ENT UK Guidance

A graduated return to the provision of elective ENT services during the COVID-19 pandemic

OTOLOGY

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Introduction

This guidance has been developed to assist clinicians in their return to elective otological practice during the COVID-19 pandemic. The recommendations contained within this document are based on current knowledge, but it is accepted that the clinical setting in which we work and the evidence base for our practice are constantly changing and this guidance will change over time. This document focuses on return to elective otological outpatient work and to elective otological operating. It has been prepared with the clinical needs of patients and the safety of both patients and personnel in mind. These are guidelines only and may need to be adapted dependent upon local circumstances, and changing government policy.

The initial drafts of this document were written by the 4 named authors. Opinion was obtained from personal communication with a wide range of other stakeholders (Appendix 1) and professional organizations, and government, as well as a review of the literature. The authors have endeavoured to develop guidance that is consistent with recommendations from these other organizations but the stated opinions are those of the British Society of Otology (BSO). Once completed a final review was undertaken by the full BSO Council and the ENT UK committee overseeing the development of these guidelines.

Outpatients

Triage

BSO recommends that all new and follow up patients are triaged by a senior clinician. They may then be seen face to face, in virtual clinics, or discharged. We do not recommend appointments are rolled over without clinical staff having seen either the referral letter or recent clinic letters. Time should be allocated for this. Each ENT department will need to work closely with their administrative staff to generate Consultant-level outpatient waiting lists. This will include patients whose clinic appointments have been deferred since the lockdown and those going forwards who have appointments booked to the end of the calendar year. In addition, a list of the outstanding new referrals that have as yet not been allocated an outpatient date due to the lock-down will be required. This will no doubt generate a substantial list for each Consultant with their senior trainee to actively manage with regards to triaging, but will serve to confer ownership and responsibility to each Consultant.

Virtual clinics

These may be undertaken either by telephone or secure video link. There is good published evidence of their usefulness. For example, Healy et al. concluded "*The majority of patients discharged from a surgical service could be better followed up by a virtual clinic with a significant proportion of patients reporting a preference for and a greater satisfaction with such a service."*

For most new otology referrals, the initial appointment should remain virtual whilst social distancing rules are in place. These appointments should be undertaken by an experienced clinician in an appropriate protected environment. It is likely that most otology referrals will need a face to face appointment subsequently for audiometry and examination of the ear. The virtual appointment will allow triaging of urgency, initiation of treatment, and review with investigation results. This will generate reduced hospital visits.

Follow up appointments can be particularly suited to a virtual setting and many patients may be discharged after this. This type of consultation may become part of routine practice in the long term but we would advise caution when considering serial virtual appointments particularly for wet ears, although it is reasonable to request an ear swab is obtained in the community and treated appropriately to reduce hospital attendance when there are high volumes of COVID-19 patients in the hospital and the community.

Balance clinic appointments can also be successfully undertaken virtually and asking patients to use their smart phones allows a significant amount of the examination to be completed, including Hallpike's test. However, caution will be needed and until further evidence is available most patients are likely to require face to face appointments at some stage.

Face to face appointments

As the pandemic subsides and levels of PPE improve the safety of face to face consultations will improve and it will become possible to increase the number of face to face consultations. At present, however, we would recommend that face to face appointments are limited to patients who require clinical examination, investigation, or outpatient treatment.

General Advice on PPE in outpatients

Although rapid, sensitive antigen and antibody testing for COVID-19 infection is becoming increasingly available we still recommend taking appropriate precautions to limit the risk of viral transmission between patient and surgeon and vice versa in patients that have tested as COVID-19 negative. For consultation only (no examination, testing or treatment) this constitutes:

- Limiting appointments to asymptomatic patients who have had no contact with known COVID-19 positive individuals in the last 2 weeks. Patient selection will have to be more cautious than in the past and individual patient risks assessed against needs. In particular careful consideration will be needed as to whether it is justifiable to bring older patients, or those with other COVID-19 risk factors, into an acute hospital setting.
- Minimising patient waiting time within the department prior to their appointment.
- Social distancing of 2 metres wherever possible, including the waiting area and inside the consulting room.
- Avoidance of relatives and friends attending with the patient where possible. Use of the most spacious and well-ventilated consulting room available.
- The surgeon should wear theatre clothing if not wearing additional PPE.
- Standard ANTT precautions ie. Bare below the elbow (including rings and watches) should be maintained.
- FFP3 masks are not required for consultations. Protection should be within national and local guidelines.
- Patients may be required to wear a mask. This should also follow national and local guidelines. Clear evidence is lacking at present.
- All surfaces should be wiped down with alcohol-based wipes following the consultation.
- Additional time should be allowed to accommodate the additional infection control activities.

In suspected or confirmed COVID-19 positive patients precautions, as recommended by PHE, should be taken ie. The following should be worn: FFP3 mask, plastic gown and apron, disposable gloves and eye protection (for further information please refer to PHE COVID-19 PPE Guidance). It is vital that fit testing for FFP3 masks is undertaken prior to use.

Examination

In asymptomatic patients with no COVID-19 contacts, if it is necessary to examine the patient then a fluid resistant mask, plastic apron, eye protection and disposable gloves should be worn. In suspected or confirmed positive COVID-19 patients precautions as recommended by PHE should be taken ie. The following should be worn: FFP3 mask, plastic gown and apron, disposable gloves and eye protection (for further information please refer to PHE COVID-19 PPE Guidance).

Otoscopy

As the use of an otoscope requires close face to face proximity, where possible the use of the operating microscope or a video otoscope with remote screen should be considered. It is recognized standard otoscopy may be required at times. A standard fluid resistant mask and gloves should be worn. Disposable ear specula should be used. Some surgeons may also prefer to wear eye protection although this may interfere with the microscope eye pieces. Close fitting visors are likely to interfere less than bulkier eye protection. We could find no clear evidence regarding the use of face masks by patients in this setting although breathing does generate some aerosol.

Tuning forks

Should be cleaned after each use.

Testing

BSO has liaised with NHSEI, and the Presidents of BAA (British Association of Audiology) and BAAP (British Association of Audio-vestibular Physicians), when making these recommendations to ensure a degree of uniformity and we thank them all for their very helpful engagement. In particular we draw your attention to the following documents: *COVID-19: Prioritization within Community Healthcare*. This is an important document for us. Despite the title this does affect acute hospital settings. This is published by NHS England and NHS Improvement (NHSEI). The most recent update is 2nd April 2020. New guidance is expected in May. NHSEI have been very helpful and listened carefully to our views and those of other professionals. As of April 2nd, 2020, there was a "partial stop" on audiology services, but we understand this will be amended to prepare for a gradual return to practice and we will update the BSO document as soon as new guidance is published which we understand is imminent. Departments should monitor this document carefully. Reference should also be made to: *Audiology and otology guidance during COVID-19: From the UK's audiology professional bodies. BAA, BSHA, BSA and AIHHP, 1st May 2020.* However, the guidelines presented in this BSO document are ultimately the opinion of BSO.

As per the above, audiovestibular testing should only be undertaken in patients who are asymptomatic and have not had contact with anyone known to be COVID-19 positive in the

last 2 weeks. Again, consideration of additional risk to older patients and those with other COVID-19 risk factors, is required. There is no reason to undertake audiovestibular testing in suspected or confirmed COVID-19 positive patients at the present time.

A fluid resistant mask, plastic apron, eye protection and disposable gloves should be worn. The patient may wish to wear a mask. Evidence is lacking to be prescriptive at this stage.

Testing is likely to take longer due to the longer periods required for cleaning between cases and numbers tested will be reduced. Local discussions regarding staffing factors and the test environment will need exploring.

Urgent testing for sudden sensorineural hearing loss should continue to be provided in all circumstances. Testing of patients undergoing aminoglycoside or chemotherapy regimens that may induce audio-vestibular injury should not be delayed.

To ensure appropriate triage we recommend testing is requested only by senior clinical staff. We recommend that the following procedures can now be restarted when individual units have appropriate infection control policies in place, and where clear need is present:

Audiometry, tympanometry, stapedial reflexes, ABR, CERA, VNG testing, caloric testing in the presence of intact tympanic membranes, posturography, rotating chair, vHIT and VEMPS.

We do not recommend limiting the availability of these tests as long as appropriate precautions are taken. However, fewer test will be possible due to increased time for cleaning.

We do not recommend undertaking calorics in the presence of a perforation. Careful consideration should be given as to whether or not trans-tympanic electrocochleography is appropriate as this involves piercing the tympanic membrane and may risk exposure to middle ear mucosa.

Out Patient Treatment

In asymptomatic, unexposed patients requiring outpatient otological treatment, a fluid resistant mask, plastic apron, eye protection and disposable gloves should be worn if there is no risk of aerosol generation or viral transmission. The patient may wish to wear a fluid resistant mask.

If there is a risk of aerosol generation or if the patient is suspected or confirmed to be positive for COVID-19, precautions as recommended by PHE should be taken ie. The following should be worn: FFP3 mask, plastic apron and gown, disposable gloves and eye protection (for further information please refer to PHE COVID-19 PPE Guidance). Where instruments are required to undertake procedures and treatments, disposable instruments are recommended where possible.

Microsuction

We have considered a number of sources of evidence when considering the safety of micro-suction of the ear in an outpatient clinic.

- The external ear canal is not virus bearing (*personal communication, Dr David Jenkins, consultant medical microbiologist, University Hospitals of Leicester*). Micro-suction of the external ear canal therefore should not generate risk of COVID-19 transmission from the *ear canal* if the tympanic membrane is intact, and it is not considered an AGP with respect to COVID-19 transmission.

- The middle ear and mastoid mucosa may be virus bearing. There is no direct evidence as yet with respect to COVID-19 infection, but there is evidence from previous coronavirus studies. Two papers are worth considering:

  The first paper (*Wiertsema SP et al.)* showed that coronaviruses were present in 14.4% of nasopharyngeal swabs of patients with recurrent AOM and OME compared to 6% of healthy controls. The difference did not quite reach statistical significance (p=0.08). 4.9% of patients had coronavirus in their middle ear aspirate. There were no controls for this, presumably because healthy controls had no middle ear fluid to aspirate.

  The second paper (*Heikkinen et. al.)* did not test for coronaviruses in the middle ear aspirates (it is an old paper) but it does show that when a virus is present in the nasopharynx there is also a high probability of the virus being present in the middle ear (between 4% and 74% depending on the virus).

  Microsuction of the middle ear or its contents could therefore in *theory* risk viral transmission in infected patients.

- Concern has been raised regarding the risk of a cough reflex generated by micro-suction. In particular whether asking patients to wear a face mask might direct the cough laterally towards the clinician. The British Academy of Audiology (BAA) sought opinion on coughing and we have liaised with them. Professor Wilson of the Infection Prevention Society recommended the use of a face mask by the patient (*Audiology and otology guidance during COVID-19. BAA, BSHA, BSA and AIHHP, 1st May 2020*). On balance BSO would also recommend asking the patient to wear a mask during microsuction to reduce aerosol in the clinic room, but this will be at the individual clinician's discretion in the absence of firm evidence.

- Consideration should also be given to placing a fan at angle behind you whilst undertaking microsuction. This has become common practice in some countries following earlier epidemics and is believed to blow droplets away from the operating surgeon should the patient sneeze or cough. We are not aware of formal publications on this (personal communication Dr Julian Tang, consultant Virologist).

- It is also strongly recommended that suction equipment in the clinic is reviewed as venting from the machine may be unfiltered. This is particularly true of free standing (portable) suction machines. In theory this could circulate a virus containing aerosol. It is recommended that the filter status of machines is discussed with the manufacturer, as required, and if necessary additional filters should be fitted.

When undertaking micro-suction or dewaxing in the presence of an intact tympanic membrane the 2-metre social distancing guideline will be breached. To maintain reasonable distance the use of an operating microscope, or video-endoscope with remote screen is likely to be safest. PPE as per otoscopy is recommended. There appears no need to have a period to allow the air of the room to recirculate with such procedures although cleaning of surfaces will be required.

In the presence of a dry tympanic membrane perforation it is reasonable to follow the same recommendations as for an intact tympanic membrane.

If the middle ear is wet intuitively the risk of contamination with virus seems higher. In this situation we would currently recommend the use of a filtering face piece respirator (FFP2 or FFP3). We have no guidance on whether a period of time will be required between patients. PHE imply this is not an AGP, although this depends on the interpretation of the meaning of "upper respiratory tract." We would tend to take a more cautious approach and consider the middle ear an extension of the upper aerodigestive tract. A risk assessment will need to be made on each individual patient in line with local guidance.

Avoidance of fenestrated suction is recommended in the presence of a wet ear in order to minimize aerosolization through the fenestration, and contamination of the surgeon's glove.

Intra-tympanic injections

In the presence of an intact tympanic membrane there appears no significant risk to the clinician from the injection itself. This is not an AGP. PPE should be used in line with that described for microsuction. In the presence of a perforation the provision of ear drops might be considered as an alternative if steroids are being used. We would recommend the patient is not asked to spit after the injection as was traditional practice prior to COVID-19, and patients can swallow.

In our earlier guidance on otology surgery we discussed the concerns over the use of steroids in potential COVID-19 infection. The evidence that steroids cause harm is now less clear and the cumulative dose being provided with intra-tympanic therapy is low. We see no reason not to offer this treatment at the present time.

Specific scenarios

Wax impaction

Services can resume in outpatient clinics for those with significant symptoms as described above, where appropriate infection control methods are in place.

Otitis externa

Virtual consultations may reasonably request a culture swab of the ear be taken in the community and treated appropriately. Severe pain or failure to settle will need clinic review as described above. Dry mopping a wet ear to look for a perforation prior to, or in place of microsuction may be helpful.

Necrotising otitis externa (NOE)

This should be managed as per local protocol. BSO have published guidelines on the general management of NOE on the ENT UK website. Where practical, we would recommend an increased use of intra-venous therapy at home for as much of the duration of treatment as possible.

Sudden sensorineural hearing loss

Urgent assessment should not be delayed. As mentioned above, the evidence for detrimental effects of high dose systemic steroid use is under review and opinion is changing. Some of the literature suggests that high dose systemic steroids, whether to manage COVID-19 infection or to treat an unrelated condition, may be associated with a worse outcome *(i. Russell et al.; ii. The Faculty of Pain Management guidelines).* We therefore still recommend that high dose oral steroids are used cautiously in the treatment of Meniere's Disease or Sudden Sensorineural Hearing Loss (SSNHL) and should only be used after full discussion of the risks and benefits of this type of treatment. The systemic dose of steroid following intra-tympanic treatment is significantly lower than that of oral treatment, and it is therefore likely that the impact on COVID-19 outcomes will be less. It may therefore be preferable to use intra-tympanic steroid to treat these conditions. There is, however, no evidence base for this assumption.

Meniere's Disease

If indicated, intra-tympanic therapy with steroid or gentamicin may be offered following detailed discussion of the potential additional risks as outlined above. Precautions as per microsuction should be taken.

Bell's Palsy

In idiopathic facial palsy, the use of oral steroids should be discussed with the patient. Evidence from the Scottish Bell's Palsy study suggests that the use of oral steroids improves

recovery from 85% to 96% *(Sullivan FM et al.).* The potential risks and benefits of oral steroid use during the current pandemic need to be made clear and a balanced decision made. For patients with known COVID-19 infection the balance may weigh towards avoiding steroids. For those not believed to be infected the balance of risk may weigh towards treatment with steroids.

Adult otitis media with effusion

In adults with effusions lasting 6 weeks or more investigation should be initiated. Patients may require a nasal endoscopy but in the absence of nasal symptoms an MRI of the nose, post-nasal space, and skull base is currently recommended in preference.

Chronically infected mastoid cavities

The risks of coronavirus in an infected mastoid cavity with an intact tympanic membrane appear low. The cautions described for microsuction should be employed. Consideration may be given to leaving antiseptic creams in the ear for longer periods.

Surgery

Introduction

In light of the changing demands on acute NHS Trusts, we believe we are now in a phase of the current pandemic when recovery plans for provision of elective ear surgery can be formulated and ear surgery can begin to be safely reintroduced. Practice varies considerably around the world at present reflecting the uncertainty. The precise timing of this will vary to some degree from department to department but the over-arching principles are applicable. There are however a number of considerations.

There is evidence of viable virus particles in the middle ear mucosa during viral acute otitis media in a high proportion of individuals as described in the outpatient section above. It is, however, unclear if COVID-19 produces middle ear inflammation and whether viral particles are present in the middle ear during COVID-19 infection with or without middle ear inflammation. Nevertheless, based upon the current literature there is a significant risk that viable COVID-19 producing virus particles are present in the middle ear mucosa during systemic infection with the virus. In contrast, bone and blood are believed to contain minimal viral material in coronavirus infection as this is an infection of the respiratory mucosa.

Tympano-mastoid surgery should currently be considered a high risk AGP due to the mist of mucosa, fluid, and bone dust created by the drilling which might contain viral particles. Our knowledge is, however, incomplete on this point. However, a literature is beginning to develop (*Chen et al.).* This poses a risk of exposure to the surgeon and theatre staff.

Prioritisation of Otological Surgery

Based on the ENTUK, Federation of Royal Colleges and NHS England statements (Appendix 2), the majority of elective ear surgery falls under Priority Level 4 (elective surgery can be deferred beyond 3 months). Whilst most ear surgery can be deferred for a certain time period, patients will require monitoring if deferral is extended, particularly in units where waiting lists were already long prior to the pandemic.

There are a number of exceptions:

- The development of acute or life-threatening complications (Priority level 1a / 1b)
- Acute worsening of existing pathology with non-life-threatening complications eg. Facial palsy, sudden hearing loss, new onset vertigo. These will require an urgent or emergency review and a category uplift.
- Acute mastoiditis not responsive to conservative management (Priority level 1b): We recommend minimum drilling, and subsequent curettage to reduce generation of bone dust (see ENT UK guidelines for otology surgery). Drilling should be at low speed with reduced irrigation. Consideration may be given to needle aspiration in place of surgical drainage (*Bakhos et al.*). BSO are participating in research looking at this.
- Vestibular schwannoma if there is life-threatening brainstem compression (Category 2).
- Cochlear implantation in specific situations:
    - Children who are pre-lingual and are at the margins of neural plasticity for speech development (Priority level 2)
    - Device failure leaving user without hearing (Priority level 2)
    - Removal of infected implant (Priority level 1b)
    - Post-meningitis with threatened cochlear ossification (Priority level 2)
- Posterior cranial fossa/lateral skull base pathology if there is life-threatening brainstem compression/hydrocephalus. This will require close collaboration with neurosurgery and a decision to be reached around emergency, urgent, or early surgery (Priority level 1a, 1b and 2)

We would also highlight that some priority level 4 patients cannot safely wait indefinitely. We therefore propose two subtypes of priority level 4. 4b where waiting indefinitely should have no detrimental effect on the patient eg. Ossicular reconstruction, stable tympanic membrane perforations and stapedectomy, and 4a when waiting too long may have a detrimental effect eg. active cholesteatoma. There is insufficient evidence to be able to put a specific time line on 4a for surgery, nor specific guidance on individual situations, but active monitoring is recommended with a notes review and where necessary a telephone consultations for those delayed significantly. In particular we would highlight active wet cholesteatoma in children, second sided active cholesteatoma, cholesteatoma in an only hearing ear and cholesteatoma which has already shown erosion of the tegmen, facial canal and otic capsule as needing prioritization. Active monitoring of each individual's own waiting list is required by the senior surgeon. In many departments, this process has already

started – Consultant level waiting lists are being reviewed and categorization by way of priority level and social isolation status (age, co-morbidities). In addition, we recommend that since the majority of ear surgery is Priority level 4, these patients should be stratified by time on waiting list so as to avoid inadvertent "queue jumping". It is recognized however that it may not be possible to offer surgery within the desired time frames at present because of resource limitations such as access to theatre and theatre staff and because of the additional risks of anaesthesia to individual patients in the COVID-19 era. Those patients in priority level 4b will inevitably wait longer for their surgery and the situation should be explained to them. At the current time, the balance of risk verses benefit may need to be re-considered for those patients who have co-morbidities that put them at greater risk from COVID-19 infection.

Interdependencies for reinstatement of elective ear surgery

The reintroduction of elective otological surgery will be dependent on the availability of the following: Imaging; audiology; PPE stocks; advice from PHE; advice from related specialty associations e.g. BAA, BSA, BCIG, RCoA, RCS; local circumstances e.g. availability of staff and facilities (we are aware many anaesthetic colleagues have been redeployed and theatres reconfigured. It may take time for more elective practice to return); and a safe operative environment.

The need for preoperative imaging and audio-vestibular testing remains unchanged (see section on clinics). Clear consenting explaining the rationale for undertaking the elective procedure and the risk – benefit balance in the presence of 1) a very small risk of the patient having asymptomatic COVID-19 infection just prior to admission and 2) a small risk of transmission during hospitalisation; must be undertaken and documented (see section on consenting). Alternative management options including non-surgical treatment should be discussed (please also refer to ENT UK guidance on consent).

Pre-operative Considerations

- Pre-operative COVID-19 testing is essential to minimise viral transmission as much as possible. We would recommend that the patient should be asymptomatic, have 2 negative COVID-19 tests taken 7 days and 48 hours pre-operatively, and have self-isolated for 14 days prior to surgery. One or both parents will need to self-isolate with the child in the case of paediatric surgery. This should be checked by the admissions team on the day of surgery. These criteria may vary across hospitals according to local policy.
- The optimal length of time to postpone surgery after a positive swab is unknown. Given that increased mortality is described with GA following COVID-19 infection a considerable gap may be required. Discussion with your anaesthetic team will be required.
- As we progress through the pandemic the risk of operating on an asymptomatic patient should decrease rapidly. At the time of writing approximately 1 in 400 of the population is infected. Pre-admission protocols generally mean that surgery will only be undertaken on asymptomatic patients who have self-isolated for 2 weeks and

who have had 2 consecutive negative swabs. The likelihood of operating on an infected, but asymptomatic patient is therefore already likely to be several thousand to one against. This will continue to fall assuming no second wave. It is not possible to provide guidance on what is, and what is not, a safe level of risk. However, in producing this document opinion has been taken from around the world and there are a number of otologists working in Europe and the USA, in areas where the prevalence of COVID-19 was relatively high but has fallen, who are now undertaking major ear surgery with only an N95 face mask and goggles or visor. Others are limiting themselves to tympano-ossicluar surgery and avoiding drilling, whilst many have yet to restart elective work.

Theatre Considerations

- It is likely that the turnaround time for patients will be significantly extended. We would recommend assuming a doubling in duration of the patient's surgical pathway initially. This is an important consideration and teams should be realistic in terms of the number of cases that can be safely undertaken in each surgical session. Re-organisation of theatre lists to 2 or 3 session lists may be more efficient in terms of case throughput and utilisation of resources such as theatre staff and PPE.
- The number of staff in theatre should be kept to a minimum.
- Theatre staff familiar with the procedure being undertaken is critical in order to maintain efficiency.
- Safe, fast and efficient surgery is important in order to minimise the risk of exposure and optimise the use of PPE. It should therefore be undertaken by an experienced otologist.
- The use of endoscopic ear surgery in preference to mastoid drilling may be appropriate for suitably trained surgeons in certain cases.
- Novel draping techniques may help in limiting aerosolization of tissues during surgery and are already being introduced in to clinical practice (Hellier *et al; ENTUK COVID-19 guidelines web page*). It is likely that further design improvements and alternatives will emerge. Particular care will be needed when removing these drapes at the end of surgery.
- The theatre needs to be appropriately cleaned post-operatively to ensure minimisation of residual particulate material on surfaces. Similarly, optimisation of theatre ventilation is critical in order to clear aerosolised material as promptly as possible.
- The use of drills, lasers and electro-cautery has been considered. This has been reviewed in a paper by *Thamboo et al*. The laser reviewed was a CO2 laser and there was no data on KTP lasers. Nor was there any comment about the viability of virus particles following lasering. Drills, lasers, and electro-cautery all produced aerosol and so caution is required. There is evidence from papilloma surgery that great caution is required when using lasers in the presence of virus bearing material.

PPE Requirements

Not all ear surgery will generate significant aerosols, for example, stapedectomy or routine myringoplasty in a dry ear. Nevertheless, we recommend the following PPE as a minimum for all otological surgery:

- Fit-tested FFP3 mask or powered air-purifying respirator (PAPR) or equivalent
- Goggles or Visor
- Water proof gown
- Double gloving
- Non-fenestrated suction

Standard donning and doffing procedures should be adhered to.

We have considered at length the optimal design of visor and face mask to take into account the difficulties of working with a microscope in PPE. It is not possible to give individual recommendations as different mask designs fit different individuals faces and interact differently with the microscope. Similarly, it is difficult to make specific recommendations for eye protection.

Two types of contamination should be considered. Droplets are likely to be blocked by visors. However, aerosol will not. Whilst an FFP3 mask should protect the surgeon from inhaled virus it will not protect from contamination of the conjunctiva which may be a significant portal of entry of infection. Appropriate eye protection is therefore critical. This is one of the major challenges for recommencement of otological practice as most of the forms of eye protection available interfere with the use of the microscope. A number of possible eye protection options that might offer adequate protection whilst allowing use of the microscope are currently under assessment across the UK and abroad. There is not enough information at the time of writing to make recommendations on their use. It is likely that most full-face masks will not be compatible with microscope use. Close fitting wrap around visors may be easier to use, but they may not protect the conjunctiva from aerosol. The microscope and eye pieces may offer some degree of protection in themselves from droplets. Some surgeons may prefer to operate from a screen, particularly in conjunction with an endoscope or state of the art exoscope technologies. These technologies may allow a wider range of masks, hoods, and visor options.

Consideration should also be given to some of the other difficulties faced when wearing this equipment for prolonged periods including discomfort, claustrophobia and CO2 build up (there are reports of surgeons unaccustomed to tight fitting masks and visors losing concentration in long procedures, so practice and experience are needed).

It is recommended that all surgeons familiarise themselves with the PPE available in their hospital and undertake “dry runs” to ensure it is appropriate for them whilst maintaining an appropriate fit.

Anaesthetic Considerations

The Royal College of Anaesthetists have a COVID-19 website that can be referred to for specific anaesthetic advice.

- We would recommend that patients having general anaesthesia are woken in the operating theatre.
- All appropriate steps to avoid coughing on waking should be taken. Similarly, precautions to minimise aerosolisation with coughing should be taken. This should be discussed with the anaesthetic team.
- Local Anaesthetic may be preferred in some procedures to reduce aerosol generation and to reduce patient risk from general anaesthesia.
- Otological surgery should be carried out as a day case (including mastoid surgery and auditory implantation) in a designated COVID-19 free area wherever practical in order to minimise the duration of time in hospital and avoid exposure to potentially COVID-19 positive areas of the hospital.

Procedure Specific Considerations

- *Grommet insertion*: For otitis media with effusion where other hearing strategies have not been helpful local anaesthetic placement is preferred. Management in out patients may be preferable where facilities allow. For children hearing aids should be considered as an alternative to surgery at present.

- *Tympanoplasty / Myringoplasty/ Ossiculoplasty / Stapedectomy* : (Priority level 4b). As elective work and theatre availability increases these procedures are expected to be increasingly reinstated. Local anaesthesia may be considered in preference to general anaesthesia but there will be a balance, and the longer the case the safer it may be for theatre staff and patient for general anaesthesia.

- *Mastoidectomy*: Deferral will become increasingly difficult with cholesteatoma as time passes. Monitoring of waiting lists is important and should be documented. From a patient safety perspective, it is likely most mastoidectomies for cholesteatoma should be given precedence over tympanoplasty, myringoplasty, ossiculoplasty, and stapedectomy in stable ears. However, the reverse is true for the safety of the operating surgeon and theatre staff. This is a challenge faced by all otologists and there is no simple answer. Given the high-risk nature of drilling a wet ear, and the current absence of safe and practical PPE when using the operating microscope, some surgeons may prefer to defer mastoid surgery for as long as possible to allow the prevalence of COVID-19 to reduce. In general cholesteatoma surgery *can* safely be deferred for a number of months.

- *Middle Ear Implantation*: (Priority level 4b). Whilst the operative considerations are similar to cholesteatoma surgery, like other priority level 4b procedures, middle ear

implantation may be deferred to prioritise higher category procedures. The availability of audiology assessments and fittings needs to be considered.

- *BAHA* (Priority level 4b) **:** As above, these procedures may be deferred. They should be regarded as relatively low risk as bone and blood are not believed to harbour significant viral loads. This type of surgery lends itself to day case local anaesthesia. The availability of audiology assessments and fittings need to be considered.

- Cochlear Implantation**:** (Priority level 4). The same precautions need to be taken as in mastoid surgery. Adult, post-lingual cochlear implantation can be safely deferred if necessary with the exceptions described above. We would place all paediatric cochlear implantations (other than the exceptions listed previously) into category 4a ie. They should not wait indefinitely. There is good evidence that significant delay beyond 18 months of age has a detrimental effect on eventual auditory outcome and, as such, they ought to be given the same prioritisation as other 4a cases.

- *Skull base*: (Priority level 4). Patients with no new symptoms or non-growing pathology such as vestibular schwannoma can be monitored as usual with interval scanning. As described above, patients should be monitored closely and advised to contact the team if new symptoms develop which may result in escalation to priority level 2 or 3 (MDT decision). Rapidly growing tumours or tumours with symptoms or signs of brainstem compression should be regarded as priority level 2 or 3 and appropriately prioritised. All other vestibular schwannomas under consideration for surgery should be regarded as priority level 4a and should be given some degree of prioritisation. Some patients, especially those with risk factors for adverse outcomes in COVID-19 infection, may wish to reassess the decision to proceed with surgery where appropriate. They may prefer to pursue radiotherapy options. This should be discussed with the patient through the MDT. Some centres may prefer a retro-sigmoid approach over a trans-labyrinthine approach in order to minimise drilling time and exposure to middle ear mucosa. Temporal Bone malignancies needing surgery will need prioritising with MDT guidance. Decision making in this group is complex and must take into consideration patient co-morbidities, the prolonged nature of surgery, the need for reconstruction and the prolonged in patient stay. Other options including neo-adjuvant radiotherapy should also be discussed.

Training

- We acknowledge the ongoing need for training and with appropriate protection, trainees are no more at risk of COVID-19 infection than their consultant. It is therefore recommended that trainees should be allowed to carry out sections of an operation under close consultant supervision within tight time constraints, but timely completion of surgery should be a priority, and this will probably result in a reduction in the overall operating time for the trainee. This may vary depending on competencies, seniority and COVID-19 status, and will have to be taken on a case by case basis.

- Observation within the operating theatre should be minimised especially in the presence of AGPs and, where possible, facilities should be made available for live streaming outside the theatre. The use of pre-recorded and edited operative videos or simulation are safer alternatives to direct observation. Operative simulation training is a good adjunct to operative training, but ultimately one cannot substitute for the other and a lack of operative training may need to be addressed in time.

- The effects on training of the reduced operating time that trainees are likely to experience in the near future will need to be reviewed on an ongoing basis.

Research / Audit:

- All routine NIHR / MRC research projects are currently suspended.

Current BSO projects related to COVID-19. (*We would be grateful if ENT UK members could inform us of any projects you are undertaking that BSO can add to this "live" list*):

- Observational study of conservative vs surgical management of acute mastoiditis, and COVID-19 status. Iain Bruce for BAPO and Peter Rea for BSO

- Protective draping in mastoid surgery. Will Hellier, Tim Mitchell, Seb Thomas

- Virtual vs face to face outpatient study in balance patients. Yougan Saman, Louisa Murdin and Peter Rea (Editorial paper submitted)

- The distribution of aerosols during ENT procedures. Simon Lloyd

- SNHL in COVID-19. Wendy Smith and Manohar Bance

- Does middle ear mucosa contain coronavirus?: a histological study of COVID-19 patients undergoing middle ear or mastoid surgery at up to 2 months post infection. Manohar Bance, Matthew Smith and Peter Rea

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- ENT UK Guidance on Clinical Prioritization https://www.entuk.org/clinical-guide-surgical-prioritisation-during-coronavirus-pandemic-ent-specific

- Mastoidectomy in the Covid era – The 2 microscope drape method to reduce aerosolization. https://www.entuk.org/sites/default/files/Mastoidectomy%20in%20the%20COVID%20Era%20–%20The%202.pdf

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- Prachand, V. N. et al. Medically Necessary, Time-Sensitive Procedures: Scoring System to Ethically and Efficiently Manage Resource Scarcity and Provider Risk During the COVID-19 Pandemic. J. Am. Coll. Surg. (2020) doi:10.1016/j.jamcollsurg.2020.04.011 .

- Re-opening facilities to provide Non-Emergent Non Covid 19 Healthcare Phase I https://www.cms.gov/files/document/covid-flexibility-reopen-essential-non-covid-services.pdf

- Robert Jackler (Covid 19 and Ear Surgery) in www.entnet.org

- RCS Guidance on Recovery of surgical services during and after COVID-19 29 April 2020 %%44331https://www.rcseng.ac.uk/coronavirus/recovery-of-surgical-services/?utm_campaign=1394067_Survey%20findings%20%26%20recovery%20report%20all%20members&utm_medium=dotmailer&utm_source=emailmarketing&dm_i=4D4N,TVO3,117RPB,3MHEP,1#s5

- Restarting planned surgery in the context of the COVID-19 pandemic : A strategy document from the Royal College of Anaesthetists, Association of Anaesthetists, Intensive Care Society and Faculty of Intensive Care Medicine https://static1.squarespace.com/static/5e6613a1dc75b87df82b78e1/t/5eac2a173d65cd27933fca88/1588341272367/Restarting-Planned-Surgery.pdf

- Thamboo et al. Clinical evidence based review and recommendations of aerosol generating medical procedures in otolaryngology – head and neck surgery during the COVID-19 pandemic. J Otolaryngol Head Neck Surg (2020). 49, 28.

Appendix 1

In addition to researching the current publications we have engaged with the organizations listed below. Whilst we have sought consensus the opinions expressed are those of BSO and not necessarily those who contributed advice and opinion. We are very grateful to all those who have assisted us.

British Society of Otology committee members
British Association of Audiovestibular Physicians
British Academy of Audiology
British Skull Base Society
British Society of Audiology
British Society of Neuro-otology committee members
ENT UK
Local audiology services
Medical microbiology
National Community Hearing Association
NHS England and NHS Improvement (NHSEI)
Royal College of Surgeons of England

Appendix 2

Priority level 1a
Emergency operation needed within 24 hours

	Laryngology / Head and Neck	Otology	Rhinology
	Airway obstruction: cancer/foreign body/sepsis	Nasal/ear button battery removal	Orbital cellulitis (abscess)
	Neck trauma with vascular/visceral/ airway injury	Life threatening middle ear conditions - intracranial extension / sepsis	

Priority level 1b
Emergency operation needed within 72 hours

	Laryngology / Head and Neck	Otology	Rhinology
	Head and neck sepsis - not responding to conservative Rx.	Acute mastoiditis and other middle ear conditions not responding to conservative Rx (eg Cholesteatoma-complicated)	Uncontrolled epistaxis
	Lymph node biopsy - lymphoma where core biopsy inadequate	Traumatic/ cholesteatoma related facial nerve palsy	Sinus surgery for impending catastrophe
	MDT directed Cancer debulking / biopsy – Microlaryngoscopy +/- laser	Traumatic injury to the pinna	
	Vocal Cord medialisation for severe aspiration		

Priority level 2
Surgery that can be deferred for up to 4 weeks

	Laryngology / Head and Neck	Otology	Rhinology
	EUA/biopsy for malignancy - hypopharynx/ larynx	Cochlear implantation post meningitis.	Non-malignant sino-nasal lesions threatening sight
	MDT directed nasopharyngeal surgery for malignancy	Baro-trauma perilymph fistula	
	MDT directed oropharyngeal surgery for malignancy	Organic foreign bodies in the ear.	
	MDT directed treatment of small, high grade salivary cancers.		
	MDT directed treatment of sinus cancers. - threatening sight		
	Treatment of pharyngeal / oesophageal / airway stricture		

Priority level 3
Surgery that can be delayed for up to 3 months

	Laryngology / Head and Neck	Otology	Rhinology
	MDT directed otological cancer surgery.	CSF fistula repair - Otological	CSF fistula repair - Rhinological
	Micro-Laryngoscopy and papilloma resection (laser / microdebrider / coblation / steel)	Cochlear implant in pre-verbal profound hearing loss where delay will impact on long term outcome. (MDT)	Symptomatic mucocoele (eg diplopia/recurrent infection)
	Endoscopic treatment of pharyngeal pouch with severe dysphagia	Cholesteatoma – extensive or complex	

Priority level 4
Surgery that can be delayed for more than 3months

	Laryngology / Head and Neck	Otology	Rhinology
	Phonosurgery	Cholesteatoma - uncomplicated.	All other Rhinology
	Sleep disordered breathing surgery	Chronic otitis media	Uncomplicated nasal fracture
	Micro Laryngoscopy benign vocal fold / cord conditions e.g.polyp/cyst/ectasia/ paralysis	All Ossicular Surgery/Middle ear implants / grommets / meatoplasty	
	Laryngeal framework surgery (thyroplasty) (unless significant aspiration)	Vestibular Surgery	
	Routine procedures for pharyngeal pouch	Non-organic foreign body (except button batteries)	
	Routine transnasal oesophagocopy	Cochlear Implants - other	