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Telemedicine in Otorhinolaryngology during
COVID-19 pandemic and beyond

Telemedicina em Otorrinolaringologia – para
além da pandemia COVID-19

Ana Campos, Mário Morais – Almeida,
Cristina Caroça, José Pais, João Paço

Authors and Affiliations:

Ana Campos, MD. Otorhinolaryngology Clinical Academic Nucleus, Hospital CUF Tejo, Lisbon, Portugal.

Mário Morais – Almeida, MD. Allergy Center, Hospital CUF Descobertas, Lisbon, Portugal

Cristina Caroça, PhD. Otorhinolaryngology Clinical Academic Nucleus, Hospital CUF Tejo, Lisbon, Portugal

José Pais, MD, Otorhinolaryngology Clinical Academic Nucleus, Hospital CUF Tejo, Lisbon, Portugal

João Paço, PhD. Otorhinolaryngology Clinical Academic Nucleus, Hospital CUF Tejo, Lisbon, Portugal

Author for correspondence:

Ana Campos

Hospital CUF Tejo, Avenida 24 de Julho, Lisboa, Portugal

Ana.t.campos@cuf.pt

Ana.t.campos@jmellosaude.pt

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actaorlgallega@gmail.com

Abstract:

Telemedicine in Otorhinolaryngology is a growing field of study and it has proved to effectively reduce costs, waiting lists and improve the coordination of specialist services. One reason for the slowly growing of telemedicine in ENT is that the otolaryngologic diagnosis largely depend on physical examination, which in turn relies heavily on objective sources, such as radiologic imaging, audiometry, and otoscopic and endoscopic visualization, all of which can nowadays be viewed and transmitted electronically. Since the onset of the COVID-19 pandemic, telemedicine adoption has rapidly accelerated. This study reviews current literature on the use of telemedicine services during Covid-19 pandemic and reveal the role telemedicine can play in otorhinolaryngology practice.

Resumo:

A Telemedicina em Otorrinolaringologia é um campo de estudo em crescimento dentro da otorrinolaringologia, que tem demonstrado reduzir custos, listas de espera e melhorar a coordenação de serviços especializados. Uma das razões para o seu desenvolvimento arrastado é que o diagnóstico otorrinolaringológico depende em grande parte do exame físico, que por sua vez depende muito de fontes objetivas, como imagens radiológicas, audiometria e visualização otoscópica e endoscópica, que hoje podem ser visualizadas e transmitidas eletronicamente. No entanto, desde o início da pandemia COVID-19, a adoção da telemedicina acelerou rapidamente. Este estudo revê a literatura atual sobre o uso de serviços de telemedicina durante o período pandémico e revela o papel que a telemedicina pode desempenhar na prática da otorrinolaringologia.

Key-words: telemedicine, telepractice, otorhinolaryngology

Palavras-chave: telemedicina, otorrinolaringologia

Background:

The WHO describes telemedicine as “...using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries...”.¹

Therefore, telemedicine refers to the use of technology to provide communication and patient care remotely through the transfer of information electronically. It is a growing field of study, outlined as a means to attend increasing demand of specialist care in society. Otorhinolaryngology has long ago been found an amenable specialty to this kind of care.^{2,3} Seim and colleagues found physician diagnostic agreement in 95% of cases and 96% of patient satisfaction.⁴ McCool and Davies found that an average of 62% of otolaryngology visits could be completed via telemedicine.⁵ Moreover, it has proved to effectively reduce costs, waiting lists and improve the coordination of specialist services.^{6,7,8}

Applications of telemedicine within otorhinolaryngology can be considered in categories: synchronous care, with and without assistant providers, as well as asynchronous care. Synchronous care without assistance includes interactions between the otolaryngologist and the patient without an assistant. The second category involves synchronous care with the presence of a trained assistant who may facilitate remote diagnostic procedures such as otoscopic and swallowing evaluation. The third category is asynchronous care telemedicine, in which primary data are collected, transmitted to the consultant, and evaluated at a later time point.⁹

One reason for the slowly growing of telemedicine in ENT is that the otolaryngologic diagnosis depends on physical examination. Otolaryngologic examination in turn relies heavily on objective sources, such as radiologic imaging, audiometry, and otoscopic and endoscopic visualization, all of which can nowadays be viewed, recorded, and transmitted electronically.¹⁰

Since the onset of the COVID-19 pandemic, telemedicine adoption has rapidly accelerated, motivating physicians and health care systems worldwide to rapidly implement telemedicine programs to reduce or replace in-person visits.^{11,12,13}

The purpose of this study is to review literature on the use of telemedicine services during COVID-19 pandemic and emphasize the role of telemedicine in otolaryngology practice.

Methods:

A literature search was carried out in the MEDLINE database. The retrieval form of the Medical Subject Headings (Mesh) was Telemedicine OR Telehealth AND ENT OR Otorhinolaryngology. Data were extracted from the articles selected in the included studies published from June 1st 2016 to 30th May 2021: systematic reviews, reviews, meta-analysis, clinical trials and randomized-control trials. Only studies in English were included, with the selected search items in title or abstract. Additional searches were conducted for relevant studies from the references of the included articles.

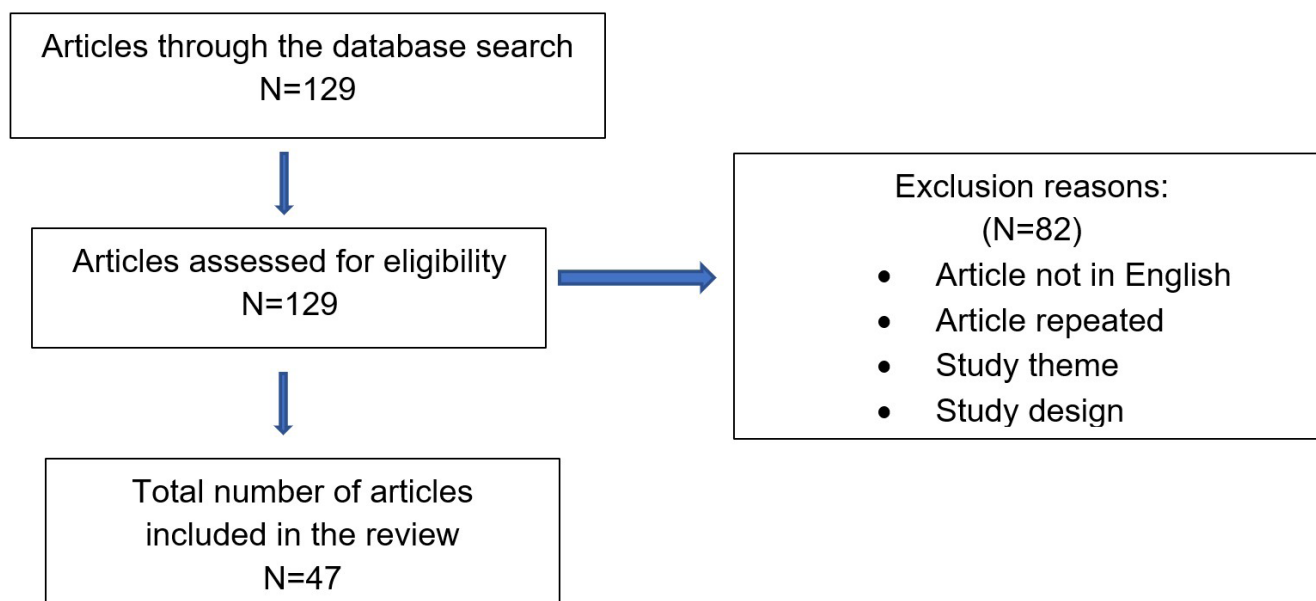


Figure 1 – flow diagram showing the process of selection of articles being included in our review. From 129 articles, only 47 studies were considered.

Literature Review:

A significant number of articles have been published, validating the advantages and limitations of telemedicine in managing ENT patients in multiple dimensions. Over the last several years consumer demand and technological advancements have resulted in telemedicine becoming more common for several Otolaryngology subspecialties.¹³

1. Otology appears to be the most agreeable sub-specialty to a telemedicine platform. McCool and Davies conducted a retrospective cohort study in order to identify which diagnoses within otolaryngology were most adequate for evaluation throughout telemedicine and found that most of ENT consultations were suitable for telemedicine evaluation, and of those, inner and middle ear complaints were the most likely to be eligible because they less commonly require invasive procedures to reach a diagnosis.⁵ Furthermore, otologic evaluation waiting time can be reduced up to 40%, according to previous studies.⁷

Innovative procedures that aid in the remote recognition of otologic pathology have also been explored as a means to help virtual evaluation. One method involves the use of a smartphone-enabled otoscope, which captures images of the tympanic membrane for evaluation by an otolaryngologist remotely.^{14,15} One study examined whether parents could perform smartphone otoscopy for the diagnosis of otitis media and found that it could be detected or excluded in 87% of the videos during acute symptoms, although it required previous teaching visits and cerumen removal.¹⁴ Another study compared a smartphone-enabled otoscope to microscopic otoscopy in the detection and evaluation of tympanic membrane pathology in an otology/neurotology practice and reported a 96% specificity in identifying normal tympanic membranes and 100% sensitivity in identifying pathology.¹⁵ Particular limitations to widespread use of smartphone-enabled otoscopy tools are financial, the ability of patients to manage them and the knowledge of basic anatomy in order to perform it correctly and safely.

An alternative application could be the its use in primary care practice with subsequent forwarding of the images to the otologist, or the large screening of ENT pathology. A pilot study in India assessed the feasibility of empowering trained healthcare workers equipped with a store-and-forward telemedicine device that integrates a camera-enabled smart phone with an otoscope, that allows the screening of otology patients within the community. After extensive training, community otology screenings were conducted to triage otology patients and provide them with specialized ENT care at a tertiary hospital. A total of 3000 patients were screened, 1619 were referred for ENT consultation and 215 required surgical intervention.¹⁶

Audiology procedures are also being explored for telemedicine methodologies in a near future.¹⁷ A pilot study examined cochlear implant candidacy testing via a telemedicine approach and revealed that apparently this method is feasible to perform with the current technology.¹⁸ Teleconsultation was also found to be an efficient procedure for hearing aid programming, verification and fitting when face-to-face services were not available.¹⁹

2. The Neurotology field can also benefit from telemedicine technologies. Shaikh and colleagues proposed virtual practice patterns agreed upon by a taskforce of vestibular and eye movement experts who had substantial clinical experience. They addressed strategic approaches on implementing a virtual platform for remote assessment of the dizzy patient and triaging strategy.²⁰ Moreover, Chari and colleagues offer an algorithm for the management of dizzy patients designed for a telemedicine platform that emphasizes initial triage of patients with potentially life threatening neurologic or cardiovascular conditions.²¹ The patient physical examination is essential in the evaluation of vertigo complaints, but it is easily performed by an instructed patient with a camera, which makes this complaint particularly amenable to an initial virtual consultation.

3. For pediatric population, telemedicine has the potential to reduce avoidable in-person contact, keeping both patients, parents and providers safe during the COVID-19 pandemic and this technology is regarded favorably by both patients and physicians.¹⁵ In a review article, Schafer and colleagues analyzed several studies that have evaluated the efficacy of different telemedicine approaches in pediatric otolaryngology and determined that it is not appropriate to generalize the evaluation of telemedicine to the entire field of otolaryngology.²²

Nevertheless, in a review about telemedicine in pediatric sleep, the authors realize potential specific advantages of telemedicine in this population, such as the possibility of the child to see and interact with the clinician without feeling threatened or the clinician's opportunity to explore the child's sleep environment.²³

In a study by Miller, remote examinations of the upper airway in children through telemedicine demonstrated strong diagnostic accuracy across providers and good overall evaluation.²⁴ However, nasopharyngolaryngoscopy was performed by an ENT doctor.

In Covid-19 pandemic early days, Murasse and colleagues managed to overcome some airway physical examination challenges by asking parents to take a picture of the child's throat and display it for the webcam.²⁵

Also, a retrospective study by Smith and colleagues compared diagnosis and management plans accomplished via synchronous telemedicine with those completed by face-to-face appointments and found that the recorded diagnosis was the same in 99% of cases, indicating high diagnostic accuracy of telemedicine evaluations. Moreover, they found that surgical management decisions were the same 93% of the time.²⁶ Telemedicine has also been successfully used for initial pediatric surgical consultation and postoperative care, with the advantage of conducting a telemedicine visit directly to the patient's home.²⁷

4. Rhinology practice has been most disturbed by the Covid-19 pandemic, with controversy and significant concern regarding endoscopic evaluation of patients in the office, since performing these procedures puts one in direct contact with the virus, as it resides primarily in the nose and nasopharynx.^{28,29} Moreover, many studies emphasized the recognition of anosmia and hyposmia a critical symptom and olfactory dysfunctions as a prevalent disease consequence.^{30,31,32}

Setzen and colleagues addressed rhinology-specific concerns related to COVID-19, including telemedicine. They regard it as an opportunity for providers to maintain care to rhinology patients. It could be used to triage who needs nasal endoscopy. In their opinion, patients with a known tumor history following, depending on the severity of the previous lesion, could be monitored remotely with imaging replacing endoscopy. Also, many epistaxis patients could be seen remotely and instructed on conservative measures for minimizing it.³³

5. Head and neck cancer patients are a specially affected group, as their illness poses them at greater risk of contracting Covid-19 and, simultaneously, they need close monitoring. A number of head and neck, otolaryngologic, and oral surgery procedures were considered high risk owing to exposure of airway and mucosal surfaces and the possibility of generating aerosols and routine or lower-priority examinations were recommended to be deferred during the pandemic. Telemedicine emerged as an important tool in this context. A review of 23 international guidelines addressing head and neck oncology management in COVID-19 patients stated that first consultation for new referrals should be conducted by telephone or videoconference, to assess the need or urgency to evaluate the patient in person.³⁴ Most guidelines also recommended

videoconferences in order to maintain tumor board meetings. Regarding these meetings, a previous study on satisfaction with telemedicine presentation at a multidisciplinary tumor meeting among patients with head and neck cancer reported the same grade of satisfaction between patients presented face-to-face and by means of telemedicine.³⁵ Another study focused on patient satisfaction with a pre-operative patient-surgeon interaction via videoconferencing and found no significant differences from that for a conventional face-to-face discussion.³⁶ Finally, a recent study evaluated the role of a symptom-based telephone questionnaire in detecting recurrences in patients with radically treated oral cancer and found a sensitivity of 90.0% and specificity of 74.2%. Moreover, 31.0% of patients said that they would prefer a telephone follow-up compared with an actual physical follow-up visit.³⁷

6. The use of telemedicine within the field of **Laryngology** has been studied mainly by speech-language pathologists. In 2011, Constantinescu and colleagues investigated the validity and reliability of online delivery of the Lee Silverman Voice Treatment (LSVT®) for the speech and voice disorder associated with Parkinson's disease and concluded that online treatment for hypokinetic dysarthria associated with Parkinson's disease appeared to be clinically valid and reliable.³⁸ Towey describes a web-based telepractice model used to deliver speech therapy services and compares the progress of children who received either in-person "table top" therapy or telepractice speech therapy from the same hospital therapists. Children who received speech therapy via telepractice achieved the best outcomes.³⁹ Doarn and colleagues examined the implementation of a virtual portal in order to facilitate remote voice therapy sessions via telemedicine to patients with voice disorders.⁴⁰ Several studies emphasized the cost efficiency for providing remote specialist speech therapy to different pathologies.^{41, 42}

Regarding medical practice, Bryson and colleagues demonstrated that high quality flexible laryngoscopy and videostroboscopy images can be transmitted electronically to off-site laryngologists. This application, however, would be limited by the requirement of trained professional to perform laryngoscopy and stroboscopy.⁴³ Nordio and colleagues conducted a systematic review on the effects of telerehabilitation in the field of dysphagia as an alternative to face-to-face patient care, but couldn't provide final evidence on the efficacy of telerehabilitation in dysphagia recovery due to the lack of quality studies.⁴⁴ Despite significant limitation, telemedicine has a role in dysphagia patients care during the pandemic of COVID-19.⁴⁵⁻⁴⁷

Discussion and Conclusions:

Otolaryngology is regarded as one of the specialties with most potential to develop telemedicine care. Yet, it's progress was steady and slow. Literature before the pandemic is limited and focus on the reduction of costs, waiting lists and solving distance issues.

In COVID-19 period, telemedicine grew a critical role in otolaryngology, as it allowed the clinician to minimize exposure risks by determining which patients require in-person services versus those that could be managed remotely. Several guidelines were issued encouraging ENT doctors to adopt telemedicine care. Moreover, an increasing market of online platforms allowed providers to easily conduct appointments in their office with a smartphone or a portable computer, requiring minimal to no extra equipment or outfitting. Patients, whom also were told to work from home, expanded their technological resources and rapidly got used to online meetings. Privacy and confidentiality concerns are giving rise to video conferencing and diagnostics platforms specifically designed for telehealth, some of them already adapted with diagnostic tools.⁴⁸

One challenge of telemedicine appointments lies in the physical examination and the otolaryngologic examination is among the most challenging owing to obstacles in visualizing anatomic spaces, such as the oropharynx or the external auditory canal.

Suggested practices for optimizing the remote oropharynx examination include patient use of a light source to illuminate the oropharynx and household items to serve as tongue depressors. In addition, smartphone cameras allow patients to capture photos of their oropharynx for examination purposes.

Remote visualization of the external auditory canal and tympanic membrane are even more challenging given that examination requires an otoscope. Digital video otoscopes allow users to capture and share digital videos of these structures for remote diagnosis, which could be done during the appointment, therefore allowing for real time guidance. These low-cost tools are widely available online. As an example, the digital otoscope sold by Shenzhen Anykit Technology, that allows for oropharynx and nose inspection also.⁴⁹

Some phases of the physical exam though are still difficult to perform, namely laryngoscopy and palpation. Furthermore, considering the wider adoption of telemedicine within otolaryngology, several factors must be weighed. Younger and more well-informed patients may have a higher degree of comfort and experience with technology, which could exacerbate health care access disparities. Conversely, telemedicine may meet the needs of patients who cannot travel due to challenging socioeconomic issues.

Once the world overcomes the COVID 19 pandemic, telemedicine in otorhinolaryngology most likely it will become an important part of the daily practice, as it will guarantee a more sustainable and robust system that can endure future global pandemics or even future "waves" of the present one.

A challenge for the near future is the implementation of specific telemedicine algorithms and protocols in order to establish patient selection criteria and standards of care.

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