



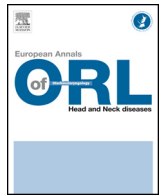
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Original article

Telemedicine for ENT: Effect on quality of care during Covid-19 pandemic



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ARTICLE INFO

Keywords:
 Telemedicine
 Telehealth
 Otolaryngology
 Satisfaction
 Covid-19

ABSTRACT

Aims: To assess the benefit of telemedicine consultation during the Covid-19 pandemic.

Material and methods: A prospective study of patient satisfaction with telemedicine consultation was carried out in the ENT department of a university hospital center where telemedicine consultations were set up to replace scheduled out-patient consultations. Patients were divided into two groups according to overall satisfaction, in order to identify predictive factors. The significance threshold was set at $P < 0.005$. The main endpoint was patient satisfaction after an ENT telemedicine consultation during global lockdown. The secondary endpoint comprised predictive factors for overall satisfaction.

Results: One hundred of the 125 patients with telemedicine consultation over a 7-day inclusion period completed the questionnaire. Overall satisfaction was 87%. There were no clinically relevant predictive factors significantly associated with satisfaction. Sound and video quality was satisfactory for 76% and 61% of patients respectively, without significant impact on overall satisfaction (respectively: OR = 3.40, P -value = 0.049; and OR = 3.79, P -value = 0.049). Lack of physical examination did not significantly correlate with reduced overall satisfaction (OR = 0.30, P -value = 0.027).

Conclusion: Telemedicine consultation did not allow complete medical care but, in a difficult time like the global pandemic, was well accepted by patients. It is a simple way to maintain continuity of care while reducing contamination risk by avoiding direct contact between patients and healthcare professionals.

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1. Introduction

With the Greek prefix “tele”, meaning “far”, teleconsultation is a means of performing remote medical consultation, enabled by modern technology. The French health authority (HAS) defines telemedicine as medical acts performed remotely using information and communication technology (https://www.has-sante.fr/upload/docs/application/pdf/2019-07/guide_teleconsultation_et_teleexpertise.pdf). Application of telemedicine in ENT was first advocated in the 1990s [1], initially to improve care provision, especially in rural areas, by facilitating access to specialist consultation in particular [2]. It has since been assessed in the context of specialist opinion [2], including ENT opinion [3–7], and in certain

under-provided geographic areas [8]. The Covid-19 (SARS-CoV-2) pandemic shook up medical practices; since the onset, all face-to-face hospital consultations were suspended, except in cases defined by the guidelines of the French ENT Society (SFORL): immediately life-threatening pathology, uncontrolled pain, major incapacity with neurologic deficit, and any unusual postoperative development [3].

In this context, telemedicine consultation was developed for patients with suspected Covid-19 [9], to limit travel (and hence virus propagation) and protect caregivers and patients [9]. It was also implemented for non-Covid-19 patients with chronic pathology [3]. Prior to the present health emergency, telemedicine was already increasingly used, as numerous articles testify [8]. There have, however, been few reports of telemedicine consultation in ENT in contexts of pandemic or other natural disasters [7,10], and there are no data on patient satisfaction with teleconsultation during the pandemic.

The main study endpoint was patient satisfaction with an ENT telemedicine consultation in the context of global lockdown for

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Table 1
Questionnaire responses to qualitative questions (questions 1–12) with 1–5 Likert scores, according to age.

Question	Results < 50 years	Results > 50 years	P-value
1. I was satisfied with the sound quality during the teleconsultation	4.0 (1.1)	4.0 (1.3)	0.636
2. I was satisfied with the video quality during the teleconsultation	3.4 (1.3)	3.6 (1.5)	0.319
3. The teleconsultation made me nervous	1.3 (0.8)	1.7 (1.2)	0.111
4. I could easily communicate and tell my doctor my health problems	4.5 (0.8)	4.7 (0.5)	0.605
5. I felt the doctor answered all my questions	4.7 (0.5)	4.8 (0.4)	0.180
6. I felt the reason for consulting was urgent	3.0 (1.3)	3.2 (1.4)	0.456
7. I was satisfied with the doctor's response to my problem	4.7 (0.6)	4.6 (0.7)	0.575
8. I think the consultation was as effective as if it had been at the hospital	3.4 (1.5)	3.4 (1.4)	0.919
9. I was bothered that the doctor could not examine me	3.0 (1.4)	2.9 (1.4)	0.852
10. Teleconsultation saved time and money	4.3 (1.0)	3.7 (1.4)	0.020 ^a
11. I would use teleconsultation again	3.9 (1.2)	3.9 (1.1)	0.863
12. Overall, I was satisfied with the teleconsultation	4.2 (1.0)	4.3 (0.9)	0.687

Response distribution not being symmetric, results are reported as median (interquartile range). The Likert scale was scored as: 1 = disagree; 2 = partly disagree; 3 = neutral; 4 = agree; 5 = fully agree

^a statistically suggestive ($P < 0.05$).

the Covid-19 pandemic. Secondary endpoints comprised predictive factors for satisfaction, and the advantages, drawbacks and limitations during a major health crisis.

2. Materials and methods

A prospective study was performed in the ENT department of a university hospital center during the Covid-19 pandemic. Telemedicine consultations were set up to replace scheduled consultations cancelled under French nationwide lockdown. A satisfaction survey was carried out over a 7-day inclusion period during lockdown. The institutional review board of Lyon, France, judged the study non-interventional (n° 20-85).

Telemedicine consultation used the "SARA" platform, a free and user-friendly telemedicine system accessible to health professionals and patients at www.sante-ara.fr/teleconsultation, secure and approved for hosting health data. Patients were contacted by the secretariat with explanations regarding the platform, and consent was obtained for teleconsultation. The secretariat telephone number was systematically given to the patient, to ensure technical assistance in case of problems with the teleconsultation. The application was accessible on Apple® or Android®, via smartphone or computer. Some minutes before the appointment, the patient was sent a link, by text message or e-mail; the patient thus arrived in a virtual waiting room, and the physician was informed that the connection had been made. Consultations were performed by senior ENT physicians who had had webinar training and written support explaining the platform's functioning. The secure platform was linked to a secure messaging service used by medical staff in the local area (Auvergne-Rhône-Alpes Region of France).

The questionnaire was delivered at end of consultation. Consenting patients could respond by e-mail, mail or telephone. As no validated questionnaires were available [8], we drew one up comprising demographic data, field of and reason for consultation, home-to-hospital distance, and whether patients were shielding at home or going out to work. There were 12 quantitative questions (questions 1–12) on 1–5 Likert scales (Table 1), followed by 2 binary yes/no qualitative questions (question 13: "Did you encounter technical problems in the teleconsultation?", and question 14: "Do you think the lack of clinical examination is a problem for your ENT pathology?") 1 open qualitative question (question 15: "What was the outcome of the consultation?"). Consultation time was directly recorded on the SARA platform. A satisfaction survey was also conducted with the 4 senior ENT physicians who were using telemedicine consultation for the first time.

Statistical analysis focused on the first hundred complete questionnaires collected after systematic inclusion of all patients over a 7-day period, to ensure sample representativeness and minimize

optimism bias. Reported values comprised number (percentage) for categorical variables and mean [range] for quantitative variables. Qualitative analysis of free comments (question 15) was performed blindly by 2 observers, identifying key survey topics. According to overall satisfaction responses to question 12, 2 groups were distinguished: "Poorly or not satisfied: PNS" (Likert score 1–3) and "Satisfied or very satisfied: SVS" (Likert score 4–5). Likert scores on the main endpoint were reported as percentages per item and are detailed below for the overall population. Mean values were compared on Wilcoxon parametric test to assess responses according to satisfaction group (PNS versus SVS). For secondary endpoints, odds ratios (OR) with 95% confidence intervals (95% CI) were calculated per variable on univariate logistic regression. All clinically relevant variables suggestively associated with satisfaction on univariate logistic regression (at $P < 0.05$) were included in the multivariate model to take account of possible confounding factors. The results of the uni- and multi-variate analysis are presented in Table 3. $OR > 1$ corresponds to an independent predictive factor for better satisfaction (SVS), and $OR < 1$ to an independent predictive factor for poorer satisfaction (PNS). A descriptive subgroup analysis was performed for patients in multidisciplinary consultation for peripheral facial palsy. The significance threshold was set at $P < 0.005$, in line with recent studies for improved reproducibility in evidence-based medicine [11,12]; $P < 0.05$ indicated a non-significant but suggestive trend. All analyses used R software, version 3.5.3 (www.r-project.org).

During the inclusion period from April 6 to 10, 2020, 125 patients had ENT telemedicine consultation, 100 of whom agreed to answer the questionnaire. Mean age was 51 years [18–78 years]. Age-group distribution was homogeneous, with 28% < 40 years, 39% 40–60 years, and 34% > 60 years. Male/female sex ratio was 2 to 3. For a majority of patients (91%), this was their first telemedicine consultation. Two patients were consulting for Covid-19-related symptoms (anosmia). 91% were already being followed in the department, and the consultation was for postoperative follow-up in 45 cases. Population and consultation details are shown in Table 2. Home-to-hospital distance was categorized as < 25 km (543%), 25–100 km (30%) and > 100 km (17%). Most patients (83%) were shielding at home, with 58% teleworking and the others without occupation (retired or otherwise not working). Mean consultation time was 9 minutes [2–21 min]; 45% of consultations were otologic and 22% oto-neurosurgical.

The subgroup of consultations lasting less than 5 minutes (10 out of 100) was analyzed. One young patient consulting for a scar check-up after sebaceous auricle cyst resection had a 2-minute consultation. There were three 3-minute and six 4-minute consultations, all following middle-ear surgery (otosclerosis in 5 cases and cholesteatoma in 4), all with good results (no complaints). An

Table 2
Population data.

Study population (N = 100)	Total
Consultation time (minutes)	9 [2–21]
Age (years)	
< 40	28 (28.0%)
40–60	38 (38.0%)
> 60	34 (34.0%)
Gender: number (percentage)	
Male	40 (40.0%)
Female	60 (60.0%)
Occupational status	
Working	58 (58.0%)
Not working (retired, etc.)	42 (42.0%)
Situation during pandemic	
Traveling to work	17 (17.0%)
Shielded (inc. telework)	83 (83.0%)
Home-hospital distance (km)	
< 25	53 (53.0%)
25–100	30 (30.0%)
> 100	17 (17.0%)
Consultation field	
Otology	45 (45.0%)
Otoneurosurgery	22 (22.0%)
Rhinology	11 (11.0%)
Pharyngolaryngeal	22 (22.0%)
Reason for teleconsultation	
First consultation	9 (9.0%)
Clinical follow-up	28 (28.0%)
Postoperative follow-up	45 (45.0%)
Imaging results	11 (11.0%)
Peripheral facial palsy follow-up	7 (7.0%)
Symptoms suggesting COVID-19	
Yes	2 (2.0%)
No	98 (98.0%)
Outcome of teleconsultation (Q15)	
Face-to-face consultation	45 (45.0%)
New teleconsultation	50 (50.0%)
No further consultation	5 (5.0%)

Results are reported as frequency (percentage) for categorical variables, and as mean [range] for the quantitative variable.

audiometry consultation was scheduled, whence the short teleconsultation.

3. Results

3.1. Satisfaction survey results

Table 1 shows mean responses to questions 1 to 12, with standard deviations. Categorical results on the 1–5 Likert scale are detailed below. Sound quality (Q1) was judged poorly or not satisfactory by 24% of patients (Q1) and video quality (Q2, including neutral) by 39%. On the other hand, 94% of patients agreed or completely agreed that communication was easy (Q4). 90% reported that teleconsultation had not made them nervous (Q3) and 98% that the physician had answered all of their questions (Q5), while 49% felt teleconsultation was not equivalent to face-to-face consultation (Q8). Reasons for consultation were various (Table 2), and considered to be not or not very urgent (Q6) in 32% of cases. 64% of patients were bothered by the lack of clinical examination (Q9), despite 93% being satisfied with the physician's response (Q7). With 87% overall satisfaction (Q12), it was unsurprising that a majority of patients (68%) were willing to use teleconsultation in the future (Q11); 72% appreciated the time and cost savings (Q10). 42% had encountered technical problems (Q13), and 64% were bothered by the lack of clinical examination (Q14). A face-to-face consultation was scheduled for 45% of patients, another teleconsultation for 50%, and no further consultation for 5% (Q15).

Reasons for scheduling a face-to-face consultation included audiometry (15 patients), physical examination to follow up

imaging (18 patients), efficacy assessment of prescribed medical treatment (7 patients), and to schedule surgery (5 patients). All patients with facial palsy followed in multidisciplinary consultation (7/100) were able to communicate easily with their surgeon and were satisfied by his/her response; their overall satisfaction was 100% (7/7), but 42.8% (3/7) were bothered by the lack of physical examination and 85.7% (6/7) felt teleconsultation was not equivalent to face-to-face consultation.

100% of the physicians were satisfied by the tool and found it easy to use. 50% found it saved time and that it was easy to get technical back-up if need be. 75% found the tool was a great help in the context of a health crisis, and 100% wished to continue using it after the crisis, while stressing that it did not replace face-to-face consultation, especially for a first consultation or if audiometry was needed.

3.2. Predictive factors for satisfaction

The PNS and SVS groups were demographically comparable (data not shown). No significant predictive factors for satisfaction emerged. Table 3 shows uni- and multi-variate analysis. Multivariate analysis found no significant associations with satisfaction for age: 40–60 years (OR = 1.05; 95% CI [0.28–3.93]; *P*-value = 0.941) or > 60 years (OR = 0.25; 95% CI [0.25–3.78]; *P*-value = 0.984) compared to < 40 years. Likewise, there were no significant associations for gender, occupational status, home-to-hospital distance or teleconsultation duration (Table 3). Patients with prior experience of telemedicine consultation were generally more satisfied, but with only a suggestive association (OR = 6.41; 95% CI [1.37–36.85]; *P*-value = 0.025). Patients seemed better satisfied when sound quality was sufficient (OR = 3.40; 95% CI [1.03–12.49]; *P*-value = 0.049; suggestive but non-significant correlation), and when video was smooth (OR = 3.79; 95% CI [1.05–15.92]; *P*-value = 0.049). Absence of technical problems was neither significantly nor suggestively associated with better satisfaction (OR = 2.09; 95% CI [0.66–7.34]; *P*-value = 0.227). Patients bothered by the lack of physical examination were suggestively but not significantly less satisfied (OR = 0.30; 95% CI [0.10–0.84]; *P*-value = 0.027).

4. Discussion

Patients' overall satisfaction with telemedicine consultation was excellent, with 87% satisfied or very satisfied. No significant predictive factors emerged. However, two main suggestive associations with poorer satisfaction were identified, being bothered by the absence of physical examination (OR = 0.30; *P* = 0.027) and deficient sound and video quality (OR = 3.40; *P* = 0.049 and OR = 3.79; *P* = 0.049, respectively).

The present pandemic situation is exceptional, requiring emergency reorganization of our practices to limit propagation. Scientific society guidelines have been published to maintain continuity of care respecting good ENT practices [3,13,14]. The pandemic has led to massive and cancellation of face-to-face consultations with little warning, interrupting continuity of care and causing patients to hesitate to consult in medical settings [15]. In this context, telemedicine consultation got around the restrictions of lockdown, making follow-up possible; this may well account for the high rate of satisfaction, but also means the results cannot be extrapolated to telemedicine in general, as there is an important bias. Teleconsultation in this context of health crisis doubtless contributed to psychological support for a locked down population, and the satisfaction rate is probably an overestimation.

Payment could also introduce a bias but not in the present series of public-sector patients accustomed to not advancing any

Table 3
Comparison of overall satisfaction between groups (Question 12) to identify predictive factors.

	Univariate analysis	Multivariate analysis	
	Odds Ratio (OR) [95% CI]	OR [95% CI]	P-value
Population			
Age (years)			
< 40	Reference	Reference	
40–60	1.02 [0.38–2.78]	1.05 [0.28–3.93]	0.941
> 60	1.15 [0.42–3.20]	0.99 [0.25–3.78]	0.984
Gender			
Female	Reference		
Male	0.669 [0.30–1.50]	0.71 [0.25–1.95]	0.5
Teleconsultation			
Teleconsulted before	Reference		
1st teleconsultation	2.42 [0.81–8.24]	6.413 [1.37–36.85]	0.025 ^a
Situation			
Locked down or teleworking	Reference		
Traveling to work	1.10 [0.39–3.20]	1.55 [0.40–6.14]	0.52
Home-hospital distance			
< 25 km	Reference		
≥ 25 km	1.19 [0.54–2.60]	0.84 [0.30–2.29]	0.735
Consultation			
Time (minutes)	0.97 [0.88–1.07]	0.95 [0.84–1.10]	0.437
Field			
Otology	Reference		
Otoneurology	1.88 [0.66–5.72]	2.16 [0.52–10.16]	0.3
Sinus	0.33 [0.06–1.30]	0.37 [0.05–2.12]	0.273
Cervical	0.61 [0.21–1.69]	0.75 [0.19–2.92]	0.673
Sound quality			
Poorly or not satisfactory	Reference		
Satisfactory (or very)	4.36 [1.63–13.16]	3.40 [1.03–12.49]	0.049 ^a
Video quality			
Poorly or not satisfactory	Reference		
Satisfactory (or very)	2.30 [1.02–5.33]	3.79 [1.05–15.92]	0.049 ^a
Absence of technical problems	0.79 [0.36–1.75]	2.09 [0.66–7.34]	0.227
Bothered by absence of clinical examination	0.53 [0.23–1.20]	0.30 [0.10–0.84]	0.027 ^a

Odds ratios (OR) on uni- (column 2) and multi-variate logistic regression (column 3), with 95% confidence intervals, and *P*-value for multivariate analysis. OR > 1 predictive of better satisfaction (SVS), OR < 1 of poorer satisfaction (PNS), according to question 12: “Overall, I was satisfied with the teleconsultation”. PNS: Likert scores 1–3; SVS: Likert scores 4–5.

^a statistically suggestive (*P* < 0.05).

payment for university hospital services, whether face-to-face or telemedical. Finally, were all non-respondents taken to be dissatisfied, their exclusion from analysis could constitute an optimism bias; however, the full response rate of 80% was good and inclusion was continuous, limiting any such bias.

Our department was able to set up teleconsultation rapidly, despite no dedicated means available before the crisis. The aim was to ensure continuity of care while safeguarding shielding. Pandemic onset is unforeseeable, and experience shows that it will be necessary to anticipate future episodes. Lockdown and restructuring of patient management during a pandemic should, if at all possible, not be at the expense of care. It is essential that medical services be equipped for effective teleconsultation and that teams should be regularly trained so as to enable rapid and efficient implementation [9]. ENT telemedicine could also contribute to management of Covid-19-positive patients: sudden-onset anosmia accounted for only 2% of the present patients but is one of the first clinical signs of Covid-19 [16], and teleconsultation enabled adapted management. For patients without suspected Covid-19, especially in at-risk populations (elderly, diabetic, etc.), teleconsultation allows follow-up of chronic pathology [17] without risk of contamination due to travel and can avoid loss of chance due to delayed diagnosis or treatment, reduce stress and facilitate resumption of activity when lockdown is relaxed.

Several previous studies of telemedicine reported good overall satisfaction, as access to specialist opinion is facilitated and time is saved by avoiding the need to travel [4–6]. On the other hand, some patients expressed reservations as to the quality of communication, hindering dialogue and understanding of the patient's

complaints. These findings match the rate of patients poorly or not satisfied with sound and video quality in the present study (respectively 24% and 39%). There were no significant associations with satisfaction for age: 40–60 years (OR = 1.05; 95% CI [0.28–3.93]; *P*-value = 0.941) or >60 years (OR = 0.25; 95% CI [0.25–3.78]; *P*-value = 0.984) compared to < 40 years. This was previously found by Abelson et al., who questioned 800 patients about their willingness to be involved in various telemedicine programs [18], and found no significant difference between younger and older patients, confirming that unfamiliarity with modern technology is not a hindrance to employing telemedicine. Patients already used to video calls in everyday life, on the other hand, are more likely to use teleconsultation [19]; no significant results emerged in this regard in the present study, but overall satisfaction was suggestively high in patients with prior experience of teleconsultation (OR = 6.41; 95% CI [1.37–36.85]; *P*-value = 0.025). Involving a third party can help extend telemedicine to more elderly subjects and those less at ease with new technology.

Teleconsultation also allows follow-up of patients generally managed in reference centers by multidisciplinary consultation, such as peripheral facial palsy outside the acute phase. Reference centers being few and far between, access to care is limited, and telemedicine facilitates consultation [20]. Tan et al. reported that telemedicine could ensure some of the follow-up for peripheral facial palsy patients, although precise assessment on House and Brackmann or Sunnybrook scales remained a problem [20]. Thus, as we have demonstrated in the lockdown situation, telemedicine enables follow-up for peripheral facial palsy patients and/or those who have had botox injection. It provides a useful solution to ensure

that patients performing exercise schedules at home respect the instructions for ocular protection.

The present study had several limitations. The small sample size due to the short study duration in a context of crisis precludes extrapolation to everyday practice [21].

The technical problems encountered are those known in telemedicine (connection, video and sound quality) and are liable to limit benefit or even induce serious stress [22,23]. It is important to ensure that the practitioners' audio and video equipment is of good quality and that the Internet connection bandwidth is sufficient [22]. When phoning to obtain the patient's consent, it is essential to check that he or she is suitably equipped and has understood how to start up the system [22]. In the present study, the secretariat phone number was systematically provided to enable technical assistance. Simplified information on the teleconsultation procedure was given in this prior telephone call. Nevertheless, 42% of patients encountered technical difficulties, as reported elsewhere [22–24], even if this did not impair overall satisfaction (OR = 2.09; P-value = 0.227).

The advantage of video teleconsultation compared to a simple telephone call lies in the visual feedback and non-verbal communication, which are especially important for postoperative follow-up, providing extra information, such as the patient's facial expression [23,24], which may express discomfort related to inadequate outcome (which the patient may not wish to put into words) or on the other hand great satisfaction with a successful surgery. Visual contact can also improve the doctor-patient relationship of trust, especially if the patient has never seen the practitioner before [24].

The study also incurred certain biases related to the department's specific activity: 91% of cases concerned follow-up of known patients in a department mainly practicing otology and otoneurosurgery. Teleconsultation did not allow audiometry, and 64% of patients were bothered by the lack of physical examination. In 45% of cases, a face-to-face consultation was scheduled, either for complete clinical examination or for audiometry. The impossibility of performing audiometry is a serious limitation of telemedicine during lockdown for a center specializing in otology. The feasibility of tele-audiometry has been investigated and test results seem to be equivalent [7,25]; however, this may be less true in case of profound hearing loss, where communication is limited and screen-mediated interaction makes remote testing complicated, showing one of the limitations of telemedicine.

5. Conclusion

Teleconsultation in the pandemic context is a simple means of ensuring continuity of care, and provides a high rate of patient satisfaction. No predictive factors for satisfaction emerged in the present study, although audiovisual quality seemed to count. By avoiding face-to-face contact in more than half of cases, teleconsultation enabled medical follow-up during lockdown, limiting viral propagation and the exposure of health professionals. Further studies are needed to determine the contribution and limitations of teleconsultation in ENT, beyond the specific lockdown situation.

Disclosure of interest

The authors declare that they have no competing interest.

Acknowledgments

The authors thank Pr Christian Dubreuil for re-editing, Clément Leroux (leader of the telemedicine project and information and IT

department of the Lyon Hospitals Board (Hospices Civils de Lyon: HCL)) and the HCL IT and Logistics team for their efficiency in setting up the teleconsultation equipment and technical assistance.

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