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

Emily C Chen1, Rustom P Manecksha1, Robert Abouassaly2, Damien M Bolton1, Oliver Reich3, Nathan Lawrentschuk1,4

1Department of Surgery, Urology Unit, Austin Hospital, University of Melbourne, Melbourne, Australia
2Urological Institute, University Hospitals Case Medical Center, Case Western Reserve University, Cleveland, OH, USA
3Munich Hospital Campus Harlaching, Ludwig-Maximilians-University, Germany
4Ludwig Institute for Cancer Research, Austin Hospital, Urology, Austin Hospital, Melbourne, Australia

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...
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 management 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 Hyper trophy"; "BPH"; "Prostatomegaly"; "Benign Prostate Enlargement"; "TURP"; "Transurethral resection prostate"; "Prostateectomy"; "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 | HON accredited (600 per term) | \( P \)-value | %HON+ |
|-----------------------|--------------------------------|-------------------------|------------------------------|--------------|-------|
| Terminology           | BPH                            | 17,861,000              | 54                           | 9            | 0.0006 |
|                       | Benign prostatic hyperplasia   | 3,336,000               | 97                           | 16           |       |
|                       | Benign prostatic hypertrophy   | 949,000                 | 69                           | 12           |       |
|                       | Prostatomegaly                 | 72,449                  | 20                           | 3            |       |
|                       | Benign prostate enlargement    | 375,900                 | 54                           | 9            |       |
|                       | Total (median*, sum^)          | 949,000*                | 294                          | 9^           |       |
| Surgical treatments   | TURP                           | 9,387,000               | 44                           | 7            | <0.0001 |
|                       | Transurethral resection prostate | 572,680             | 47                           | 8            |       |
|                       | Prostatectomy                  | 1,075,700               | 70                           | 12           |       |
|                       | Laser prostate surgery         | 1,796,800               | 46                           | 8            |       |
|                       | Greenlight laser prostate      | 401,500                 | 33                           | 6            |       |
|                       | Holmium laser prostate         | 395,800                 | 41                           | 7            |       |
|                       | Diode laser prostate           | 580,150                 | 27                           | 5            |       |
|                       | Total (median*, sum^)          | 580,150*                | 308                          | 7^           |       |
| Medical treatments    | Medical therapy prostate       | 12,187,000              | 94                           | 16           | <0.0001 |
|                       | Alpha blocker prostate         | 1,496,400               | 58                           | 10           |       |
|                       | Alpha reductase prostate       | 947,500                 | 50                           | 8            |       |
|                       | Total (median*, sum^)          | 580,150*                | 611                          | 7^           |       |
|                       | Grand total (median*, sum^)    | 949,000*                | 804                          | 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 \( \times \) 150 websites searched.

http://dx.doi.org/10.12954/PI.14058
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+ |
| BPH                           | 22 17   | 33 28  | 17 13  | 11 8    |
| Benign prostatic hyperplasia  | 33 28   | 33 28  | 18 14  | 13 9    |
| Benign prostatic hypertrophy  | 22 17   | 18 14  | 13 10  | 15 11   |
| Prostatomegaly                | 4 3     | 5 3    | 9 6    | 2 1     |
| Benign prostate enlargement   | 35 30  | 1 1    | 10 7   | 8 6     |
| Total (median%, sum^)         | 116^ 634^ 17^ | 61^ 689^ 3^ | 67^ 682^ 10^ | 49^ 701^ 8^ |

Surgical therapies

| Procedure                      | HONcode+ %HON+ | HONcode+ %HON+ | HONcode+ %HON+ | HONcode+ %HON+ |
|-------------------------------|---------------|---------------|---------------|---------------|
| TURP                          | 13 9          | 10 7          | 15 11         | 6 4           |
| Transurethral resection prostate | 6 4          | 22 17         | 7 5           | 12 9          |
| Prostatectomy                 | 16 12         | 27 22         | 7 5           | 20 15         |
| Laser prostate surgery        | 8 6           | 20 15         | 8 6           | 10 7          |
| Greenlight laser prostate     | 6 4           | 16 12         | 8 6           | 3 2           |
| Holmium laser prostate        | 12 9          | 14 10         | 13 9          | 2 1           |
| Diode laser prostate          | 9 6           | 13 9          | 2 1           | 3 2           |
| Total                         | 51 699       | 90 660       | 38 712       | 38 712       |

Medical therapy prostate

| Procedure                      | HONcode+ %HON+ | HONcode+ %HON+ | HONcode+ %HON+ | HONcode+ %HON+ |
|-------------------------------|---------------|---------------|---------------|---------------|
| Medical therapy prostate      | 29 24         | 28 23         | 9 6           | 28 23         |
| Alpha blocker prostate        | 23 18         | 14 10         | 12 9          | 9 6           |
| Alpha reductase prostate      | 17 13         | 14 10         | 10 7          | 9 6           |
| Total                         | 129 1,221     | 159 1,191     | 71 1,279      | 87 1,263      |

Grand total

| Total                         | 233 1,867     | 235 1,865     | 141 1,958     | 140 1,960      |

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-

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                |          |          |        |          |          |        |          |          |        |
| 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         |          |          |        |          |          |        |          |          |        |
| 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          |          |          |        |          |          |        |          |          |        |
| 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.
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

| Category | Effect on HONcode status | Odds ratio (95% confidence limits) |
|----------|-------------------------|-----------------------------------|
| BPH condition | 1.00 (referent) | |
| Medical therapy | 1.149 (0.950–1.391) | |
| Surgical therapy | 0.714 (0.603–0.844) | |
| Websites*<sup>a</sup> | | |
| 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.

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

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) | <0.0001 |
| 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        |        |           |                       |            |                           |                   |        | <0.0001 |
| 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)  |
| 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.

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 and 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
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.

REFERENCES

1. PewResearchCenter. Internet adoption over time [Internet]. Washington, DC: PewResearchCenter; c2014 [cited 2012 Apr 30]. Available from: http://pewinternet.org/Reports/2012/Digital-differences/Main-Report/Internet-adoption-over-time.aspx.

2. PewResearchCenter. Fox S. The social life of health information [Internet]. Washington, DC: PewResearchCenter; c2014 [cited 2012 Apr 30]. Available from: http://www.pewresearch.org/fact-tank/2014/01/15/the-social-life-of-health-information/.

3. Kaimal AJ, Cheng YW, Bryant AS, Norton ME, Shaffer BL, Caughey AB. Google obstetrics: who is educating our patients? Am J Obstet Gynecol 2008;198:682.e1-5.

4. Lawrentschuk N, Abouassaly R, Hackett N, Groll R, Fleschner NE. Health information quality on the internet in urological oncology: a multilingual longitudinal evaluation. Urology 2009;74:1058-63.

5. Jacobsen SJ, Girman CJ, Guess HA, Oesterling JE, Lieber MM. New diagnostic and treatment guidelines for benign prostatic hyperplasia. Potential impact in the United States. Arch Intern Med 1995;155:477-81.

6. Fagerlin A, Wang C, Ubel PA. Reducing the influence of anecdotal reasoning on people’s health care decisions: is a picture worth a thousand statistics? Med Decis Making 2005;25:398-405.

7. Ubel PA, Jepson C, Baron J. The inclusion of patient testimonials in decision aids: effects on treatment choices. Med Decis Making 2001;21:60-8.

8. Health on the Net Foundation. Last updated 2012 [Internet]. Chêne-Bourg: Health on the Net Foundation; c2013 [cited 2013 Mar 13]. Available from: http://www.hon.ch/HONcode.

9. Lawrentschuk N, Sages D, Tasevski R, Abouassaly R, Scott AM, Davis ID. Oncology health information quality on the Internet: a multilingual evaluation. Ann Surg Oncol 2012;19:706-13.

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

11. Gaudinat A, Grabar N, Boyer C. Machine learning approach for automatic quality criteria detection of health web pages. Stud Health Technol Inform 2007;129(Pt 1):705-9.

12. Alkhateeb S, Lawrentschuk N. Consumerism and its impact on robotic-assisted radical prostatectomy. BJU Int 2011;108:1874-8.

13. Zulman DM, Kirch M, Zheng K, An LC. Trust in the internet as a health resource among older adults: analysis of data from a nationally representative survey. J Med Internet Res 2011;13:e19.

14. Wong P, Lawrentschuk N, Bolton DM. Phosphodiesterase 5 inhibitors in the management of benign prostatic hyperplasia and erectile dysfunction: the best of both worlds. Curr Opin Urol 2009;19:7-12.

15. Filson CP, Wei JT, Hollingsworth JM. Trends in medical management of men with lower urinary tract symptoms suggestive of benign prostatic hyperplasia. Urology 2013;82:1386-92.

16. Eid K, Krughoff K, Stoimenova D, Smith D, Phillips J, O’Donnell C, et al. Validation of the Urgency, Weak stream, Incomplete emptying, and Nocturia (UWIN) score compared with the American Urological Association Symptoms Score in assessing lower urinary tract symptoms in the clinical setting. Urology 2014;83:181-5.

17. Finkle-Perazzo D, Jetha N. Online resources to enhance decision-making in public health. Chronic Dis Inj Can 2011;31:
172-5.

18. Hueber PA, Liberman D, Ben-Zvi T, Woo H, Hai MA, Te AE, et al. 180 W vs 120 W lithium triborate photoselective vaporization of the prostate for benign prostatic hyperplasia: a global, multicenter comparative analysis of perioperative treatment parameters. Urology 2013;82:1108-13.

19. Fast AM, Deibert CM, Boyer C, Hruby GW, McKiernan JM. Partial nephrectomy online: a preliminary evaluation of the quality of health information on the Internet. BJU Int 2012;110(11 Pt B):E765-9.

20. Berland GK, Elliott MN, Morales LS, Algazy JJ, Kravitz RL, Broder MS, et al. Health information on the Internet: accessibility, quality, and readability in English and Spanish. JAMA 2001;285:2612-21.