Requirements Analysis of Information Services for Patients on a General Practitioner's Website

Patient and General Practitioner's Perspectives

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Summary

Objective: To elicit and analyze information needs of patients and primary care physicians (GPs) regarding the information services (static and functional) that a GP's practice website should provide.

Methods: To find candidate information services, we conducted a literature search and examined primary care physicians' websites, especially Dutch websites. Semi-structured depth interviews with the stakeholders, Dutch patients and GPs, were done to arrive at a final checklist. We then conducted a survey to elicit the level of importance associated with each service on the checklist. The data underwent statistical analysis and relevant requirements were formulated. The requirements were then validated by interviews. General website quality and usability aspects were elicited from the literature.

Results: The research resulted in a checklist of 38 selected information services including their priority ratings for patients and GPs; a discrepancy list between GP and patient priorities; and a requirements document containing information services (14 static and 6 functional), and general quality and usability aspects (8 and 5).

Conclusion: The following items occurred in the top 10 of both user groups: *general practice information, information of local public health institutions, self-help information, repeat prescription, links to health web sites.* At the bottom on both priority lists were: *links to journals, tests and forums.* Dutch GPs are much more selective in terms of which information services to provide on-line. Discrepancy between the two groups concerns on-line services that seem to require a change to the GP's workflow, or those services that are not recognized for reimbursing the GP. Although the Dutch patients' requirements seem to generalize to other patients, the conflict list might depend on the primary care system.

Keywords

Requirements analysis, information services (MeSH), medical websites, GP

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Introduction

The Internet is increasingly becoming a popular medium for patients seeking health information. It is estimated that more than 100,000 medical internet websites are available [1].

Several surveys show that 60-80% of Internet users look up health information [2].

The primary care physician (GP), also known as family doctor or general practitioner, is confronted daily with patients using the Internet to search for medical information pertaining to their health problems [3, 5, 6]. Although the Internet is at large an important source of health information in the Netherlands, the GP still remains the most important information source for patients [1]. Although to a lesser extent, this holds for many other countries. A GP website that provides reliable information has, hence, a great potential for addressing patient questions and problems. A recent survey held in the UK postulates that a substantial proportion of practices (45%) either have a website or will soon be offering one [3]. An evaluation of practice websites offered by GPs shows that the websites offer a wide range of information, but that the quality of information is poor [4]. Despite the fact that a lot of research concerns the quality of health information on the Internet in general [7-14], very little is known about the patient and GP information needs for GP practice websites.

Objective

Within our study we aimed at eliciting and analyzing information needs perceived by both patients and GPs regarding the information services on a GP website. Hereby, we took into account the discrepancy in the perception of these two groups of stakeholders regarding the level of importance of the various information services.

Methods

The systematic approach for the development of websites is referred to as web-engineering [15-17]. We are concerned here with the first phase of web-engineering called requirements analysis in which the information needs are elicited and formulated [20]. Figure 1 illustrates our methods, techniques and their products in the requirements analysis process. We based our survey mainly on Dutch websites, GPs and patients.

Literature Search

We found relevant literature concerning GP practice websites using the following sources: the academic medical search engines Pubmed and Web of Science, all published articles in the Journal of Medical Internet Research (JMIR 1999-March 2004), the medical library of the University of Amsterdam, and a free search in Google.

We used the following terms or a combination of the following terms in English as well as in Dutch: GP, family doctor, general practitioner, patient, Internet, Internet usage, website, e-health, World Wide Web, public health, and quality.

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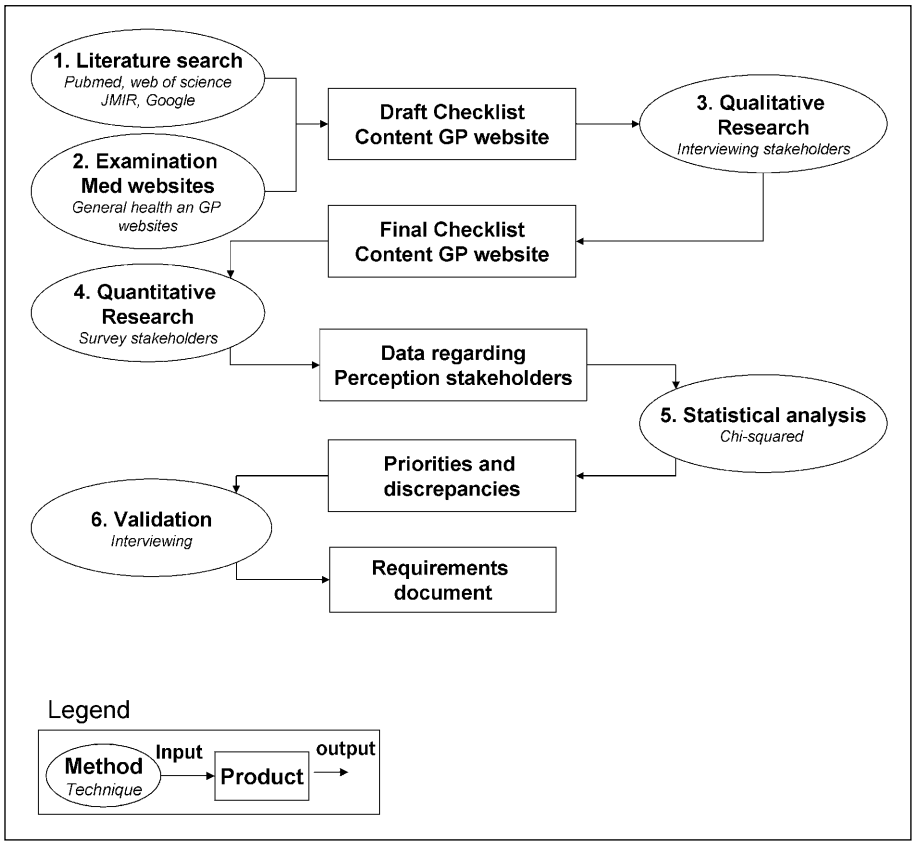

Fig. 1 Our used methods, techniques and products in the requirements analysis process

Examination of Medical Websites

We examined several medical and GP websites; 40 general health websites and about 50 GP websites freely available on the Internet and searched for possible information services on these websites. Because we elicited the perception of Dutch stakeholders, we mainly focused on services currently available on Dutch websites but this does not seem to limit the generality of our study. Together with the literature search, we composed a draft checklist of candidate information services.

Qualitative and Quantitative Analysis of Candidate Information Services

We conducted semi-structured depth interviews, lasting between half an hour till one hour, with different end-users (two patients, three GPs and one GP assistant) in order to obtain a final checklist of information services categorized in static and functional services. The checklist was included in a survey form. Alongside the checklist of the information services, the survey form also includes general questions about demography, Internet usage and so on to obtain general characteristics of the responders' population.

Subsequently, patients and GPs were approached to fill-in the survey form. They were instructed to indicate, for each information service, whether they consider it important, not important or whether they were neutral about the service. This resulted in quantitative information for both groups regarding the level of importance they associate with each service.

GP Sample

The survey form for the GPs was made available on the Internet.

To approach GPs for the survey, we sent an e-mail to 251 e-mail addresses of GPs in the Netherlands. The GP e-mail addresses were publicly accessible on several websites on the Internet. The e-mail contained a link to the online survey. A reminder was sent out by e-mail to achieve a high response. The survey was fully anonymous.

Patient Sample

Three GPs collaborated in this research by distributing survey forms to their patients while they were waiting to consult with the GP. The practices are located in three different cities in two different provinces. We asked each GP to collect 25 completed survey forms. Two of the three GPs possessed a practice website for a considerable amount of time (over one year and over six years).

Statistical Analysis

We recoded the three answer categories *not important*, *neutral* and *important* into –1, 0 and 1 respectively. In statistical testing, we consider these categories as non-ordinal symbolic categories.

We had three aims in mind in performing the data analysis. First, we aim at two overall priority lists of information services for both GPs and patients. Second, we aim at identifying discrepancies between the different priorities of the GPs and patients. Third, we aim at getting insight into the attitude of both groups towards the different services.

Priority Levels

We calculated the mean value of the answer category for importance for each information service per user group. The mean is used to order the information services into different levels of importance. By using –1, 0 and 1 as values for the importance level, a positive mean value for an information service reflects the fact that more respondents answered *important* than *not important* for that service. By the same token, a negative mean reflects the opposite. The information service with the greatest mean (the one nearest to 1) reflects that the respective user

group considers, on average, that that particular information service is the most important in the list. By ordering the means we were able to compose a priority list for each of the two user groups.

For each information service the Chi-squared test is used to determine the statistically significant differences between the answers of the patients and the GPs. For performing this test we do not consider the –1, 0, and 1 as numeric values but as non-ordered symbolic categories. This might lower the statistical power of the test but it does not require making assumptions about the meaning of the categories.

To determine at which information services a relevant discrepancy exists between the GPs and patients perceptions, we additionally require the following conditions from a discrepancy:

1) The discrepancy between the two groups is statistically significant ($p < 0.05$).
2) One group regards the information service important (corresponding to a positive mean value) while the other considers it not important (a negative mean value).

Requirements Document

The information services that do not appear in the conflict set are formulated in a draft requirements document. The services are presented in descending order of the patients' importance priorities.

Usability and Quality Aspects

We observe that the presentation and the quality of (information on) a website is of considerable importance for the accessibility of the provided content. Therefore, one should also take the general usability and quality aspects into account. In order to formulate general usability requirements for websites, we performed a separate general literature search on usability [18, 19], user-friendliness and layout, combined with a critical examination of various GP-websites. Moreover, we searched for literature about already formulated quality criteria for medical information and medical websites. We included the most frequent and general quality criteria in our requirements document.

Validation of Requirements

We presented the requirements to GPs and patients to validate the identified information services. Validation means verifying whether the requirements were complete, consistent and whether they reflect the GP and patient needs in a correct way [20]. To validate the requirements we interviewed three GPs and three patients. During the interview we used examples of websites with information services to illustrate what was meant by a specific requirement. The examples originated from different GP websites already available on the Internet. As a result of the validation process, the requirements document was refined and reformulated.

Results

Checklist

After conducting the interviews, the draft checklist was accordingly adjusted and its items categorized. Table 3 shows the services that have been selected and, hence, appear in the survey form. There are 38 items which we group in two different categories: 25 static services and 13 functional ones.

GPs

Two hundred and fifty-one e-mails were sent out, 234 of which are considered to have been actually received by the GP. The remaining 17 e-mails bounced. The response was 78 (33,3%). Mainly male GPs filled in the survey. But from the e-mail addresses of the sample that we approached we could not tell the proportion of males and females.

Most of the respondents were in possession of an Internet connection within their practice and are using e-mail for their practice purposes. Eight out of ten respondents possessed a GP website. Most of the GPs did not know how many people visit their website (Table 1).

Table 1 Description of the GPs´ sample

	GP	%
Gender		
	male	91
	female	8
	no answer	1
Age		
	25-35 years	5
	35-50 years	45
	>50 years	50
Practice		
	solo or duo practice	76
	combined practice	10
	health center	10
	other	4
Internet connection at the practice		
	broadband connection	58
	telephone connection	25
	no connection	14
	no answer	3
E-mail usage		
	no use of e-mail	0
	only for personal use	13
	only for work use	82
	both personal and work use	3
	no answer	2
GP website		
	yes	83
	no	17

Patients

Three GPs collaborated with us by distributing survey forms to patients waiting in the waiting rooms. We asked the GPs to collect about 25 surveys which were completely filled in. It is unknown how many patients were approached to fill in the survey form in each practice. The total response amounted to 66 patients (22 + 25 + 19). Table 2 shows some general characteristics of the patient sample.

Table 2 Description of the patients´ sample

Patient	%
Gender	
male	45
female	55
Age	
15-30 years	24
30-50 years	51
50-70 years	22
> 70 years	3
Chronical disease	
yes	24
no	73
no answer	3
Number of contacts with GP	
< 2 times	16
2-5 times	48
5-10 times	23
> 10 times	13
Internet connection	
broadband connection	54
telephone connection	31
no connection	15
E-mail usage	
yes	88
no	12
Internet connection usage	
never	5
< 1 hour	12
1-2 hours	34
2-5 hours	16
> 5 hours	30
no answer	3
Looks up health information on internet	
yes	73
no	19
no answer	8

Priority Lists

The top 5 of the most important information services belonging to each user group is shown in Table 4. This table also shows the bottom 5 services.

General practice information was considered to be the most important item on the checklist by both the GPs and patients. The order of priorities within the two lists was very different. However the following items did occur in the top 10 of both user groups: *general practice information, information of local public health institutions, self-help information, repeat prescription, links to health websites.* The common items which were placed at the bottom on both priority lists were: *links to journals, tests and forums.*

Requirements at Conflict

There were 22 services with a statistically significant discrepancy (see Table 3) established by the Chi-squared test on the distribution of the answers. In 12 of these 22 services there was a relevant discrepancy: aside from the statistically significant discrepancy, the mean value of the response was positive for one group and negative in the other group. These services represent the conflict set, and are distributed as follows: Five (out of 25) are static information services and seven (out of 13) are functional services.

Attitude towards Priorities

For each item of the 22 services in the checklist the overall normalized proportion of GPs was calculated. Figure 2 illustrates this proportion for each answer category of 7 out of the 12 items in the conflict set. It is clear that when moving from *important* to *neutral* and then to *not important* the normalized proportion of GPs for each of these 7 items increases, indicating that GPs choose for lower importance levels than patients. This negative trend was detected in 86% (19/22) of the information services.

Validation

Validation of the identified information requirements concerning static, functional and quality and usability aspects was performed as described in the Methods section. The requirements were modified accordingly resulting in a final requirements document containing 20 information services (14 static and 6 functional) and 8 quality and 5 usability aspects. The information services are presented in descending order of the patients' importance priorities (Table 5).

Discussion and Conclusion

From our results we observe that the following items occurred in the top 10 of both user groups: *general practice information*, *information of local public health institutions*, *self-help information*, *repeat prescription*, and *links to health web sites.* The common items which were placed at the bottom on both priority lists were: *links to journals*, and *tests and forums*. GPs are much more selective in terms of which information services they consider important to provide online. An analysis of the discrepancy between the two groups reveals that conflicts arise at services which would alter the workflow of GPs (e.g. making appointments), or those that are not recognized for reimbursing the GP (e.g. e-consultation). GPs are hence not keen on providing these services on their website.

In our efforts to identify information needs and perceptions of GPs and patients towards them, we made various decisions on how to approach members of these groups and how to elicit their opinions. Below we critically review our sample of GPs and patients and then draw conclusions.

Because we only approached GPs from whom an e-mail address was publicly available on the Internet, the GP sample is not likely to adequately represent the Dutch GP population. Hence the results reflect opinions of GPs which are presumably familiar with the Internet. In our case, however, this is not a disadvantage as most questioned GPs did already have some form of a practice website and could provide informed opinions about which information and services should be made available. In other words, the completed surveys from GPs are quite valuable.

Due to logistic constraints we approached only a relatively small number of

Table 3 Information services, and the results of the survey. The distribution concerns the answers: not important (–1); neutral (0); important (1). Services appearing in bold are in the conflict set. The discrepancies between the distributions were tested for significance by the Chi-squared test at the 0.5 level. The non-significant p-values are shown as italic numbers.

STATIC SERVICES	GP		Patient		p-value (chi-squared test)	Difference in means
	distribution % –1;0;1	rating (mean)	distribution % –1;0;1	rating (mean)		
General practice information	0;0;100	1 (1.00)	3;11;86	1 (0.83)	0.003	0.17
Information about local public health institutions	18;22;60	5 (0.42)	2;19;79	2 (0.77)	0.004	–0.35
Information concerning 40 common disorders	13;23;64	3 (0.51)	9;32;59	15 (0.50)	*0.449*	0.01
Top 10 most common health complaints	23;28;49	9 (0.26)	23;38;39	31 (0.17)	*0.422*	0.09
Information concerning therapy and treating options of common disorders	24;34;42	14 (0.18)	8;19;73	6 (0.65)	0.001	–0.47
Answers to the most common questions	23;45;32	22 (0.09)	18;34;48	29 (0.30)	*0.132*	–0.21
Season-related information	21;35;44	11 (0.23)	11;31;58	18 (0.47)	*0.160*	–0.24
Medical encyclopedia	**45;28;17**	**34 (–0.29)**	**18;34;48**	**28 (0.30)**	**0.000**	**–0.59**
Current health news	28;31;41	18 (0.13)	12;36;52	24 (0.39)	*0.071*	–0.26
Information concerning common used medications	**40;41;19**	**31 (–0.21)**	**12;38;50**	**25 (0.38)**	**0.000**	**–0.59**
Self help hints	16;23;61	4 (0.45)	8;10;82	3 (0.74)	0.025	–0.29
Links to relevant health-related websites	8;23;69	2 (0.62)	6;29;65	8 (0.59)	*0.712*	0.03
Links to medical journals	57;35;8	35 (–0.49)	36;40;24	36 (-0.12)	0.008	–0.37
Information concerning support groups	27;37;36	21 (0.09)	29;41;30	32 (0.02)	*0.738*	0.07
information concerning nutrition (healthy food, diets)	25;40;35	19 (0.10)	12;33;55	20 (0.42)	0.039	–0.32
Information concerning a healthy body weight	39;36;25	17 (0.14)	14;38;48	26 (0.35)	*0.226*	–0.21
Information concerning blood pressure	28;35;37	20 (0.09)	12;31;57	19 (0.45)	0.026	–0.36
Information concerning cholesterol	23;28;39	16 (0.16)	12;35;53	22 (0.41)	*0.129*	–0.25
Information concerning several allergies	**32;43;25**	**26 (–0.07)**	**12;29;59**	**17 (0.47)**	**0.000**	**–0.54**
General traveller information on health issues	**37;30;33**	**25 (–0.04)**	**12;20;68**	**10 (0.56)**	**0.000**	**–0.60**
Question a patient could pose during consultation	**19;40;41**	**12 (0.22)**	**11;36;53**	**23 (0.42)**	*0.268*	**–0.20**
Public health laws	21;52;27	23 (0.05)	9;30;61	13 (0.52)	0.000	–0.47
Complaint regulations	16;29;45	7 (0.29)	9;30;61	14 (0.52)	*0.167*	–0.23
Photo of the GP and other employees	21;31;48	8 (0.27)	32;39;29	33 (-0.03)	0.057	0.30
Photo of the practice	**23;30;47**	**10 (0.23)**	**41;41;18**	**38 (-0.23)**	**0.002**	**0.46**
FUNCTIONAL SERVICES						
Request for repeat *prescription* through a web-form	23;22;55	6 (0.32)	6;15;79	4 (0.73)	0.005	–0.41
E-consultation	**42;28;30**	**28 (–0.12)**	**12;23;65**	**12 (0.53)**	**0.000**	**–0.65**
Online service to make appointment	**47;32;21**	**32 (–0.26)**	**6;26;68**	**7 (0.62)**	**0.000**	**–0.88**
Request for lab-test results	**47;32;21**	**33 (–0.26)**	**9;12;79**	**5 (0.70)**	**0.000**	**–0.96**
Request for visit	**86;9;5**	**38 (–0.81)**	**11;36;53**	**21 (0.42)**	**0.000**	**–1.23**
Request for a referral letter	**80;8;12**	**37 (–0.68)**	**11;22;67**	**11 (0.56)**	**0.000**	**–1.24**
Triage procedure	**66;25;9**	**36 (–0.57)**	**9;32;59**	**16 (0.50)**	**0.000**	**–1.07**
Several forums (e.g. patients suffering from the same disease, smoking)	40;37;23	29 (–0.17)	32;42;26	34 (-0.06)	*0.601*	–0.11
Simple self tests	**39;41;20**	**30 (–0.19)**	**18;46;36**	**30 (0.18)**	**0.014**	**–0.37**
Guest book	33;33;34	24 (0.01)	41;41;18	37 (-0.23)	*0.099*	0.24
Search engine	25;34;41	15 (0.16)	5;32;63	9 (0.58)	0.002	–0.42
Prefab forms to be filled in (e.g. Keep up an ovulation diary)	25;30;45	13 (0.20)	15;37;48	27 (0.33)	*0.336*	–0.13
Electronic newsletter	38;34;28	27 (–0.10)	32;44;24	35 (-0.08)	*0.540*	–0.02

Table 4 Top 5 and bottom 5 information services for GPs and patients

GP			PATIENT		
Ranking GP; (patient)	Information services	Mean	Ranking patient; (GP)	Information services	Mean
1 (1)	General Practice information	1	1 (1)	General Practice information	0.83
2 (8)	Links to health web sites	0.62	2 (5)	Local health institutions	0.77
3 (15)	Information concerning disorders	0.51	3 (4)	Tips for self care	0.74
4 (3)	Tips for self care	0.45	4 (6)	Repeat prescription	0.73
5 (2)	Local health institutions	0.42	5 (33)	Research result	0.7
34 (28)	*Encyclopedia*	*–0.29*	*34 (29)*	*Forums*	*–0.06*
35 (36)	*Links to journals*	*–0.49*	*35 (27)*	*Newsletter*	*–0.08*
36 (16)	*Triage*	*–0.57*	*36 (35)*	*Links to journals*	*–0.12*
37 (11)	*Referral letter*	*–0.68*	*37 (24)*	*Guest book*	*–0.23*
38 (21)	*Request for visit*	*–0.81*	*38 (10)*	*Photo of the GP practice*	*–0.23*

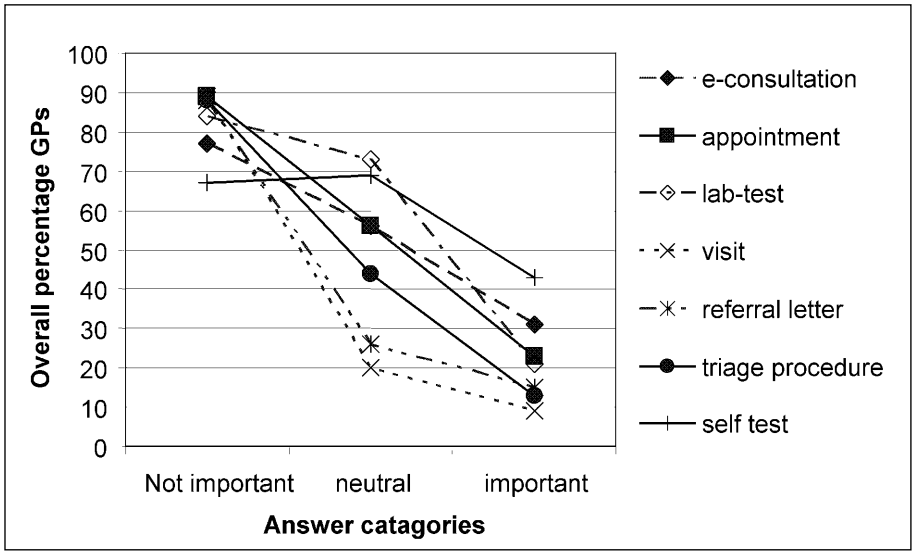

Fig. 2 Negative trend in the normalized proportion of GPs for seven services

Table 5 Final requirements document. (F) denotes the functional services.

REQUIREMENTS DOCUMENT
Requirements concerning information services on a PCP website
General practice information
Information about local public health institutions
Request for repeat prescription through a web-form (F)
Information concerning several common disorders and health status
Online service to make appointment (F)
Links to relevant health-related websites
General traveler information on health issues
Public health laws
Complaint regulations
Question a patient could pose during consultation
Season-related information
Lifestyle information
Current and local health news
Frequently used medications
Prefab forms to be filled in (e.g. Keep up an ovulation diary)
Medical encyclopedia
Simple self tests (F)
Several forums (e.g. patients suffering from the same disease, smoking) (F)
Electronic newsletter (F)
Guest book (F)
Quality requirements
Transparency
Contents' reliability
Authority
Website maintenance and updating policy
Justifications and disclaimers
Privacy
Ownership rights
Accessibility
usability requirements
Navigation
Readability and eligibility
Lay-out
Retrieval
Presentation

patients from three different practices in three different cities in two different provinces. Therefore the opinions of these patients do not necessary reflect the Dutch patient population. However, by distributing the surveys at general practices we approach people who were patients and in need of attention at the time of our study, including frequent visitors to the practices. This allows patients to articulate their information needs at the time they need medical attention.

There is much work addressing the quality of medical information or information needs of patients with a specific disease. There are also efforts to evaluate GP websites. However, to our knowledge there is no published work addressing the information needs and attitudes of GPs and patients concerning GP websites.

Our results pertain mainly to the situation in the Netherlands as we based our survey on Dutch GPs and patients and, primarily, on Dutch websites. Across countries, there are differences in the importance attached to the roles played by care disciplines and in the role of primary care within the wider healthcare environment. This is dependent on the regulations, insurance systems and circumstances that prevail [21, 22]. Nevertheless, many functions are common to most primary care systems at least across Europe [22]. It is fair to assume that patients across countries with various pri-

mary care systems still share many interests and hence the patient requirements reported here are likely to generalize to other patients. This is especially the case for countries such as Denmark, Spain, Ireland, UK, Italy, Norway, Portugal and Finland in which the GP plays the gate keeper's role as in the Netherlands. For these and other countries many of the GP requirements reported here that concern basic information should hold. However, requirements for online services may not be common to various settings especially in relation to reimbursement policies. For example, GPs are employed on salaries (Greece, Finland, Iceland), salary-fee mix (Norway), salary-capitation mix (Portugal, Spain, Sweden), capitation-fee mix (Austria, Denmark, Ireland, Italy, Netherlands, UK) and fee for service (Germany). In addition in the USA, where the formal gate-keeping role is absent, free public health care applies only to a small proportion of the population, and private health insurance is voluntary. In either case, the conflict set for the patient and the GP alike may very well turn out to be dependent on the primary care setting in place. This dependency merits further investigation.

Our work can contribute to those wishing to set up a GP website by providing the information services in the requirements document. The requirements for the online services might need to be adapted to the setting at hand. Another possible contribution of our requirements document is that it can be used as a simple "standard" upon which different GP websites might be scored or compared.

Further research into GP websites, especially in different countries and settings or for specific subgroups of patients, such as chronic patients, would contribute to a better understanding of information needs perceived by GPs and patients alike.

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