Recommended Procedure

Taking an aural impression: children under 5 years of age

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General Foreword

This document presents a Recommended Procedure by the British Society of Audiology (BSA). This Practice Guidance represents, to the best knowledge of the BSA, the evidence-base and consensus on good practice, given the stated methodology and scope of the document and at the time of publication.

Although care has been taken in preparing this information, the BSA does not and cannot guarantee the interpretation and application of it. The BSA cannot be held responsible for any errors or omissions, and the BSA accepts no liability whatsoever for any loss or damage howsoever arising. This document supersedes any previous recommended procedure by the BSA and stands until superseded or withdrawn by the BSA.

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- Declaration of interests by the authors: None declared

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Shared Decision-Making

It is implied throughout this document that the service user should be involved in shared decision-making when undertaking audiological intervention, receiving subsequent information and understanding how it will impact on the personalisation of care. Individual preferences should be taken into account and the role of the clinician is to enable a person to make a meaningful and informed choice. Audiological interventions bring a variety of information for both the clinician and the patient which can be used for counselling and decision-making regarding technology and anticipated outcomes.

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1. Introduction

With the advent of newborn hearing screening there is a greater demand for ear impressions to be taken on children under 5 years of age, and a greater number of professionals across different disciplines carrying out this specialist work. While there are specific recommendations for impression-taking in adults and children over 5 years of age (British Society of Audiology, BSA, 2013), there is a need to provide specific guidance for children under 5 years of age, particularly in babies, in order to ensure safety and quality of care for this age group.

2. Scope

This recommended procedure relates to children under the age of 5 years; the terms 'paediatric', 'child' and 'children' refer to children under the age of 5 years unless indicated otherwise; 'baby' refers to children typically 1 year or younger. It is a supplement to the BSA recommended procedure in impression taking (BSA 2016) and includes recommendations for variations and considerations to the procedure relating to this age group. It is essential that the current document is interpreted alongside the original impression taking guidance (BSA 2016).

Many of those guidelines are referenced in the current document, which provides additional detail, particularly related to the procedure of impression-taking in paediatrics and parent / carer interaction. It is not the intention of this document to provide specific guidance for impression-taking in children with medical conditions affecting head movement, developmental delay, and/or malformations of the ear, although some of the techniques described here might apply.
The term 'shall' is used in this document to refer to essential practice, and 'should' is used to refer to desirable practice.
Unless otherwise stated, the principles and techniques described here represent the consensus of expert opinion and received wisdom as interpreted by the Professional Guidance Group (PGG) of the British Society of Audiology in consultation with its stakeholders. This document was developed in accordance with (BSA 2021).

3. Personnel

The impression-taker shall be competent, or supervised by someone who is competent in paediatric impression-taking. Competence should be evidenced by sufficient and relevant training, experience and assessment (e.g. BSA, 2004). Audiologists who have experience in impression-taking in adults, and other personnel who are not audiologists and undertake this role (e.g. teachers of the deaf), shall be closely supervised in the procedure with children under 5 years of age before undertaking this role autonomously. It is ultimately the competent professional (carrying out or supervising the procedure) that is responsible and they shall ensure that they remain within their professional scope of practice at all times (e.g. refer onwards if necessary).

4. Parents/carers and their children

As with any paediatric audiological intervention, those responsible for the child (i.e. parents/carers) shall be included in the process (NDCS, 2002). The individuals concerned shall be communicated with throughout the procedure. The procedure and how their child might react should be explained and reassurance to the parent and/or child that the procedure should not be painful or harmful may also be needed. Informed consent (e.g. verbal) shall be obtained from the person responsible for the child. Parent/carer co-operation is needed in the assistance of the brace positions and effective communication shall be employed to ensure that they feel empowered and relaxed in the environment, in order to help the child feel comfortable and supported which, in turn, assists with the safety of the procedure - See Section 9.
The impression-taker should take the age and understanding of the child into account and take steps to ensure that the child feels comfortable, safe and relaxed as possible. Distraction of the child by a second person (either the carer or another audiologist/professional) may be beneficial so that the child remains calm and still for the impression taking. Older children may need some explanation of the procedure at each stage and the child should have a good view of the impression-taker and their equipment about to be used.

5. Equipment

A range of sizes and type of equipment is required due to the large variation of ear size in paediatrics. Speculae with widths of 2.4 mm and 4 mm shall both be available for otoscopy. There should also be a variety of toys available for distraction throughout the procedure, however soft toys shall be avoided as they provide an infection risk. All otolights shall have a 10 mm marker (these can be marked manually) for use with babies aged under 1 year as a guide to the maximum insertion depth from the entrance of the canal. A range of otostop sizes should be available for use including very small cotton otostops for very young babies. Cotton otostops may be preferable to sponge, as cotton may be less abrasive in a child's ear. The selected otostop should be large enough to fill the cross section of the ear canal, without causing undue pressure on the ear canal walls. In some cases it may be necessary to trim the otostop to size. If this is done, great care shall be taken to ensure that the string remains intact and attached, and that any debris from the otostop is removed prior to entering the ear.
The impression-taker should have a variety of syringes with different nozzle lengths and widths, so that the most appropriate can be chosen, depending on the size of the child's ear. For very small ear canals (e.g. very young babies), a dental syringe can be used where the nozzle can be cut to size. Impression material with a fast setting time (e.g. 4 minutes or less) should be used. When using a syringe, the setting time can be decreased when warming the material in the hands first or taking ear impressions in a warm environment. Material that has less shrinkage provides better fitting ear moulds for children, therefore addition impression materials (where equal quantities of catalyst and base are mixed together) should be used where possible.

Professionals shall be experienced in using impression guns in adults, prior to using them in paediatrics, or be supervised by someone competent (see section 3). Considerations should be made as to whether the child might find the gun equipment quite daunting, e.g. new or nervous children. If this is the case, then the gun equipment should be introduced to the child gradually with explanations of its use; alternatively, a syringe may be more suitable. Impression guns shall be used with caution and great care in children who are restless since there is a risk of injury if the child moves quickly into the impression canula.
If using an impression gun, material and equipment recommended by the manufacturer for paediatrics should be used. This is usually a smaller impression mixing canula, with the option of a paediatric tip for smaller canals, and impression cartridge material that has lower viscosity and low pressure. After taking the ear impression with a gun, impression film should be placed on the dispensed impression material. This will protect the impression from accidentally being damaged.

6. Environment

Care shall be taken to ensure that the environment is safe, hygienic and child-friendly; time should be set aside to do this, particularly when visiting a child at home. The impression-taker shall adopt procedures relating to hygiene and infection control as described in (BSA 2016) and by relevant local policies. Where possible, the environment should be well-lit to enable a good view of the ear canal, pinna and eardrum. All equipment should be laid out and prepared prior to the procedure.

7. Examination of the ear

See (BSA 2016) for a full and detailed account of how to carry out an ear examination. Key aspects of this for children under 5 years of age are reiterated here.
Before ear examination and impression-taking, the parent/carer shall be asked an appropriate history to identify any contraindications that might prevent the examiner from proceeding to impressions. This should include: if the child has shown any sign of discomfort or pain in his/her ears (e.g. by tugging at the ears, red/soreness), if there has been any discharge from the ears and if he/she is being treated for any ear-related problems or has previously had any surgery on the ears. The examiner shall select an appropriately sized speculum, based on the initial examination of the entrance of the ear canal. In many cases a narrow speculum (2.4-mm width) will be required since children often have narrow ear canals; however it is appropriate to use the largest possible speculum for maximum illumination of the ear canal and ear drum.
Otoscopy shall be used to check the length, width and orientation of the ear canal, and for contraindications that might prevent the examiner from proceeding to impressions. In addition to the recommended brace position used for otoscopy by the examiner a brace position should also be adopted by the parent/carer (outlined in Section 9). In children, the ear canal tends to be straighter and lacks the bends of an adult canal. Therefore, in the majority of cases the impression-taker needs only to

move the pinna posteriorly to have a better view of the ear drum and canal. However, it is common to have a limited view of the ear drum in children due to narrow canals.

8. Depth of ear impression and insertion of otostop

Prior to otostop and impression material insertion, the parent/carer should adopt one of the brace positions outlined in Section 9. Meanwhile the impression-taker shall continue to carry out the procedure using the appropriate recommended brace position (BSA 2016).
The length of the ear canal varies greatly between children and depending on the age of the child. The majority of growth takes place in the first 12 months of life, by which time the ear canal length is similar to the average adult length of 2.5 cm (Keefe et al, 1993). Careful consideration during otoscopy shall be given to the length of the ear canal in order to judge the insertion of the otostop.
For babies under 6 months, the 10-mm marker on the otolight (see Section 5) shall be used as a guide for the ***maximum*** insertion of the otostop into the ear canal; for babies under 2 months and premature babies the insertion depth may need to be less.
Due to the soft cartilaginous nature of the pinna in young children, the hearing aid should be placed on the child's pinna before filling the ear canal with impression material.

9. Brace positions: otoscopy, otostop placement and impression-taking

Figures 1 and 2 show examples of brace positions that should be adopted by the parent/carer for otoscopy, otostop placement and impression-taking. All positions can be reversed from the left to right position. The examples are not exhaustive and variations can be used. The key principle is that the child is still and avoids injury during the procedure. This often requires that the child's hands are held and the head is supported, preferably by the parent/carer. Where the child needs more comfort or reassurance, positions which hug into the parent/carer may be more successful. Where the child's legs are moving or kicking, the parent/carer may have to also hold the legs or place the child's legs between their own. If the child is happy and able to sit still on their own (e.g. 4-5 years old) for the duration of the procedure then no bracing by the carer may be necessary, although the child should have something to look at (e.g. a book) during the procedure.

Figure 1

Example brace position that can be used by the parent/carer for babies (left panel) and for babies and children that prefer to sit on their parents' lap (right panel) when taking an impression of the right ear (reverse position for the left ear). In the left panel the baby is being cradled, with his underside arm inserted under the carer's right arm; the carer's right hand is used to support baby's head, while the left hand is used to hold the baby's arms and legs in place. In the right panel, the child faces sideways with his/her head against the carer's chest; the carer uses her right arm to keep the child's right hand/arm still, and her left arm to hold his head against her chest; the child's left arm can be held in place against the carer or placed underneath the carer's right arm.

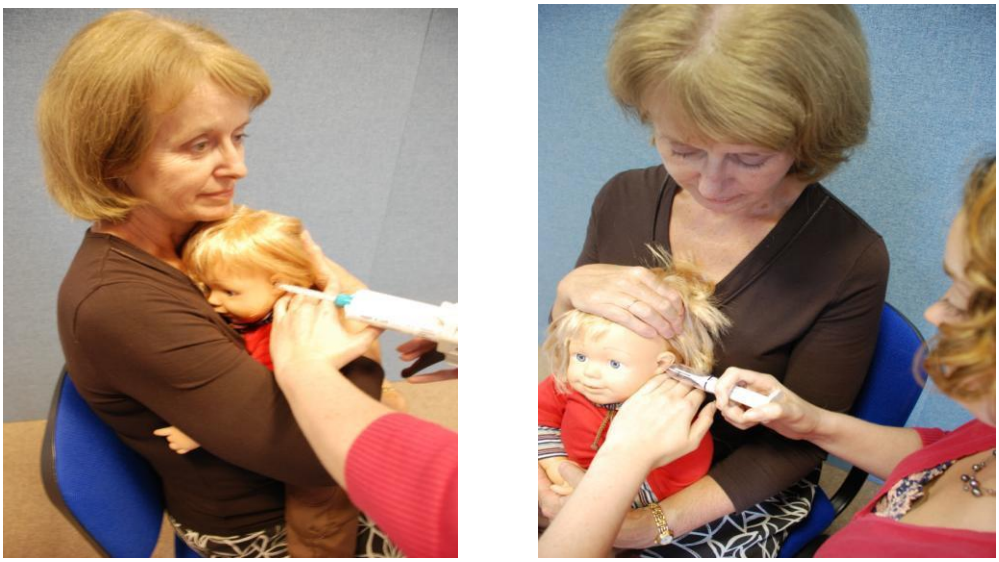

Figure 2
Example brace positions that can be used by the parent/carer for babies and children that prefer to sit on their parents' lap when taking an impression of the left ear (reverse position for the right ear). In the left panel the baby is being hugged into the carer's chest; the carer's left arm is used to wrap around the baby and keep his arms in place; the carer's right arm is on top and is used to support the baby's head. For older children, each leg can be positioned around the carer's hips. The right panel may be suitable for older children, who prefer to sit forward. The child is sat on the carer's lap with his/her back and head against her chest; she uses one arm to hold the child's hands and the other to support the child's head against her chest.

10. Removal of the impression

While the ear impression is setting, the child shall be distracted with toys to prevent him/her touching the ear or impression material. It can be useful to place toys in the child's hands during this time. Removal of the impression shall be carried out as described in (BSA 2016). A brace position is not always required in the removal of the impression, but may be desirable if the child is upset or needs comfort.

Following removal of the impression otoscopy should be carried out to check for any undue harm caused by the procedure.

11. Further guidance for the procedure

As with otoscopy, the impression-taker shall be sitting or kneeling when carrying out the procedure. However, there may be occasions when the impression-taker is required to stand; this is particularly the case for younger babies who may be comforted by their carer while standing. Under no circumstances

shall the professional bend over while standing, as this may easily result in a loss of balance and thus provide a risk of injury to the professional, child or carer.
Where possible, it is useful to have two professionals in the room in order to help speed the process, particularly if the child becomes distressed, or for one person to use toys to distract the child while the process is being carried out.
In most cases, only one ear impression at a time should be carried out. Where a child already wears hearing aids bilaterally, one hearing aid should be worn as the impression is carried out in the contralateral ear as this generally causes least distress to the child as they can still hear from their other ear during the procedure.

The frequency of impression-taking will be greater the younger the child, and particularly during growth spurts. Ear impressions may be required as often as every 2-3 weeks for babies. The need for new ear moulds may be identified by the parent or professional and once this need has been identified then ear impressions should be taken as soon as possible.

12. References

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Further Reading
www.dslio.com/wp-content/uploads/2015/05/DSL5-Pediatric-Protocol.2014.01.pdf

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Appendix

i. Paediatric ear mould service

The document highlights the importance of having in place a separate paediatric contract with ear mould manufacturers, with a level of service agreed between the parties, to ensure a fast turn-around from ear impression to the family receiving the ear mould. This includes using manufacturers are who are able to turn around ear moulds within 24 hours of receiving the ear impression, and who can offer a variety of colours and patterns. The service may also be able to make two ear moulds from one ear impression (for example swim plugs and acoustic ear moulds) so that only one ear impression needs to be taken for each ear.

Ear mould services should be accessible, for example offering impression-taking at home, drop-in clinics, appointment times at local clinics, or out-of-hours services. All ear impressions that are packaged to the manufacturer should have some means of distinguishing them as paediatric, e.g. the placement of a paediatric sticker on the package. Where parents wish for ear moulds to be posted directly, appropriate consent should be gained for the sharing of information to a named manufacturer outside of the trust. The format of this consent should be in keeping with local trust policy and all appropriate data protection legislation. Therefore, in such cases, parents shall be trained how to fit new moulds themselves