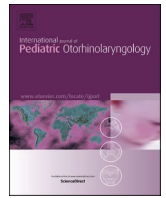


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

## International Journal of Pediatric Otorhinology

journal homepage: [www.elsevier.com/locate/ijporl](http://www.elsevier.com/locate/ijporl)

## The impact of the coronavirus (COVID-19) pandemic on elective paediatric otolaryngology outpatient services – An analysis of virtual outpatient clinics in a tertiary referral centre using the modified paediatric otolaryngology telemedicine satisfaction survey (POTSS)

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## ARTICLE INFO

## Keywords:

Telemedicine  
Survey  
Otolaryngology  
Virtual  
Clinic  
COVID-19

## ABSTRACT

**Introduction:** Virtual outpatient clinics (VOPC) have been integrated into both paediatric and based adult outpatient services due to a multitude of factors, including increased demand for services, technological advances and rising morbidity secondary to ageing populations. The novel coronavirus disease (COVID-19) has accentuated pressures on the National Health Service (NHS) infrastructure, particularly elective services, whilst radically altering patterns of practice.

**Aim:** To evaluate the impact of the COVID-19 pandemic on paediatric otolaryngology outpatient services whilst collating patient feedback to elicit long-term sustainability post COVID-19.

**Method:** A retrospective analysis of VOPCs was undertaken at a tertiary paediatric referral centre over a 3-month capture period during the COVID-19 pandemic. Demographic, generic clinic (presenting complaint, new vs. follow-up, consultation type), as well as outcome data (medical or surgical intervention, discharge vs. ongoing review, onward referral, investigations, and conversion to face-to-face) was collated. Additionally a modified 15-point patient satisfaction survey was created. The Paediatric Otolaryngology Telemedicine Satisfaction survey (POTSS), was an adaptation of 4 validated patient satisfaction tools including the General Medical Council (GMC) patient questionnaire, the telehealth satisfaction scale (TESS), the telehealth usability questionnaire (TUQ), and the telemedicine satisfaction and usefulness questionnaire (TSUQ).

**Results:** Of 514 patients reviewed virtually over a 3-month period, 225 (45%) were randomly selected to participate, of which 200 met our inclusion criteria. The most common mode of consultation was telephony (92.5%, n = 185). Non-attendance rates were reduced when compared to face-to-face clinics during an equivalent period prior to the COVID-19 pandemic. A significant proportion of patients (29% compared to 26% pre-VOPC) were discharged to primary care. Nine percent were listed for surgery compared to 19% pre-VOPC. A subsequent face-to-face appointment was required in 10% of participants. Overall, the satisfaction when assessing the doctor-patient relationship, privacy & trust, as well as consultation domains was high, with the overwhelming majority of parents' content with the future integration and participation in VOPCs.

**Conclusion:** An evolving worldwide pandemic has accelerated the need for healthcare services to reform in order to maintain a steady flow of patients within an elective outpatient setting without compromising patient care. Solutions must be sustainable long-term to account for future disruptions, whilst accounting for evolving patient demographics. Our novel survey has demonstrated the vast potential that the integration of VOPCs can offer paediatric otolaryngology services within a carefully selected cohort of patients.

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<https://doi.org/10.1016/j.ijporl.2020.110383>

Received 21 July 2020; Received in revised form 8 September 2020; Accepted 9 September 2020

Available online 24 September 2020

0165-5876/© 2020 Published by Elsevier B.V.

## 1. Introduction

In December 2019, a sporadic outbreak of pneumonia cases of unknown aetiology was identified in the Wuhan district of Hubei Province in Central China. The causative agent was eventually isolated and identified as a novel coronavirus (SARS-CoV-2). COVID-19 was subsequently declared as a global pandemic by the World Health Organisation (WHO), after being identified in excess of 70 countries worldwide [1].

The emergence of COVID-19 was not only to have a devastating impact on the financial climate globally but would more importantly result in long-standing alterations and the need for evolution of health services to meet demand with limited resources. Alterations to clinical practice were no more apparent than within the field of otolaryngology, where high viral load and shedding from the mucous membranes of the upper aerodigestive tract resulted in increased risk to healthcare professionals exposed to COVID-19 positive patients [2]. The use of aerosol generating procedures (AGPs), particularly flexible nasendoscopy (FNE) was minimised, with recommendations for use only in extenuating circumstances [3]. Government advice regarding travel and social distancing, combined with patient reluctance to attend appointments amidst a pandemic resulted in the postponement of most elective outpatient and inpatient services [4].

The unpredictable nature of COVID-19 and significant uncertainties surrounding short and long-term treatment strategies resulted in the need for healthcare services to reform and explore alternative modes of service delivery. VOPCs are one such strategy, where traditional face-to-face outpatient consultations are superseded by the integration of telemedicine, defined as 'the use of electronic communications and information technologies to provide clinical services when participants are at different locations' by the American Telemedicine Association [5]. Previous assessment of VOPCs within otolaryngology demonstrated a 99% concordance in diagnosis and 93% concordance in surgical management plans when compared to face-to-face clinics [6]. Such clinics also provide a two-fold benefit to patients by minimising the risk of COVID-19 transmission, whilst also addressing any concerns that parents may have with new or pre-existing pathology. Although advantageous in many circumstances, the need for a detailed examination, use of instrumentation and further investigations may limit the use of VOPCs, and necessitate a face-to-face appointment based on the clinical priority level. Despite such limitations, the integration of VOPCs have been formally ratified both by ENT UK and the Royal College of Surgeons (RCS), and reinforced their use by introducing guidance regarding good practice for surgeons and surgical teams [7].

## 2. Method

Following prior verbal consent for study enrolment, a retrospective analysis of otolaryngology VOPCs was undertaken at a tertiary paediatric referral centre within the West Midlands over a 3-month period during the COVID-19 pandemic (17th March – 17<sup>th</sup> June 2020). Both new and follow-up patients undergoing consultant-led telephone and video-linked (NHS approved AccuRx and Zoom platforms) consultations were selected by block randomisation from both general and subspecialist paediatric otolaryngology clinics. Exclusion criteria included language barriers to consultation, patient or parental preference, inadequate access to services, non-respondents, and necessity for acute evaluation or intervention.

Initial analysis included acquisition of demographic (age, gender and ethnicity), and clinical data (presenting complaint, nature of review, type of consultation, and outcome). Data was then subsequently compared to an equivalent 3-month period prior to the COVID-19 pandemic, in particular the discharge and theatre conversion rates, to determine the impact on outpatient services.

The remainder of our analysis incorporated a 3-part comprehensive patient satisfaction survey exploring all usability aspects, including ease

of use, convenience, effectiveness, overall satisfaction, likelihood of recommendation of service and the doctor-patient relationship. Questions were pooled from 4 existing validated tools (the GMC questionnaire [8]; TESS [9]; TUQ [10]; and TSUQ [11]). Twenty random patients were selected and asked to rank importance of all pooled questions using a 5-point Likert scale (strongly disagree, disagree, neutral, agree and strongly agree). Combined with clinician consensus, the 15 highest scoring survey questions were combined to form the Paediatric Otolaryngology Telemedicine Satisfaction survey (POTSS).

Responses were collated anonymously by follow-up telephone consultations undertaken by senior registrars (range: 1 day–3 months post-clinic review). No personally identifiable information was collected, in compliance with general data protection regulations (GDPR). Responses were evaluated using a 5-point Likert-type rating scale from strongly agree to strongly disagree (appendix 1).

## 3. Results

### 3.1. Demographics and clinical data

A total of 514 patients participated in 144 VOPC clinics, undertaken by 7 consultant otolaryngologists during the COVID-19 pandemic. This figure was a 75% reduction in the number of outpatient appointments compared to the pre-COVID-19 cohort (n = 2102). Of the initial cohort, there was a non-response rate of 2.5% (n = 13), where patients were non-contactable following 3 separate attempts. Two hundred and twenty five patients (45%) were randomly selected to participate in our survey. There were 21 non-respondents (9%) when contacted to collate feedback on their VOPC experiences. Two respondents declined to participate (0.9%), and no contactable information was identified in a further 2 patients (0.9%). Data analysis was undertaken on the remaining 200 (40%) patients.

The mean age at consultation was 6.4yrs (range: 0.3–15yrs). The majority of participants were male (59.5%, n = 119). Ethnicity in order of frequency was white (51.5%, n = 103), black/African (11.5%, n = 23), Asian (27.5%, n = 55), mixed (5.5%, n = 11) and other (4%, n = 8). The majority of consultations involved follow-up patients (85%, n = 170).

The most common mode of consultation was telephony (92.5%, n = 185), with the remainder undertaken using video conferencing (7.5%, n = 15), of which 6 patients were reviewed for hearing loss, 5 for voice related pathology, 3 for known cholesteatoma, and one for obstructive sleep apnoea (OSA). The decision on the modality of choice utilised was multi-factorial and based on clinician preference, previous experience with both modalities, as well as availability of resources.

A scheduled appointment was cited as the most common reason for consultation (79.5%, n = 159); followed by post-operative review (13.5%, n = 27); relaying of results (4.5%, n = 9); and other (2.5%, n = 5).

The nature of presentation in order of frequency and pathology within our cohort have been summarised below (Table 1).

Medical therapy was initiated in 15% of patients reviewed (n = 34), of which nasal obstruction (5%, n = 10), otorrhoea (3.5%, n = 7) and acute otitis media (AOM) (1.5%, n = 3) were the most common indications (Table 2).

Forty-one percent (n = 81) of the cohort were subject to an ongoing review. Twenty-nine percent (n = 58) of patients were discharged to primary care, compared to 27% in the pre-COVID-19 period. Further investigations were required in 11% (n = 22). Ten percent of participants were converted to a face-to-face clinic, of which 1% (n = 2) were at the request of family/caregivers. Nine percent (n = 18) of patients were listed for surgery (Table 3), and 0.5% (n = 1) were referred to a different specialty within the same trust.

**Table 1**  
Breakdown of presentation amongst surveyed cohort.

Subspecialty	Pathology	Number (n)/%
Otology	Hearing Loss	30 (15%)
	OME	21 (10.5%)
	Otorrhoea	15 (7.5%)
	AOM	15 (7.5%)
	Otalgia	6 (3%)
	Cholesteatoma	6 (3%)
	Aural Fullness	6 (3%)
	Foreign Body	1 (0.5%)
	Fistula/Congenital	1 (0.5%)
	Chronic Suppurative Otitis Media	1 (0.5%)
	Rhinology	Rhinorrhoea
Epistaxis		11 (5.5%)
Nasal Trauma		1 (0.5%)
Sinusitis		2 (1%)
OSA		25 (12.5%)
Nasal Obstruction		25 (12.5%)
Head & Neck/Voice/Airway	Airway pathology (i.e. stridor)	22 (11%)
	Voice	13 (6.5%)
	Neck Lump	13 (6.5%)
	Sore Throat	5 (2.5%)
	Tracheocutaneous Fistula	1 (0.5%)

**Table 2**  
Initiation of treatment and pathology.

Subspecialty	Pathology	Number (n)/% of all patients
Otology	Otorrhoea	7 (3.5%)
	AOM	3 (1.5%)
	Aural fullness	2 (1%)
	Hearing Loss	2 (1%)
	OME	2 (1%)
	Epistaxis	1 (0.5%)
Rhinology	Nasal Obstruction	10 (5%)
	OSA	1 (0.5%)
	Sinusitis	1 (0.5%)
	Epistaxis	1 (0.5%)
Head & Neck/Voice/ Airway	Voice	2 (1%)
	Airway pathology (i.e. stridor)	2 (1%)

**Table 3**  
Breakdown of patients listed by pathology/presentation.

Pathology	Number listed (n)
Airway	2
Neck Lump	1
Sore Throat	1
Hearing Loss	3
Cholesteatoma	2
OME	1
Otorrhoea	1
OSA	5
Nasal Obstruction	1
Epistaxis	1

### 3.2. Satisfaction survey

The second section of our study focussed predominantly on patient/caregiver experience of the VOPC service and was separated into domains including: the doctor-patient relationship (politeness, ease during consultation, listening skills and involvement in decision-making process), privacy & honesty, and the consultation process (reservations prior to use, ease of use, convenience, length, improvement by use of video-conferencing, overall experience and likelihood of recommendation).

Prior to their allotted telemedicine consultation, 5% (n = 10) respondents cited having reservations about the nature of the clinic

appointment, but all concerns were allayed following completion of the consultation.

The integration of a VOPC service was greeted with an overwhelmingly positive response by our surveyed cohort. A response of 'strongly agree' or 'agree' was recorded in  $\geq 99\%$  of respondents within the domains of doctor-patient relationship as well as privacy and trust. There was similarly positive response of  $\geq 98\%$  when assessing experience of the consultation process. Significant variation in responses were only observed when patients were asked whether a video-conferencing facility would improve their experience, indicating that despite the theoretical benefit of video consultations, the simplicity of a telephone based consultation was preferential. A detailed breakdown of our findings is demonstrated below (Figs. 1–3).

## 4. Discussion

The use of VOPCs has gained prominence in the Western world due to a combination of patient-based and financial factors. VOPC use within the U.K. was described as early as the 1990s, with a continued and steady growth pattern demonstrated. Formal assessment of VOPC use in 2004 demonstrated a total of 216 projects amongst a variety of specialties including emergency medicine, general internal medicine and education [12]. The rising costs and increasing demand for specialist services have resulted in an increased interest in maximising the efficiency of specialist outpatient departments. Video and telephone follow-up consultations for various medical and surgical patient populations have been suggested as a means of streamlining outpatient resources, particularly for chronic pathology [13]. Providing routine assessment by VOPC may be considered preferable in situations where patients have to travel greater distances to a centralised tertiary centre and for those whose health or social conditions make hospital visits challenging, whilst prioritising valuable outpatient resources for patients with severe or complex conditions [13].

Management decisions, more than ever, need to be made as a partnership between patients, their families and the medical staff who care for them. To the best of our knowledge, there has been no published work to-date assessing patient and parent satisfaction of VOPC use when making these decisions in a paediatric otolaryngology setting. Our findings support the role of VOPCs in the long-term, particularly as uncertainty around elective services continues during the pandemic.

As predicted, due to restrictions in services, the average number of clinic patients reviewed was significantly reduced, compared to an equivalent period prior to the COVID-19 pandemic (75% reduction). Although a pre-COVID-19 period yielded a follow-up dominant cohort of patients (85%), this was more a reflection of departmental consensus to reduce acceptance of new referrals unless graded as high clinical priority.

The change in non-attendance rate from 15% (pre-COVID) to 2.5% (COVID-19 period) is a clear reflection of the convenient nature of VOPCs. Non-attendance rates may also have been significantly reduced due to a two-fold notification approach by means of both postal letters and a pre-consultation telephone confirmation. Video-conferencing was reserved for those patients who required more detailed assessment, or where visual input was required; such as post-operative wound reviews, assessment of nasal/facial trauma, and where an MDT input was indicated (cochlear implantation, or voice therapy). Caution must also be exercised when utilising video-conferencing facilities, as although there is a generational trend towards the use of such resources, clinicians must also acknowledge that a small cohort of patients may not possess the relevant technology or acumen to engage with such technology.

There was a subtle reduction in the discharge rates when compared to face-to-face outcomes (27% vs. 29%), a finding perhaps indicative of examination constraints and thus a reluctance to discharge without a formal review. Unsurprisingly, a reduction was observed in patients listed for surgery (19% pre-COVID vs. 9% post-COVID), which may in part be attributed to restricted resources for repeat outpatient reviews,

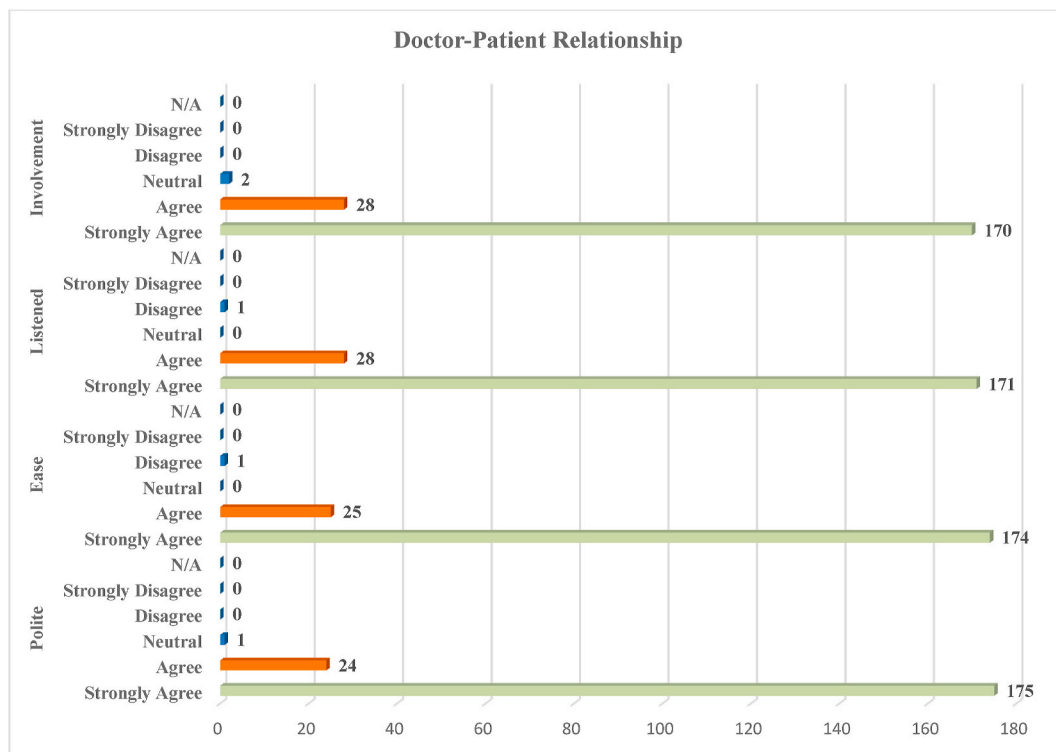


Fig. 1. Responses assessing doctor-patient relationship.

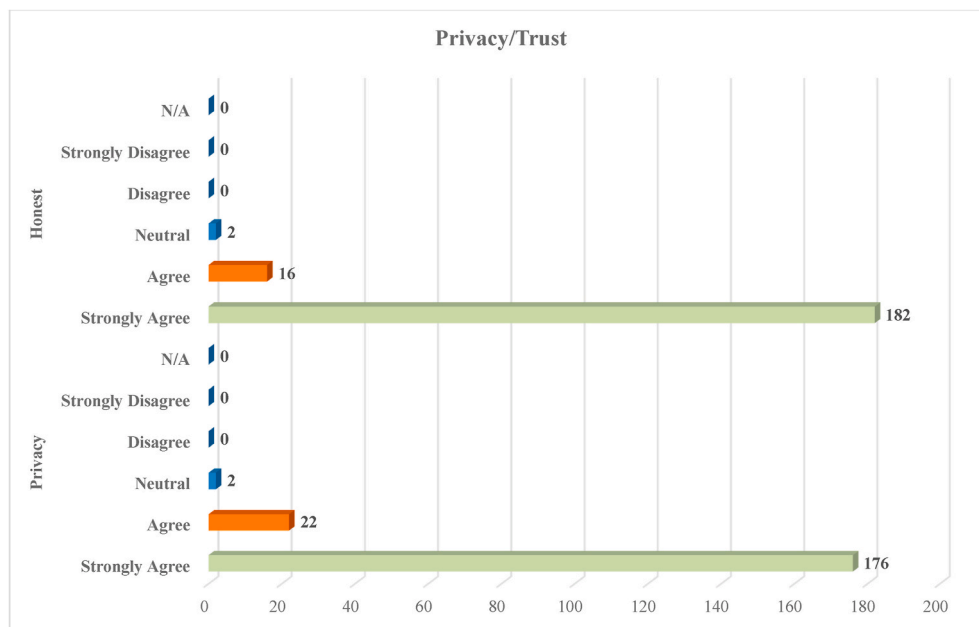


Fig. 2. Responses to maintenance of privacy and trust.

but equally could have a negative impact on theatre waiting times whilst resumption of elective services is postponed due to the unpredictable nature of the pandemic.

The COVID-19 pandemic has inevitably hastened the integration of VOPCs, which has invariably brought to light various privacy issues that plague such formats. Although there has been widespread media coverage outlining such concerns, an overwhelming majority of respondents cited no concerns regarding maintenance of their privacy.

Despite the restricted nature of communication permitted by VOPCs, an overwhelming proportion of patients provided positive feedback

when evaluating the doctor-patient relationship aspect of our study. This will no doubt be attributed to expertise of clinicians within a tertiary referral unit, combined with the pre-existing relationships formed within the follow-up cohort of patients.

A combination of factors could account for the overwhelmingly positive feedback provided when analysing the consultation aspect of our survey. Alleviating parental concerns regarding cancellation of scheduled appointments during the COVID-19 pandemic, minimising viral exposure, and the convenience of VOPCs appeared to be the most commonly cited reasons for high levels of satisfaction, particularly in

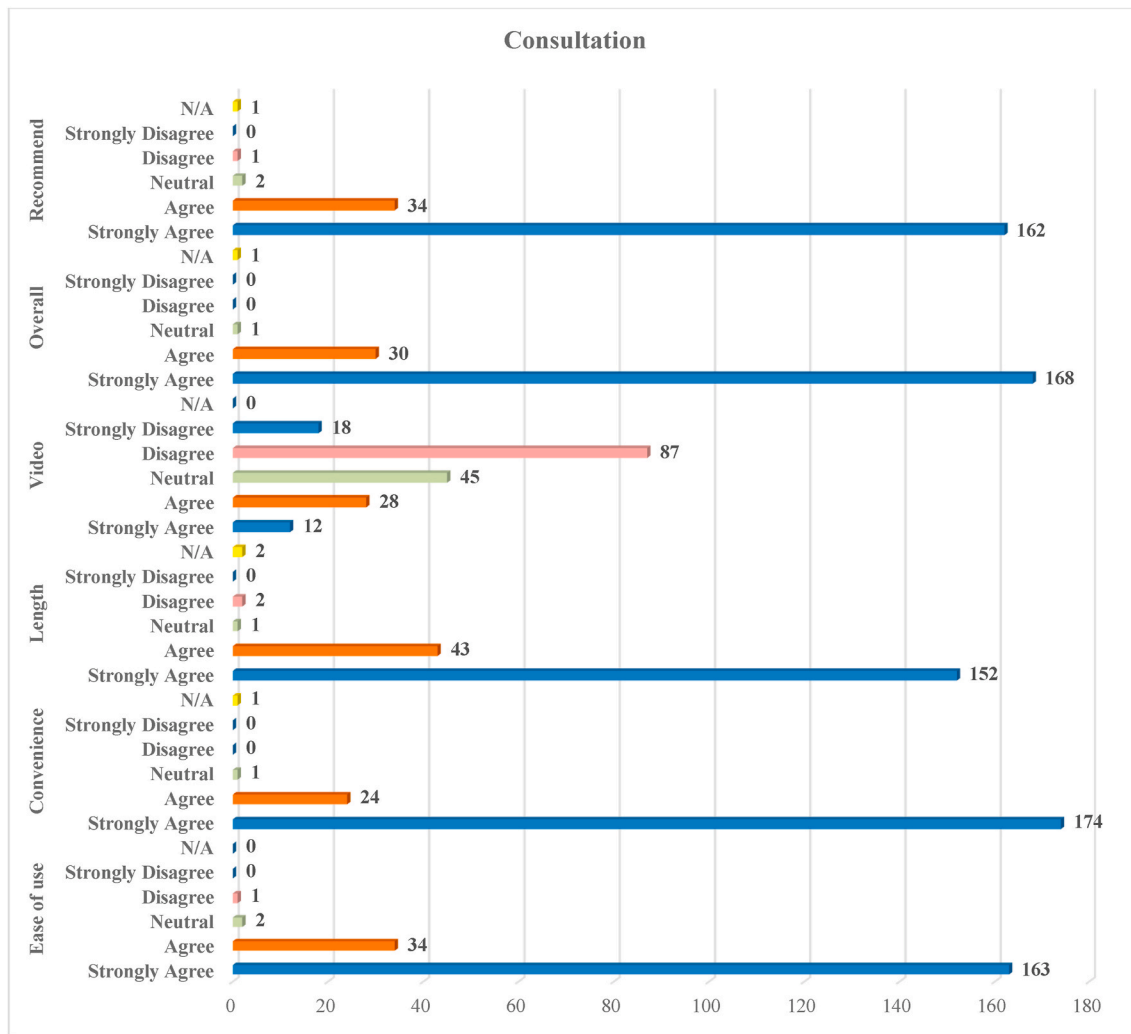


Fig. 3. Responses on consultation aspects of VOPC.

children with advanced needs. The latter is a notion consolidated within literature by Healey et al., 2018, who reported the burden due to inconvenience is not only likely to lead to higher non-attendance rates (15% pre-COVID-19 v 9% in VOPCs), but also generation of a significantly greater number of investigations [13]. Non-attendance rates not only have financial implications, but clinicians should be aware that up to 60% of children will re-present acutely following a failed outpatient attendance, with up to 20% necessitating admission [14].

Whilst convenience is no doubt a positive aspect of VOPCs, they cannot supersede the ability of a face-to-face consultation to provide a crude assessment of parental relationship. Non-verbal cues, and in particular body language, may alert a clinician to potential safeguarding issues, which may only be assessed to a limited extent by video-consultations. For these reasons, our recommendation would be to limit successive VOPCs where possible in follow-up patients, as well as for new consultations, where the doctor-parent relationship is yet to be evaluated.

With regards to study limitations, an important consideration is that of selection bias. The method of feedback employed has ensured a high and prompt response rate but introduced the possibility of subconscious bias towards a positive response due to being contacted directly by a member of clinical staff. Such bias could be counteracted in any future studies by use of a non-clinical assessor with no affiliation with the department or clinical team. Whilst teleconsultation is no doubt a swift process acquiring feedback, it is probable that more balanced feedback

could be achieved by utilising online or postal questionnaires, but this will undoubtedly be counteracted by a compromised response rate. Other limitations of our study relate to the exclusion criteria for VOPCs, which include language barriers, whereby patients were unsuitable for VOPCs without a translator and therefore are a demographic not accounted for by our study. Socio-economic factors will invariably be influenced by geographic location but will encompass a significant cohort of patients who lacked the economic means to access technology to enable participation, particularly for video-linked consultations. Whilst comparative analysis between a pre and post-COVID cohort was undertaken over identical intervals, consideration of seasonal variation in pathology is another factor that would need to be accounted for in order to ensure homogeneity.

For any healthcare organisations considering implementation of VOPCs, a steep learning curve is likely to be encountered particularly given the unpredictable nature of COVID-19 and impact on services long-term. Clinicians will be not only expected to rapidly develop skills in virtual rapport, empathy, and communication, but this will be combined with an expectation of comparable levels of efficiency in diagnosis and management with limited clinical resources to hand. Maintenance of quality at a standard reproducible level will require education and training of clinicians in order to aid with acquisition of new skills and modalities. Permitting inexperienced healthcare professionals to be involved in multiparty consultations for observation purposes is one such solution, in combination with the involvement of a multi-

disciplinary team to address technological deficiencies.

On a final note, the COVID-19 pandemic has not only tested the ability of our healthcare resources to reform during a period of immense demand but has potentially provided a sustainable long-term solution during a period of austerity. Whilst VOPCs do not offer a solution for every pathology encountered in an outpatient setting, our study certainly demonstrates its benefits in a carefully selected cohort of patients including post-operative follow-ups, discussions regarding results, and decisions to proceed with surgical intervention (where previous discussions have already taken place). Whilst examination constraints were cited as the key factors in conversion to face-to-face clinics, the use of affordable image acquisition devices (multi-use portable endoscopes) in patients requiring regular evaluation may provide a simple yet cost-effective solution.

The financial impact of COVID-19 on the NHS has been an area of intense speculation. Due to the unexpected and unprecedented demand secondary to COVID-19 on the healthcare system, at present no trusts are financially disadvantaged when utilising VOPC facilities. Block contract arrangements across the system, certainly within our deanery, have resulted in a fixed level of funding irrespective of clinical activity. Moving forward, there is a growing consensus that trusts will eventually revert to national tariffs, although discussions are yet at a preliminary stage.

## 5. Conclusion

The worldwide COVID-19 pandemic has resulted in great deal of financial and logistical strain on global healthcare services, some of

which were already on the brink of collapse. Postponement of elective services combined with patient reluctance to attend routine appointments due to the risk of contracting COVID-19 will invariably have significant repercussions in terms of long-term clinical burden as well as delayed morbidity. Potential solutions must be sustainable given the unpredictable nature of the pandemic, and also account for the change in patient demographics and demands.

Whilst VOPC use has demonstrated long-term success in many outpatient settings in previous literature, our survey has potentially advocated its use within a paediatric otolaryngology setting.

## Declaration of competing interest

None.

## Acknowledgements

Mr Michael Kuo, Consultant ENT Surgeon, Birmingham Women's and Children's NHS Foundation Trust.

Ms Anne-Louise McDermott, Consultant ENT Surgeon, Birmingham Women's and Children's NHS Foundation Trust.

Ms Konstance Tzifa, Consultant ENT Surgeon, Birmingham Women's and Children's NHS Foundation Trust.

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## Appendix 1. Disseminated questionnaire

**Otolaryngology Telemedicine Clinic Patient Questionnaire:****Section 1:****1) Patient Demographics:**

- *Consultant:* KS/KT/CP/AP/ALM/RI/MK/JG
- *DOB:* Age (yrs):
- *Gender:* M/F
- *Ethnicity:* Asian:British (A)/ Black:African (B)/ White (W)/ Mixed (M)/ Other (O)

**2) Clinic Details:**

- *New/ Follow-up*
- *Type of clinic:* Telephone (T) Video conference call (V)
- *Initial presenting complaint (circle and specify):*
  - Otology Rhinology
  - Head & Neck Voice/ airway
- *Nature of call (please circle):*
  - Results (R) Post-procedure (PP)
  - Planned review (PR) Other (O)

**3) Outcome of consultation:**

- *Treatment initiated: Yes/ No*
- *Discharged (D)*
- *Ongoing review (OR)*
- *Face –to-face consultation arranged (FF) (please specify reasons):*
- *Further investigations (FI)*
- *Listed for surgery (L)*
- *Referred to other specialty (OS)*

**Section 2:****The doctor:**

- 1) The doctor was polite during the consultation:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 2) The doctor made you feel at ease:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 3) You felt the doctor listened to your concerns:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 4) You felt the doctor involved you in any management plans/ decisions:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A

**Privacy and confidentiality:**

- 1) I felt my privacy was maintained during the consultation:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 2) The doctor was honest/ trustworthy:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A

**About the consultation:**

- 1) Did you have reservations about your consultation?** Yes/No
- 2) If yes to Q1, have your concerns changed following your consultation?** Yes/No
- 3) The consultation was easy to use:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 4) The consultation was convenient:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 5) The length of the consultation was adequate:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 6) Videoconferencing would improve the consultation (for tele-consults only):**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 7) I was happy with the overall experience from the consultation :**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 8) I would recommend this form of consultations to others:**  
Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree N/A
- 9) Any other comments**

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