

A multilingual evaluation of current health information on the Internet for the treatments of benign prostatic hyperplasia

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Purpose: To compare the quality of current Internet information on benign prostatic hyperplasia (BPH) and its surgical and medical managements across four Western languages and a comparative analysis of website sponsors. BPH Internet information quality is particularly relevant in an era of expanding, minimally invasive and surgical therapies. However, no comprehensive analysis exists.

Methods: World Health Organization Health on the Net (HON) principles may be applied to websites using an automated toolbar function. Using a search engine (www.google.com), 9,000 websites were assessed using keywords related to BPH and its medical and surgical treatment in English, French, German, and Spanish. The first 150 websites in each language had HON principles measured whilst a further analysis of site sponsorship was undertaken.

Results: Very few BPH websites had greater than ten per cent HON accredited with significant differences ($P < 0.001$) based on terms used for BPH, its medical and surgical management. Tertiles (thirds) of the first 150 websites returned differences in accredited websites ($P < 0.0001$). English language had most accredited websites. Odds ratios for different terms returning accredited websites also were significantly different across terms ($P < 0.001$). Websites were largely commercially sponsored.

Conclusions: A lack of validation of most BPH sites should be appreciated with discrepancies in quality and number of websites across diseases, languages and also between medical and alternate terms. Physicians should participate in and encourage the development of informative, ethical and reliable health websites on the Internet and direct patients to them.

Keywords: Prostate, Surgery, Internet, Patient education, Pharmacology

INTRODUCTION

In recent years, the Internet has become an accessible source of health related information for patients and their carers. Studies have shown that in 2010, an astonishing 80% of internet users which comprised of 59% of all American adults use the Internet to seek medical information [1,2]. The convenience of the Internet as a source of health information and

the frequency with which it is used highlights the importance of assessing the quality and validity of Internet health information. As evident in the fields of oncology and uro-oncology the quality of health information published on the Internet is often variable [3,4].

Benign prostatic hyperplasia (BPH) is one of the most common benign conditions in men; its prevalence increases exponentially with age. In a recent estimate approximately

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6.5 million of the 27 million Caucasian men 50–79 years of age in the USA were expected to meet the criteria for discussing treatment options for BPH [5]. The acceptance of medical therapy as well as minimally invasive therapies for BPH meant various treatment options are available for patients. However patients are often faced with a vast array of Internet information that are unregulated which may negatively impact upon patients' expectations and informed decision-making [6,7].

Systems such as the Health on the Net (HON) Foundation [8] have been used as a tool to identify quality and reliable health information on the Internet. HON is an accreditation body supported by the World Health Organisation (WHO) that accredits websites according to its key principles of authority, complementarity, confidentiality, attribution, justifiability, transparency of authorship and sponsorship and advertising [8].

We aimed to assess and compare the quality of current Internet information on BPH and its surgical and medical managements across four Western languages: English, French, German and Spanish, utilising the HONcode criteria. We further aimed to perform a quality assessment and comparison based on the types of website sponsors.

MATERIALS AND METHODS

1. Internet searching for websites

Our methodology has been previously described and utilised in previous publications [4,9]. Using the Google search engine (www.google.com), in February 2013, we performed Internet searches for 15 terms associated with BPH and its treatment and assessed just over 9,000 websites. The terms searched were: “Benign Prostatic Hyperplasia”; “Benign Prostatic Hypertrophy”; “BPH”; “Prostatomegaly”; “Benign Prostate Enlargement”; “TURP”; “Transurethral resection prostate”; “Prostatectomy”; “Laser prostate surgery”; “Greenlight laser prostate”; “Holmium laser prostate”; “Diode laser prostate”; “Medical therapy prostate”; “Alpha blocker prostate” and “Alpha reductase prostate”. English and equivalent terms in French, German and Spanish (translated from English through use of medical translation services and confirmed by laypersons and doctors having the non-English primary language as their primary language for term accuracy) were utilised.

2. Internet searching for accredited websites

Based on the observation that patients rarely access more than the first page of search results [10], the first 150 websites yielded by each search were then identified and sequentially

screened for quality as defined by the HON Foundation. This was done by applying HON principles through the HONcode toolbar function (downloaded from <http://www.hon.ch/>) [8] for use on any personal computer and automatically activates or “lights-up” toolbar if a website is accredited by the HON foundation. The HON function has been used and assessed in several studies and was thus deemed to be a valid and high calibre tool [4,11].

3. Analysis of accredited websites likelihood of being viewed

A secondary analysis of the first 150 websites encountered for ‘search term’ was undertaken as previously described [4,9,12]. Firstly, all returned websites for each term were divided into tertiles (first, middle, and last 50). The proportion of accredited sites in each term and language was then analysed and compared using the chi-square test. The purpose of this analysis was to determine where accredited websites were appearing preferentially i.e., in the pages least likely (last 50) versus the most likely to be viewed (first 50).

4. Quality control

For quality control, an English search (“BPH”), had nonaccredited sites within the first 150 discovered websites manually evaluated using the HON criteria to determine their HON status to ascertain if they fulfilled the criteria despite not being “officially” accredited.

5. Logistic regression examining variables associated with HON status

This was conducted using the three major variables of search term, language, and tertiles of the first 150 returned. The referent groups for each variable were the English version and the first 50 websites respectively as these had the highest percentage and/or number of HON accredited websites.

6. Analysis of website sponsors

For all groups an analysis was undertaken from English language websites to determine the website sponsors and each was categorized according to prior studies of quality of websites on the Internet [3,4]. In summary, the sites were deemed sponsored by (1) lawyers, (2) nonprofit organizations, (3) government organizations/educational institutions, (4) commercial, (5) surgeons/physicians (and their professional organizations), (6) other health professionals, or (7) other. Sponsorship was determined independently by two examiners firstly by web page retrieved; if sponsorship was not obviously apparent, the website was explored until sponsorship

could be determined. The concept of sponsorship is not to be confused with the Google terminology of “sponsored links” either highlighting pages at the start of retrieved search or appearing on the side of the page under a banner. As in prior analysis, such pages were not included throughout the entirety of this study [4]. This however is not to be confused with paid “sponsored links”; either highlighting pages at the start of retrieved search or appearing on the side of the page under a banner such pages were not considered in this study.

7. Statistical analysis

Comparisons of proportions across term and language were performed using the chi-square test (or Fisher exact tests when cell counts were less than 5). All statistical tests were two-sided and significance was defined as $P < 0.05$. Odds ratios and 95% confidence intervals were also calculated from the logistic regression analysis. Analyses were performed using SAS 9.1 (SAS Institute Inc., Cary, NC, USA).

RESULTS

1. Internet search results for accredited websites

The total number of websites for each disease term is variable

(Table 1).

‘BPH’ had the most websites, with approximately 17 million websites followed by ‘Medical therapy Prostate’ with 12 million websites. ‘Prostatomegaly’ had the least websites listed with only approximately 70,000 websites.

The total percentage of HON accredited sites was notably low across all search terms (median, 8%; Table 1). Few terms had above 10% of all websites that were HON accredited. ‘Benign Prostatic Hyperplasia’ and ‘Medical therapy Prostate’ had only 16% of HON accredited sites (Table 1).

In regards to linguistic differences (Table 2), English (median, 11%; range 3%–30%) had the greatest percentage of HON accredited sites across all disease search terms, followed by French (11%; 1%–28%), German (7%, 1%–14%), and Spanish (6%; 1%–14%).

When analysed by tertiles to determine where HON accredited sites were more likely to appear, it appeared that HON accreditation was significantly more common in the sites that appear in first tertile (Table 3).

Finally the odds ratios (ORs) were calculated demonstrating significant differences with search terms, language or between groups (Table 4). Indeed it appeared an Internet search was more likely to be accredited if it was for a medical (OR,

Table 1. Results of the total websites returned for each term and also the percentage of HON accredited sites (%HON+)

Terminology/treatment	Term searched	Total websites returned ^{a)}	HON accredited (600 per term) ^{b)}				P-value
			HONcode +	HONcode –	Total	%HON+	
Terminology	BPH	17,861,000	54	546	600	9	0.0006
	Benign prostatic hyperplasia	3,336,000	97	503	600	16	
	Benign prostatic hypertrophy	949,000	69	531	600	12	
	Prostatomegaly	72,449	20	580	600	3	
	Benign prostate enlargement	375,900	54	546	600	9	
Total (median*, sum [^])		949,000*	294 [^]	2,706 [^]	3,000 [^]	9*	
Surgical treatments	TURP	9,387,000	44	556	600	7	<0.0001
	Transurethral resection prostate	572,680	47	553	600	8	
	Prostatectomy	1,075,700	70	530	600	12	
	Laser prostate surgery	1,796,800	46	554	600	8	
	Greenlight laser prostate	401,500	33	567	600	6	
	Holmium laser prostate	395,800	41	559	600	7	
	Diode laser prostate	580,150	27	573	600	5	
Total (median*, sum [^])		580,150*	308 [^]	3,892 [^]	4,200	7*	
Medical treatments	Medical therapy prostate	12,187,000	94	506	600	16	<0.0001
	Alpha blocker prostate	1,496,400	58	542	600	10	
	Alpha reductase prostate	947,500	50	550	600	8	
Total (median*, sum [^])		580,150*	611 [^]	7,189 [^]	600 [^]	7*	
Grand total (median*, sum [^])		949,000*	804 [^]	8,196 [^]	1,800 [^]	8*	

The %HON+ according to websites in tertiles (first, second, and third fifty) for each search returned is also indicated. Total websites and percentage of HON accredited sites by treatment options.

HON, Health on the Net foundation; HONcode, toolbar function that allows recognition of accreditation of a website by HON principles; %HON+, percentage of HON accredited sites.

^{a)}Total websites returned: total of 4 languages—English, French, German & Spanish. ^{b)}Total of 600 per term: 4 languages × 150 websites searched.

Table 2. Differences in HON accreditation of websites by term and language

Terminology/treatment	English		French		German		Spanish		P-value
	HONcode+	%HON+	HONcode+	%HON+	HONcode+	%HON+	HONcode+	%HON+	
Terminology									<0.0001
BPH	22	17	4	146	17	133	11	139	8
Benign prostatic hyperplasia	33	28	33	117	18	132	13	137	9
Benign prostatic hypertrophy	22	17	18	132	13	136	15	135	11
Prostatomegaly	4	3	5	145	9	141	2	148	1
Benign prostate enlargement	35	30	1	149	10	140	8	142	6
Total (median%, sum[^])	116[^]	17*	61[^]	689[^]	67[^]	682[^]	49[^]	701[^]	8*
Surgical therapies									<0.0001
TURP	13	9	10	140	15	135	6	144	4
Transurethral resection prostate	6	4	22	128	7	143	12	138	9
Prostatectomy	16	12	27	123	7	143	20	130	15
Laser prostate surgery	8	6	20	130	8	142	10	140	7
Greenlight laser prostate	6	4	16	134	8	142	3	147	2
Holmium laser prostate	12	9	14	136	13	137	2	148	1
Diode laser prostate	9	6	13	137	2	148	3	147	2
Total	51	6	90	660	38	712	38	712	4
Medical therapies									0.0006
Medical therapy prostate	29	24	28	122	9	141	28	122	23
Alpha blocker prostate	23	18	14	136	12	138	9	141	6
Alpha reductase prostate	17	13	14	136	10	140	9	141	6
Total	129	18	159	1,191	71	1,279	87	1,263	6
Grand total	233	11	235	1,865	141	1,958	140	1,960	6

HON, Health on the Net foundation; HONcode, toolbar function that allows recognition of accreditation of a website by HON principles; %HON+, percentage of HON accredited sites; BPH, benign prostatic hyperplasia; TURP, transurethral resection of the prostate.

Table 3. Results of the percentage of HON accredited sites by organ group

Search term	Tertile 1 (sites 1–50)			Tertile 2 (sites 51–100)			Tertile 3 (sites 101–150)			P-value
	HONcode+	HONcode–	%HON+	HONcode+	HONcode–	%HON+	HONcode+	HONcode–	%HON+	
Terminology										<0.0001
BPH	36	164	22	10	190	5	8	192	4	
Benign prostatic hyperplasia	52	148	35	27	173	16	18	182	10	
Benign prostatic hypertrophy	39	160	24	17	183	9	12	188	6	
Prostatomegaly	11	189	6	2	198	1	7	193	4	
Benign prostate enlargement	32	168	19	17	183	9	5	195	3	
Total	170	829	21	73	927	8	50	950	5	
Surgical therapies										0.0274
TURP	17	183	9	14	186	8	13	187	7	
Transurethral resection prostate	23	177	13	11	189	6	13	187	7	
Prostatectomy	24	176	14	23	177	13	23	177	13	
Laser prostate surgery	23	177	13	11	189	6	12	188	6	
Greenlight laser prostate	10	190	5	12	188	6	11	189	6	
Holmium laser prostate	16	184	9	12	188	6	13	187	7	
Diode laser prostate	11	189	6	8	192	4	8	192	4	
Total	84	916	9	66	934	7	67	933	7	
Medical therapies										<0.0001
Medical therapy prostate	45	155	29	27	173	16	22	178	12	
Alpha blocker prostate	30	170	18	12	188	6	16	184	9	
Alpha reductase prostate	25	175	14	15	185	8	10	190	5	
Total	195	1,605	12	128	1,672	8	123	1,677	7	

The %HON+ according to for websites in tertiles (first, second, and third fifty) for each search returned is also indicated.

HON, Health on the Net foundation; HONcode, toolbar function that allows recognition of accreditation of a website by HON principles; %HON+, percentage of HON accredited sites; BPH, benign prostatic hyperplasia; TURP, transurethral resection of the prostate.

1.15) rather than surgical therapy (OR, 0.71). The first tertile was more likely to return an accredited site over the second (OR, 0.52) whilst again one is almost half as likely to get an accredited site in Spanish compared to English (OR, 0.55).

2. Analysis of website sponsors

The sponsor analysis of the 150 websites in four languages revealed that the most commonly encountered sponsors were commercial sites (40%) followed by government organisations or educational institutions (20%) and nonprofit organisations (19%). Other sponsors (15%), other health professionals (4%), surgeons/physicians (4%) sponsored far less sites and lawyer-sponsored sites were not encountered (Table 5).

DISCUSSION

It is without a doubt that the Internet has become an accessible source of health information for the general public [2]. Moreover studies have shown that the Internet usage is growing rapidly in adults aged >50 years with an estimated 76% of these adults search online for health information [13]. Since most BPH patients fall within this age group, knowledge concerning how to acquire high-quality information about the disease and treatment options has become increasingly important. In particular medical therapy has evolved with the uptake of alpha reductase inhibitors now rivalling alpha blockers and other agents being explored [14-16]. Also, the plethora of minimally invasive and laser alternates to transurethral resection of the prostate are being increasingly ex-

panded. For these patients the quality of information could potentially influence their decision-making as well as the overall satisfaction of their care [17,18].

Table 4. Results of the logistic regression analysis comparing across BPH terminology, likelihood of an accredited website based on first, second and third 50 websites returned and by language

Effect on HONcode status	Odds ratio (95% confidence limits)
Category	
BPH condition	1.00 (referent)
Medical therapy	1.149 (0.950–1.391)
Surgical therapy	0.714 (0.603–0.844)
Websites ^{a)}	
1st Tertile (0–50)	1.00 (referent)
2nd Tertile (51–100)	0.524 (0.440–0.623)
3rd Tertile (101–150)	0.445 (0.371–0.534)
Language	
English	1.00 (referent)
French	0.929 (0.769–1.121)
German	0.607 (0.493–0.746)
Spanish	0.558 (0.452–0.690)

Referents were chosen based on the term BPH and its alternate terms being the standard; the first tertile returned because of this having the greatest percentage of HON accredited websites and English as the most common language.

BPH, benign prostatic hyperplasia; HON, Health on the Net foundation.

^{a)}Of the first 150 websites examined the first third or 50 (5 pages) were reference group compared to second third and last third.

As demonstrated previously in other oncological studies, the HON foundation found that most websites did not meet their criteria for certification [4,9,19]. Indeed oncology studies sit around 20% whereas it was around 10% for BPH and its medical and surgical management. However, there was no difference in the percentage of HON accredited sites for surgical and medical management of BPH. The result is concerning as it illustrates the substandard, perhaps inaccurate and unreliable information that patients may encounter when searching for information related to their disease.

It was previously recognised that language differences exist regarding website quality [3,4,20]. In our study, English-language searches overall had more website listings and ultimately had more HON accredited sites as compared to French, German, and Spanish. At best, under one third of English websites were HON accredited and at worst, under one fifth of Spanish websites were HON accredited. This study highlights the paucity of good quality comprehensive, multilingual information on BPH available on the Internet.

As well as being a source of health information for patients, Websites often serve as a platform for advertising. Marketing and competing commercial interests play an increasing role in driving health information. This is often at the expense of considered, well-balanced opinion. The analysis of website sponsors in this study suggest that the majority of sponsors comprised mainly of commercial sponsors, which begs the

Table 5. Results of the analysis of website sponsors by organ malignancy (or alternate term) across the English language sites only

Disease terms searched	Lawyer	Nonprofit	Government/education	Commercial	Other health professionals	Physician/surgeon	Others	P-value
Terminology/treatment								<0.0001
BPH	0 (0)	87 (15)	105 (18)	228 (38)	28 (5)	23 (4)	129 (22)	
Benign prostatic hyperplasia	0 (0)	97 (16)	99 (17)	252 (42)	29 (5)	43 (7)	80 (13)	
Benign prostatic hypertrophy	0 (0)	103 (17)	86 (14)	212 (35)	17 (3)	41(7)	141 (24)	
Prostatomegaly	0 (0)	96 (16)	67 (11)	164 (27)	5 (1)	113 (19)	155 (26)	
Benign prostate enlargement	0 (0)	125 (21)	132 (22)	237 (40)	22 (4)	29 (5)	55 (9)	
Surgical technique								<0.0001
TURP	0 (0)	86 (14)	93 (16)	153 (26)	17 (3)	4 (1)	247 (41)	
Transurethral resection prostate	0 (0)	95 (16)	160 (27)	265 (44)	16 (3)	2 (0)	62 (10)	
Prostatectomy	0 (0)	116 (19)	166 (28)	224 (37)	26 (4)	3 (0)	66 (11)	
Laser prostate surgery	0 (0)	119 (20)	178 (30)	191 (32)	27 (5)	7 (1)	78 (13)	
Greenlight laser prostate	0 (0)	113 (19)	160 (27)	221 (37)	39 (7)	5 (1)	62 (10)	
Holmium laser prostate	0 (0)	114 (19)	133 (22)	273 (46)	25 (4)	2 (0)	53 (9)	
Diode laser prostate	0 (0)	76 (13)	89 (15)	337 (56)	13 (2)	7 (1)	78 (13)	
Medical therapy								
m/Medical therapy prostate	0 (0)	141 (24)	133 (22)	263 (44)	22 (4)	18 (3)	23 (4)	
Alpha blocker prostate	0 (0)	172 (29)	78 (13)	288 (48)	15 (2)	19 (3)	28 (5)	<0.0001
Alpha reductase prostate	3 (1)	145 (24)	66 (11)	289 (48)	19 (3)	32 (5)	46 (8)	
Total (mean %)	3 (0)	1,685 (19)	1,745 (20)	3,597 (40)	320 (4)	348 (4)	1,303 (15)	

Values are presented as number (%).

BPH, benign prostatic hyperplasia; TURP, transurethral resection of the prostate.

question of whether the information provided is neutral and unbiased or if information serves to promote certain products.

There are a number of limitations of this study. The Internet is dynamic with websites constantly being developed and uploaded. Thus search results may vary depending on time and location. Furthermore other search engines are available apart from 'Google', it would be possible for future analyses to investigate if the various filter systems would make a difference in the quality of websites retrieved. It would also be interesting for future studies to assess the likelihood of commercial vs. noncommercial websites being HON accredited.

In conclusion, a lack of validation of most BPH sites should be appreciated with discrepancies in quality and number of websites across diseases, languages and also between medical and alternate terms. Interestingly, the quality found is significantly lower than that available for oncological Internet searches. Perhaps more awareness is needed to broadcast the relevance of HON certification so that creditable medical health information could be published online. As medical professionals, we should also encourage and participate in the development of informative and ethical health websites so that we could direct patients to them as another reliable source of information.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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