

CHILDREN'S AUDIOLOGY SERVICES

Paediatric Audiology has been a neglected area in the past. I am pleased to report on a RCPCH Working Group I have established to ensure we develop paediatricians with a special expertise in this area for the future, building on the hard work of our predecessors.

The service models are changing but the need for paediatric involvement remains. The group, which includes Officers and College staff as well as representatives from BACDA, BACCH, Neurodisability and a trainee, is looking at competences needed at all levels and should complete its work by the summer.

The report of the seminar held last March and edited by our past President makes interesting reading. If you have views on this area of College work please contact me.

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**CHILDREN'S AUDIOLOGY SERVICES – A MULTI-
PROFESSIONAL REVIEW IN PARTNERSHIP
WITH THE NHSU.**

*Report of a seminar held on March 23rd 2004 at RCPCH,
compiled and edited by David Hall,
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October 14th 2004.

Please discard previous versions!

Important notices:

1. The members of the group who took part in the seminar on which this report is based were invited because of their particular expertise; this report should not be assumed necessarily to represent the views or policies of the organisations to which members belong. The editor believes that the report is a fair reflection of the discussion that took place and the comments subsequently received, but accepts full responsibility for the ideas and recommendations etc set out in this report.

Further comments are welcome-please send to d.hall@sheffield.ac.uk

2. This report may be updated as discussion continues. ***Any reader who would like to be added to the mailing list – please send your email address to:***

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EXECUTIVE SUMMARY

A multi-disciplinary group met on March 23rd 2004 to consider how the recent advances in paediatric audiology can be made accessible to all UK children over the next decade. The group reviewed professional roles, workforce numbers and service structures in paediatric audiology. This report summarises the ideas discussed and makes proposals for further work. Recommendations are summarised on the next page. *The most important outcomes of the meeting, on which there is broad consensus among the delegates, were as follows:*

- There is support for a managed network model of care, to maintain local access while developing a critical mass of expertise; each network might serve 2-3 million total population. This would have obvious planning and commissioning implications. *Action: Dept of Health and specialist commissioning groups*
- Audiological services are and will remain multi-disciplinary in nature. While this review focuses on provision within the health service, the vital role of teamwork with early years staff, educational and social services in early identification, management and support is emphasised.
- The invaluable continuing contribution of community paediatricians to audiological provision is acknowledged but it is probable that in the future much of the service they currently provide will be delivered by graduate audiologists.
- There is an important role for consultant physicians in audiological medicine, some of whom develop particular expertise in paediatric audiology, but the numbers are and will probably remain too small to locate one in every district and they should provide consulting services for an entire network.
- Community paediatricians, particularly those with an interest in or responsibility for disability services, need to be familiar with key issues regarding hearing loss. Some of these should extend their interests in this field and provide a paediatric consulting and liaison service to paediatric audiology teams and networks. *Action: RCPCH¹ - consider and develop a flexible approach to provision of training and CPD² in hearing impairment and communication disorders.*
- It is suggested that the patient journey might be streamlined, and the service made more efficient, if SALTs³ were able to undertake an initial hearing assessment of children referred to them with concerns about speech and language. *Action: for further debate within the SALT profession and the Royal College of Speech and Language Therapists.*
- Educational audiologists and ENT surgeons play vital roles in the provision of services for children with hearing impairment. Further data are needed to assess workforce and training needs.

¹ Royal College of Paediatrics and Child Health

² Continuing professional development

³ Speech and language therapists

IMPLICATIONS AND RECOMMENDATIONS

The recommendation	Responsibility
Future plans for children's audiological services should assume that graduate audiologists will play a key role and that paediatricians with a special interest, ENT surgeons, and consultants in audiological medicine, will continue to make an essential contribution, though their numbers will be smaller.	Departments of Health: Royal Colleges; University departments of audiology.
In addition to training in the core material of each specialty, there will be a need for an educational programme for those managing and developing services, to incorporate generic leadership & management skills, basic public health concepts & content specific to audiology. In particular, it should include the information requirements & organisational structures required to ensure that patient journeys are kept as simple as possible.	Ditto. NHSU could play a role here.
A cross-discipline approach is needed to the provision of information and support for parents, relevant to the training needs of health professionals, teachers and social care staff. "Expert" parents could play a key role in educating professionals and parents of newly diagnosed children.	Ditto: plus National Deaf Children's Society, Contact a Family and other parent organisations. ?NHSU
Primary research is needed on the patient journey: how do children enter various community systems; how do they obtain appropriate diagnosis and intervention at least possible cost in time, money and inconvenience. This should be undertaken in a number of different localities - services are probably highly variable in quality and structure.	Departments of Health to suggest how this may be commissioned.
Depending on the results of this research, the Royal College of Speech and Language Therapists should be invited to consider pilot studies of the extent to which therapists could undertake initial assessments of hearing in children referred for SALT assessment in order to rationalise referrals to audiological services. If these pilots are favourable, this could be extended and the content of the undergraduate programme expanded.	Royal College of Speech and Language Therapists with Departments of Health – ? Modernisation Agency or Workforce Confederations. NHSU?
Paediatricians in training should have some exposure to audiology – currently most have no idea what the specialty has to offer.	RCPCH Higher Specialist Training committee & PG Deans.
Paediatricians with relevant experience and interests should have the opportunity either during their SpR training or in career posts, to undertake additional training in the relevant aspects of audiology and communication disorders.	RCPCH with Sheffield Masters programme in Disability and collaborating University departments.
Service planning for paediatric audiology should take account of the need to ensure a critical mass of staff in various disciplines. This implies planning at a level above that of PCT – an issue that has much in common with other specialised children's services ⁴ .	Departments of Health; Specialised Commissioning teams.
Health visitors & midwives should participate in awareness-raising programmes; they need to be equipped to deal with parental worries & questions about newborn screening in general; HVs to continue regular updates on hearing test technique until the distraction test is phased out.	Children's sub-group of National Screening Committee; National Coordinating Centre for newborn screening. NHSU
Non-professional staff who undertake newborn hearing testing should have their training and expertise recognised by some form of recognised accredited qualification. Under discussion, .	Departments of Health. ?NHSU
Educational psychologists, educational audiologists and ENT surgeons play vital roles in services for hearing impaired children; long term plan needed to sustain these services & secure access to education and training. Policy statement needed on numbers, roles and aims.	DfES; DH; British Associations of Paediatric Otorhinolaryngologists (BAPO) & of Educational Audiologists (BAEA).

⁴ See the RCPCH report "Commissioning Tertiary and Specialised Services for Children and Young People" – www.rcpch.ac.uk

Background

Over the past decade there have been a number of important advances in paediatric audiology and in the understanding of speech and language development:

- The advent of universal newborn screening for hearing impairment.
- Cochlear implantation.
- Identification of some of the genes associated with hearing loss.
- Improved understanding of the genetic and environmental influence on language acquisition both in hearing and in hearing-impaired children.
- Increasingly precise definition of which children with middle ear disorders are likely to benefit from surgery.

There is however much uncertainty as to how children's audiological services can best be delivered over the next decade so that these advances benefit children. A multi-professional seminar⁵ was held on March 23rd 2004 to discuss a number of issues including:

- The introduction of universal newborn hearing screening (UNHS) and the gradual phasing out of the infant distraction hearing test will require changes in the size and expertise of the workforce.
- The extent of these changes depends on clarity about how UNHS is to be managed and the number of centres needed to carry out diagnostic testing and on-going management.
- UNHS will not eliminate the need for local access to hearing assessment after the newborn period but there is no clear plan as to how this might best be provided.
- This lack of clarity has many causes, one of which is continuing uncertainty about the clinical significance of conductive hearing loss due to "glue ear".
- Community paediatricians are currently responsible for much community children's audiology provision but this workforce is ageing and there are too few trainees to replace those who will soon be retiring.
- Children with possible hearing loss often have to see many professionals before they receive a comprehensive diagnosis and an integrated plan of action. It is suspected that many children never complete this patient journey and do not get the optimal treatment.

These issues when combined create considerable uncertainties about the investment needed in training to ensure that children's audiology is provided to a high standard in the future. NHSU supported a seminar to assist in defining these training needs and to determine whether it may have any role in meeting those needs.

Causes and prevalence of permanent hearing impairment in the UK⁶ - see Box 1 on next page.

⁵ The names and affiliations of those invited to participate are listed in Appendix 2.

⁶ It is generally agreed that the figures for mild and unilateral hearing impairments are somewhat less precise than those for significant bilateral impairment (defined as >40dBHL in the better ear), but they are nevertheless sufficiently reliable for service planning considerations.

A brief overview of hearing impairment in children

Hearing impairment (HI) is usually divided into two main types –

Permanent congenital HI (PCHI) is usually caused by abnormality of the cochlea (the organ that receives sound signals and converts them to nerve signals) or the nerve that carries signals from the cochlea to the brain. The hearing loss may vary from trivial to total. There is no cure but hearing aids, cochlear implants and specialised education enable most children to learn to speak and to interpret the speech of others. An early diagnosis and prompt intervention are essential for a good outcome. Modern technology (“Universal Neonatal Hearing Screening” – UNHS) allows many children with PCHI to be identified in the first days of life but some cases are of late onset and others are acquired in infancy or childhood.

Conductive HI is usually due to an abnormality in the middle ear, and by far the commonest cause is an accumulation of thick fluid – this is known as secretory otitis media, otitis with effusion or colloquially as “glue ear”. The degree of HI is usually mild to moderate. Many cases resolve on their own but a few are very persistent. There is controversy about which children benefit from treatment, the optimal treatment and the adverse effects of having persistent glue ear. Glue ear can occur at any time in childhood but usually resolves by age 9 or 10 at the latest. There is currently no way of predicting persistent cases (except in children with syndromes associated with a high risk of middle ear disease).

There are *other conditions* as well as hearing impairment which may lead parents to mistakenly believe that their child has poor hearing. Children with autism spectrum disorders, moderate or severe learning difficulties and various forms of aphasia may all be wrongly thought to be hearing impaired because they do not show normal responses to sound or speech. It is important to *exclude hearing impairment as a main or contributory factor* in children presenting with speech and language difficulties, autism spectrum disorder, behaviour problems or frequent ear infections.

Current best estimates for prevalence are as follows:

- 1.1 per 1000 children born with permanent bilateral deafness (40+ dB HL)
- 0.2 per 1000 develop deafness by age 4-5 years
- 0.4-0.7 per 1000 develop deafness from 5- 10 years

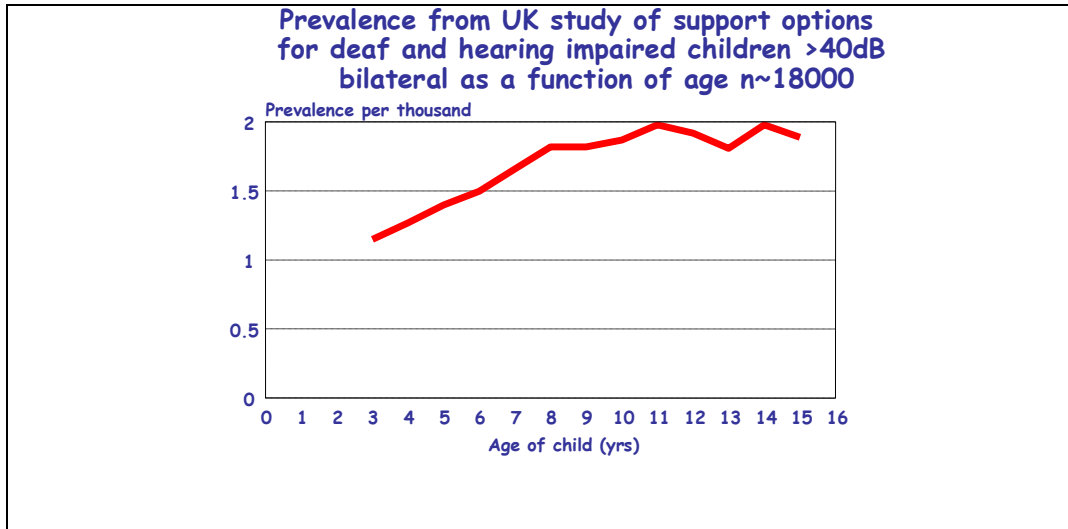
Figure 1 (next page) shows that nearly half of all the children with significant hearing loss at age 10 were not identifiable at birth by any current method and new cases continue to be found into the teens. There may be many more with hearing loss confined to the high frequencies who would not be included in these figures.

Evidence: prevalence of unilateral deafness:

- 0.6 per 1000 possibly born with a unilateral deafness
- 10-25% unilateral congenital – but these may progress to bilateral

Evidence: prevalence of childhood hearing loss (Bess et al 1998)

- Minimal SNHL at school age = 5.4% (bilateral, high-frequency, unilateral) - 54/1000
- All forms of HL at school age = 11.3% (including conductive) - 113/1000



Implications of prevalence data

Children identified by newborn screening or by other means as having a permanent hearing loss need a multi-disciplinary assessment. Table 1 shows the number of newly diagnosed cases per annum for each size of population in England. Although the numbers for one PCT or one Newborn Hearing Screening Programme (NHSP) are small, children with permanent hearing impairment need follow up throughout childhood and adolescence, and in the early years require several appointments each year. In addition, there are many children who require assessment for suspected hearing loss and a proportion of these will have middle ear disease that needs monitoring or intervention. “Watchful waiting” as a strategy for dealing with “glue ear” depends on the availability of experienced staff, to ensure that those children who do need surgery receive it. There is, therefore, sufficient workload to justify provision of a locally based paediatric audiology service⁷.

The figures also suggest, however, that neither a single PCT⁸ nor a single newborn hearing screening programme would generate sufficient cases to justify the staffing needed for a *comprehensive* audiological service, i.e. one that includes highly specialised skills needed only for a small proportion of cases. The optimum population size for a comprehensive service is probably that of a Strategic Health Authority (StHA), working with a number of PCTs and newborn programmes. This would allow employment of a team of staff with varying types and levels of skills.

⁷ Close liaison between services is vital but is made more difficult by lack of co-terminosity – an issue that has to be addressed no matter what structure is adopted for paediatric audiology.

⁸ A PCT (Primary Care Trust) is the unit of service management in England. The population served by a PCT varies widely but is generally of the order of 160,000 – 200,000. Thus an StHA would serve approximately 1.6 to 2 million people. Different structures exist in the other countries of the UK and in sparsely populated rural areas optimal population sizes for service provision may differ.

Incidence / prevalence of Childhood Hearing Loss as a function of area size

	AREA PCT	NHSP	SHA	REGION	ENGLAND
N	300	112	28	9	1
Births	1885	5051	20204	62856	565709
Bilateral	1.89	5.05	20.20	62.86	565.71
Neuropathy	0.19	0.51	2.02	6.29	56.57
Unilateral	1.13	3.03	12.12	37.71	339.43
Total (40 dB HL+)	3.20	8.59	34.35	106.86	961.71
Acquired year 1-5	0.37	0.98	3.92	12.19	109.75
Acquired year 5-11	0.94	2.53	10.10	31.43	282.85
Mild HL missed by NHSP	0.75	2.02	8.08	25.14	226.28
All SNHL school age ↗	101.79	272.75	1091.02	3394.22	30548.29
All HL school age	213.01	570.76	2283.05	7102.73	63925.12

↗ ~20 dB HL any frequency

Abbreviations: PCT = Primary Care Trust (see below); NHSP = Newborn Hearing Screening Programme; SHA = Strategic Health Authority.

The concept of the “managed network”

The emerging solution to the inevitable trade-off between local access and availability of specialist expertise is the concept of the managed network in which services and teams collaborate to ensure that every child obtains the expertise he or she requires.

In a managed network ... “The emphasis ... moves from buildings and organisations towards services and patients it is a move from competition to co-operation, not just between primary, secondary and tertiary providers but also between different health professions.” It is characterised by:

- Appointment of one person with overall responsibility, be it a clinician, manager or other professional. (This person is often, but not necessarily, based in a major centre – commitment, respect of colleagues and leadership qualities are more important than the professional discipline or the main place of work).
- Statement of service improvements expected
- Documented evidence base
- Quality assurance
- Patient involvement
- Annual report
- Agreement of all to participate.

(Cardiology – development of a managed clinical network. Baker CD, Lorimer AR. BMJ 321 1152-3).

Notes: 1. Bigger does not mean better – many small-scale local services provide excellent care. Creating networks should not imply the dominance of large centres – it need not and must not de-skill or de-value the smaller services.
 2. The term “hub and spoke” is also used, for example in the re-design of cleft lip and palate services – however, the concept of the Managed Network which is promoted in the NSF may be more effective in securing the planning and cooperation needed.

Middle ear disease – otitis media with effusion, secretory otitis media or “Glue ear”

This is far more common than permanent hearing loss. Most children have at least one episode that usually resolves but in a few children it becomes persistent. Glue ear is associated with variable mild to moderate hearing impairment but there has been much controversy about the extent of the disability this causes. In the 1970s and 80s many developmental problems were attributed to glue ear, resulting in an enormous increase in the amount of surgery (insertion of grommets or ventilation tubes) carried out for this condition. As it became clear that much of this was unnecessary the pendulum swung too far the other way and some children who almost certainly would have benefited from surgery were denied it.

Children with glue ear may present with various concerns, most commonly about hearing, attacks of ear infection, speech and language delay, behaviour problems, or poor school progress. Thus they may reach an audiology clinic directly from their GP or via other specialists – speech and language therapists (SALTs), ENT surgeons, paediatricians or child mental health services.

Continuing research, notably the TARGET study (Trial of Alternative Regimens in Glue Ear Treatment) suggests a more balanced approach. The evidence is that:

- Persistent glue ear is not rare but is much less common than fluctuating episodes of acute otitis media.
- Episodes of glue ear with recovery between attacks have little effect on language development; but persistent glue ear has a significant impact on development and school progress.
- There is as yet no easy way of identifying in advance which children are at risk of persistent as opposed to transient glue ear (other than those with syndromes recognised to have a strong association with the condition)).
- There is a strong association between glue ear and upper respiratory complaints such as infections, rhinitis, and airway obstruction in sleep leading to snoring, disturbed sleep patterns and behaviour difficulties – in appropriate cases, these are often improved by surgery (adenoidectomy).
- The children most likely to benefit from surgery cannot be identified solely by the severity of the hearing impairment.
- Ventilation tubes alone may improve hearing levels but the benefit is usually short lived.
- Hearing impairment, parent evidence and respiratory symptoms must all be assessed when deciding which children are likely to benefit from surgery and whether or not to perform adenoidectomy as well as insertion of ventilation tubes.
- A speech-in-noise test may be a substantially better predictor of which children will benefit from surgery than standard hearing tests ⁹.
- Systems for case-finding need further study – the dilemma is that universal screening for middle ear disease produces too many non-persistent cases, but purely reactive approaches leave too many persistent cases without timely intervention.

⁹ More information is needed on the training and resource implications of this approach.

Children presenting with concerns about speech and language

Speech and language delay in various forms is common – depending on definitions used, between 3 and 10% of children may be affected. National Statistics (DH 2002-2003) state that:

- Initial contacts have increased from 225000 in 88/89 to 338000 in 02/03
- Of children referred - 62% are from non-hospital services
 - 15% from Health Visitors
 - 9% from education services
 - 8% from general practice and
 - 30% from other services.

In terms of age at referral:

- 10% are in 0-2 age range
 - 20% are between 3-4
 - 16% are between 5-9
- i.e. 46% of all SALT referrals come before the end of primary school

In the school years there is a consistent ratio of 2:1 males: females

Putting this together, 30% are pre-school and this equates to over 100,000 initial contact per year or over 300 per PCT. Hearing impairment probably plays a significant role in just a small minority of these, but this cannot be excluded without an audiological assessment. Thus the numbers involved are far greater than for congenital hearing impairment. There are also many children with learning problems, dyslexia, behavioural difficulties, etc., all of whom are likely to need a hearing assessment even though hearing impairment is rarely responsible.

The patient journey A study of children in inner city London showed that about 60% of children with language delay are referred on for audiological assessment. The speech and language delay group is clearly one that is at considerable risk of concern about hearing, thus reasserting the link between hearing and language. The process of screening of speech and language also identifies a broad range of children where the symptom of delayed language development acts as a test for psychosocial well-being but with the possibility of underlying pathologies, many of which are co-morbid.

Little is known about the potentially complicated patient journeys involved for all these children but anecdotal evidence and a recent in-depth study in a SureStart area in Sheffield suggest that many children never complete that journey and some never embark on it¹⁰. Low income and deprived social areas equate with high prevalence of language delay. In the Sheffield study, the prevalence of delayed language at 20-24 months was 18-31% (by parents report and direct testing); at school entry it showed

¹⁰ See Pickstone, C. PhD thesis, University of Sheffield, 2004. For equivalent USA data, see Allen, R., Stuart, A., Everett, D. & Elangovan, S. (2004) Pre school hearing screening; Pass/refer rates for children enrolled in a Head Start programme in Eastern North Carolina. *American Journal of Audiology*, 13, 29-38.

that 80% of boys and 60% of girls were below normal in language development. Yet only 10% of those expected were actually referred prior to the start of the study.

Hearing loss in pre-school children – the need for continuing vigilance Health professionals must remain vigilant and refer children promptly for assessment if there is any possibility of hearing loss. The school entry test provides an opportunity to identify children whose hearing difficulty has been overlooked and those with recently acquired HI. Behavioural observations and questionnaires to parents and / or teachers may sometimes detect hearing difficulties, but school entry hearing screening will probably stay in force for some years to come. Its role is reviewed from time to time by the Child Health sub-group of the National Screening Committee. An HTA review of the school entry screen is in progress and is expected to report in 2006.

A comprehensive and holistic approach to paediatric audiology – what do children and families need?

Newborn screening will only be successful if it is an integral part of a comprehensive audiological service. The term “Family Friendly Hearing Services” captures the need very clearly. It assumes a co-ordinated team approach, good multi-disciplinary working, sharing information with Education and Social services and collaboration with voluntary organisations. A first class service must provide technical excellence in assessment and diagnosis, and a personalised intervention and management plan. Excellence also implies:

- Sharing the news sensitively with parents – there is abundant evidence that this is crucial and that professionals improve with experience and regular peer and parent feedback
- Dealing with equivocal results - managing uncertainty and parental anxiety
- Review of medical history, physical examination supported by a detailed knowledge of syndromes and dysmorphology, followed by co-ordination of comprehensive aetiological and diagnostic investigations and referral to other specialists (e.g., geneticists) when indicated
- Imaging (CT, MR etc.) in particular should be undertaken in centres with the relevant expertise and “child-friendly” approach.
- Monitoring children ‘at risk’ of developing hearing loss
- Well planned assessment of children with complex multiple impairments and ‘difficult to test’ children, such as those with other problems that may present as possible hearing loss – for example, autism spectrum disorders, central auditory processing disorders and acquired aphasia.
- Speech and language assessment in deaf children
- Developmental assessment taking into account the impact of hearing loss and, where relevant, other impairments such as reduced vision
- Urgent referral of children after recovery from meningitis for MRI / cochlear implant
- Specialist services - Tinnitus, Neurovestibular assessment, central processing disorders, Cochlear implantation, Bone anchored hearing aids, Auditory neuropathy
- Consultations with dissatisfied or concerned parents, uncertain professionals, and those seeking reassurance or a fresh approach – the second and third opinion.

- Recognition of psychological distress and familiarity with the psychiatric problems that are particularly associated with hearing impairment
- Advocacy and information
- Managing and supporting transitions – starting school, changing school, moving to a new home, entering further or higher education and moving from paediatric to adult services
- A “public health” overview, management and co-ordination of the service

The implications of the evidence are as follows:

- Introduction of UNHS will require a continuing investment in staff training at all levels and careful consideration of how best to structure the diagnostic and intervention programmes that will be needed.
- Some children with permanent hearing impairment will present after the newborn period, though the numbers will be far smaller than is the case for glue ear.
- A service must be available to identify children with any form of hearing impairment and to determine who may benefit from intervention.
- Middle ear disease is common and self-limiting in most children but not in all.
- It is important to optimise the patient journey from first concern to discharge or surgery and minimise child and parent time spent on appointments.
- ENT, SALT, paediatric and mental health services need to be closely integrated with audiological services both at local level and at referral centres.

Who will provide these services?

Many disciplines are involved in or come in contact with paediatric audiology – consultants in audiological medicine, audiologists, ENT surgeons, speech and language therapists, paediatricians, psychologists, psychiatrists, neurophysiologists and neurologists. Nurses and technicians contribute to hearing assessment, particularly in community clinics and in schools. Further details are in the appendix.

No profession has a monopoly of wisdom and few professionals will have all the attributes or skills listed above. With increasing specialisation and greater technical sophistication in assessment and intervention, the need for multi-disciplinary teams will increase.

The continuing problem of how best to identify middle ear disease and conductive hearing loss is unresolved. Parents, GPs, teachers, early years workers and SENCOs may all have a part to play and this suggests a need for broadening our concepts of early detection in the community as a whole.

The current and future workforce

A more detailed analysis will be found in the Appendix. Approximate numbers for the key disciplines working in or linked to paediatric audiology are as follows:

SALTs – 5,600. This workforce is still expanding.
Community paediatricians in audiology – 200 (many part time). This is an ageing population with many due to retire in the next ten years. A high proportion of these

doctors are in staff grade or associate specialist posts. These are unlikely to be replaced because a trained doctor in community paediatrics can usually obtain a consultant community paediatrician post without difficulty; currently only a minority of these are trained in or have an interest in paediatric audiology.

Consultants in audiological medicine – 44 consultants and 23 trainees. Of the 44 consultants, 32 are in London, Manchester or Sheffield and the rest are single handed. Half the trainees plan to specialise in paediatric audiology.

Paediatric ENT surgeons All ENT surgeons receive training in paediatric oto-rhino-laryngology and, in volume terms, their major task is to deal with “glue ear”. Some develop paediatric ENT work as a special interest and they provide expertise on issues such as malformations of the outer, middle or inner ear; deal with more complex middle ear disease; and manage the surgical aspects of the cochlear implant programme.

Audiologists (non-medical) – there are estimated to be 720 paediatric audiologists in post at present¹¹ with many more in training. This is rapidly becoming an all-graduate profession and will have a major involvement in service provision⁷. The numbers would be sufficient to support a model based on 28 comprehensive services as suggested in this paper, but not to provide a separate service in each PCT or for small groups of PCTs.

Educational psychologists – there are around 2000 in post but very few with specialised expertise in audiology or in the psychological assessment of children with hearing impairment.

Educational audiologists In the UK, educational audiologists are teachers of the deaf who take a further qualification (MSc) in audiology¹². There are believed to be around 100 practising Educational Audiologists in the UK. Their role varies to some extent according to the setting where they work. They work with hearing impaired children in school and home settings, ensuring that technology¹³ is used to best advantage – e.g., managing and adjusting amplification needs, setting up (via LEA budgets) personal radio hearing aids systems, advice on classroom acoustics (including acoustic properties of newly built accommodation), classroom soundfield FM systems etc. They also provide expertise and support for teachers of the deaf, mainstream teachers and special schools. Educational Audiologists take an active role in dealing with infants diagnosed through the newborn screening programme. These skills will increasingly be needed.

General practitioners are often the source of referral to all the services mentioned here and need to be well informed about local policy. It is possible that in the future a few GPs might develop Special Interests in ENT, audiology or child development.

Audiology 2010

What kind of service will parents and children need in 2010? And what staff would be needed to provide it? Bearing in mind the need to maintain local access while

¹¹ This is a “guesstimate” based on an assumption that paediatric audiology represents about one third of the total audiology workload.

¹² In the USA they are audiologists, with the same training as all audiologists, but with additional training as teachers of the deaf.

¹³ For example, the “Modernising Hearing Aid Services for Children” (MCHAS) programme provides digital hearing aids but the benefits of such technology may not be realised if they are used inappropriately.

ensuring optimum use of scarce specialised skills, it is suggested that paediatric audiology should be planned like other specialised paediatric services, on the basis of a large population rather than purely as a local service. Some staff should be prepared to travel in order to maintain local outreach services.

Designated teams. Universal newborn screening should be firmly established by or before 2010. Working within current organisational arrangements in England, one paediatric audiological service based in each of the 28 StHAs may be a reasonable model. Each service would be able to deal with advanced assessment and diagnostic procedures. Families may need to travel for some services, particularly at the diagnosis stage or for advanced procedures but wherever possible ongoing management and support would be provided locally, minimising the need for frequent long journeys.

The ideal multi-disciplinary team would include:

- at least 3 audiologists at level 8 - this structure would counter the problem of solo practice, provide continuing training and support for newly qualified audiologists and ensure service continuity during holidays, sickness etc;
- a paediatrician with a knowledge of disability but with a particular focus on all forms of communication impairment;
- a consultant in audiological medicine with a major interest in paediatrics;
- speech and language therapist(s) with expertise in hearing impairment and other communication disorders
- a clinical psychologist and a child and adolescent psychiatrist with an interest in the particular problems experienced by hearing impaired children and young people;
- paediatric oto-rhino-laryngology expertise
- close working relationships with educational and social services and with parent support groups;
- links with other vital services including genetics, imaging, neurology etc.
- a network manager, a database manager and administrative support.

Initial assessment at community level Universal newborn screening will never identify all children with hearing impairment and children will continue to present throughout childhood with suspected hearing loss or with problems that might be due to hearing loss. Notwithstanding the expansion of audiology training, it will not be feasible in the foreseeable future for every child presenting with a speech and language or behavioural problem to be assessed by either a graduate audiologist, a community paediatrician or a consultant in audiological medicine.

Patient journeys The various specialist services in the community can be confusing and referral patterns vary from place to place. More needs to be learned about the patient journeys that a child can take from screening or initial concern through to the most advanced level of intervention. Research is needed to provide better epidemiological data and ascertain how many of the children who could benefit from a comprehensive review of their speech and language, hearing and development ever complete that journey. Information tools would also need to be developed to demonstrate the various steps along the pathway for different types and levels of need.

However, evidence to date suggests that there is likely to be considerable attrition and that the inverse care law applies.

School services A school audiology service is often provided by trained nurses or technical staff but the future need for this depends on further research into the role of school entry screening. Educational psychologists assess children in their normal surroundings and can add information about the impact of any hearing impairment and levels of background noise.

What are the future roles for health professionals in audiology?

Audiologists (non-medical) This is an expanding discipline and will become an all-graduate profession. As numbers increase and the scientific and clinical training are consolidated, they will make an increasing contribution in paediatric audiology. In the future it is likely that they will be pivotal in UNHS, and in the assessment of hearing and amplification requirements for infants and children. *Educational audiologists* (see above) make a valuable contribution to management in school and home but their future role, their training options and the numbers required are in need of clarification.

A new role for SALTs? In order to simplify the patient journey and provide more coordinated care, a good case might be made for experienced and suitably trained speech and language therapists¹⁴ to undertake a preliminary hearing assessment for the children referred to them with a main concern about speech and language difficulties. This would be appropriate because:

- This is a group of children who are at risk for hearing difficulties but ...
- Only a minority of these children do in fact have a clinically significant hearing loss
- SALTs are already in place all over the UK
- They are well-trained in assessing young children and enlisting their attention and cooperation
- They already receive some audiological training
- They are well integrated into early years provision
- They are committed to skill mix and training of front line staff
- Speech, language and hearing naturally co-exist in the minds of teachers/parents.

It is not being suggested that SALTs should take referrals where the main focus of concern was hearing loss. The hypothesis is that SALTs could confidently exclude significant hearing impairment in many children referred to their service for speech and language concerns and refer for detailed audiological assessment only those with equivocal clinical findings or a high suspicion of hearing problems¹⁵.

¹⁴ It is recognized that this would only be possible where SALTs work in premises with acceptable background noise levels.

¹⁵ The word "hypothesis" is emphasised since this is a proposal that can be tested empirically, not a statement of fact.

There are currently shortages of SALTs in many areas, although there is a commitment to increase numbers. Adding a hearing assessment to the routine evaluation of new referrals may increase consultation time, but this might be more than compensated for by increased efficiency in the process as a whole and fewer incomplete interventions.

Community Paediatricians with special interest in Audiology In the short and medium term doctors working in this area, particularly those who have a higher qualification in audiology (usually a Master's), may wish to register as a specialist¹⁶ if the opportunity arises. In the longer term, the demand for doctors with this qualification will probably decline as community audiological services are increasingly provided by other disciplines.

All *paediatricians who have an interest in disability* need to be familiar with essential clinical aspects of hearing impairment – in particular, the presenting features, the associated disorders¹⁷ and the impact on development. There is likely to be a continuing need for *some paediatricians* to provide a *consulting and liaison service for paediatric audiology teams as part of managed networks*, both at local or secondary care level and at tertiary centres. They would need to broaden their expertise to encompass a wide range of conditions, particularly the range of other disorders associated with communication impairment, and would acquire sufficient familiarity with the concepts of acoustics and audiology to work effectively with audiology teams, but would not need or expect to acquire in-depth technical expertise. The knowledge and skills they would require regarding communication disorders in general could be acquired as part of a distance learning programme developed in collaboration with a university department of audiology, for example using the model of the Sheffield Neurodisability distance learning scheme. Such a programme might also offer valuable CPD for the current generation of community paediatricians with a special interest in audiology.

Consultants in audiological medicine who focus mainly on work with children have a comprehensive training in the many aspects of paediatrics, medicine, neurology, genetics and oto-rhino-laryngology that are relevant to their specialty. Numbers are likely to be small for some years to come and so it will be vital to make best use of their special skills. They will work closely with audiologists and will be best placed to be members of expert teams engaged in research, training, service development, quality assurance and audit.

ENT surgeons are involved in diagnosis and management of permanent hearing impairment and middle ear disease, and currently some also play a major role in the organisation and provision of audiological services.

Training and information are needed for all *midwives and health visitors*. These staff must be well informed about hearing and hearing loss, since parents may ask their advice and guidance about newborn hearing screening tests and their outcome. There

¹⁶ Some doctors in staff grade and associate specialist posts who have been refused recognition as specialists may have a further opportunity to seek entry to the specialist register as a result of changes in the UK legislation implementing the European Specialist Medical Qualifications Order.

¹⁷ For example, nearly 40% of children with permanent hearing loss have other problems as well.

are up to 50,000 people involved with newborn screening. Information packs should be provided both for induction training and for established staff. It would make sense to develop information and training regarding other newborn screens at the same time – biochemical screening, cystic fibrosis, sickle cell disease etc. Maintenance of awareness about all aspects of hearing impairment is vital as not all cases are identified by newborn screening. Health visitors should continue with regular updates and quality assurance for the distraction test programme until it is finally phased out.

Staff who undertake *newborn hearing screening* also need training, both about the technical skills needed and the communication and information sharing aspects of their work. This training should be in a form that is recognised and gives due credit and a transferable skill for the individual.

All staff working with children should receive appropriate generic training about the needs of children and adolescents, including transition from paediatric to adult services, regardless of their professional label or the service they are providing, as specified by Kennedy and by the NSF.

APPENDIX 1 - THE UK WORKFORCE

Speech and language therapists (SALTs)

The number of SALTs is increasing – in 1997 there was a total of 4,868 and by 2001 the total had risen to 5,683. There has been an overall increase of 21% in SALT student places due to an increased number of jobs, brought about largely through the Sure Start and Early Years programmes.

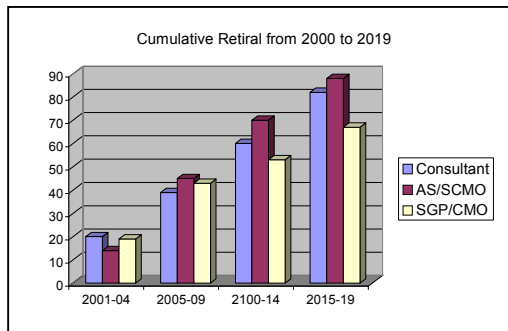
The ideal of early identification and prevention feeds into high referral rates. Sure Start raises parents' expectations of their children. The Sure Start aims and targets are possibly resulting in too many children being referred. There are consequently too few SALTs to deal with the workload and this may result in the use of speech and language workers who are not adequately trained to see children with real problems.

Community Paediatricians in Audiology

Figures compiled from the 2000 census by the British Association of Community Doctors in Audiology (BACDA) show that in community paediatric audiology there are:

- 44 Consultants
- 84 Associate Specialists / SCMO
- 70 Staff Grade / CMO

However, not all those working in audiology are members of BACDA and there is no information on the particular training or experience of these non members. Many of those experienced in community audiological services are approaching retiring age. All the paediatricians included in the census have experience in child development and many have MSc in audiological medicine. Many carry out audiology as part of a wider community paediatric role resulting in a largely part-time workforce.



Workforce working less than 6 sessions per week in paediatric audiology:

- 45% of consultants
- 65% of Associate Specialists / SCMOs
- 83% of Staff Grades / CMOs

Importantly, this is an ageing workforce and by the end of 2004 almost 1/5 will have retired. By 2010 43% will have retired.

Consultants in Audiological Medicine

The consultant in paediatric audiological medicine at tertiary level deals with diagnosis and management of children with auditory and vestibular disorders. This physician will have special skills in medical differential diagnosis by history taking,

clinical examination and investigation and will be involved in effective team working to provide an integrated care package for the child and family.

Current training of the Audiological Physician¹⁸:

- Qualified medical practitioner
- MRCP or MRCPCH; MRCS or FRCS; or MRCGP
- 5 year training programme in Audiological Medicine
- MSc in Audiological Medicine

In addition to the core curriculum those specialising in children's work would cover an additional paediatric curriculum. The work of an audiological physician has similarities with the Community Paediatrician regarding inter-disciplinary teamwork. Active participation of the team is vital to an integrated care plan.

The membership of British Association of Audiological Physicians (BAAP) shows that there are:

- 44 Consultants (2 chairs) – there are 22 within M25, 7 in Manchester, 3 in Sheffield and the rest are single-handed posts
- 23 Specialist trainees - at least 12 are from paediatrics and wish to remain working with children.

Out of the 44 Consultants:

- About 8 practice only in paediatrics
- About 5 practice only or mainly with adults
- Remaining 31 see mixture of adults and children

There was a 100% expansion of posts between 1993 and 2002. The projected number of consultants by 2020, expanding at the present rate, is 160.

The new generation of audiologists

Historically, the training and resources available to those who provide audiology services in the UK have varied widely. There are also myths about who can carry out certain aspects of the service. The way to reverse this is to ensure an all-graduate entry to good quality training and to have strong leadership.

There are many professionals involved in audiology whose primary speciality is not audiology; for example, HVs, SALTs, geneticists, paediatricians. There is currently insufficient specialist training available for these professionals although the situation is likely to improve through the NHSP and the NHSU.

¹⁸ All comments on the training of doctors will need to be considered in the light of "Modernising Medical Careers".

There is an urgent need for rigorous training for people who are registered audiologists and whose primary discipline is audiology. The services carried out by these specialists include¹⁹:

- Audiological assessment
- Aetiological investigations and management
- Hearing aid assessment, selection, fitting, verification and evaluation
- Fitting and management of cochlear implants
- Advanced audiological management 'in the field' with families, schools, FE and HE transition, sound systems

The new initial training routes for audiologists are:

- 4 year BSc including 1 year in-service assessed clinical competency
- 1 year post-graduate Diploma followed by 1 year in-service assessed clinical competency
- 1 year MSc followed by 1 year/18 months in-service assessed clinical competency

All these will be accredited, QAA assessed and lead to state registration. The clinical competence measures (CtP) used to measure fitness to practice should be consistent across the BSc, MSc and Diploma routes. The gateway to "Advanced Practitioner" should be subject to portfolio assessment confirming core attainments including M-Level credits rather than being an MSc *per se*. The Higher Competency to Practice (HCtP) will also form an obligatory part of this portfolio. Access to the HCtP (and hence higher grades) will not be limited to any one training route. The DH A-grade training route for clinical scientists will be maintained using the combination of the CtP and HCtP to replace the current Certificate of Audiological Competence.

The following places will be offering 4 year honours degrees with 1 whole year (usually in year 3) in-service training:

- Manchester
- De Montfort
- Swansea
- Southampton
- UCL
- Aston
- Bristol (from 04)
- Leeds (from 04)
- ? Sunderland

The total BSc output when all these courses are running will be in the region of 200 per year. They will be competent to work in a paediatric audiology team but not to lead.

¹⁹ As with any other health professional, audiologists will work in teams and it is assumed that they will consult with and share expertise with other professionals – doctors, SALTs, ENT surgeons etc.

Based on a 2001 IHR survey, it is estimated that there are currently a total of 720 WTE paediatric audiologists in post, representing 1/3 of the total number of audiologists in post. If a full audiological service was required at all 112 of the current paediatric audiology centres there would be a need for a total of 1305 WTE registered audiologists. However, it is unrealistic to expect to train this number at a high enough standard to meet the need at each of these. The model of 28 centres working in a network structure proposed here would help focus expertise. The idea of 'upskilling' SALTs could, if successful, help to support and maintain ease of access by reducing workload at the local level. Education services play a key role in the support and management of children with permanent hearing loss.

An increase in numbers training will mean over the next few years there is likely to be a gradual transition from a non-graduate to a graduate workforce. There should also be an increased number of posts available in PCTs, and increased opportunities for advanced CPD training.

ENT surgeons There are currently no recruitment problems in otolaryngology, and paediatric otolaryngology is becoming very popular as a sub-specialty, but there is a need for expansion in consultant numbers.

Educational audiologists

The British Association of Educational Audiologists (BAEA) is the professional body for educational audiologists. The estimate of current numbers mentioned in this paper and the description of their roles were provided by BAEA.

Educational psychologists in audiological services

There are currently approximately 2000 educational psychologists across the UK. Each has a 'patch' from which they are expected to deal with everything 'psychological'. Most services do not have a specialist educational psychologist. Some areas may have part of a post within the whole service but the amount of expertise in hearing difficulties is very small. Such lack of expertise poses a problem as these professionals may not have seen many hearing impaired children and yet they have a duty on behalf of the LEA to contribute to the educational assessment. Educational Psychologists deal with the whole child population but there is little detailed evidence on what is needed for hearing impaired children. This issue should be addressed by the DfES.

APPENDIX 2 – PARTICIPANTS & CIRCULATION LIST

N.B.: all participants were invited as individuals and should not be assumed to be representing the views of their respective professional organisations or institutions.

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