GASTROENTEROLOGY & HEPATOLOGY | RESEARCH ARTICLE

Medical online consultation service in gastroenterology at the University Hospital Zurich

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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 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, Tolley, & 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. 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
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.

| 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                              |
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 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             | Leishmaniosis                    | 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           |
3.2.2. 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 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                               |

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           |
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, Table 5. Rating of the online service

|                       | Benefit n = 106 | Clarity n = 104 | Fulfilled expectation n = 107 |
|-----------------------|-----------------|-----------------|-------------------------------|
| 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%)                    |
Lopez, Guzman, & Fajardo, 2010). Despite the considerable proportion of gastroenterological tele-
consultations 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 pro-
vide 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 gastro-
enterological 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 anonymous-
ly setting of the online service could indicate its attractiveness to men concerning this small sub-
group 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 sys-
tem (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 “ab-
dominal pain” and “diarrhea” also occupy the first two places in the same order in large epidemi-
ological 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.

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