *vs* 13%; 40-50, 44% *vs* 35%; 50-60, 29% *vs* 38% and >60, 11% *vs* 11%) of the study sample was representative of the study population as cited by the Royal College of Physicians census of 2009) [24]. There was evidence of over-representation of younger health professionals. This is not unexpected given that younger individuals tend to use the computer more in general and thus were more likely to participate in the survey. Given that this questionnaire was administered online there is the possibility of selection bias as health professionals that use the web more would be more likely to complete it. This would tend to overestimate the percentage of computer based education for both professional and patients. There are also potential issues for generalizability since our sample was based in the musculoskeletal field and mainly consisted of Rheumatology physicians (65%) and should thus be interpreted primarily within that population. Furthermore the sample size may not have been large enough in order to detect differences in responses especially when stratifications were made.

Results from this survey suggest that targeting e-learning characteristics may offer ways to improve patient education with the use of e-learning. For example making CPD with a diary portfolio more readily available and necessary in health professionals may increase the number that use or adjunct their patient education with the use of web resources. The barriers also need to be resolved to allow the education process to evolve. This would involve educating patients and health professionals on the advantages of e-learning, making computers more accessible, creating sustainable venues that are convenient for patients to use and utilizing different methods to overcome reading and writing difficulties, such as involving family members, friends or using study groups. Health professionals that use the web for patient education rated a greater number of websites suggesting that there should be a greater effort in educating musculoskeletal health professionals about the available quality website resources and thus establishing the web as part of their patient education. These web ratings should be used as a guide to where to search for quality information but should always be tailored to the patient needs and abilities and should always be correlated with the health professional's recommendations. Newly developed web resources should include interactive online content as a mode of web based learning but not limited in order to appeal to a wider group.

With more reliable web resources for patient education and new evidence supporting the use of e-learning in patient education it is suggested that e-learning becomes an integral part of patient education. It is thus important that health professionals understand and support its use and find ways to

include it in their patient education plans. New research should be formulated to study the implementation of the web in patient education using the most appropriate methods (i.e. experimental studies). This requires a greater understanding of the patients learning practices and abilities (including social, environmental and educational factors) and taking into account the limitations relating to their illness. This may mean that future research should be disease specific as well as patient specific.

CONCLUSIONS

Almost all musculoskeletal health professionals use electronic learning resources. In this sample a gender effect was observed with a higher proportion of females utilising computer based learning for longer periods. Interactive online learning was the preferred format for computer based learning. The use of e-learning in patient education by musculoskeletal health professionals remains low even though a larger percentage of adults are accessing information on the web. Insufficient resources for education groups was the most commonly referred barrier to educating patients while literacy remains a significant barrier. There are highly rated educational web resources available for both professionals and patients.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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