



Increasing the use of e-consultation in primary care: Results of an online survey among non-users of e-consultation

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ABSTRACT

Objective: To identify factors that can enhance the use of e-consultation in primary care. We investigated the barriers, demands and motivations regarding e-consultation among patients with no e-consultation experience (non-users).

Methods: We used an online survey to gather data. Via online banners on 26 different websites of patient organizations we recruited primary care patients with chronic complaints, an important target group for e-consultation. A regression analysis was performed to identify the main drivers for e-consultation use among patients with no e-consultation experience.

Results: In total, 1706 patients started to fill out the survey. Of these patients 90% had no prior e-consultation experience. The most prominent reasons for non-use of e-consultation use were: not being aware of the existence of the service, the preference to see a doctor and e-consultation not being provided by a GP. Patients were motivated to use e-consultation, because e-consultation makes it possible to contact a GP at any time and because it enabled patients to ask additional questions after a visit to the doctor. The use of a Web-based triage application for computer-generated advice was popular among patients desiring to determine the need to see a doctor and for purposes of self-care. The patients' motivations to use e-consultation strongly depended on demands being satisfied such as getting a quick response. When looking at socio-demographic and health-related characteristics it turned out that certain patient groups – the elderly, the less-educated individuals, the chronic medication users and the frequent GP visitors – were more motivated than other patient groups to use e-consultation services, but were also more demanding. The less-educated patients, for example, more strongly demanded instructions regarding e-consultation use than the highly educated patients.

Conclusion: In order to foster the use of e-consultation in primary care both GPs and non-users must be informed about the possibilities and consequences of e-consultation through tailored education and instruction. We must also take into account patient profiles and their

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specific demands regarding e-consultation. Special attention should be paid to patients who can benefit the most from e-consultation while also facing the greatest chance of being excluded from the service. As health care continues to evolve towards a more patient-centred approach, we expect that patient expectations and demands will be a major force in driving the adoption of e-consultation.

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1. Introduction

These days the use of the Internet as a source for health information has increased substantially [1–4]. Therefore, we could expect that secured systems for online asynchronous patient-caregiver communication, such as e-consultation, would be incorporated into medical practice. However, the use of e-consultation remains relatively low [1,3,5–7]. This seems rather paradoxical since e-consultation has many potential benefits such as:

- *Increased access to care.* Patients can ask questions from any place and at any time, anonymous consultation is possible for sensitive questions and the service facilitates a second opinion [8–10].
- *Increased self-management support* for individuals with significant medical problems; e-consultation use can empower patients' self-control skills and strengthen their autonomy, especially when the service is used as part of a disease-management program for monitoring chronic diseases [11–15].
- *Reduced costs* while maintaining the same or achieving better quality of care [11,15]. This means that e-consultation can respond to an increasing demand for care in the aging society, provided that e-consultation will be widely used.

The main purpose of this study was to identify factors that can increase the use of e-consultation among non-users: patients with access to Internet, but with no prior e-consultation experience. We carried out an online survey among non-users in order to assess their *barriers* towards e-consultation, their *demands* regarding e-consultation and their *motivations* to use e-consultation. We investigated the motivations for using two types of e-consultation, which are being provided in the Netherlands:

- *Direct e-consultation:* consulting a GP through secured e-mail.
- *Indirect e-consultation:* consulting a GP through secured e-mail with intervention of a Web-based triage system.

The systems for direct and indirect e-consultation have been described in more detail in a previous study [16]. Web-based triage systems for e-consultation have been developed to prevent unnecessary visits to the doctor by promoting self-care advice. Web-based triage systems consist of a symptom-driven question-and-answer system for filtering urgent complaints. Patients have to label their health complaint either on alphabetically ordered lists or on a virtual body. Subsequently, they have to run through the questions and answers related to the identified problem. In the event of urgent symptoms the Web-based triage application generates

advice to visit a doctor. In the event of non-urgent issues it generates a tailored self-care advice. Through this study we hoped to assess whether patients are motivated to use such e-consultation services.

We also identified socio-demographic and health-related characteristics of non-users in order to find out how these factors affect e-consultation use. Therefore, we assessed barriers, demands and motivations regarding e-consultation of different patient groups, to know:

- *Patient groups that could benefit especially from e-consultation because of their increasing demand for care* such as elderly patients, frequent GP visitors, chronic medication users, because Internet users with more medical problems may have a more frequent need to use e-consultation [3].
- *Patient groups that have a significant chance of being left behind* such as less-educated patients, because Internet users with lower levels of education were less inclined to use e-consultation than Internet users with higher levels of education [3,6].

2. Methods

2.1. Survey instrument

We used an online survey to assess the factors that can enhance e-consultation use among Dutch primary care patients who have Internet access, but lack experience with e-consultation. The survey covered 7 main topics and contained a total of 45 items. Topic 1 asked whether patients had experience with e-consultation (Yes/No). Topics 2–6 consisted of multiple statements, which could be answered on a 5-point scale ranging from strongly disagree (1) to strongly agree (5). The statements were based on previous studies about barriers and motivations regarding the use of e-consultation in primary care among early adopters [8–11,17–24] and referred to aspects with significant impact on e-consultation use, such as convenience, self-control, self-management of care and the use of different formats for self-control. Topic 2 (seven statements) examined possible barriers to using e-consultation. Topic 3 (ten statements) assessed patients' demands regarding e-consultation. Topic 4 (seven statements) identified motivations for using e-consultation. Topics 5 (seven statements) and 6 (eight statements) assessed the motivation for using two types of e-consultation: direct e-consultation and indirect e-consultation. Topic 7 closed the survey by asking patients' socio-demographic and health-related characteristics, such as gender, age, education level, chronic use of medication and frequency of seeing a GP. Respondents could skip questions. The survey was pre-tested by patients recruited through the Dutch Federation of Patients and Con-

sumer Organizations. The survey is available upon request (n.nijland@utwente.nl).

2.2. Recruitment of study participants

In this study we collaborated with the Dutch Federation of Patients and Consumer Organizations. We focussed on patients with various chronic complaints of different origins. Chronic patients with basic Internet skills who have visited health-related websites, are a primary target group for e-consultation. We recruited participants through banners on frequently visited websites of 26 well-trusted patient organizations, all member organizations of the Dutch Federation of Patients and Consumer Organizations. For example, the National Federation of Cancer Patients, the COPD Patient Association, the Dutch Diabetes Association, the Cardiovascular Diseases Association, the Dutch Muscular Diseases Federation, Association of Patients in Mental Health Care, the Skin Diseases Federation, the Dutch Association for Patients with Hearing Problems. By clicking on a banner patients were automatically linked to the online survey, which was available for a period of 11 weeks. This enabled us to focus on the motivations of people with chronic complaints, an important target group for e-consultation. Eligible patients were at least 18 years old.

2.3. Data analysis

Statistical analyses were performed using SPSS version 13.0. Standard descriptive statistics were performed and mean sum scores were computed for all constructs (see [Appendix A](#)). Internal consistency of all constructs was satisfactory (Cronbach's $\alpha = .64$) to high (Cronbach's $\alpha = .84$). F-tests were used to identify significant differences between independent variables of interest. Linear regression models were used to predict the dependent variable 'motivation for using e-consultation' (mean score of questions 4–6, Cronbach's $\alpha = .86$). Independent predictors included: barriers towards e-consultation, demands regarding e-consultation and socio-demographic and health-related characteristics, such as age, education level, medication use and frequency of seeing a GP. Two-tailed significance was considered at the $p < .05$ level.

3. Results

3.1. Study participants

Of the total sample ($n = 1706$), 163 patients (9.6%) had experience with e-consultation. Of the remaining 1543 patients (90.4%) who had no prior e-consultation experience, only 1066 patients were eligible for the analysis. We excluded the patients who had filled out only 1 question. The n varies, because patients could skip questions.

In this study we describe the results of the 1066 patients with no e-consultation experience. [Table 1](#) shows that most patients were female (62.4%) and frequent visitors of GPs (70.2%). The mean age was 49 years old ($SD = 13.5$) and half of the patients were highly educated (50.9%).

Table 1 – Characteristics of patients ($n = 1066$).

Characteristics	Number	Percentage
Age ($n = 713$)		
18–35	105	14.7
36–50	264	37
51–65	245	34.4
65–75	72	10.1
75–84	27	3.8
Gender ($n = 713$)		
Male	268	37.6
Female	445	62.4
Education level ($n = 713$)		
Low (primary/secondary school graduate)	43	6
Medium (high school graduate)	307	43.1
High (college graduate)	363	50.9
Chronic use of medication ($n = 665$)		
No chronic use	321	48.3
Chronic use	344	51.7
Frequency of GP visits ($n = 708$)		
Infrequent (less than once every 6 months)	211	29.8
Frequent (once every 6 months or more)	497	70.2

3.2. Barriers towards e-consultation

[Fig. 1](#) shows the reasons for the non-use of e-consultation. Of all the presented reasons the most prominent ones were: not being aware of the existence of e-consultation services (65%), the preference to see a doctor (56.6%) and limited access to e-consultation services, because 53.6% of the patients stated that their GP did not provide e-consultation. Computer or Internet skills were not expected to be a problem. In addition, 66.1% did not know whether the use of e-consultation is refunded by their insurer.

3.3. Demands regarding e-consultation

[Fig. 2](#) presents the patients' demands regarding e-consultation. The top priority was getting a quick response (98%), but all other demands were almost equally important to the patients. Fewer patients (63.9%) agreed with the statement 'I find it important that my own GP answers my question'.

3.4. Motivations for using e-consultation

Overall, the patients were fairly willing to use e-consultation given the high agreement on the presented statements ([Fig. 3](#)). Of all the presented reasons to use e-consultation, the ability to contact a GP regardless of time (92%) and place (81.3%) and the possibility to formulate questions undisturbed (86.3%), were most appealing to the patients. These factors seemed to matter more than reducing office visits or travelling time.

We also asked the patients about their motivations for using two types of e-consultation, which are being provided in the Netherlands: direct e-consultation (consulting a GP through secured e-mail) and indirect e-consultation (consult-

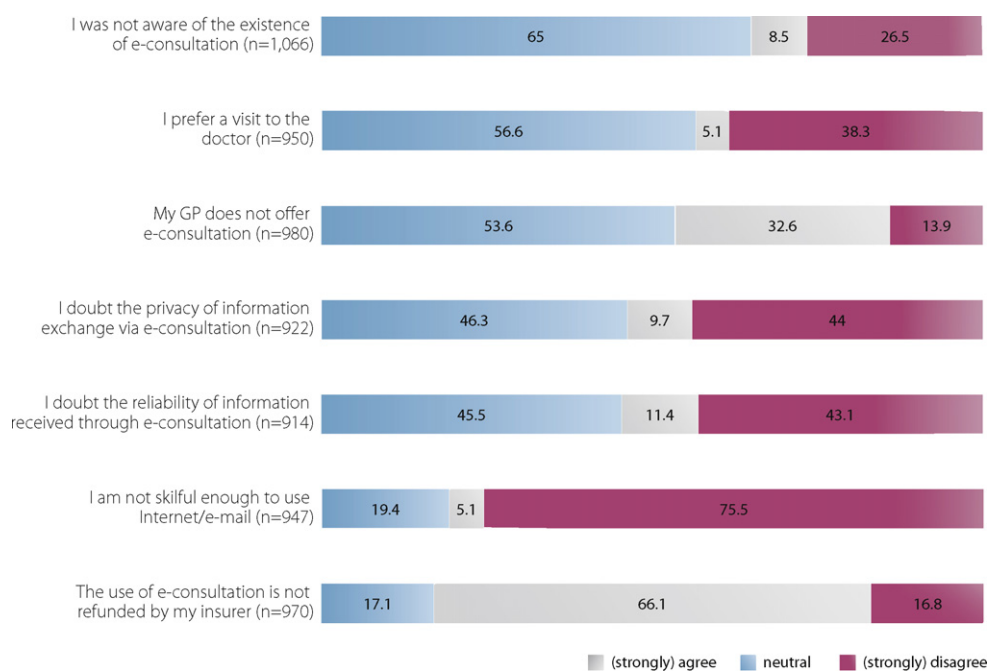


Fig. 1 – Barriers towards e-consultation (%).

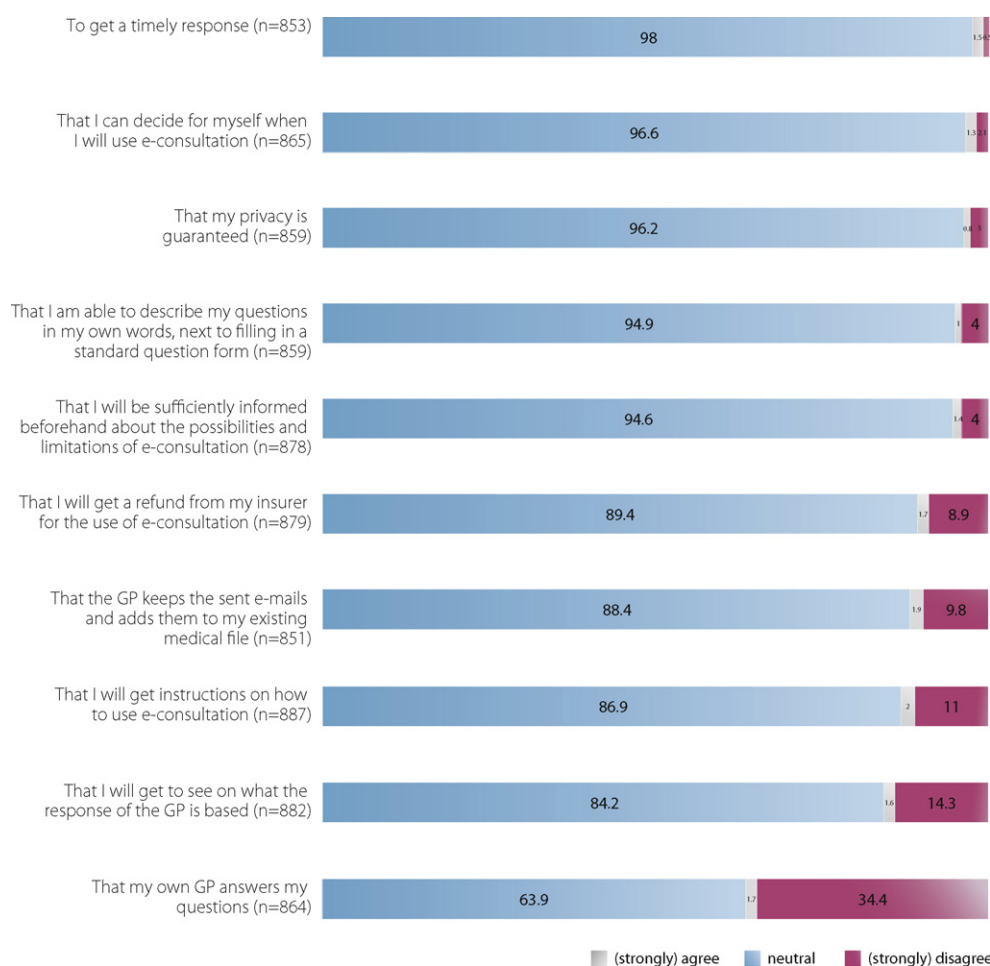


Fig. 2 – Demands regarding e-consultation (%).

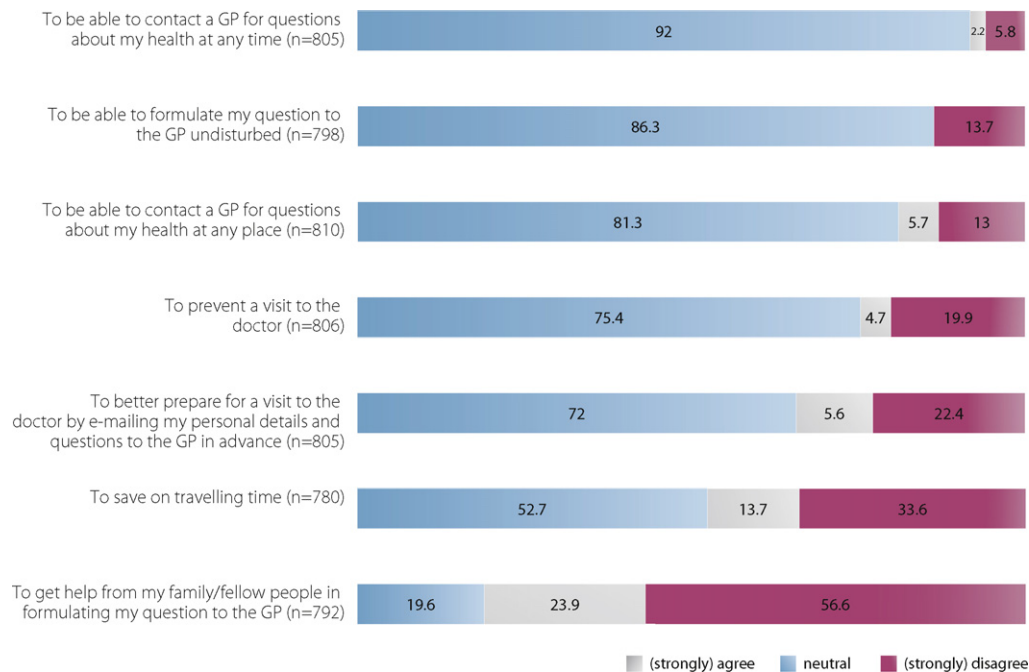


Fig. 3 – Motivations for using e-consultation in general (%).

ing a GP through secured e-mail with intervention of a triage mechanism for advice on whether it is necessary to see a doctor and for self-care advice). Motivations for using direct e-consultation are presented in Fig. 4. The possibility to ask additional questions after a visit to the doctor (88.2%) and the possibility to ask questions about medication use (78.4%) were most appealing to patients. Getting advice on how to handle a health problem and asking questions about the costs and payment of treatments were less of a motivation to use e-consultation (55.6%).

Fig. 5 presents the motivations for using indirect e-consultation. Agreement on the statements was fairly high overall. We found that indirect e-consultation would be particularly useful for determining whether a visit to the GP is necessary (87.8%), for self-care advice (83.7%) and for uncertainty reduction, e.g., knowing what is up and what to do (80.3%). The need to use indirect e-consultation for asking questions anonymously was rather divided. About 47% favoured anonymous communication against 41% who did not feel the need.

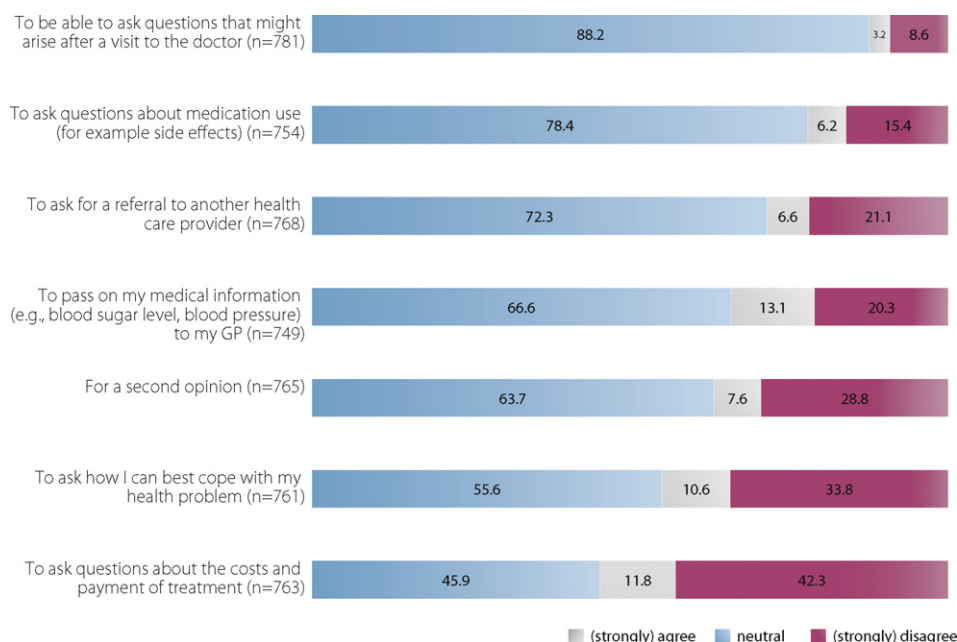


Fig. 4 – Motivations for using direct e-consultation (%).

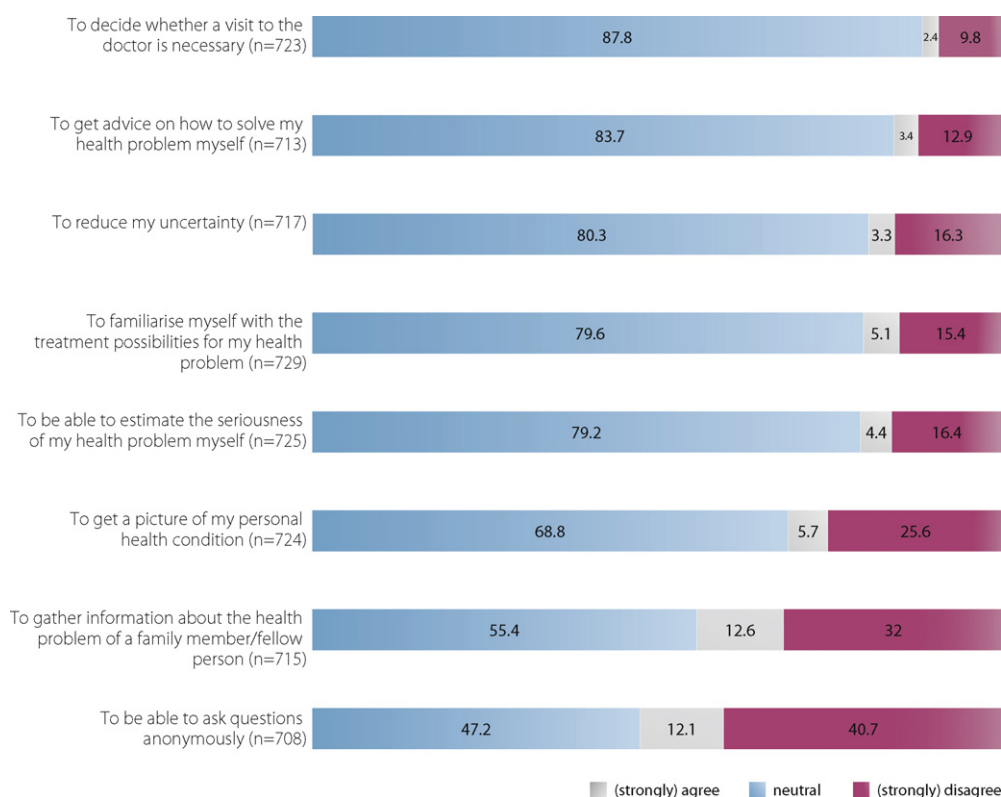


Fig. 5 – Motivations for using indirect e-consultation (%).

3.5. Main drivers for e-consultation

Regression analysis (Table 2) showed that the motivation for using e-consultation was highly correlated with patients' characteristics and their demands regarding e-consultation. The motivation for using e-consultation increased as more demands were satisfied such as getting a timely response. Of all patient characteristics, education level and age were the strongest predictors of the motivations for using e-consultation. The less-educated and elderly patients seemed more strongly motivated to use

the service than the more highly educated and younger patients.

3.6. Comparison of patient groups on barriers, demands and motivations regarding e-consultation

We compared distinct patient groups regarding age, education level, chronic use of medication and frequency of GP visits. Table 3 gives an overview of the distinguished patient groups. We focused on the patient groups that have a greater change of being left behind or that could benefit especially

Table 2 – Bivariate correlations and regression analyses: predictors associated with 'motivations for using e-consultation'.

Predictors for motivations for using e-consultation	Univariate correlation	Multivariate beta coefficient
Age (n = 713)	.13**	.08*
Education level (n = 713)	-.19***	-.13**
Chronic use of medication (n = 665)	.05	-.01
Frequency of GP visits (n = 708)	.03	-.04
Barriers towards e-consultation (n = 824)	.07	-.09*
Demands regarding e-consultation (n = 827)	.43***	.42***
Patient characteristics and constructs (F(6; 664) = 27.9, $p < .001$) ($R^2 = .46$).		
Specific items of construct demands (F(9; 785) = 21.7, $p < .001$) ($R^2 = .45$).		
* $p < .05$.		
** $p < .01$.		
*** $p < .001$.		

Table 3 – Distinguished patient groups (n = 1066).

Patient characteristics	Number	Percentage
Age (n = 713)		
18–49	369	51.8
50–84 ^a	344	48.2
Education level (n = 713)		
Low/medium ^a (primary/secondary/high school graduate)	350	49.1
High (college graduate)	363	50.9
Chronic use of medication (n = 665)		
No chronic use	321	48.3
Chronic use ^a	344	51.7
Frequency of GP visits (n = 708)		
Infrequent (less than once every half year)	211	29.8
Frequent (once every half year or more) ^a	497	70.2

^a Target groups.

from e-consultation because of their increasing demand for care. These target groups are marked in the table.

Comparison of patient groups on perceived barriers towards e-consultation

The target patient groups perceived significantly more barriers towards e-consultation use than the other groups (see Table 3 for distinguished patient groups). Table 4 shows that compared to younger patients, the elderly appeared to have lower Internet skills and greater concerns about the costs of using e-consultation. Compared to more highly educated patients, the less-educated patients seemed to have lower Internet skills, were less aware of the existence of e-consultation services and had more doubts about the reliability and privacy of information exchanged via e-consultation. Face-to-face contact was preferred more strongly by the chronic medication users than by the patients without chronic conditions. The frequent GP visitors had a stronger preference to visit a doctor than the less frequent GP visitors.

Comparison of patient groups on demands regarding e-consultation

It turned out that the target patient groups had a greater number of demands regarding e-consultation than other patient groups (Table 5). The elderly patients had stronger demands, especially with regard to obtaining evidence-based answers from their caregivers. The less-educated patients more greatly preferred to receive instructions about e-consultation use, to receive information about the possibilities and restrictions of e-consultation and to use e-consultation free of charge. The chronic medication users had a greater desire to obtain an answer from their own GP and to have their e-consultation stored in their medical record. Frequent GP visitors preferred, over less-frequent GP visitors, to be informed about the possibilities and restrictions of e-consultation.

Comparison of patient groups on motivations to use e-consultation

We found significant differences between the patient groups with regard to their motivation to use e-consultation. The elderly patients, the less-educated patients and the chronic

medication users were significantly more motivated to use e-consultation than their counterparts (Table 6). The elderly patients had a greater desire to use e-consultation in order to get help from their family/fellow people when formulating their health questions, to better prepare for a visit to the doctor by sending information in advance and to formulate their questions without disturbance. The less-educated patients were more motivated to use e-consultation to contact their GP from any place, to get help from their family/fellow people when formulating their health questions and to ask questions undisturbed. The chronic medication users were significantly more motivated to use e-consultation in order to prepare for a visit to the doctor by sending information about their health problems in advance, pass on their medical data (such as blood pressure and blood sugar levels) and to ask questions about their medications (such as side effects).

We also compared the patient groups regarding their motivations to use two types of e-consultation: direct e-consultation and indirect e-consultation with intervention of a Web-based triage feature for determining the urgency of a health problem. The results on direct e-consultation showed that the elderly and less-educated patients were significantly more motivated (see Table 7). E-consultation enables them to ask questions about the costs and payment of a treatment and to ask advice about certain health problems. The chronic medication users were also more motivated to use e-consultation, especially to pass on their medical data.

The results on indirect e-consultation (Table 8) indicated that the less-educated patients were more motivated than the more highly educated patients to use a Web-based triage application, especially for uncertainty reduction.

4. Discussion

These days e-consultation provides more advanced services, such as Web-based triage features for decision-making assistance and for promoting patient self-care [16]. Therefore, we would expect that e-consultation would be widespread in today's technological age. However, this is not the case. About

Table 4 – Comparison of patient groups on perceived barriers towards e-consultation.

Construct and items—mean (SD)	Age		Education level		Medication use		Frequency of GP visits	
	<50 (n = 369)	≥50 (n = 342)	High (n = 361)	Low/medium (n = 349)	No (n = 319)	Yes (n = 343)	Infrequent (n = 210)	Frequent (n = 495)
Barriers towards e-consultation	2.63 (0.85)	2.96 (0.89) ^{***}	2.54 (0.84)	3.05 (0.86) ^{***}	2.68 (0.84)	2.86 (0.91) ^{**}	2.61 (0.87)	2.86 (0.89) [*]
To this day you have not used e-consultation. To what extent do the factors mentioned below play an important role in not using e-consultation?								
a. I was not aware of the existence of e-consultation	3.47 (1.56)	3.83 (1.34) ^{**}	3.42 (1.61)	3.87 (1.29) ^{***}	3.61 (1.54)	3.63 (1.44)	3.61 (1.59)	3.65 (1.42)
b. My GP does not offer e-consultation	3.83 (1.18)	3.84 (1.10)	3.92 (1.20)	3.75 (1.09)	3.73 (1.21)	3.90 (1.10)	3.65 (1.21)	3.91 (1.12) ^{**}
c. I am not skilful enough to use Internet/e-mail	1.40 (0.85)	2.14 (1.38) ^{***}	1.43 (0.94)	2.07 (1.33) ^{***}	1.61 (1.12)	1.80 (1.20) [*]	1.67 (1.17)	1.75 (1.17)
d. The use of e-consultation is not refunded by my insurer	2.84 (0.97)	3.09 (0.93) ^{***}	2.84 (1.04)	3.08 (0.85) [*]	2.90 (0.94)	3.00 (0.97)	2.96 (1.03)	2.94 (0.92)
e. I prefer a visit to the doctor	3.08 (1.41)	3.30 (1.36) [*]	3.02 (1.39)	3.34 (1.37) ^{**}	3.02 (1.38)	3.31 (1.39) ^{**}	2.81 (1.39)	3.32 (1.36) ^{***}
f. I doubt the reliability of information received through e-consultation	2.83 (1.41)	2.93 (1.35)	2.63 (1.38)	3.17 (1.32) ^{***}	2.79 (1.36)	2.96 (1.39)	2.71 (1.37)	2.96 (1.38) [*]
g. I doubt the privacy of information exchange via e-consultation	2.86 (1.45)	3.04 (1.38)	2.70 (1.41)	3.24 (1.39) ^{***}	2.93 (1.43)	2.95 (1.42)	2.85 (1.44)	2.99 (1.41)

Age: (F(1; 710) = 24.3, $p < .001$), education level: (F(1; 709) = 64.3, $p < .001$), chronic use of medication: (F(1; 661) = 7.2, $p < .01$), frequency of GP visits: (F(1; 704) = 11.4, $p < .01$).

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 5 – Comparison of patient groups on demands regarding e-consultation.

Construct and items—mean (SD)	Age		Education level		Medication use		Frequency of GP visits	
	<50 (n = 369)	≥50 (n = 344)	High (n = 363)	Low/medium (n = 350)	No (n = 321)	Yes (n = 344)	Infrequent (n = 211)	Frequent (n = 497)
Demands regarding e-consultation	4.41 (0.47)	4.50 (.43)*	4.35 (0.47)	4.56 (0.42)***	4.40 (0.47)	4.50 (0.44)**	4.35 (0.47)	4.50 (0.45)***
What is important to you when using e-consultation?								
a. That I will get instructions on how to use e-consultation	4.04 (1.17)	4.29 (0.94)**	3.89 (1.20)	4.45 (0.82)***	4.09 (1.13)	4.20 (1.04)	3.97 (1.21)	4.24 (1.00)**
b. That I will be sufficiently informed in advance about the possibilities and limitations of e-consultation	4.43 (0.82)	4.55 (0.65)*	4.36 (0.81)	4.64 (0.64)***	4.47 (0.76)	4.50 (0.75)	4.33 (0.84)	4.56 (0.69)***
c. That I receive a refund from my insurer for the use of e-consultation	4.33 (0.93)	4.36 (0.95)	4.20 (1.03)	4.49 (0.81)***	4.27 (0.99)	4.44 (0.87)*	4.26 (1.02)	4.38 (0.91)
d. That I will get to see on what the response of the GP is based (for example by a reference to scientific sources and interesting websites)	3.96 (1.17)	4.27 (0.97)***	4.02 (1.12)	4.20 (1.06)*	4.03 (1.11)	4.19 (1.04)	3.99 (1.15)	4.15 (1.07)
e. That I can decide for myself when I will use e-consultation	4.59 (0.66)	4.67 (0.56)	4.57 (0.66)	4.69 (0.55)**	4.63 (0.66)	4.62 (0.58)	4.58 (0.70)	4.65 (0.58)
f. That my own GP answers my questions	3.51 (1.40)	3.63 (1.36)	3.52 (1.36)	3.60 (1.41)	3.43 (1.41)	3.75 (1.34)**	3.33 (1.45)	3.67 (1.34)**
g. That I am able to describe my questions in my own words next to filling in a standard question form	4.53 (0.76)	4.52 (0.71)	4.44 (0.81)	4.60 (0.65)**	4.48 (0.77)	4.58 (0.68)	4.48 (0.76)	4.54 (0.73)
h. To get a timely response	4.74 (0.47)	4.71 (0.51)	4.68 (0.53)	4.77 (0.44)*	4.72 (0.48)	4.74 (0.49)	4.71 (0.51)	4.73 (0.49)
i. That the GP keeps the sent e-mails and adds them to my existing medical file	4.30 (0.98)	4.37 (0.95)	4.27 (0.99)	4.39 (0.97)	4.21 (1.04)	4.42 (0.90)**	4.17 (1.09)	4.40 (0.91)**
j. That privacy is guaranteed	4.77 (0.55)	4.69 (0.69)	4.68 (0.67)	4.78 (0.58)	4.70 (0.64)	4.77 (0.57)	4.68 (0.68)	4.75 (0.61)

Age: (F(1; 712) = 6.3, $p < .05$), education level: (F(1; 712) = 40.2, $p < .001$), chronic use of medication: (F(1; 664) = 7.7, $p < .01$), frequency of GP visits: (F(1; 707) = 14.8, $p < .001$).

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 6 – Comparison of patient groups on motivations to use e-consultation in general.

Construct and items—mean (SD)	Age		Education level		Medication use		Frequency of GP visits	
	<50 (n = 369)	≥50 (n = 344)	High (n = 363)	Low/medium (n = 350)	No (n = 321)	Yes (n = 344)	Infrequent (n = 211)	Frequent (n = 497)
Motivations to use e-consultation in general	3.51 (0.76)	3.76 (0.68) ^{***}	3.50 (0.73)	3.78 (0.72) ^{**}	3.55 (0.74)	3.69 (0.72) [*]	3.56 (0.75)	3.66 (0.72)
Why would you like to use e-consultation?								
a. To get help from my family/fellow people in formulating my question to the GP	2.07 (1.16)	2.58 (1.17) ^{***}	2.16 (1.18)	2.48 (1.19) ^{***}	2.24 (1.18)	2.34 (1.17)	2.23 (1.23)	2.33 (1.16)
b. To be able to contact a GP for questions about my health at any place (on holiday, at home, in the hospital)	3.92 (1.12)	4.02 (1.01)	3.82 (1.13)	4.14 (0.96) ^{***}	3.95 (1.02)	3.98 (1.10)	3.95 (1.09)	3.99 (1.06)
c. To prevent a visit to the doctor	4.02 (1.21)	3.83 (1.22) [*]	3.96 (1.18)	3.90 (1.25)	3.99 (1.20)	3.86 (1.24)	4.12 (1.13)	3.86 (1.25) ^{**}
d. To better prepare for a visit to the doctor by e-mailing my personal details and questions to the GP in advance	3.59 (1.27)	3.93 (1.14) ^{***}	3.64 (1.24)	3.87 (1.19) [*]	3.55 (1.27)	3.91 (1.17) ^{***}	3.64 (1.28)	3.79 (1.21)
e. To be able to contact a GP for questions about my health at any time	4.46 (0.83)	4.42 (0.84)	4.35 (0.91)	4.54 (0.74) ^{**}	4.42 (0.81)	4.44 (0.87)	4.48 (0.83)	4.42 (0.84)
f. To save on travelling time	3.33 (1.43)	3.32 (1.26)	3.38 (1.35)	3.27 (1.36)	3.38 (1.35)	3.29 (1.36)	3.44 (1.37)	3.28 (1.35)
g. To be able to formulate my question to the GP undisturbed	4.26 (1.38)	4.71 (0.90) ^{***}	4.30 (1.34)	4.67 (0.97) ^{***}	4.32 (1.32)	4.60 (1.07) ^{**}	4.30 (1.37)	4.55 (1.10) [*]

Age: (F(1; 712) = 21.8, $p < .001$), education level: (F(1; 712) = 27.8, $p < .001$), chronic use of medication: (F(1; 664) = 6.2, $p < .01$).

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 7 – Comparison of patient groups on motivations to use direct e-consultation.

Construct and items—mean (SD)	Age		Education level		Medication use		Frequency of GP visits	
	<50 (n = 369)	≥50 (n = 344)	High (n = 393)	Low/medium (n = 367)	No (n = 321)	Yes (n = 344)	Infrequent (n = 211)	Frequent (n = 497)
Motivations to use direct e-consultation	3.68 (0.67)	3.86 (0.67)***	3.68 (0.69)	3.88 (0.65)***	3.70 (0.65)	3.81 (0.70)*	3.75 (0.69)	3.78 (0.67)
For which purposes would you like to use direct e-consultation?								
a. To be able to ask questions that might arise after a visit to the doctor	4.13 (0.97)	4.16 (0.85)	4.06 (0.93)	4.25 (0.89)**	4.11 (0.94)	4.17 (0.90)	4.06 (1.00)	4.19 (0.87)
b. For a second opinion	3.38 (1.32)	3.63 (1.13)*	3.40 (1.27)	3.63 (1.18)	3.50 (1.27)	3.49 (1.21)	3.49 (1.28)	3.50 (1.21)
c. To ask questions about the costs and payment of a treatment	2.82 (1.28)	3.19 (1.20)***	2.84 (1.26)	3.19 (1.24)***	3.03 (1.26)	2.99 (1.23)	3.00 (1.29)	3.00 (1.25)
d. To ask for a referral to another health care provider	3.62 (1.21)	3.82 (1.09)*	3.62 (1.19)	3.82 (1.12)*	3.73 (1.13)	3.72 (1.16)	3.70 (1.15)	3.72 (1.16)
e. To ask how I can best cope with my health problem	3.06 (1.30)	3.52 (1.17)***	3.03 (1.26)	3.57 (1.21)***	3.15 (1.28)	3.38 (1.24)*	3.23 (1.27)	3.32 (1.25)
f. To pass on my medical information (e.g., blood sugar level, blood pressure) to my GP	3.62 (1.17)	3.78 (1.05)	3.62 (1.14)	3.78 (1.09)	3.53 (1.15)	3.85 (1.06)***	3.58 (1.13)	3.74 (1.11)
g. To ask questions about medication use (for example side effects)	3.79 (1.15)	4.00 (0.97)*	3.77 (1.12)	4.02 (1.00)**	3.75 (1.10)	4.02 (1.02)**	3.70 (1.09)	3.97 (1.04)**

Age: (F(1; 712) = 12.8, $p < .001$), education level: (F(1; 712) = 16.1, $p < .001$), chronic use of medication: (F(1; 664) = 4.3, $p < .05$).

* $p < .05$.

** $p < .01$.

*** $p < .001$.

[illegible]

90% of our total sample ($n=1706$) had never encountered e-consultation.

In this study we aimed to identify factors that can increase the use of e-consultation in primary care. With an online survey, we investigated the barriers, demands and motivations regarding e-consultation of patients with no prior e-consultation experience (non-users).

The results of our study showed that 70% of our study population, patients with no e-consultation experience ($n=1066$), were frequent GP visitors. E-consultation may be especially beneficial for these patients with a higher demand for care, because it can help them decide whether it is necessary to see a doctor and teach them self-care techniques in order to prevent unnecessary encounters [8,9,16]. This is an important reason to foster the use of e-consultation services in primary care.

The most prominent barriers towards e-consultation were: unawareness of the existence of e-consultation, e-consultation not being provided by a GP and the preference to see a doctor. Education and examination of user expectations can provide a solution for these barriers, for both patients and caregivers alike. Patients are dependent on a GPs' provision of e-consultation. Therefore, it is important to advise caregivers on the mutual benefits of e-consultation, its consequences and implementation into regular practice. It is also important for GPs to ask their patients about e-consultation, since patients are unlikely to request electronic GP access, simply because they are unaware of the option. Besides, non-users of e-consultation may have no clear ideas or assumptions about the benefits and disadvantages of e-consultation.

Next to the perceived barriers we gathered information about non-users' motivations and demands regarding e-consultation. We provided patients with statements based on prior research among e-consultation users [8–11,17–23]. These statements expressed the advantages of e-consultation such as being able to ask follow-up questions after a visit to the doctor, to ask questions about medication use, to pass on medical data (e.g., blood glucose) and to get decision-support on whether it is necessary to see a doctor. Overall, our results demonstrated that non-users were fairly motivated to use e-consultation for these purposes, but only under certain conditions. Patients attached great importance to a timely response and a guarantee on privacy. These results are comparable with other studies among early adopters of e-consultation [20,22,24], which gives us the impression that today's non-users do not differ from early adopters in their motivations to use e-consultation. Non-users and early adopters both, for example, expressed the desire for a primary evaluation of a medical problem, including advice as to the necessity of seeing a doctor [24].

Our study also revealed that certain patient groups, such as less-educated patients, elderly patients and chronic users of medication were especially motivated to use e-consultation, but also perceived many barriers towards e-consultation. The elderly patients, for example, perceived a stronger lack of Internet skills than younger patients and the less-educated patients were less aware of the existence of e-consultation than the more highly educated patients.

These results are consistent with the literature in the conclusion that socio-demographic and health-related factors influence the use of online patient-caregiver communication [3,4,25,26].

Overall, our findings on e-consultation are comparable with studies about online patient-provider communication in Europe and the United States [3,4]. Although there has been an increase in online communications regarding health-related issues since 2005 [4,26], the impact of e-consultation on the healthcare delivery system and its services is rather low. The potentials of e-consultation exist in enhancing its accessibility and in optimizing the features for self-care. Increasing the use of e-consultation requires a proactive approach, not only from healthcare professionals, but also from governmental agencies on a policy level [27–29].

4.1. Limitations of this study

There are a number of limitations of this study. Non-users might have a limited view on the possibilities of e-consultation for self-care. Because of this, we used statements to gain insight into their motivations for using e-consultation in our survey. These statements were based on findings of previous studies and are thus directive in nature. However, we could only give general directions for the design and implementation of e-consultation in primary care.

Future research could focus on the motivations of early adopters in comparison to the motivations of non-users and a user-centred approach will be necessary in order to transform the general directions into specific requirements that can be taken up in designing e-consultation applications [30].

Another limitation is that we did not reflect on the motivations, demands, or barriers of patients without access to a computer or Internet or patients with GPs without e-consultation services. The study was directed solely at Internet users, because this population has the potential to use e-consultation in the near future.

5. Conclusions

The findings of this study demonstrate that the use of e-consultation will not increase through efforts to change the attitudes of patients or health care providers, since many non-users liked the possibilities of e-consultation and were thus motivated to use e-consultation. Increase in use will rather occur through solving existing barriers among non-users [16,31] and through addressing patients' demands, preferences and skills when developing e-consultation systems [16,20,32,33]. Educational and informational deficits can be handled by informing end-users about the possibilities and consequences of e-consultation via tailored education and instructions. Moreover, we must take into account patient profiles; special attention should be paid to patients who can benefit the most from e-consultation, while also facing the greatest chance of being excluded from the service. As health care continues to evolve towards a more patient-centred approach, we expect that patient expectations and demands will be a major force in driving the use of electronic communication.

Summary points

What was already known on the topic?

- The increased public interest in medical information regarding health issues are driving forces for the growth of health services on the Internet. However, the growth of e-consultation in primary care has been minor.
- Access to healthcare and information technology is often most difficult for those populations who need it most. E-consultation can be beneficial for certain patient groups, such as frequent GP visitors and chronic users of medication. Yet, it is unclear whether access to e-consultation is most difficult for these populations.

What did this study add to our knowledge?

- Non-use of e-consultation was primarily due to lack of availability among GPs and to information deficits among patients, such as unawareness of the existence of the service and the possibilities of e-consultation. Proper education and instructions are necessary to increase the use of e-consultation.
- Patient groups who were most motivated to use e-consultation e.g., elderly patients, less-educated patients, chronic medication users and frequent GP-visitors, perceived the greatest barriers towards e-consultation.
- Web-based triage systems may be promising, because this study indicates that patients are motivated to use such systems for primary evaluation of medical complaints and for self-care advice.

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Appendix A. Constructs and items of the online survey**A.1. Barriers towards e-consultation (Chronbach's $\alpha = .66$)**

Survey question: To this day you have not used e-consultation. To what extent do the factors mentioned below play an important role in not using e-consultation?

- I was not aware of the existence of e-consultation
- My GP does not offer e-consultation
- I am not skilful enough to use Internet/e-mail
- The use of e-consultation is not refunded by my insurer
- I prefer a visit to the doctor
- I doubt the reliability of information received through e-consultation

- I doubt the privacy of information exchange via e-consultation

A.2. Demands regarding e-consultation (Chronbach's $\alpha = .74$)

Survey question: What is important to you when using e-consultation? (I find it important...)

- That I will get instructions on how to use e-consultation
- That I will be sufficiently informed in advance about the possibilities and limitations of e-consultation
- That I receive a refund from my insurer for the use of e-consultation
- That I will get to see on what the response of the GP is based (for example by a reference to scientific sources and interesting websites)
- That I can decide for myself when I will use e-consultation
- That my own GP answers my questions
- That I am able to describe my questions in my own words next to filling in a standard question form
- To get a timely response
- That the GP keeps the sent e-mails and adds them to my existing medical file
- That privacy is guaranteed

A.3. Motivation for using e-consultation in general (Chronbach's $\alpha = .64$)

Survey question: Why would you like to use e-consultation?

- To get help from my family/fellow people in formulating my question to the GP
- To be able to contact a GP for questions about my health at any place (on holiday, at home, in the hospital)
- To prevent a visit to the doctor
- To better prepare for a visit to the doctor by e-mailing my personal details and questions to the GP in advance
- To be able to contact a GP for questions about my health at any time
- To save on travelling time
- To be able to formulate my question to the GP undisturbed

A.4. Motivation for using direct e-consultation (Chronbach's $\alpha = .73$)

Survey question: For which purposes would you like to use direct e-consultation?

- To be able to ask questions that might arise after a visit to the doctor
- For a second opinion
- To ask questions about the costs and payment of a treatment
- To ask for a referral to another health care provider
- To ask how I can best cope with my health problem
- To pass on my medical information (e.g., blood sugar level, blood pressure) to my GP

- g. To ask questions about medication use (for example side effects)

A.5. Motivation for using indirect e-consultation (Chronbach's $\alpha = .84$)

Survey question: For which purposes would you like to use indirect e-consultation?

- To familiarise myself with the treatment possibilities for my health problem
- To get a picture of my personal health condition
- To gather information about the health problem of a family member/fellow person
- To be able to estimate the seriousness of my health problem myself
- To get advice on how I might be able to solve my health problem myself
- To reduce my uncertainty
- To decide whether a visit to the doctor is necessary
- To be able to ask questions anonymously

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