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To cite this article: Sabine Schmidt-Weitmann, Thomas Grischott, Peter Bauerfeind & Christiane Brockes | (2017) Medical online consultation service in gastroenterology at the University Hospital Zurich, Cogent Medicine, 4:1, 1334409, DOI: [10.1080/2331205X.2017.1334409](https://doi.org/10.1080/2331205X.2017.1334409)

To link to this article: <https://doi.org/10.1080/2331205X.2017.1334409>



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Published online: 05 Jun 2017.



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## GASTROENTEROLOGY & HEPATOLOGY | RESEARCH ARTICLE

# Medical online consultation service in gastroenterology at the University Hospital Zurich

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Received: 27 March 2017  
Accepted: 22 May 2017  
First Published: 25 May 2017

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Reviewing editor:  
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**Abstract:** *Background:* Since 1999, the University Hospital Zurich (Switzerland) offers an e-mail based online consultation where patients can ask online doctors anonymous questions about individual health concerns. This study aimed at the characterization of the patient, the content of the question and the recommendations given specifically in the field of gastroenterology. *Methods:* In total, 3,489 inquiries were asked from July 2010 to December 2015. Based on the International Classification of Diseases ICD-10 and the Primary Care Code ICPC-2 252 (7.2%) inquiries were included in the retrospective qualitative study. The content of the requests was qualitatively evaluated by inductive categorization using a professional text analysis program (MAXQDA). *Results:* Of the users, 49.2% were male, 49.6% female. The mean age was 47.9 years. Main topics of the questions were bowel diseases in 29.8% (infectious in 6%, non-infectious in 7.1%, other bowel diseases in 16.7%). Most often patients suffered from abdominal pain (32.7%), diarrhea (22.7%), general weakness (22.7%) or epigastric pain (17.1%). Half (48.8%) of the questioners inquired about a second opinion while 25% asked for medical advice. The online doctors responded with detailed information about therapy (73.4%), explained a specific disease (63.9%) or provided decision support (13.9%). Most patients rated the clarity of the answer as good or very good (95.2%). *Conclusion:* An

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Since 1999, the division of Clinical Telemedicine at the University Hospital of Zurich provides an e-mail based medical online consultation service, where patients can ask online doctors anonymous questions about individual health concerns. The database includes over 50.000 enquiries and is the leading university based online consultation service in Switzerland.

Main focus of research includes the acceptance and feasibility of virtual patient consultation of different types of information and communication technologies including the telemonitoring of vital data. The evaluation of the effects on the health literacy of patients are of special interest as well as the opportunities of telemedicine in the field of ambient assisted living (AAL).

### PUBLIC INTEREST STATEMENT

Since 1999, the University Hospital Zurich (Switzerland) offers an e-mail based online consultation where patients can ask online doctors anonymous questions about individual health concerns. This study aimed at the characterization of the patient, the content of the question and the recommendations given specifically in the field of gastroenterology. Two hundred and fifty two (7.2%) inquiries were included in the study. Of the users, 49.2% were male. Main topics of the questions were bowel diseases in 29.8%. Most often patients suffered from abdominal pain (32.7%), diarrhea (22.7%), general weakness (22.7%) or epigastric pain (17.1%). Half (48.8%) of the questioners inquired about a second opinion. The online doctors responded with information about therapy (73.4%) or provided decision support (13.9%). Most patients rated the service as good or very good (95.2%). An e-mail based teleconsultation in the field of gastroenterology can provide individual advice and empowers patients by improving their health literacy.

e-mail based teleconsultation in the field of gastroenterology can provide individual advice and empowers patients by improving their health literacy. Patients with bowel diseases have high expectations to obtain professional medical advice and need support in their decision-making process.

**Subjects:** Gastroenterology; Medical Education; Computers in Medicine

**Keywords:** telemedicine; teleconsultation; gastroenterology; e-mail; telehealth

## 1. Introduction

Gastrointestinal diseases have a high prevalence and are a significant burden on the health care system (Koloski, Talley, & Boyce, 2002). Especially the widespread occurrence of inflammatory bowel diseases (IBD) like Crohn's disease and Colitis ulcerosa require new approaches of health care models (Molodecky et al., 2012). Telemedicine offers the opportunity to use the advantages of the information and communication technology in different ways such as teleconsultation, tele-education, telemonitoring and telecare and could represent a potential approach in the health care sector. The accessibility of remote and rural groups of the population is an important benefit (Siegel, 2017).

Since 1999, the University Hospital Zurich (USZ) offers an anonymous e-mail based online consultation service (Brockes, Neuhaus Bühler, Schulz, Neumann, & Schmidt-Weitmann, 2010). The service differs in several aspects from other telemedicine services. Communication is generally done in the written form via a web questionnaire with the additional possibility of transmitting pictures or additional documents electronically. The service is not limited to office hours or location of the user. The inquiries can be submitted anonymously and the answers are provided exclusively by online doctors who can rely on a highly specialized expertise of the entire USZ and associated institutions. Although the e-mail based service is open to the entire population, the user profile as well as the content of the inquiries partly differ from telephone-based medical consultation services (Siegel, 2017). Former analyses of the data pool showed that the service was used for well communicable issues like photo-documented skin lesions, embarrassing concerns like sexually transmitted diseases, mental problems or complex medical cases, which often require specialist knowledge (Grunig, Schmidt-Weitmann, Brockes-Bracht, & Hofbauer, 2015; Schmidt-Weitmann, Bösch, Weidt, & Brockes, 2015; Schmidt-Weitmann, Schulz, Schmid, & Brockes, 2015). In addition, a teleconsultation also serves as a low-threshold point of contact for inquiries where the visit to the general practitioner may be not necessary from the patient's point of view, like lifestyle changes in arterial hypertension (Schmidt-Weitmann, Berz, Weidt, Schulz, & Brockes, 2016).

With nearly one in ten questions a considerable proportion of the questions concerns the digestive system (Brockes, Neuhaus Bühler et al., 2010). To date, only few studies are available of the potential use of an e-mail based teleconsultation in gastroenterology (Plener, Hayward, & Saibil, 2014). It is therefore important to know more about the characteristics of the inquirers, which kind of gastrointestinal problems lead to an inquiry and the reason why the service is used. Furthermore, it is interesting to get more knowledge about the provided information and recommendations of the online doctors and the satisfaction of the patients.

## 2. Methods

### 2.1. Medical online consultation service

The service answers questions from the entire spectrum of human medicine and is available to medical laymen. All responses are written by doctors from various fields of medicine such as internal medicine, anesthesiology, cardiology or family medicine who can request expert support from other departments to answer complex inquiries. The service can be accessed via the URL [www.onlineberatung.usz.ch](http://www.onlineberatung.usz.ch). The written request is made by completing a web form which is then transmitted via a protected Secure Sockets Layer (SSL) connection. The following information are mandatory: e-mail address, subject of inquiry, question text, age, size, weight and place of residence. In addition, first

**Table 1. Matrix of main categories and subcategories**

Main category	Subcategory
1. User profile	Concerned person, age, gender, medical history, past physician contact
2. Content	Topic based on ICD-10
a. Present medical problem	Symptoms based on ICPC-2
b. Content of request	Treatment and therapies, diagnosis and cause of symptoms, information about a specific disease, information about diagnostic procedures, recommendation for a doctor appointment, explanation of findings, no specific question
c. Purpose of request	Reasons using the online consultation service
3. Responses of the online service	Author, kind of information, differential diagnosis, recommendation of consultation
4. Rating of the service	Benefit, clarity, fulfillment of expectations

name, name, gender, smoking status, further complaints, medications and other illnesses can be indicated voluntarily. The user has either to decide to decline or to give consent for scientific evaluation. The fee for a request is 75 Swiss francs (75 USD). An independent financial service provider who transmits no personal data but only a transaction number of the customer handles the payment process by credit or debit card. The service is asynchronous and therefore not suitable for medical emergencies, which is clearly stated on the website. A team of online doctors answers the requests on working days within 24 h. Complex questions, which are forwarded to experts, may extend the response time to five working days. The leading medical issue of the consultation is encoded according to ICD-10 (International Classification of Diseases) and ICPC-2 (International Classification of Primary Care). Finally, a web link is sent to the users' email address, referring to the response on a protected server of the USZ. After getting the answer, the inquirer is invited to evaluate the service.

## 2.2. Content and data analysis

All inquiries are stored in a database. For the present study, the database was searched for inquiries from July 2010 to December 2015,  $n = 3,489$ , concerning the gastrointestinal tract. As search criteria, the ICD-10 codes from Chapter A, C, D, K, Q, R, and ICPC-2 Chapter D were used. Sixty-two patients declined consent for scientific evaluation and 17 requests had to be excluded due to an incorrect ICD-10 or ICPC-2 key. As a result,  $n = 252$  (7.2%) inquiries remained for evaluation. An approval of the Cantonal Ethics Committee Zurich was available.

The content of the questions and answers was analyzed by means of inductive classification as described by Mayring (2002, 2015). For that purpose, all inquiries were transferred into the text analysis program MAXQDA 12 (Verbi, Software, Berlin), a tool that is used in social sciences to provide interpretation of texts and systematic analysis. All key information units, so called "codes", of the text were assigned to a main category and successively to the according subcategories, see Table 1. Coding of multiple categories and subcategories was possible. The matrix of categories and subcodes as well as all numerical data were evaluated quantitatively by evaluating relative frequencies.

## 3. Results

A total number of  $n = 3,489$  patient inquiries from all fields of medicine were answered by the online consultation service in the observed interval and 7.2% ( $n = 252$ ) relevant for gastroenterology were included in the qualitative content analysis.

**Table 2. Distribution of the inquiries according to the ICD-10 chapters**

ICD-10 Chapters	Diagnosis	n = 252	Frequency (%)
A00-09	Infectious bowel diseases	15	6.0
B15-19	Virus hepatitis	10	3.9
B55	Leishmaniasis	0	0.0
B65-83	Helminthiasis	4	1.6
C15-26	Neoplasia	24	9.5
C78	Secondary neoplasm	1	0.4
D12-13	Benign neoplasm	5	2.0
D37	Unclear neoplasm	1	0.4
K20-31	Esophagus, stomach, duodenum	21	8.3
K35-38	Appendix	0	0.0
K40-46	Hernia	9	3.6
K50-52	Non-infectious (inflammatory bowel disease)	18	7.1
K55-64	Other bowel diseases	42	16.7
K65-67	Peritoneum	1	0.4
K70-77	Liver	5	2.0
K80-87	Gallbladder, bile duct, pancreas	4	1.6
K90-93	Other diseases of the gastrointestinal tract	6	2.4
Q39-45	Congenital malformation	1	0.4
R10-19	Symptoms related to digestion and abdomen	69	27.4
	Not classified	16	6.3

### 3.1. User profile

#### 3.1.1. Concerned person, age, gender

In 206 requests (81.7%), the problem addressed the patient himself, in 12 requests (4.8%) a partner, in 34 requests (13.5%) other family members. Gender distribution was almost equal with 125 (49.6%) women, 124 (49.2%) men and 3 (1.2%) unknown. The age of the patients ranged from one to 89 years with a mean age of 47.9 years (SD 17.3 years).

#### 3.1.2. Medical history

In 20.2% ( $n = 51$ ) the inquirers mentioned a mean of 1.29 previous gastroenterological diagnoses and in 50.4% ( $n = 127$ ) a mean of 1.90 further pre-existing somatic illnesses were reported.

#### 3.1.3. Past physician contact

Of all inquirers, 61.5% ( $n = 155$ ) reported having seen already a physician for the present medical problem. Of these, 41.3% ( $n = 64$ ) have seen a general practitioner and/or 75.5% ( $n = 117$ ) went to see a specialist.

### 3.2. Present medical problem

#### 3.2.1. Topic based on ICD-10

The main ICD-10 topic was bowel diseases in 29.8% ( $n = 75$ ) including infectious bowel diseases in 6% ( $n = 15$ ), IBD in 7.1% ( $n = 18$ ) and other bowel diseases in 16.7% ( $n = 42$ ). The ICD-10 chapter "Other bowel diseases" included 38.1% ( $n = 16$ ) inquiries about the irritable bowel syndrome (IBS), see Table 2.

**Table 3. Frequency of the top 10 symptoms mentioned in n = 211 inquiries**

ICPC-2-Code	Top 10 symptoms	Number of symptoms (n = 373)	Frequency in n = 211 inquiries (%)
D01	Abdominal pain or cramps, general	69	32.7
D11	Diarrhea	48	22.7
A04	General weakness	47	22.3
D02	Abdominal pain, epigastric	36	17.1
D18	Modification of digestion/ bowel movements	35	16.6
D09	Nausea	34	16.1
D08	Flatulence	32	15.2
D06	Abdominal pain, other location	28	13.3
D07	Dyspepsia	24	11.4
D16	Rectal bleeding	20	9.5

### 3.2.2. Symptoms based on ICPC-2

In 211 questions (83.7%), 779 symptoms were reported. On average 3.69 symptoms and a maximum of 13 symptoms were mentioned per request. Of these 211 inquirers 32.7% (n = 69) complained about abdominal pain and 17.1% (n = 36) about epigastric pain, 22.7% (n = 48) about diarrhea and 22.3% (n = 47) about general weakness. The frequency of the top 10 symptoms (n = 373) are listed in Table 3.

### 3.3. Content of request

The vast majority of the patients (55.2%, n = 139) wanted to know about treatment and therapies, 32.1% (n = 81) asked for a diagnosis or the cause of symptoms, 21% (n = 53) wanted obtain information about a specific disease and 19.8% (n = 50) about a diagnostic procedure, 10.3% (n = 26) wanted a recommendation for a doctor appointment, 3.2% (n = 8) an explanation of findings and no specific question was mentioned in 9.9% (n = 25).

### 3.4. Purpose of request

In 252 questions 362 reasons for using the online consultation service could be evaluated. The named reasons are listed in Table 4.

**Table 4. Reason for request**

Reason	n = 362	Frequency (%)
Second opinion	123	48.8
Medical advice	63	25.0
Worry/insecurity/fear of a disease	59	23.4
Decision support	32	12.7
Contact points	26	10.3
Avoidance of a personal consultation with a physician	23	9.1
Financial and insurance aspects	18	7.1
Treatment options at the USZ	14	5.6
Family doctor absent	4	1.6

**Table 5. Rating of the online service**

	<b>Benefit n = 106</b>	<b>Clarity n = 104</b>	<b>Fulfilled expectation n = 107</b>
Very good and good	68 (64.1%)	99 (95.2%)	68 (63.6%)
Average	27 (25.5%)	4 (3.8%)	26 (24.3%)
Bad and very bad	11 (10.4%)	1 (1.0%)	13 (12.1%)

### **3.5. Responses of the online service**

#### **3.5.1. Author**

Of 252 inquiries, 165 (65.5%) were answered by the online doctors themselves and 87 (34.5%) with the support of experts.

#### **3.5.2. Kind of information**

In 73.4% ( $n = 185$ ) the online doctor gave information or recommendations about a therapy and in 68.3% ( $n = 172$ ) information about diagnostics. Information about a specific disease was provided in 63.9% ( $n = 161$ ), information about the pathophysiology in 11.1% ( $n = 28$ ), contact points were recommended in 30.6% ( $n = 77$ ) and explanation of measured values were given in 26.6% ( $n = 67$ ). In 25.8% ( $n = 65$ ) the online doctor gave reassurance to the patient, decision support (13.9%,  $n = 35$ ) or further sources of information (19.8%,  $n = 50$ ) were provided. Warnings of red flag symptoms were mentioned in 18.7% ( $n = 47$ ) and preventive measurement were advised in 4.4% ( $n = 11$ ). Financial and insurance aspects were discussed in 7.9% ( $n = 20$ ).

#### **3.5.3. Differential diagnosis**

Of  $n = 252$  answers, in 6% ( $n = 15$ ) the online doctors could not assume a possible diagnosis from afar and in 64.7% ( $n = 163$ ) they made a differential diagnosis where they discussed several possible reasons for the mentioned problem.

#### **3.5.4. Recommendation of consultation**

Of all answers, in 53.6% ( $n = 135$ ) a face-to-face consultation was recommended. A visit to the general practitioner was advised in 50.4% ( $n = 127$ ), seeing a resident specialist in Gastroenterology in 31.3% ( $n = 79$ ) or seeing an outpatient specialist in Gastroenterology of a hospital, including the USZ, in 25.6% ( $n = 69$ ).

### **3.6. Rating of the service**

Of all answers, 42.1% ( $n = 106$ ) were rated with regard to their perceived benefit for the user, 41.3% ( $n = 104$ ) for clarity and 42.5% ( $n = 107$ ) for whether the users expectation were met by the provided answer. Of the rated responses, 95.2% rated the clarity, 64.1% the benefit of the medical advice and 63.6% the fulfilled expectation as “very good” or “good”, see Table 5.

## **4. Discussion**

The present retrospective study aimed at analyzing the question content of gastroenterology-related inquiries, the evaluation of the characteristics of the patients and the reasons for using the online consultation service at the USZ. Of further interest were the recommendations of the online doctors and the satisfaction of the inquirers with the service. Most questions were asked about bowel diseases. General abdominal pain and diarrhea were the most commonly mentioned symptoms. The reason using the service was to obtain a second opinion as well as to get medical advice from a University Hospital. Overall, the satisfaction with the answers was good.

With 7.2% of the inquiries concerning the gastrointestinal tract, this health problem represents a common topic of the online consultation service at the USZ. Similar data were presented by “Alleanza degli Ospedali Italiani nel Mondo” (Costanzo & Monari, 2006) and the internet based teleconsultation service „Doctor Chat” in Columbia (Valenzuela, Arguello, Cendales, & Rizo, 2007; Valenzuela,

Lopez, Guzman, & Fajardo, 2010). Despite the considerable proportion of gastroenterological teleconsultations at our institution, little has been published about an email based communication between the patient and their physician especially to provide patients with additional educational content or detailed explanations of their condition (Plener et al., 2014). Most studies are available about remote health programs to support patients with IBD and hepatitis C virus infection (Aguas Peris et al., 2015; Cross, 2011; Huang, Reich, & Fedorak, 2014; Siegel, 2017). In order to meet the needs of the inquirers, it is important to evaluate their characteristics and reasons to be able to provide recommendations of high quality.

The favorite topic of the questions to our service were inquiries about bowel diseases (29.8%) including infectious bowel diseases in 6%, IBD in 7.1% and other bowel diseases in 16.7%, 38.1% of the latter inquiries concerning the irritable bowel syndrome (IBS). The concerned person was mainly the inquirer himself (81.7%) and 20.2% of the inquirers mentioned a mean of 1.29 previous gastroenterological diagnoses. Interestingly the gender ratio of the inquiries was nearly equal but Crohn's disease and IBS occurs more frequently in women as in contrast Colitis ulcerosa shows nearly no gender – related difference (Burisch & Munkholm, 2015; Meleine & Matricon, 2014). The anonymously setting of the online service could indicate its attractiveness to men concerning this small subgroup of patients. The high prevalence of IBD and IBS requires new approaches of health care models and a teleconsultation service with an anonymous setting could complement the health care system (Molodecky et al., 2012; Siegel, 2017). Previous studies of the USZ Online Consultation Service confirm the current result as the service suggest to diminish the barrier for men to ask questions about sexual transmitted diseases or psychological problems (Schmidt-Weitmann, Schulz et al., 2015; Schmidt-Weitmann, Bösch, Weidt, & Brockes, 2015).

In 83.7% of all questions, 779 symptoms were reported with an average number of 3.7 symptoms and maximum of 13 symptoms per request and therefore their number was higher compared to former evaluations of the service. Inquiries about arterial hypertension or psychiatric disorders showed up to 2.3 symptoms on average (Schmidt-Weitmann et al., 2015, 2016). Most often patients suffered from abdominal pain (32.7%), diarrhea (22.7%), general weakness (22.3%) or epigastric pain (17.1%). The self-declared number of symptoms in patients with gastrointestinal disorders is often high (Enck, Kowalski, Martens, & Klosterhalfen, 2006). The two most common symptoms “abdominal pain” and “diarrhea” also occupy the first two places in the same order in large epidemiological studies of gastrointestinal symptoms, which have led to outpatient medical visits in the US in recent years (Peery et al., 2012, 2015; Russo et al., 2004).

Reason for an inquiry was in half of the users to obtain a second opinion, while 25% asked for medical advice. Most patients (61.5%) had already seen a physician, but still wanted to know about different treatment options (55.2%), possible causes of their symptoms or a diagnosis (32.1%), information about a specific disease (21%) or diagnostic procedures (19.8%). The complexity of the inquiries to the online service is reflected in the involvement of other experts of the USZ in 34.5%. Reassurance was given in 25.5%, decision support in 13.9% and differential diagnosis in 64.7% of all answers. Patients with a bowel disease, especially with an IBS or IBD, often have high expectations toward their health providers and a need to obtain comprehensive information about their condition as well as support and hope (Halpert et al., 2010). The lack of information may encourage the concerned patients to search the internet for more medical information. Fifty-three percent of the internet users in Switzerland search for health information and use it for medical decisions (BAG, 2011; Couper et al., 2010). Health information found on the internet is often of different quality and depending on the situation of the information seeker, the information may lead to confusion instead of clarification of the concern of the patient (Morahan-Martin, 2004). The provision of a trustworthy and professional health information service like the online consultation service of the USZ may contribute to the medical education of the inquirer and promotes a new role of the patient being more self-empowered. The rating of the service shows that nearly two thirds of the inquirers appreciated the benefit and the fulfillment of the expectation as very good and good and nearly all inquirers were more than satisfied with the clarity of the given answer. In order to ensure further development of telemedical service models in the future, young student doctors



at the University of Zurich are already taught in the field of different eHealth technologies. The teaching module “Clinical Telemedicine/eHealth” is under the direction of the Department of Clinical Telemedicine at the USZ (Brockes, Wirth, Schmidt-Weitmann, Battegay, & Gerke, 2010).

Nearly two-third of the patients mentioned a past physician contact of a general practitioner or a specialist. Most responses contained information and recommendations on therapies (73.4%), diagnostics (68.3%), or explanation of a specific disease (63.9%). On average, every third gastroenterological question required an assessment of an additional expert and in 53.6% another face-to-face consultation with a health professional was recommended (Schmidt-Weitmann, Buser, Baumann, Schmidt, & Brockes, 2015). Providing comprehensive medical information may support the decision-making process of patients, helps to increase their health literacy and represents a certain form of security and quality instrument.

A limitation of the study is that the information provided by the patient might not be complete due to the open structure of the questionnaire and the number of evaluated inquiries is small. Furthermore, the asynchronous communication and the inability to ask the patients about further details of their medical history limits the comprehensiveness of the medical advice.

In conclusion, an e-mail based teleconsultation in the field of gastroenterology can provide individual advice and empowers patients by improving their health literacy. Patients with bowel diseases have high expectations to obtain professional medical advice and need support in their decision-making process. Furthermore, seems the online consultation service to be attractive for men with IBD and IBS.

#### Competing Interests

The authors declare no competing interest.

#### Funding

The authors received no direct funding for this research.

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#### Citation information

Cite this article as: Medical online consultation service in gastroenterology at the University Hospital Zurich, Sabine Schmidt-Weitmann, Thomas Grischott, Peter Bauerfeind & Christiane Brockes, *Cogent Medicine* (2017), 4: 1334409.

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