

Factors influencing QoE of video consultations

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Abstract—During the Covid-19 pandemic, the use of videoconferencing for medical consultations between patients and general practitioners (GPs) has strongly increased. The aim of this work-in-progress paper is to investigate which factors (technical and non-technical) influence patients’ and doctor’s Quality of Experience with video consultations (“tele-consultations”) and how. We report on findings from an online questionnaire (N=109) and an (ongoing) semi-structured interview study targeting GPs (N=4), highlighting the importance of both technical and non-technical factors.

I. INTRODUCTION & RELATED WORK

The worldwide COVID-19 pandemic forced certain sectors (e.g., the judicial sector [1] and primary healthcare sector [2]), to suddenly switch to digital workflows and practices. In Norway for instance, the number of General Practitioners (GPs) who offered video consultations had more than tripled in the first months after the first lock-down [3]. As a result, patients and doctors who had little to no experience with video consultations and/or a negative attitude towards such “tele-consultations”, were forced to adopt it almost overnight.

As this large-scale “trial” may also lead to increased use of videoconferencing in medical practice in the future, it represents a unique opportunity to capture data on how video consultations are used, experienced and on factors influencing these experiences. In this work-in-progress paper, we therefore focus on the increased use of videoconferencing for patient-GP video consultations and investigate which factors may influence doctors’ and patients’ Quality of Experience (QoE) in this context [4], [5]. To do so, we share findings from a questionnaire study (N=109) primarily focusing on patients and an (ongoing) interview study targeting GPs (N=4).

While video conferencing as a medium has received a lot of attention in research on QoE (see e.g., [6]) for an overview, video consultations as a distinct use case have not received as much attention [7]. Prior studies have among others focused on QoE in the context of e-Health services (see e.g., [8], subjective evaluations of medical content [9] an other tele-medicine use cases (see [10])). The recent work presented in [11], emphasizes the importance of a good QoE in the context of e-Health services due to the potential severe consequences of bad QoE (e.g., task performance, delayed or wrong diagnosis). The authors introduce a model-based approach to measure QoE of a teleconsultation application [11], however, without considering non-technical factors. Further, [12] investigated the impact of content and device awareness on QoE for

medical (ultrasound) video streaming. However, the generated database contains evaluations from 6 medical experts only.

Turning now to the literature addressing this topic from a more medical perspective, prior work focusing on the concept of *patient experience* and related to video consultations is highly relevant. While there is no commonly accepted definition of patient experience [13], the concept deals with how patients subjectively perceive their disease and treatment [14]. Some prior studies have focused on patient experiences in the context of video consultations. In [15], patients who needed a follow-up consultation were able to choose between video, telephone and face-to-face consultation. The consultations were recorded, and participant experience was investigated through a post-consultation questionnaire. The findings indicated among others that the patients who chose video consultation were younger and more frequent users of Internet-based services and that technical problems were common. A study with a similar methodology reported positive patient experiences with the use of video consultations [16]. However, technical problems were commonly reported and the lack of an integrated infrastructure was identified as a barrier.

Nonetheless, the pandemic has also triggered successful usage of video consultations among specialist such as orthopedists [17], [18], cardiologists [19], neurologists [20], [21], oncologists [22], psychiatrists and mental health counselors [23]. Studies such as [24], [25] illustrated specialists’ satisfaction with and positive attitude towards future use of video consultations [25] and positive self-evaluations of their patient examinations over video [24]. However, [25] also identified clear barriers related to technology access and quality-related challenges. Studies linked to e.g., medical student and practitioner training programs also highlighted the importance of technical factors [26], [27]. In [28], the usefulness of video consultations was questioned and it was argued that they are not a practical replacement for physical consultations. Some of the above studies informed the design of the questionnaire and interview guide, described in Section II.

II. STUDY SET-UP

To better understand what influences the (quality of) patients and doctor’s experiences with video consultations, we combined a cross-sectional, online questionnaire with semi-structured interviews of GPs. A convenience sampling strategy was used to recruit respondents via social media.

A. Online questionnaire

The questionnaire [29] contained 22 questions and was administered in the survey tool Nettskjema. The first part aimed to collect general info about the respondents. Next, they were asked whether they had already participated in a video consultation. Respondents who answered “no” were sent to the final part of the questionnaire (future use). Those with video consultation experience were asked about basic use-related characteristics, after which the questionnaire further zoomed in on respondents subjective experiences with video consultations. They were asked about the occurrence of quality-related problems and if relevant, how these affected the conversation. Further, respondents had to rate the importance of different attributes and factors. Finally, they were invited to shortly describe their latest video consultation experience and asked about their anticipated future use. The respondents who indicated to have participated in a video consultation as doctor/GP were asked to reply to additional questions, but as this applied only for 3 participants, we do not discuss them in detail here.

B. Semi-structured Interviews with GPs

The interviews were conducted digitally via Zoom and took around 45-50 minutes. The interview guide was divided into 5 parts: introduction, warm up, general opinion on video consultations, personal experience and future of video consultations. First, relevant background information was collected, such as age, years of experience as GP, general use of video conferencing. The next part of the interview addressed GPs’ general attitudes towards the use of video consultations in their practice, and the factors bearing an influence on them. The main part of the interview was concerned with GPs personal experiences with video consultations: how and when (e.g., for which problems, patient types) were video consultations used? The GPs were also invited to elaborate on factors influencing the quality of their experience and on what is needed for a successful consultation. Finally, there were questions related to the patient-doctor relationship and doctor’s working practice. The very last part of the interview was related to anticipated future use and to what could be improved.

III. RESULTS

A. Online questionnaire

In total, 109 people (of whom 3 active GPs) completed the questionnaire. 47.7% of the respondents are female and the average age is 35.37 (S.D. 12.80). 7 out of 10 respondents have experience with the use of video chat both for private and work-related purposes. In total, 41.3 % of the respondents had already participated in at least one video consultation with a GP. Of them, 73.4 % did not have any previous experience with this type of consultation before the lockdown. In terms of devices, smartphones (used by 66% for a video consultation), laptops (used by 42%) were most commonly used. As platforms, Confrere (31.1%) and Facetime (20%) were most common (note that 31.1% indicated to not remember which platform was used). When asked how many

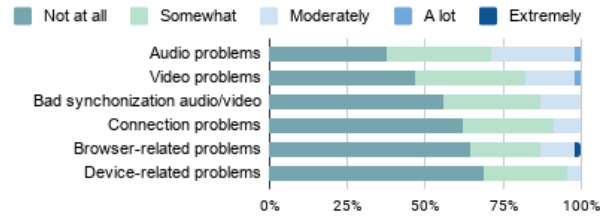


Fig. 1. Quality-related problems experienced during a video consultation

video consultations they had had in the 6 preceding months, 40% indicated 2-3 (not surprisingly the 3 GPs indicated more than 10). While 42.5% indicated an average video consultation duration of less than 10 minutes, 27.5% reported 10-20 minutes and the remaining 40% even longer.

Figure 1 shows the reported occurrence of quality-related problems. More than half of the respondents reported to have experienced audio- and video-related problems to a certain extent, while browser- and device-related problems less frequently reported. The following open question indicated however that other than technical factors come into play here as well. One respondent wrote “*I suspect my doctor was not very technically competent. He called me on the cell phone in addition to the video, as there was no sound on the video*”. Another respondent referred to the GP not using a good microphone as the main cause of bad audio quality. Further, one of the GPs wrote: “*I’ve experienced few technical problems, but when they occur, they are time consuming and disabling. Lots of extra work*”.

Respondents were also asked to indicate what they consider to be important when having a video consultation. As displayed in Figure 2, a wide range of attributes are considered to be (very) important. The safeguarding of patients’ privacy at all times and related to that, the security of the used platform are considered “very important” by more than half of the respondents. The availability of the platform whenever needed and the sound quality are clearly also considered as crucial. The fact that video consultations may offer a more environmental-friendly alternative and the relationship with the doctor are considered as somewhat less important.

When asked through an open question which other aspects matter in this context, one respondent pointed to the fact that the doctor should feel in control and create a safe environment, despite the digital setting: “*It’s still important to me that my*

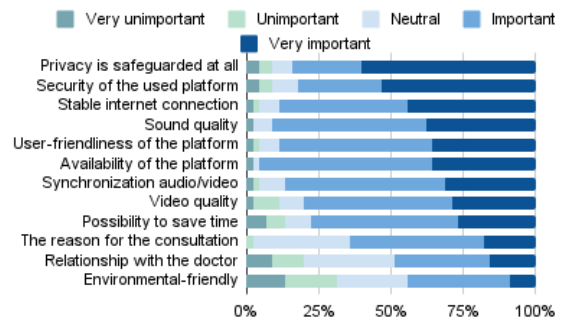


Fig. 2. What is important in the context of video consultations?

doctor has “warm hands”, even if we do not meet physically”. An additional aspect mentioned here by several respondents was that they felt safer and not risking to get a COVID-19 infection. One respondent stated: “Since there was no need for any clinical examinations, it was very nice to be able to take it on video consultation, both in terms of infection control, travel time, waiting, transport, etc”. Respondents were also asked to describe in their own words how they experienced their last video consultation. While the majority of those who chose to answer reported on positive experiences (e.g., convenient and easy, familiarity with the doctor hence no obstacle, not having to wait in a waiting room, better than an audio-only consultation, doctor had more time), the lack of the physical aspect was also mentioned several times, both in view of medical investigation and in terms of the lack of body language and visual cues in the conversation. In addition, the context (reason for going to the doctor) was mentioned to play a role: “in some cases I really want a physical consultation”.

The last part focused on anticipated future use. Whereas half of the respondents indicated that they will make use of the video consultation possibility also in the future, around 1 out of 4 respondents indicated that they would go for a video consultation only if the physical alternative is not available. In terms of preference, almost 1 of 2 (46.7%) would still prefer a physical consultation if able to choose.

B. Interviews with GPs

Four interviews were conducted so far - two women and two men, with an age range between 24-47. Both female interviewees started working as GPs right after the pandemic started. Three out of four GPs had never used video consultations before the pandemic and when asked about their attitudes towards video consultations, they answered that they were mostly positive: the video solution was safe and time-saving for themselves and their patients. The fourth doctor had a more negative attitude due to the lack of doctor-patient physical interaction. For three out of four doctors’ offices, physical consultations were not available at all during the lockdown period. The fourth doctor mentioned that also most patients preferred video, despite the physical consultation option.

In terms of suitability, there was high agreement that cases such as prolongation of sick leave, anxiety and depression can be handled by means of video consultations. However, the respondents all individually concluded that the medium is not suitable for all cases. Examples such as consulting acute abdomen or performing blood tests, ECG etc. were given to indicate that sometimes, physical contact with the patient is essential. Rash was also mentioned as difficult to consult over the video, due to technical issues such as poor camera quality, unstable internet and sub-optimal lighting conditions on the patient’s side: “One would expect that the digital technology works so well that one would be able to clearly see birthmarks, but it actually works really bad for that”(Female, 30). Other technical problems mentioned include bad internet connection, lack of a stable infrastructure and crashing software. Re-calling the patients who had

technical difficulties or who disconnected from virtual waiting room could be very time-consuming. Further, the influence on doctor-patient relationships was discussed. Here, the age of the patient and established relation were mentioned as influence factors. E.g., for older patients, the video consultation format was mentioned to be less suitable, as they need to real contact. For younger patients, the opposite was mentioned: “There are many, especially younger patients, that seem to find it easier to talk with some distance” (female, 24). Further, knowing the patient from before was mentioned to make the difference between regular and video consultation smaller. Interestingly, another factor influencing how video consultations were used, was the income it generated. One of the GPs admitted that her practice made a lot more money because of that. When compared to telephone consultations, the most experienced GP said: “Patients also think that when they have to pay for this here (the video consultation), that they get a bit more value for money if they can see the doctor” (Male, 47).

When it comes to future use, opinions were mixed. One of the younger female GPs recognizes the advantages, but at the same time fears a potential discontinuity in the patient-doctor relation. The factor “location” was also put forward as a determining one here: video consultations can become more popular in the big cities with more younger patients. However, as pointed out by the most experienced GP (male, 47): “If we want video consultations to be used more and more appropriately, then we need more research”.

IV. CONCLUDING THOUGHTS

Categorized according to the classification made in [5], our results indicate that *Human Influence Factors (IFs)* such as the patient’s age and medical condition, as well as the expectations, attitudes, prior experiences, and technical skills and competence of patient and GP play a role. The prior trust-based relation (or lack of it) between patient and GP also bears an influence. In terms of *System IFs*, both patient and GPs mentioned network-related problems (e.g., quality impairments due to unstable connection), device-related (e.g., bad microphone or camera) characteristics and application-related (e.g., stability, security, user-friendliness) properties. Finally, in terms of *Context IFs*, characteristics related to the physical (e.g., lighting in the room), temporal (e.g., follow-up of long-term illness), social (patient-GP relation), economic (remuneration and cost) and task context (e.g., reason of the consultation and type of condition) were found to influence the experience. Technical factors (still) impose a number of barriers, therefore QoE research can play an important role towards further improving patient and GP QoE with video consultations. However, as shown, the importance of non-technical factors cannot be underestimated and therefore needs to be better taken into account in future QoE-oriented studies.

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