

# Teleconsultation in vascular surgery: a 13 year single centre experience

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## Summary

The University Hospital of Zurich has provided an email-based medical consultation service for the general public since 1999. We examined the enquiries in a 13-year period to identify those related to vascular surgery (based on 22 ICD-10 codes specific for vascular surgery). There were 40,062 questions, of which 643 (2%) were selected by ICD-10 codes. After exclusion of diagnoses not relevant to vascular surgery, 139 questions remained, i.e. an average rate of about one per month. The mean age of the users was 43 years (range 19–88). Most users (61%) were women. The majority of users asked questions about their own health problems (79%) with varicose veins and spider veins accounting for 63% of all questions. Arterial diseases accounted for 30%. The patient's intention in contacting the service was to obtain advice on treatment options (37%), information about a diagnosis or symptoms (27%), or a second opinion (15%). The online service responded with detailed information and advice (87%) and suggested a referral to the family doctor or a specialist in 75%. Most patients (82%) rated the service overall as good or very good. It appears likely that telemedicine and in particular email teleconsultations will increase in vascular surgery in the future.

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## Introduction

In vascular surgery, encouraging results for postoperative teleconsultation via video-communication have been reported recently following early discharge after carotid endarterectomy.<sup>1,2</sup> Furthermore, preoperative teleconsultations of vascular surgical patients have been shown to be as effective as on-site consultations.<sup>3,4</sup> These reports are based on teleconsultations with the general practitioner or the vascular specialist arranging the telemedical consultation. Data on teleconsultations between patients and health care specialists initiated by the patients themselves, such as “ask the doctor” services, are limited. There are reports about ask-the-doctor services in general medicine,<sup>5</sup> in sports medicine,<sup>6</sup> in dermatology and in maxillo-facial surgery,<sup>7</sup> but not in vascular surgery.

The University Hospital of Zurich has provided an Internet text-based medical consultation service for public use since 1999.<sup>8</sup> The service is provided by six “Internet doctors”, who are specialists in various fields such as family medicine, general internal medicine, anaesthesiology and surgery. For very specific problems requiring additional expert knowledge, senior clinicians in any department of the University Hospital of Zurich are consulted online by forwarding the question. The expert answer is returned to the user via the Internet doctors. The service is accessible via the University Hospital of Zurich's homepage (<http://www.onlineberatung.usz.ch>)

and provides health information mainly in German, but also in English, French and Italian. In 2008, a fee of 75 Swiss francs (approximately 60 €) was introduced,<sup>9</sup> which has to be paid electronically before the answer can be received. Answers are usually given within 24 hours on working days. For the patient, the procedure is simple and convenient: after accessing the service web page, the user enters the following obligatory data through an openly structured questionnaire via a secure SSL-connection (Secure Sockets Layer connection): email address, district of domicile (canton) or country (European Union or not), gender, subject and the request. Age, height and bodyweight became obligatory in 2003. Optional information can be given on smoking status, additional complaints, past medical history and current medication. After receiving the response, the user is asked to rate the service (introduced in 2003) with respect to usefulness in terms of an overall evaluation and the clarity of answers on a 5-point scale (1 = very good to 5 = very poor). Due to its asynchronous nature, the service

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is not suitable for medical emergencies, and this is clearly stated on the webpage. To date, more than 40,000 online questions have been answered in various medical fields.<sup>7</sup>

The aim of the present study was to search the University Hospital of Zurich online consultation database for questions specific to vascular surgery, to characterize service users and their questions, and to evaluate the answers given by the doctors.

## Methods

Since all online enquiries are ICD-10 (International Classification of Diseases) coded by the doctors of the service team, the database was searched for 22 ICD-10 codes including all possible diagnoses relevant for vascular surgery for the 13-year period between August 1999 and August 2012 in this retrospective analysis. These included I 65, I 70–79, I 80–89 and Z49 and covered the whole spectrum of arterial and venous pathology. Acute and chronic wounds were not included in the study. Overall, 40,062 questions were analysed and 643 (1.6%) were selected by ICD-10 codes. After exclusion of enquiries about haemorrhoids, varicoceles, deep vein thrombosis and others, 139 questions (0.34%) were identified as suitable for analysis.

The procedure of inductive category development, as described by Mayring, was applied.<sup>10</sup> The content of the questions, answers and profile of the inquirer was manually reviewed and analysed by creating a code matrix. We used a text analysis program (MAXQDA 10, VERBI Software, Berlin, Germany). The following eight main data categories were analysed: user characteristics (including age, gender, body mass index (BMI), smoking status and concerned person), diagnoses, type and duration of symptoms, medication, previous vascular surgery and past medical history, intention to contact the service, response of the service and patient's rating of the service (Table 1). Data are presented as % relative to the study population (n = 139). The study was approved by the appropriate ethics committee.

## Results

There were 139 vascular surgery questions, of which 61% (n = 85) were asked by women and 39% (n = 54) were asked by men. The mean age of the service users was 43 years (range 19–88). Most users were younger with the

largest proportion of 35% between 21 and 30 years (Table 2). The substantial number of users of unknown age (23%, n = 32) or unknown bodyweight (29%, n = 40) was due to the fact that specification of age, bodyweight and height was optional until 2003.

Most users (58%, n = 57) had a normal BMI. About one-third (32%, n = 32) were overweight, see Table 3. Most users stated that they were not smoking (81%, n = 112), but some indicated they were smokers (16%, n = 22) or ex-smokers (4%, n = 5).

Most users asked questions about their own health problems (79%, n = 110) followed by 8% (n = 11) of users enquiring on behalf of their parents. A few users enquired for their spouses or partners (3%, n = 4), for their children (1%, n = 2), for other relatives (1%, n = 2) or friends (2%, n = 3). Three doctors used the service for consultation about their patients (2%) and in four cases, the relationship of the user to the actual patient remained unclear (3%).

## Diagnosis

In 93% of enquiries (n = 129), the diagnosis had already been made by the family doctor or a specialist, and in 7% (n = 10), the diagnosis had not been established. The largest group of enquiries concerned venous diseases (63%, n = 87) including varicose veins (40%, n = 55) and spider veins (23%, n = 32). Arterial diseases accounted for 30% (n = 42) in total. A detailed list of diagnoses is shown in Table 4.

## Type and duration of symptoms

Users described a variety of different symptoms: 60% (n = 84) complained about specific symptoms such as

**Table 1.** Categories of analysis.

User characteristics
Diagnosis
Type and duration of symptoms
Previous vascular surgery and past medical history
Medication
Patient's intention to contact online service
Response of online service
Patient's rating of online service

**Table 2.** Age distribution of users (n = 107).

Age interval, years	Number (%)
Under 21	1 (0.9)
21–30	37 (35)
31–40	17 (16)
41–50	15 (14)
51–60	15 (14)
Over 60	22 (21)

**Table 3.** Distribution of body mass index (n = 99).

Body mass index, kg/m <sup>2</sup>	Number (%)
Less than 18	10 (10)
18–24.5	57 (58)
More than 25	32 (32)

pain, aesthetically disturbing appearance, leg swelling and paraesthesia. For a detailed list of specific symptoms, see Table 5. In 17% (n = 24), users were explicitly asymptomatic, two users described non-specific symptoms (1%) and in 21% (n = 29), no symptoms were mentioned. The symptoms lasted less than one week in four patients (3%), between one week and six months in 18 patients (13%) and more than six months in 42 patients (30%). The duration of their symptoms was not indicated by 75 patients (54%).

### Previous vascular operations and past medical history

Previous vascular surgery was analysed to obtain an indication of the co-morbidity of the patients and to evaluate the potential need for further treatment. Eight patients (6%) indicated previous varicose vein surgery. If this number is related to the number of questions on varicose veins only (n = 55), the proportion is 15%. Similarly for spider vein sclerotherapy, 3% (n = 4) of all patients and 13% in the specific group of spider veins had sclerotherapy before. 2% (n = 3) of all patients and 17% of users

asking questions about aortic pathology had aortic surgery before. 6% in total (n = 8) and 38% in the respective group had peripheral arterial bypass surgery and/or angioplasty and/or stent implantations before. Previous carotid artery operations (TEA) had been performed in two patients (1% and 67%, respectively) (Table 6). Past medical history included arterial hypertension in 18 cases (13%), diabetes mellitus in three patients (2%), hyperlipidaemia in four (3%) and chronic obstructive lung disease in five patients (4%). A family history indicative for the genetic predisposition of the specific disease was stated by 12 users (9%).

### Medication

The majority of users (55%, n = 76) did not indicate any current medication. Two patients (1%) had warfarin anticoagulation, 14 patients (10%) took acetylsalicylic acid and one patient (0.7%) clopidogrel as an antiplatelet agent. 18 patients (13%) were on antihypertensive treatment. Four patients (3%) indicated the use of serum lipid lowering medication. Two varicose vein patients (1%) were on chestnut extract medications and three patients (2%) used magnesium supplements to alleviate lower extremity muscle cramps. Fifteen users (11%) were on oral contraceptive medication and further 30 patients (22%) on various other medications.

**Table 4.** Diagnoses (n = 139).

	Number (%)
Venous disease:	
Varicose veins	55 (40)
Spider veins	32 (23)
Arterial disease:	
Arterial occlusive disease (central and peripheral)	19 (14)
Aortic aneurysms (thoracic and abdominal)	15 (11)
Aortic dissections (2 type A and 1 type B)	3 (2)
Carotid artery stenosis	3 (2)
Thoracic outlet syndrome	1 (0.7)
Brachial artery aneurysm	1 (0.7)
No diagnosis	10 (7)

**Table 5.** Specific symptoms in patients (n = 136).

	Number (%)
Pain	32 (24)
Aesthetically disturbing	15 (11)
Leg swelling	12 (9)
Paraesthesia	9 (7)
Feeling of leg heaviness	7 (5)
Leg cramps	4 (3)
Skin alterations	3 (2)
Symptoms of phlebitis	1 (0.7)
Fever	1 (0.7)
Impotence	1 (0.7)

### Intention in contacting the online service

The main intention in contacting the online service was to obtain specific information on current treatment and treatment options (37%), followed by a detailed explanation of symptoms (27%) and the diagnosis made by the family doctor, see Table 7. Further intentions were the wish for a second opinion (15%), questions about the specific treatment at the University Hospital of Zurich (13%), about prevention (12%) and prognosis (4%) of their disease as well as the wish to support a patient's decision (11%) and a detailed explanation of risks and side effects of specific treatments and operations (11%). Financial aspects were also frequently asked for (10%), whereas the intention to be diagnosed by the online service was rare (5%), mainly

**Table 6.** Previous vascular surgery (n = 139).

	Number	Percentage of total	Percentage of respective group
Venous disease:			
Varicose vein surgery	8	6	15
Spider vein sclerotherapy	4	3	13
Arterial disease:			
Aortic surgery	3	2	17
Peripheral arterial bypass or angioplasty/stent implantation	8	6	38
Carotid artery surgery (TEA)	2	1	67

**Table 7.** Intentions of patients (n = 136) to contact the online service (several intentions possible).

	Number (%)
Treatment and/or treatment options	50 (37)
Explanation of symptoms and diagnosis	37 (27)
Second opinion	21 (15)
Availability of treatment at the University Hospital Zurich	18 (13)
Prevention of disease	16 (12)
Risk and side effects of treatment and operations	15 (11)
Support for a decision	15 (11)
Financial aspects (insurance coverage, costs)	14 (10)
Obtain a diagnosis	7 (5)
Prognosis of disease	6 (4)
Specialist recommended	6 (4)

because most patients had already been diagnosed by their family doctor or by their specialist. In a few cases (4%), the service was asked to recommend a specialist in the appropriate field, which was provided in all cases.

### Response of online service

Most questions (86%, n = 120) were answered by the team of Internet doctors, but 14% (n = 19) were forwarded to a specialist (vascular surgery 5%, angiology 7%, dermatology 1% and infectious diseases 0.8%). The questions were answered by all Internet doctors equally. The response of the online service consisted mainly of specific information and advice (87%, n = 122). As mentioned above, only a few times, a differential diagnosis had to be made (4%, n = 6). Due to the complexity of the medical problem including the necessity for a physical examination, laboratory testing or imaging, three-quarters of the patients were advised to see a specialist (53%, n = 73) or their family doctor (22%, n = 31).

### Patient's rating of online service

Responses from 54 (39%) of the 139 users were available for analysis (quality evaluation was introduced in 2003). On a scale from 1 (very good) to 5 (very poor), the overall evaluation was 1.9 (range from 1 to 5). Satisfaction for clarity of answers was 1.3 (range 1 to 3).

## Discussion

The introduction of the Internet has already had a considerable effect on the conventional doctor-patient relationship.<sup>11</sup> In 2004, about 5% of all Internet searches were health related<sup>12</sup> and in 2007, more than 50% of the European population had used the Internet for health purposes.<sup>13</sup>

The present study reports on an email-based medical consultation service, and specifically the enquiries about

diagnoses and therapies in vascular surgery. During a 13 year period, there were 139 enquiries about vascular surgery (0.3% of the total), i.e. approximately one per month. In terms of user characteristics, the predominance of younger female patients is well known and has been described previously. However, patients of all age groups (19–88 years) used the consultation service for vascular queries, indicating the ease of use and widespread acceptance of email consultation. Women generally look for health information more often than men do, and have been described as communicating more with physicians.

Most vascular queries (63%) were about venous pathology, such as varicose veins and spider veins, which are common in women<sup>14</sup> and tend to be aesthetically more disturbing, with aesthetic appearance being the second most common complaint in our study (11%). Arterial pathology accounted for 30% of enquiries and included very complex problems such as thoracic and abdominal aortic aneurysms, as well as aortic dissections. Only 15% of all patients enquiring about varicose veins and 17% of all patients enquiring about aortic pathology had previous surgery in the respective field. This suggests that many patients reflect thoroughly before they make a decision regarding treatment.

Most patients (93%) had been seen by their family doctor or a specialist before and had been diagnosed already. Therefore, their main intention was not to obtain a diagnosis (5%), but to obtain information about treatment options (37%), about side effects and risk of therapy (11%) and request second opinions (15%). They wished for more detailed information about their symptoms and diagnosis than their family doctor had given to them already (27%). Symptoms tended to be chronic, and most patients (30%) had suffered for more than six months before their enquiry. These findings are supported by literature.

Email consultation services have been used for enquiries about chronic diseases<sup>15</sup> and more than half of the patients were diagnosed by their family doctor beforehand. In these services, the main intention of the online enquiries was to obtain information on a specific disease or therapy (50–60%) or to obtain a second opinion (10–18%). Again, the wish for an online diagnosis was quite rare (14%).<sup>7</sup> In fact, ethical concerns have been raised about online diagnoses in the absence of a pre-existing patient-doctor relationship. Following these guidelines, email-based consultation services have been reported to advise about 50% of all patients to make a further visit to their family doctor or specialist. In our study, 75% of the patients were advised to see a specialist (53%) or their family doctor (22%) due to the need for further radiology/angiology imaging or to start treatment.

In contrast to previously reported teleconsultation services in vascular surgery<sup>4</sup>, which have substituted a conventional outpatient attendance with videoconferences, email-based consultation services aim primarily at providing general and patient specific health information in line with "patient empowerment".<sup>16</sup> Thus, patients are

“empowered” to improve their health literacy which ultimately leads to more responsible and self-guided decisions about their own health problems.

In our study 86% of the questions were answered by the six Internet doctors. However, in 14%, the enquiries were too complex and needed to be sent to specialists in vascular surgery, angiology or dermatology.

A limitation of our study might be the lack of information given by the patients on topics such as duration of symptoms, age, bodyweight and height (before their obligatory introduction in 2003) due to the open structure of the questionnaire. However, patient satisfaction with telemedical applications has been reported to be very high, as confirmed in our study with 82% of all answers rated as “good” or “very good”. Therefore, it appears likely that telemedicine and in particular email teleconsultations will increase in vascular surgery in the future.

### Conclusions

The email based medical consultation service of the University Hospital of Zurich has been used for a limited number of queries in vascular surgery. Patients have been mainly interested in specific treatment options, a second opinion and the explanation of symptoms and diagnoses. Vascular surgery consultations by email complement conventional healthcare and contribute to patient “empowerment”.

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