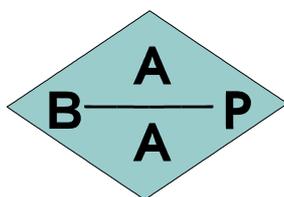


BRITISH ASSOCIATION OF AUDIOLOGICAL PHYSICIANS

Policy Document

2002



Auditory, Balance and Communication Disorders

AUDIOLOGICAL MEDICINE IN THE UK

A guide for users, commissioners and providers

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18/11/ 2001

Audiological Medicine

Introduction

Audiological Medicine is the medical speciality concerned with the investigation, diagnosis and management of auditory, balance and communication disorders, including tinnitus and auditory processing difficulties, in both adults and children. Some specialists are primarily concerned with the management of speech and language disorders in children.

The prevalence of problems managed by audiological physicians and paediatricians is:

- 20% of the UK population have a “significant” **hearing loss**,
- 5% are bothered by troublesome **tinnitus**, and
- 30% will experience symptoms of **dizziness or imbalance** by the age of 60 years.

- 10% of children suffer from some type of **communication** problem

Some of these conditions will be curable, for others medical diagnosis is the first step in a rehabilitative programme aiming to enable children to reach their full potential, and all those with disorders of hearing, communication and balance to achieve a better quality of life.

Audiological Medicine services are predominantly out-patient-based and delivered by multidisciplinary teams integrated with other medical specialities (especially Paediatrics and Otolaryngology). Close links with professionals allied to medicine, social services, education, voluntary organisations and parents' groups are crucial to the quality of care delivered.

Provision of Services:

- **Primary Care -**
 - **For children**, universal screening for congenital hearing loss, surveillance of hearing throughout infancy and the school-screening programme are primary care activities currently delivered by Community Paediatric Audiology services. Many of these will be taken over by Primary Care Trusts.
 - **For adults** there is at present no formal provision of service at **primary care** level, although this is likely to change in the current modernisation programmes.
- **Secondary Care**
 - **For children**, most audiological services are provided in paediatric community audiology clinics by paediatricians with additional training in Audiology. Cases are referred as a result of screening, surveillance and professional or parental concern.
 - **For adults** this constitutes the direct referral system into the adult hearing aid service. In some areas there are facilities for learning disabled adults and the elderly hearing impaired.
- **Tertiary Care** is predominantly hospital-based with each centre receiving both adult and child referrals for a population of 500,000 from primary and secondary care, and from other specialities. It includes:
 - **For children**, the holistic, integrated, multidisciplinary and interdisciplinary management of complex problems, permanent hearing impairment and associated communication difficulties.
 - **For adults and children**, accurate assessment and rehabilitation of patients with vestibular disorders using comprehensive neuro-otological investigations and therapy.
 - **For adults**, diagnosis, therapy and advice for hearing loss, complex auditory disorders such as tinnitus, dysacusis, and central auditory processing.
- **Specialist Regional Centres** provide cochlear implants; bone anchored hearing aids, services for developmental disorders of speech and language and advanced neuro-vestibular services.

Audiological Physicians and Audiological Paediatricians (APs) are specialists in Audiological Medicine who achieve specialist status by following the 5-year Specialist Registrar training programme of the Royal Colleges covering all aspects of the speciality for both physicians and paediatricians. They are key members of multidisciplinary teams and have particular responsibility for:

- Evaluating a patient's audio-vestibular function in the context of their general health

- Selecting appropriate and cost-effective investigations in order to determine an accurate diagnosis and thus prognosis
- Explaining the findings to the patient and/or carers in terms they understand
- Providing treatment and initiating effective rehabilitation
- Integrating audiological care across associated medical and surgical specialities in accordance with the requirements of clinical governance.

Where new services develop APs will be responsible for enrolling the team and establishing the service. Consultants may be generalists dealing with adults and children and all aspects of the speciality, or they may subspecialise in one area. Although the recommended number of consultants is 6/500,000 population, this has been achieved in very few areas to date. This target is not achievable on a national scale, but is achievable in those areas where needs are met using an Audiological Medicine. Medical members of the team will include non-consultant career grade doctors, higher specialist trainees and SHOs (Appendix E).

Summary

1. There is currently a recognised resource crisis in audiological services with insufficient clinical provision throughout the UK. In order to overcome this, and provide adequate audiological care in accordance with clinical governance, there has to be a dramatic increase in the number of consultant audiological physicians and paediatricians as well as other medical and non-medical audiological staff.
2. A minimum of 3 whole time equivalent Consultant Audiological Physicians, 3 Consultant Audiological Paediatricians and 2 Consultant Audiological Scientists (AS, State registered Audiologist) are required for a population of 500-600,000. In addition there should be appropriate junior medical staff and a comprehensive multidisciplinary team of professional staff.
3. Teams of Audiological Physicians and Paediatricians and non-medical audiologists (scientists, technicians and hearing therapists) working together should be evenly distributed throughout the United Kingdom in order to provide equitable, integrated care delivered to nationally agreed standards.
4. There should be an Audiology Centre for each population of 500,000 or more which should be purpose-designed and at which an appropriate number of consultants and other audiology staff are based. From this base primary, secondary and tertiary services can be delivered, monitored, and developed on an integrated multiple hub and spoke model. These centres must include, or be linked with, specialist speech and language therapists, psychologists, physiotherapists, and advisory teachers for the hearing impaired or educational audiologists and social services.
5. Multidisciplinary audiology working groups, including user representation, should be established alongside each tertiary centre and should influence care pathways, clinical guidelines and protocols for best practice. For child services these is Children's Hearing Services Working Groups (CHSWG). Minimum requirements for good quality service delivery must be defined and followed.
6. The clinical environment should be away from noise, well lit, uncluttered and welcoming for both children and adults, including the elderly and those with additional needs. Separate provision for different age groups may be needed. Each centre should be family-friendly and provide patient-focused care in collaboration with user groups.
7. The test equipment and soundproof rooms should meet national standards and should include the range needed for a comprehensive service. Multidisciplinary teams following nationally agreed standards of care should deliver services.
8. There should be Specialist Regional Centres for neuro-otology, cochlear implants, and speech & language disorders.
9. Primary and secondary services may provide shared care with the development of specialist GPs in ENT and specialist practice nurses with training in basic aural toilet and hearing aid management.

10. The specialised and tertiary centres should be networked for Higher Medical Speciality training rotations, research, clinical governance and audit, continuing professional development and training of primary and secondary care staff and specialist registrars in other specialities.
11. Service planning must ensure protected research time in order to provide an evidence base upon which the quality of the service can be judged and maintained.
12. Modernisation of the NHS as delivered by Action on ENT may radically change the way in which Audiology services are delivered once the information from the pilot sites is available.

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1. Terms of Reference/Preface

In the early 1990s the British Association of Audiological Physicians (BAAP) published two policy documents, one for adult and one for paediatric practice. These documents summarised the clinical needs of people with hearing and balance disorders and made recommendations concerning the facilities, skills and resources required to meet those needs by multidisciplinary teams in Community Health Clinics, General and Specialist Hospitals. The policy document of the British Association of Community Doctors in Audiology (BACDA) described in more detail the community-based Paediatric Audiology services, which are provided almost exclusively by paediatricians with special expertise in developmental paediatrics and the MSc. in Audiological Medicine.

Over the last decade there have been a number of factors affecting the way services are delivered and the extent of the demand upon them:

- **Rapid technological advances** in imaging (CT and MRI), audiological testing (e.g. oto-acoustic emissions), hearing aids (e.g. digital processing), and implantable devices (e.g. cochlear implants).
- **Modernisation of the NHS** with Action on ENT, patient partnership, Clinical Governance, emphasis upon Primary Care, locality based services, changes in Community Child Health services, and integrated care across health, education and social services.
- **Developments in NHS pilot projects** such as Universal New-born Hearing Screening (UNHS), Modernising Hearing Aid Services (including Digital Hearing Aids), and Action-on-ENT sites.
- **Reports** making recommendations for the delivery of the service, quality of the appliances and the standard of care:
 - Critical Review, Health Technology Assessment 1990
 - The Effective Health Care Bulletin, 1993, which advocated watchful waiting as an alternative to grommet insertion
 - Fully Equipped, Audit Commission (2000)
 - National Institute of Clinical Excellence (NICE) Technology Report: Hearing Aids (2000) which evaluated the current hearing aid services
 - Audiology in Crisis, Royal National Institute for the Deaf (2000) report which defined the shortfall in trained personnel and equipment in the field
 - Quality Standards in Paediatric Audiology IV, National Deaf Children's Society (NDCS; 2000) that set out precise details of accepted quality standards for the identification and management of hearing impaired children.
- **Changes in Higher Medical Training**, and the establishment of the Specialist Training Authority (STA). The Specialist Advisory Committee (SAC) of the Royal College of Physicians (RCP) is engaged in dialogue with the Royal College of Paediatrics and Child Health (RCPCH) regarding Higher Specialist Training.
- **State Registration of Audiologists** to include hearing therapy, audiological science and technical audiology as one common career path.

- **Education Policy** including changes in the way hearing impaired children are educated and inclusion in mainstream schools.
- **Social Policy including** integration of people with impairments into the workforce, the Disability Discrimination Act and the Human Rights Act.
- **Patient factors** including demographic changes and changing patient/parental expectation.
- **IT Systems for data bases, administration and the intended move towards electronic patient records.**

Audiological Medicine (AM) has been a speciality with a relatively low profile despite the high prevalence of hearing and balance disorders in the population. **The number of consultant physicians and paediatricians in the speciality remains less than that recommended, so that services have been developed piecemeal, geographic spread is uneven, access inequitable, and many centres are too small to achieve high quality patient care across the full spectrum of the service.** Consequently the provision of audiological and vestibular services in the UK remains poorly structured and diverse in organisation.

Community Paediatric Audiology services, although child-friendly and staffed by highly competent paediatricians, have been starved of a formal higher specialist training programme, modern equipment and adequate testing facilities. The critical mass, which is required for peer review, continuing education and professional development, is seldom achieved e.g. more than 50% of Audiological Physicians and Audiological Paediatricians are single-handed consultants and some Paediatric Audiology services are led by consultant paediatricians who are not specialists in audiology. In many situations the non-medical staff also have no direct peer to whom they can relate.

All professionals within clinical audiology share the common goal of improving the quality of life for those with hearing and balance disorders. This is partly achieved through The National Committee for Professions in Audiology (NCPA) which includes representatives from educational audiology, speech and language therapists, scientists, hearing therapists, audiology technicians, hearing aid audiologists, voluntary organisations, medical specialities and the Department of Health. Barriers between professionals within the NHS, and between health, education and social services are being broken down.

Medical responsibility for Audiology is provided by three specialties, AM, Community Paediatrics and Otolaryngology. Each specialty brings unique and essential skills and expertise to the service and a combination of all three is the ideal. Each of these specialities is represented on the Royal College Specialist Advisory Committee (SAC) of the others, and AM is also represented on the SAC of Neurology. This reflects their overlapping medical interests and skills. Some providers will include all three specialities, but at present most are limited to one or two of these disciplines due to lack of posts. The other specialists fill the resultant gaps to a limited extent. The service required is most effectively delivered by a multidisciplinary team, which is inclusive of all disciplines and provides the full range of audio-vestibular care.

In 1999 the British Association of Audiological Physicians (BAAP) commissioned a working group composed of Audiological Physicians and Paediatricians to prepare a policy document describing the way in which services could be delivered in the United Kingdom in the 21st Century. The opinions expressed within this document represent a distillation of the views of the members of

BAAP, and reflect the consultation exercise with other members of the National Committee of Professionals in Audiology (NCPA), which includes representation from user groups and charities.

2. Aims of the Document

This document aims to describe:

- (a) The full scope of AM in order to inform and guide users, commissioners and providers of medical services for those with auditory, balance, and communication disorders, both now and over the next 5-10 years.
- (b) A national framework for service delivery
- (c) Training requirements and developments, continuing education, and relevant clinical governance and audit.
- (d) Research needs so that a solid evidence base of effective care strategies can direct clinical care policies.

Services are described for specified patient groups with regard to:

- The clinical needs of patients and referral patterns
- The nature of the services required to meet those clinical needs
- How services may be delivered with particular attention to the roles of
 - a) Multidisciplinary teams
 - b) Conjoined services
 - c) Clinical and community networks
- Ways of measuring and monitoring the outcomes of clinical management
- Quality standards of service provision
- Specialised services e.g. cochlear implants
- The role, responsibilities and clinical work of consultants in Audiological Medicine

For the purposes of this document, all audiology services whether hospital or community based, medically or non-medically led, are considered as one integrated service. This approach was adopted because, although models of service delivery vary from place to place, the medical needs of the population are common to all areas. All the services, whether hospital or community-based, work closely together and aim for a seamless service.

Specialist facilities, equipment and workforce requirements for establishing an Audiology Centre are given as appendices. The role of the physician/paediatrician/otolaryngologist in the multidisciplinary team is clarified. The expected activity of a Consultant Audiological Physician/Paediatrician and a model consultant job plan are to be found in the appendices.

Wherever possible the views of the relevant Voluntary or Charitable Organisations have been sought, collaboration established, and any existing quality standards of these and other bodies adopted. Standards and outcome measures are described where available, but remain to be developed for many of the tasks listed. Where an evidence base for treatments/service provision exists it is quoted. Shared care with other agencies such as Social Services, Education, other medical specialities and the voluntary sector is emphasised.

3. Paediatric Audiological Medicine

Aims

- To provide a high quality, efficient and friendly service for children and young people with suspected audio-vestibular and communication disorders.
- To enable all children to achieve their full potential by offering appropriate and effective management in order to maximise function.
- To participate in integrated multi-professional teams with children and their families in order to ensure high quality patient-focused care.

The Need

Children requiring this service include those with:

- Permanent childhood hearing impairment – congenital sensorineural hearing impairment occurs in 1-3/1000 live births.
- Acquired hearing impairment - the commonest cause of acquired hearing impairment is meningitis and 10% of survivors have a permanent sensorineural hearing loss.
- Progressive hearing impairment - 32% of deaf children have a progressive loss.
- Otitis Media with Effusion which affects 25-50% of children in the preschool period.
- Chronic Suppurative Otitis Media.
- Non-organic hearing loss – prevalence around 7% in school-aged children.
- Auditory processing disorders.
- Auditory neuropathy.
- Hyperacusis – a particular problem for some children with tinnitus and also for those children with complex disorders of communication.
- Tinnitus – approximately 13% of children with normal hearing are known to experience tinnitus, while among children with hearing loss the prevalence of tinnitus can reach 66%.
- Balance disorders and dizziness – it is estimated that 20% of secondary school children will have experienced at least one episode of vertigo. The prevalence of disabling vertigo is much less.
- Children with identified syndromes e.g. Down syndrome, Turner Syndrome and other disorders known to be associated with permanent and significant audio-vestibular problems.
- Complex medical and developmental problems and special needs - these children have a high prevalence of auditory and communication disorders and may be challenging to assess.
- Children at high risk of developing audio-vestibular disorders as a result of their medical condition or its treatment e.g. children on chemotherapy.
- Delayed and/or disordered speech and language development affects about 3.2% of school age children (without other problems) of whom 0.1% have no intelligible speech. Also some deaf children may have speech and language problems in addition to those expected as a consequence of their deafness.

3.1. Children with Hearing Disorders

3.1.1 Scope of the Secondary and Tertiary Paediatric Audiology Services

Assessment

- Screening and surveillance: newborn, infant and school entry (screening is a primary care task currently undertaken by secondary and tertiary services).
- Assessment in secondary/Community centres for hearing, communication and development
- Assessment in Special schools for children with complex problems.
- Assessment in tertiary centres for neonatal screening failures, children with audiovestibular disorders, complex and challenging children and those requiring second opinions.
- Access to objective testing facilities - otoacoustic emissions (OAE) and electrophysiological tests such as auditory brainstem response (ABR) with facilities for sedation or GA.
- Access to imaging to magnetic resonance imaging (MRI) and computerised tomography (CT) with facilities for sedation or general anaesthetic.
- Aetiological investigation.

Multi-disciplinary Management

- Evidence-based management of otitis media with effusion – utilising identified medical and surgical management options.
- Counselling and information for parents and children with audio-vestibular problems, facilitation of parent choice, and inclusion of other family members/friends.
- Shared care and close working with educational audiologists or advisory teachers for the hearing impaired as part of the paediatric audiology rehabilitation team.
- Early communication specialists for pre-school intervention.
- Trained and experienced Deaf adult role model/mentor; accessible training for parents in ‘Sign Supported English (SSE) /British Sign Language (BSL), Audiology staff with Stage 1and/or 2 BSL.
- Hearing aid provision to provide optimal amplification using appropriate prescription and real ear measurement fitting.
- Speech and language assessment and therapy for the hearing impaired
- Investigation and therapy for tinnitus.
- Investigation and management advice for children with hyperacusis and central auditory processing disorders.
- Adherence to clinical governance in particular with regard to standards of care and audit of outcome measures.

Links

- Collaboration with Social Services.
- Close co-operation and shared care with Paediatric Cochlear Implant Centres
- Close co-operation and cross referral with ENT surgical services.
- Cross referral to Developmental Paediatrics, Genetics, Ophthalmology, Neurology, Child and Adolescent Psychiatry, including psychiatric services for the Deaf.
- Active involvement of voluntary bodies and Non-Governmental Agencies such as NDCS and local user groups.

3.1.2 Specialised centres for implantable devices

Paediatric Cochlear Implants: 840 children per year are born with congenital permanent hearing loss. Of these, about 200 children are likely candidates for cochlear implants. An additional 80 children per year develop profound sensorineural hearing loss, which can either be acquired (mainly

post-meningitic) or the result of a progressive hearing loss. The criteria for cochlear implantation have evolved over the past decade and there has been a reduction in the age of implantation (the youngest in the UK is a 6 month old post-meningitic child). Implant centres are willing to consider children with multiple disabilities.

Bone Anchored Hearing aids (BAHA) are used primarily for children with cranio-facial anomalies and are provided in specialised centres in collaboration with specialists in Otolaryngology, Plastic and Maxillofacial Surgery.

3.1.3 Establishing a Consultant-led Paediatric Audiology Service

A consultant in Audiological Medicine or Audiological Paediatrics, who has medical responsibility for the audiological diagnosis and care of the children, should lead children's services. Medical consultants work with a range of other professionals (Appendix E) the numbers of which in each multidisciplinary team varies according to local availability. These professionals include –

- Junior medical staff and non-consultant career grades.
- Audiological Scientists.
- Audiologists with paediatric training including Audiological Scientists, Medical Technical Officers (Grade 3 to 5) and Assistant Technical officers.
- Specialist speech and language therapists for the hearing impaired.
- Educational Audiologists/Teachers of the Deaf.
- Clinical Psychologists.
- Clerical support including secretarial, reception and administrative personnel who have training in deaf awareness.
- Trained nursing staff.
- Additional links with – Cochlear Implant Centres, Genetics, Ophthalmology, Otolaryngology, Paediatrics, Social Services, Interpreters (including Sign Language), voluntary organisations, Deaf groups/clubs.

Each Paediatric Audiology Service for a population of 500,000 should set up a Children's Hearing Services Working Group at which Health, Education, Social Services and Parent representatives discuss the strategies and policies of the local service.

3.1.4 Facilities and Manpower Required

- Welcoming and relaxing child- and family-friendly environment
- Equitable access for those with additional physical and/or sensory needs
- Adequate time for explaining results and discussing management with parents and children
- Paediatric testing facilities which meet national standards for size, sound proofing, air-conditioning and hygiene (infection control)
 - Appropriate number and types of rooms (Appendix C)
 - Appropriate equipment for paediatric testing (Appendix D. All equipment must meet minimum standards and should be less than 5 years old and well maintained and calibrated)
- Teaching Facilities with video facility and observation area
- For workforce requirements see Appendix E
- All professional staff should wear name-badges, should introduce themselves, using appropriate language (with interpreters if necessary), state their role and be conversant with the child's medical records
- IT facilities to provide database information, audit facility and monitoring of service performance

3.1.5 Equity, Equality and Advocacy

- Written policies on availability of first language interpreters including British Sign Language
- Specialist Speech and Language Therapist (SALT) should be available to all hearing impaired children on a regular basis
- Hearing aid budgets appropriate to provide the full range of NHS and commercial hearing aids
- Hearing aids provided should be the most appropriate to the child's needs and choice should be based on paediatric prescription protocols with real ear measurement fitting.
- All waiting lists should conform to national guidelines
- Services should conform to NDCS Quality Standards IV

3.1.6 Teaching and Training

- All medical undergraduates to be taught when to suspect hearing loss in children and what action to take.
- All health and education professionals involved with children to be taught when to suspect a hearing loss and how to refer children into the system.
- All non-medical audiologists and speech and language therapists working with children need to be familiar with child development and management of children and their families with empathy
- Deaf awareness training for all staff including those on A & E and Paediatric wards
- For specialist higher medical training, see Section 12
- On-going local teaching and training for the audiology team in all aspects of audiology
- Postgraduate teaching for DCH, M.Sc.s in Audiological Medicine, Audiological Science, Technical Audiology and Speech Sciences
- Child protection awareness for all paediatric Audiology staff

3.2 Children with balance disorders

3.2.1 Aim

- Diagnosis and treatment of children with imbalance or vertigo to reduce disability.
- Detection of vestibular deficit in hearing impaired children.

3.2.2 Scope of the Service

- Full assessment of referred children by an AP experienced in the subspecialty.
- Audiological and aetiological testing facilities to facilitate identification of underlying disorders.
- Age-appropriate vestibular tests performed by trained personnel.
- Access to occupational therapy and physiotherapy services for full assessment and therapy.
- Access to psychological support for children.
- Collaboration with paediatrics, paediatric neurology, neuro-ophthamology and otolaryngology.
- Access to in-patient facilities.

3.3.3 Facilities

A dedicated child friendly paediatric vestibular test room with blackout, rotating chair, videonystagmoscope, electronystagmography, static or dynamic posturography and facilities for simultaneous and bithermal caloric testing. There should be adequate time for explaining procedures, obtaining consent and discussing results with children and carers and for documenting information in the child's personal health record.

3.3.4 Manpower required (Appendix E)

- Audiological Physician
- Specifically trained audiologists
- Paediatric physiotherapist,
- Occupational therapist,
- Paediatric nurse
- Psychologist

3.3 Children with Disorders of Speech and Language

3.3.1 Aim

- To minimise the effects of delayed/disordered speech and language acquisition by prompt and accurate diagnosis and intervention in partnership with speech and language therapists.
- To distinguish between delay and disorder, investigate and identify underlying conditions.
- To ensure that careful links are established and maintained with local developmental community paediatricians, and speech and language therapists, to facilitate diagnosis and management.

3.3.2 Scope of the service

- Combined assessment of referred children with experienced specialist speech and language therapist.
- Velopharyngeal assessment and electropalatography.
- Identification of underlying disorder, eg hearing loss, autism, and referral on to most appropriate local agency.
- Recognition of effect of delay/disorder upon a child's self-esteem and social skills with referral to clinical psychologist where appropriate.
- Assessment and therapy for complex neuromotor and sensory integration difficulties by paediatric occupational therapist.

3.3.3 Manpower required (Appendix E)

- Consultant in audiological medicine (with specific training).
- Specialist speech and language therapist (developmental disorders of speech and language).
- Paediatric occupational therapist.
- Clinical psychologist.
- Audiologists.

With access to, and well-developed links with, related disciplines and voluntary bodies.

4. Adult Audiological Medicine

4.1. Adults with Hearing Disorder/Tinnitus

4.1.1 Aim:

- To improve quality of life for those with hearing impairment by reducing handicap, improving communication and thus increasing confidence and participation.
- To relieve the distress caused by tinnitus.
- To enable all hearing-impaired and deaf individuals to lead as full a life as possible.

4.1.2 the needs of the population

- **Transition of care:** 2/1000 school leavers will have an average hearing impairment of more than 50dB in the better hearing ear due to either acquired or congenital hearing impairment. 40% of these young people will have an additional impairment e.g. visual, vestibular or cognitive. Another 2/1000 will have a unilateral hearing impairment and as many again a hearing loss of between 25 and 45dB, giving a total population of 6/1000 who will be transferred to adult services. These young adults may require support as they enter employment, even if they have elected to dispense with hearing aids.
 - Some of those with childhood hearing loss may require re-investigation of the aetiology as they consider families of their own.
 - Progression of hearing loss has been reported in between 20 and 32% of those with childhood hearing impairment and this may occur during adult life.
 - Vertigo and tinnitus may present management problems for this group.
- **Acquired, early and late onset hearing loss** will gradually increase the prevalence of hearing impairment to 25% of the population by 65 years, 50% by 75 years and 75% by 85years. The prevalence of hearing loss in the population will therefore be largely dependent upon demographic factors. 50% of hearing loss in the adult population is **genetically determined**. Other causes include trauma, noise, infection, inflammation, tumours, ischaemia, and degeneration.
 - Some causes of hearing loss require active management in order to prevent further deterioration and thus accurate diagnosis of aetiological factors is essential.
 - The communication difficulties and accompanying psychological disturbance, which can occur as a result of progressing hearing impairment, need to be addressed.
 - Some of these patients will have accompanying vestibular pathology and will require full neuro-otological investigation and management of their balance difficulties in addition to their hearing difficulties.
 - Those with profound deafness, whether as a result of an acquired or a progressive hearing loss, may derive benefit from cochlear implantation.
- **Tinnitus** can affect up to 20% of the population, 5% describe the complaint as 'troublesome' while for 1% of the population it is severe enough to have a significant effect on the quality of life. Accurate diagnosis, and treatment is possible, of the underlying pathology, is crucial to the medical management of tinnitus. Rehabilitation then requires a patient focussed approach, part of which may be correction of any hearing loss.
- **Other Hearing Difficulties** which are less common, can be associated with normal hearing thresholds, but require specific investigation and management dependent on the diagnosis and cause. These include:

- **Hyperacusis:** decreased tolerance to everyday sounds, often with little or no hearing loss.
 - **Diplacusis:** the perception of a different tone to that presented. This can lead to a perceived distortion of sounds.
 - **King-Kopetzky Syndrome:** otherwise known as Obscure Auditory Dysfunction (OAD) or Auditory difficulties with normal hearing (ADN).
 - **Central auditory processing disorders:** which can occur in isolation or with other neurological disorders.
- **Intellectually impaired adults:** The incidence of hearing loss in this group of patients is variably reported as being between 25% and 75%. The impact of hearing impairment in addition to their other needs can be significant.

4.1.3 Scope of Secondary and Tertiary services to Adults with Hearing Disorders/Tinnitus

- Assessment of the degree and type of hearing loss and severity rating of tinnitus.
- Provision of hearing aids by secondary services. Adults over the age of 60 years fulfilling strict criteria for care may have direct access to hearing aid services under the care of a senior audiologist without specialist medical input. The audiological physician responsible for service provision should supervise this service.
- Tertiary Centre assessment – for those under 60 years and those over 60 with complex needs.
 - Full clinical assessment of hearing disorder or tinnitus in order to assess degree and extent of impairment and causative factors.
 - Access to investigations including full audiological assessment, vestibular assessment, blood tests and urine tests, electrophysiological assessment (ABR, electrocochleography and cortical evoked response audiometry), access to imaging such as MRI and CT scans.
 - Multidisciplinary assessment of rehabilitative needs of the patient.
- Multidisciplinary team management of the patient's needs. Rehabilitation is planned together with the patient and significant others. Rehabilitation may include:
 - Hearing aid provision - the most appropriate for the patient's needs
 - Advice and provision of assistive devices in conjunction with social services
 - Hearing therapy for tactics and strategies
 - Tinnitus rehabilitation will make up the majority of the workload of hearing therapy and consists of explanation of the mechanisms producing tinnitus, identification of any psychological factors, therapy, tinnitus retraining, bereavement counselling
 - White noise generators for tinnitus control
 - Relaxation training for tinnitus and vertigo
 - Psychological input as needed for tinnitus and deafness
 - Speech & language assessment and therapeutic intervention as appropriate
- Adults with learning difficulties must have access to the full range of audiological assessment and care appropriate to their clinical needs.
- Accessible information for patients and significant others about all aspects of hearing impairment and tinnitus, and about support available at home and in the working environment.
- Close co-operation and shared care with Otolaryngological services particularly with regard to management of chronic middle ear disease, otosclerosis, acoustic neuromas, BAHA, cochlear implantation etc.
- Close liaison with Social Services. This is via the Job Centre for those at work and local to the patient's home for domestic needs.

- Adherence to clinical governance, in particular with regard to standards of care and audit of outcome measures. (*See section 5*).
- Close liaison with specialists in Genetics, Neurology, Neurosurgery, Ophthalmology, Cardiology and Psychiatry. Psychiatric contacts should include Psychiatric services for the Deaf and for the Learning Disabled.
- Liaison with and referral to the private Hearing Aid Dispensers.
- Facilities and manpower requirements see Appendices C.D and E
- Research and development.

4.1.4 Specialist Centres for Implantable Devices

- Cochlear implantation in Specialist centres: In 1995 MRC Institute of Hearing Research published a report, the Evaluation of a National Cochlear Implant Programme, exploring the development of adult and paediatric programmes and making recommendations for future expansion. By September 1999, over eleven hundred adults had been implanted in UK. The Cochlear Implantation in Adults (POICA) study report will further help in evaluating the outcome of cochlear implantation in the U.K.
- Bone Anchored hearing aids (BAHA) for middle ear disease – performed in Specialist Centres.

4.2. Adults with Balance Disorders (*Neuro-Otology*)

4.2.1 Aim

- To provide precise site-of-lesion (and, where possible) aetiological diagnosis. In many cases this will allow effective and potentially curative treatment. Where this is not possible, accurate diagnosis enables a programme of rehabilitation to be implemented in order to minimise disability and restore quality of life.
- To provide rehabilitative advice and support for those with disorders of balance.

4.2.2 The Need

- **Vestibular disorders** may present with overt vestibular symptoms such as vertigo, imbalance, and falls. Many, however, will present with more subtle symptoms, which may be misdiagnosed as being of psychological origin.
 - **Vertigo** (ICD code 386) is a common symptom in General Practice with a rate of consultation greater than 180 per 10 000 in the over-45 age group. A referral rate to tertiary services of 20 patients per week out of a population of 500 000 should be expected. Once the effectiveness of audiological medicine in the management of these disorders becomes more widely known, it is anticipated that referral rates would increase.
 - **Imbalance and falls** (especially in the elderly) are frequent and potent causes of loss of independence, avoidable morbidity and mortality. Accurate diagnosis of the cause of imbalance and effective management can give significant benefit to patients, improving function and quality of life.

4.2.3 Scope of service

- Assessment of patients presenting with balance problems.
 - Thorough medical examination assessment which may prove cost-effective by limiting investigation to that necessary in order to make a diagnosis and thus reducing the need for expensive tests on every patient.
 - Detailed audio-vestibular testing including electrophysiological testing
 - Access to neuro-radiology, biochemistry, genetics, immunology and haematology services.

- Discussion with patients about diagnosis and prognosis with written information when possible.
- Treatment, leading to significant improvement in symptoms, may be possible at the initial assessment e.g. particle repositioning in Benign Paroxysmal Positional Vertigo.
- Rehabilitation - with assessment and management by a multi-disciplinary team including physiotherapists and clinical psychologists (cognitive behavioural therapists) with expertise in vestibular disorders, occupational therapists and hearing therapists.
- Close links with Otolaryngologists, Cardiologists, Neurologists, Neurosurgeons, Ophthalmologists Rheumatologists, Geriatricians, Psychiatrists, Nephrologists, Endocrinologists, Medical Geneticists and GPs. A General Hospital setting is therefore ideal and also affords access to resuscitation facilities, which may rarely be required.
- Education of medical undergraduates and graduates, audiologists, psychologists, physiotherapists and nurses.
- Research and publication in peer review journals.
- Adherence to clinical governance in particular with regard to standards of care and audit of outcome measures (*see section 5*)

4.2.4 Facilities and manpower requirements

- **Dark room** with:
 - a. A reclining couch with step for access
 - b. A sink
 - c. Clean mains water supply for caloric tanks
 - d. Adequate space for resuscitation (Appendix C)
 - e. electro-oculography equipment
 - f. A rotating chair (ideal –see below) – (Appendices C&D)
- **Large room** for physiotherapy classes
- **Minimum safe equipment requirement:** Frenzel lenses, Barany hand-held optokinetic drum, equipment for Fitzgerald Hallpike bithermal caloric test, electro-oculography equipment, videonystagmoscope, resuscitation equipment, routine audiological facilities (Appendix D).
- **Ideal equipment requirement:** above plus rotating chair, full field optokinetic drum, fixed or dynamic posturography platform, equipment for air calorics (Appendix D)
- **Manpower requirements** Appendix E

5. Outcomes and Outcome Measures

5.1. Children with hearing disorders

Performance based measures

- Device efficacy
- Hearing Threshold improvement
- Hearing aid/cochlear implant use
- Frequency specific sound-field aided thresholds
- Sound/speech perception
- Loudness measures
- Open set speech discrimination

Developmental measures

- Speech recognition
- Speech production
- Sign language skills
- Language development

- Use of residual hearing

Subjective Measures

- SIFTER
- LIFE
- APHAB

Social Behaviour

- mental wellbeing
- emotional stability
- conduct
- activity
- client satisfaction

Achievements

- education
- employment
- independence skills
- effective system of communication
- leisure activities

Precise methods of evaluating some of these aspects have yet to be finalised.

5.2 Adults with hearing disorders

Audiological Medicine is primarily concerned with the amelioration of a number of chronic conditions so a range of outcome measures needs to be considered. They should be brief and relevant, but cover all-important areas. The precise measure(s) chosen will vary according to the specific needs e.g.

- a) Assessing the individual's progress
- b) Assessing a particular intervention
- c) Assessing a particular centre
- d) Determining the relative values of audiological management versus other medical Interventions.

Being a medical specialty, outcome is concerned with determination of the aetiology and its treatment, where relevant, together with amelioration of the troublesome symptoms. Thus outcome measures may be considered under the following headings:

1. The proportion of patients in which a specific aetiological diagnosis is achieved
2. The effectiveness of the treatment in the relief of troublesome symptoms
3. Performance based measures
4. Measures of satisfaction
5. Measures of improved Activity and Participation (reduced Disability and Handicap)
6. Improvement in the Quality of Life

A variety of different measures have been described for areas 2-6 in all aspects of Adult Audiological Medicine.

- The Client-Orientated Scale of Improvement - COSI (Dillon et al, 1997). This is a relevant and achievable measure, which may be used throughout the field in areas 2 & 4. It examines both the improvement in the problems important to the individual, and the residual problems.
- **Performance-based measures** (area 2) will be dependent on the intervention undertaken (e.g. vestibular rehabilitation, hearing aid fitting) and will be aimed at assessing relevant outcomes (e.g. improved recognition of speech in noise).
- **Satisfaction measures** can range from extensive assessments such as SADL - Satisfaction with Activities in Daily Living (Cox & Alexander, 1999), through to one or two questions tapping into satisfaction with the specific intervention or satisfaction with the overall service provided.
- There have been a wide variety of measures of **Activity Limitation and Participation Restriction** in disorders of hearing, balance and tinnitus but they have rarely been related to the

newer concepts incorporated in the World Health Organisation ICIDH-2 (2001). These measures are often lengthy and are rarely fully scored. More realistic concepts come in measures such as the International Outcome Inventory - Hearing Aids, IOI-HA (Cox et al, 2000) and the Glasgow Hearing Aid Benefit Profile (Gatehouse, 1999) and there is a need for similar brief but robust measures in other aspects of Audiological Medicine.

- Finally a variety of **Quality of Life measures** have been used in this field, most commonly the SF-36 and the Health Utilities Index. All measures have limitations, some of which have recently been described by Bess (2000) and by Cox et al (2000).

5.3 Balance disorders in children and adults

Outcomes for patients with balance disorders may be considered as generic or specific.

- **Generic** outcomes include:
 - a. Patient satisfaction and
 - b. The frequency with which a definitive diagnosis is made.
- **Specific** outcomes may be regarded as subjective or objective.
 - a. Subjective outcome measures are questionnaire based; the standardised questionnaires used in the UK are ‘The Dizziness Handicap Inventory’ (Jacobson and Newman, 1990), ‘The Post-Therapy Rating Scale’ (Shepard and Telian, 1990) and ‘The Vertigo Symptom Scale’ (Yardley et al, 1992).
 - b. Objective measures are based upon posturography, both static and dynamic in which an objective measure of instability is obtained before and after treatment and results compared.

6. Prevention of Hearing and Balance Disorders

Primary Prevention

- Noise-induced hearing loss - identification of noise as a cause of hearing loss at work, with leisure pursuits or music exposure is important and enables the audiological physician to counsel the patient appropriately.
- Oto-toxic drugs – antibiotics and chemotherapeutic agents are among the drugs, which can cause hearing and balance problems. Education of health workers using these drugs is an important role for the audiological physician so that appropriate monitoring can take place.
- Continuing vigilance on the part of the audiological physician or audiological paediatrician in identifying possible aetiological factors (e.g. illness or drugs during pregnancy) enhances understanding of the pathogenesis of deafness and will consequently lead to treatment or prevention.
- Prevention of illnesses causing deafness e.g. vaccination for meningitis prophylaxis.

Secondary Prevention

- Screening for hearing loss in newborn and school-age children.
- Screening for hearing loss in workers in noisy environments.
- Monitoring of hearing and balance in patients at risk for deafness e.g. those receiving oto-toxic drugs, those on dialysis etc.

Tertiary Prevention

- Effective rehabilitation for those with disorders of hearing and balance

7. Quality, Clinical Audit and Clinical Governance

7.1 Quality of care

The principles of care are given in Appendix B. Quality of care is particularly difficult to achieve in an under-funded unit with an inadequate work force. Specialised centres of excellence achieve better quality of care than those attempting to provide the entire spectrum of audiological medicine, but have the disadvantage of not being a local service.

7.2 Clinical Audit and Clinical Governance

The team needs to undertake ongoing audit of patient care, comparing the care delivered to published protocols and accepted best practice. Practice should be where possible evidence based with identifiable patient care pathways. Poor practice at any stage of the care pathways may compromise care and outcome and systematic audit is the best way of documenting progress. The information gained from audit can then be used reflectively to identify poor practice and ways in which this can be overcome. Clinical Governance enables concerns to be documented and corrective measures to be taken, often at managerial, rather than clinical level. The multi-disciplinary team environment is ideal for delivery of both clinical audit and clinical governance because the team as a whole delivers the service to the individual patient.

8. Anticipated developments in Clinical Audiological Medicine

8.1 Trends in Service Delivery

8.1.1 Devolution of some tasks to Primary Care

- Specialist GPs may be trained in the initial diagnosis and management of hearing and balance disorders, particularly in adults. This could be included in the training of the Specialist GP in ENT.
- Practice nurses could also be trained in basic hearing aid trouble-shooting, relaxation training for those with tinnitus and vertigo, and in gentle mobility training for those with vertigo.

8.1.2 Patient involvement in service planning

- Patient representation in audiology working groups (AWG) planning service provision
- Patient forums
- Patient questionnaires
- Patients as partners in planning rehabilitation

8.1.3 Clinical Risk management

- Safe environment
- Safe equipment (less than 5 years old, regularly maintained and calibrated and appropriate to the clinical needs of the service etc.)
- Safe staff (continuing education, working with peers and not single-handed, Deaf awareness training, Child protection awareness)
- Infection control

- Protocols for sedation and GA

8.1.4 Training and Registration

Higher Specialist Medical Training and regulation of doctors by the STA has changed considerably in the last 10 years and entry requirements for specialties such as Audiological Medicine are likely to change in line with other Medical specialties as decided by the Joint Committee on Higher Medical Training (JCHMT)

Professionals with training in audiological science, hearing therapy and technical Audiology will, in future, share the same training and a common career pathway with state registration. Changes in training are already evolving to meet this challenge. The result will affect the way that Audiology departments are able to meet service needs as staff who have a broad range of skills can work more flexibly.

8.1.5 Multiprofessional working

Recent changes in NHS policy, which provide encouragement for patient care to be shared between medical services, education and voluntary bodies, are welcomed as they reinforce the normal working practice within Audiology and further developments will be of value. Early family support, deaf role models, counsellors and psychologists are of recognised value in limiting the negative psychological sequelae of congenital deafness. The use of peer role models has proved beneficial in the management of patients with tinnitus and could be expanded to other disorders of hearing and balance for adults.

8.1.6 One stop clinics

These are desired by patients and are already conducted in specialist hospitals. They need to be implemented nationally and require adequate administrative, technical and professional support to be effective.

8.1.7 Information

The Modern NHS stipulates the requirement for full, unbiased, information for all patients. This needs to be verbal, written in an accessible form (including Braille) and produced on video for British Sign Language users, and translated where relevant. The use of interpreters is vital in this respect. In future written information will also need to include appropriate Web site addresses.

8.2 Future Therapeutic advances

8.2.1 Pharmacological

Cochlear hair cell and neuronal growth factors; development of new drugs for tinnitus

8.2.2 Medical genetics

There has been an explosion in identification of new genes responsible for deafness and their mechanism of action within the cochlea, which opens up new prospects for the medical treatment of audio-vestibular disorders.

8.3 Technological Advances

8.3.1. Diagnostic procedures

- Advances in imaging (MRI, PET, Spiral high resolution CT)

- Further refinement of Audiological tests, particularly for infants and for central auditory processing disorders
- Further refinements in posturography and in eye movement recording

8.3.2 Hearing aids and Cochlear Implants

- Digital hearing aids replacing analogue instruments
- Refined prescription techniques
- Advances in cochlear implants: miniaturisation of speech processors, new strategies in processing, use of curved electrodes and fully implantable systems.

8.3.4 Balance treatment and rehabilitation

- Increased expertise in accepted practice e.g. particle repositioning manoeuvres.
- Accurate diagnosis leading to measurable outcome measures will increase effectiveness of rehabilitation techniques nationally.

8.4 Access Time

Waiting time from first GP contact to referral, waiting time to first appointment, and waiting time to initiation of treatment are all currently under investigation by the Audit Commission in parallel with the 'Action on ENT' initiative. Right-first-time one-stop clinics are highly desirable but have to be realistically resourced and planned if delays within the clinic are to be avoided.

9. Multidisciplinary teams and the Role of the Audiological Physician / Paediatrician

Audiological services are recognised to be most effectively delivered by a multidisciplinary team. Some audiological skills are common to all members, but each discipline brings unique skills without which the service cannot comply with accepted best practice. The Audit Commission recommended that these teams should have a clinical lead, the broad-based audiological medical training being suitable for providing the type of clinical overview that is likely to promote good care. Clinical Governance has highlighted the problems faced by single-handed consultants, and this applies equally to the other disciplines involved. Only a peer can give both the support and the challenge that allows safe, modern practice. All team members will be involved in teaching, clinical audit and governance. The team will also depend upon the support of professionals in education and social services and of voluntary bodies as well as the parental representatives that constitute the AWG.

9.1 The Team

- 1. Audiologists** are responsible for ensuring equipment calibration and carrying out the routine audiometric and vestibular testing of patients. They take aural impressions, undertake simple repairs of hearing aid systems, and fit hearing aids. In direct access clinics they are solely responsible for the audiological care of the patient.
- 2. Audiological Scientists** are responsible for the maintenance and calibration of equipment and the development of test protocols and new testing techniques. They are also responsible for the provision and prescription of hearing aid systems. They provide a major service in the

investigation of complex auditory and vestibular disorders and play an important role in site of lesion identification and the development of appropriate rehabilitation strategies and outcome measures. They are collaborators and principal investigators of research activity and are involved in clinical developments.

3. **Speech and Language Therapists** establish the differentiation between primary disorders of speech and language development and speech and language delay secondary to hearing impairment, cognitive handicap or communication disorder. Within the audiology MDT they support the development of communication skills in children with hearing loss and advise on appropriate speech and language therapy. They are in *an* unique position to monitor the outcome of intervention for children with disorders of hearing. In specialist units they offer specific speech and language therapeutic support for primary disorders of speech and language development.
4. **Hearing therapists** support the hearing impaired and those with tinnitus and imbalance. They advise on hearing tactics, provide counselling and both plan and deliver the overall rehabilitation strategy for both hearing and vestibular disorders.
5. **Psychologists/behavioural therapists** are crucial to the rehabilitation process for both children and adults with disorders of hearing and balance. These debilitating conditions can be accompanied by significant psychological problems.
6. **Educational Audiologists and Advisory Teachers for the Hearing Impaired (ATHI)** play a key role in ensuring optimal educational and language development of the hearing impaired child, with whom they are involved from the day of diagnosis however young that may be. A joint working paper between the Royal National Institute for the Deaf and the National Deaf Children's Society, states that the ATHI/Educational Audiologist have characteristically worked with deaf children and their families, but does not recommend a particular professional as the key worker. The overall management of amplification and evaluation of language development in children under 2, the majority of whom will eventually be picked up by universal neonatal hearing screening systems will need to be overseen by someone specifically trained for this role (Early Years Advisor). ATHI also play a major role in integrating deaf children into to the normal education system and supporting children to maximise their potential.
7. **Physiotherapists** are key members of the vestibular rehabilitation team, constructing customised vestibular exercises, instructing patients on gait strategies and ensuring appropriate musculo-skeletal function to enable good balance.
8. **Occupational Therapists** are involved in the rehabilitation of those with vertigo and tinnitus
9. **Nurses, both paediatric and adult**, support the clinics enabling them to run efficiently, perform baseline investigations such as measuring blood pressure, perform aural toilet, are responsible for patient safety
10. **Physicians, Paediatricians, and Oto-laryngologists, (Consultants, Specialist Registrars and Non-Consultant Career Grades)** provide the medical input in the multi-disciplinary team. The role of doctors is given in more detail in Section 9.2. Non-Consultant Career Grade medical staff form the major part of the medical work force in the Second Tier Community Paediatric Audiology clinics.

9.2 The Role of the Audiological Physician / Paediatrician / Otolaryngologist within the Team

The role of the doctors within a multi-disciplinary team relates to:

- Medical responsibility for medical diagnosis, explanation and treatment, and for all the clinical activities of the team.
- Selecting investigations and assessments cost effectively and interpreting the results in the light of the person's health
- Making and sharing the diagnosis with the patient or carer must be done by the doctor responsible for the ongoing care of the patient, as they are in a position to fully explain the findings, and the implications of the diagnosis. In the case of permanent childhood hearing impairment this news needs to be given with care and sensitivity in the manner of breaking any other "bad news". Adequate time must be given in an appropriate environment as this diagnosis is likely to be extremely distressing.
- Participating in team decisions on patient care.
- Advocacy for the child/patient and co-ordination of the management plan.
- Participation in the on-going medical management of the patient (where indicated, including prescription of medication).
- Provision of a medical consultation service for inpatients across other specialities.
- Networking and liaison with other medical specialties. In particular collaboration with specialists in Otolaryngology, Genetics Neurology, Geriatrics, Paediatrics, Cardiology, the investigative specialities, and, above all, Adult and Child and Adolescent Psychiatry for the Hearing Impaired is essential for optimal patient care.
- Key role in teaching both within the NHS and to outside agencies.
- Essential role in medical research and audit.

The make up of the team will determine how many of the tasks common to all of the audiology workforce will also be undertaken by the physician / paediatrician. With Modernisation of the NHS working practices will change, and management of specific conditions be devolved to non-medical staff, responsibility remaining with the consultant physician/paediatrician. The job plan for an audiological physician/paediatrician is in Appendix G.

10. Design, Staffing and Structure of an Audiology Centre

10.1 Overall structure of Audiology Services

Historically Audiological services divided broadly into **secondary** community based Audiology services for children, hospital based **tertiary** services for adults and children, and specialised **Centres of Excellence** for advanced neuro-otology, cochlear implants etc. The secondary and tertiary services are now more rationally considered as a whole in terms of structure and resources, although management structures are likely to remain fragmented initially. These services are best organised from an Audiology centre serving a population of 500-600,000 and having a critical mass of staff and adequate specialised facilities. There will always be a need for highly specialised centres as they meet the needs of a minority of seriously affected individuals. These centres could be alongside the centralised surgical services for cleft palate, stapedectomy, and oto-neuro surgery.

10.2 Audiology Centre for a population of 500,000

These centres will incorporate services for both adults and children, so that the consultants may specialise in either paediatric or adult audiology, or mix the two. The scope of the service would be fully comprehensive, covering everything from universal neonatal hearing screening to falls in the elderly, both diagnostic and rehabilitative. The hearing aid service and support to ENT clinics would also form a significant part of the workload. Where centres of excellence provide specialised services such as bone anchored hearing aids and cochlear implants these more local centres should be able to take over the continuing care of these devices.

The Audiology service should be organised on a hub and spoke model, aiming to provide local services in Community clinics, Day Centres and in Primary care settings for both children and for the elderly and give academic and professional support to other hospitals.

10.2.1 Activity levels (Appendix F)

Populations vary in the complexity of their needs. Areas with a high proportion of people for whom English is a second language will have a lower throughput than areas where only English is spoken as it takes more time to deliver care through an interpreter. Localities with some ethnic minorities will have a greater than average incidence of congenital deafness, and localities with a large proportion of retired people will place great demands upon the hearing aid service. Hospitals, which are tertiary referral centres for paediatric intensive care, oncology or haematology, will also generate a higher proportion of complex patients who require more time. The activity levels given in Appendix F may be impossible to meet in some centres.

10.2.2 Rooms, Equipment and staffing (Appendices C, D, & E)

In these appendices resources for children and adults are given separately and together and include hearing, tinnitus and balance clinic requirements. There has been no attempt to separate Community from Hospital requirements, as local facilities will determine which services are sited in the community and which in a hospital setting. The number of consultants overall is greater than in previous documents as these had separated audiological physicians and audiological paediatricians and the overall number consultants prescribed previously for a solely hospital based medical audiology service is now inclusive of the community service. Medical staffing, particularly in the community, will include a high proportion of non-consultant career grades. All members of the team will require regular ongoing in-service training in order to keep abreast of advances in technology and medical care.

Adequate administrative and clerical support is essential for efficient modern medical practice and this includes good IT provision and support. Some teams will also include psychologists, physiotherapists, occupational therapists and teachers. Patient's representatives should be active within the department as volunteers and in contributing to policy decisions. There should be regular contact with voluntary organisation such as RNID, NDCS, BDA, RAD and local institutions.

11. Research

There is considerable scope for research in all aspects of Audiological Medicine and research is emphasised throughout Specialist Registrar training and subsequent Consultant clinical practice.

- **Technology:** The cochlear implant companies are actively researching the different speech strategies as well as designs of implants and have developed a smaller post-aural speech processor. There is also work currently going on in Australia and Canada to develop the in-the-ear cochlear implant, which will be first tried on adults but Consultants in Paediatric Audiology need to be aware of this system.
- **Children with vestibular disorders:** Epidemiological studies are required to describe the extent of the problem, outcome measures to be developed to monitor treatment response, further research into the maturation of the vestibulo-ocular reflex, postural control and the overall function of the central and peripheral vestibular system.
- **Genetics** and the role of systemic disease in the evolution of deafness hold the key to prevention. Further characterisation of **genetic hearing impairment** and the search for more causative genes in collaboration with geneticists. There is a need to detect genes, which render individuals susceptible to develop a hearing impairment after exposure to noise and other environmental agents. Understanding the genetics of disease will facilitate prevention and treatment.
- **Deafness:** Research into the **aetiology** of hearing impairment.
- A growing awareness of the **psychological effects** of deafness should broaden the scope of hearing rehabilitation and increased documentation of the problem is required.
- The **Disability Discrimination Act** will influence the way healthcare is delivered to this population and training in Deaf Awareness will play an increasing role for those involved in hearing rehabilitation. Research in this area will be collaborative with Social Services.
- **Service delivery** and the access of hearing impaired individuals to clinical services so that the benefits of improvements in clinical practice are maximised for the client population. ‘Action on ENT’ will stimulate research in this area.
- **New testing methods** - Research should parallel developments in technology which have resulted in the introduction of new tests for determining threshold in young babies and these need evaluation.
- **Digital Hearing Aids** - The application of digital signal processing hearing aids also requires an evaluatory approach particularly when used with a paediatric population.
- Further research and development is required to translate the rehabilitation and diagnostic techniques available in specialised centres to local facilities.
- The **pathophysiology of ageing** is important in view of the growing ageing population.

- Research into **vestibular disorders** should address aetiology and pathophysiology, particularly with regard to children.
- **Tinnitus** continues to cause much distress and more research is needed on the management of affected individuals.

12. Higher Medical Specialist Training, Postgraduate Training and Rotations, Continuing Medical Education (CME) and Continuing Professional Development (CPD)

12.1 Aim

The aim of higher specialist training in Audiological Medicine is to prepare and equip trainees to become able and effective consultants within the NHS. All trainees have to satisfy stringent entry requirements and then complete a demanding period of training in all aspects of the speciality resulting in the acquisition of the desired level of knowledge and skills. The development of sound clinical and technical skills is essential as is the ability to lead teams so that a high standard of clinical care and management is achieved and maintained.

The higher specialist training programme has been designed with agreement and guidance from the Specialist Advisory Committee (SAC) in Audiological Medicine and Regional Post-graduate Deans to fulfil the standards required for the award of Certificate of Completion of Specialist Training (CCST) in Audiological Medicine by the Joint Committee of Higher Medical Training (JCHMT) of the Royal Colleges which act for the STA (Specialist Training Authority). The JCHMT has laid down the guidance for training in the published curriculum for higher specialist training in Audiological Medicine, which is continuously upgraded and modified by the SAC as required. Applicants should have at least two years General Professional Training (GPT) and should have MRCPCH, MRCP (UK) or (I), or FRCS Otolaryngology or MRCS and 6 months Acute General Medicine or Paediatrics. GPT should comprise at least a two-year period of direct patient care within hospital, with unselected acute medical take for 6 months of this time. The duration of HMT in audiological medicine is a total of five years. One year or equivalent may count towards full-time or part-time MSc Audiological Medicine as part of the five-year training programme and similarly one year of research into an appropriate and related topic may also count towards the five-year training programme.

The training is monitored by a regular programme of assessment and appraisal as recommended by the SAC and Post Graduate Deans through a transparent system of aims and objectives laid down by the Specialist Training Committee or Subcommittee (STC or STSC) in Audiological Medicine and assessment throughout the training period by annual review of assessments of training (RITA) and more critically at penultimate year training assessment (PYA).

The curriculum recommended by the JCHMT outlines the periods of clinical training relevant to practice of Audiological Medicine of all age groups. The trainee should undertake four to six outpatient clinic sessions throughout four out of five years of training. The training is centred on the core subjects of paediatric and adult audiological medicine. The desired level of competence must be achieved in all aspects of assessment, investigation, diagnosis and management of adults and children with disorders of hearing and balance. Training in diagnosis and management of speech and language disorders in children forms part of the requirement. Allied aspects of screening, instrumentation, rehabilitation are also included in training, as is a knowledge of the related specialities of paediatrics, otolaryngology, neurology, communication and speech pathology,

geriatrics and ophthalmology. Specialist registrars with a background training in otolaryngology will need to acquire extensive training in developmental paediatrics and those entering from paediatrics will require extensive training in otolaryngology. Those specialist registrars with a background in neither otolaryngology nor paediatrics will need to acquire experience in both fields. Working in multidisciplinary teams is universal in Audiological Medicine and liaison with community services for the hearing impaired, education, social services and non-governmental and charity organisations forms an essential part of effective functioning of a consultant in audiological medicine.

Training should involve the development of teaching skills and active participation in audit and research. Management skills also form an essential part of training and specialist registrars are made aware of the importance of Clinical governance and modern NHS management.

A system of educational supervisors and mentors is organised to help and guide the trainee throughout the training period.

12.2 Post Graduate Training: MSc. in Audiological Medicine

Students have little exposure to Audiological Medicine during general medical training and entrants to the speciality are recommended to enrol on a master's course in Audiological Medicine. The courses, available in London and Manchester, provide a sound theoretical basis for subsequent clinical practice and give training in research design, methodology and analysis. The opportunity of putting research training into practice by carrying out a small project under supervision and submitting the resulting dissertation for examination provides the experience needed for consolidating this training. The MSc. course is modular and is available both as a full time (1 year) and part time (2 years).

12.3 Rotational Training Programme

There are two training schemes, the larger Pan-Thames Audiological Medicine Training Scheme and smaller North Western, Trent and Wales Rotational Programme. Both rotational programmes have been designed with the agreement of the relevant deans and the SAC in Audiological Medicine to satisfy the requirements for the award of the certification of completion of specialist training (CCST). There are lecturer posts within the speciality and the lecturers/specialist registrars in these posts are required to undertake a greater proportion of teaching and research and their rotation has to be modified as appropriate in order to safeguard the requirements of training.

12.4 Overseas Training and Research Periods

Overseas training or research projects in relevant topics may be undertaken outside the Pan-Thames or North Western, Trent and Wales Rotational Programmes with the permission of the relevant STC or STSC and the appropriate post-graduate dean. Some consultants in the speciality are (actively) involved in service development, research and teaching in less developed countries

12.5 CME and CPD

Professional development opportunities are provided by

- The Hallpike Symposia and BACDA study days which are each held twice a year, covering a wide range of topics of current interest and invited speakers known to have particular expertise in the subject areas.

- Research presentations are held twice annually and provide opportunities for peer review in which the design, methodology and results of investigations can receive critical comment prior to submission for publication.
- Case presentations, held twice a year, enable problems in diagnosis or management to be discussed in a forum which provides a fresh input of ideas and enables each clinician to learn from the experience of others.
- An Annual Conference gives clinicians the opportunity of benefiting from a wide range of presentations and from discussions held formally and informally.
- An International Symposium, held biannually, extends these opportunities.
- Relevant short courses include tinnitus management, neuro-otology, cochlear implant updates, paediatric audiology and hearing aid issues.
- The Journal of Audiological Medicine is published four times a year and publishes peer-reviewed research and review articles.
- ‘Audiens’ is the journal of the British Association of Community Doctors in Audiology.
- Scientific articles relevant to all disciplines in Audiology are published in ‘Audiology’ (and previously in the British Journal of Audiology).

13. National Planning and Support for Service Provision, Modernisation and Development for Vestibular and Auditory Disorders

National planning and support is undertaken by BAAP, which has the benefit of being a small enough body for people and situations to be well known. The Association represents consultants and trainees in both hospital and Community Audiology services and has very close links with the other professional bodies in Audiology, being an active member of the National Committee of Professionals in Audiology. From the outset Audiological medicine has functioned within a multidisciplinary team, and can therefore respond to Modernisation programmes which devolve tasks and management of specific conditions to non-medical staff. It is ideally placed to see the National picture and to encompass a wide range of interests. Medical Manpower needs within the speciality are negotiated with the Manpower Workforce Confederation of the NHS Executive for England.

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APPENDIX A Glossary

Professionals

A&C Administrative and Clerical
AS Audiological Scientist
ATHI Advisory teacher for the hearing impaired
ATO assistant technical officer
CAP Consultant Audiological Physician/Paediatrician
ENT Ear Nose and Throat Surgery
HT Hearing and balance therapist
MTO (Medical Technical Officer) Audiologist
NCCG Non-consultant career grade
SALT Speech and Language Therapist
SHO Senior House Officer
SpR Specialist Registrar (Higher Medical Trainee)

Organisations represented on National Committee for Professions in Audiology NCPA

BAAP British Association of Audiological Physicians
BAAT British Association of Audiology Technicians (Audiologists)
BACDA British Association of Community Doctors in Audiology
BAEA British Association of Educational Audiologists
BAOHNS British Association of Otolaryngologists, Head and Neck Surgeons
BATOD British Association of Teachers of the Deaf
BSA British Society of Audiology
BSHT British Society of Hearing Therapists
DoH Department of Health
NDCS National Deaf Children's Society
RNID Royal National Institute for the Deaf

Other Organisations

BAPO British Association of Paediatric Otolaryngologists
BDA British Deaf Association
BTA British Tinnitus Association
CHI Commission for Health Improvement
NICE National Institute for Clinical Excellence
RAD Royal Association of the Deaf

Procedures

BSER/ABR Brainstem Auditory evoked response
CT Computerised tomography of temporal bones
ENG electronystagmography/electro-oculography
OAE Otoacoustic emissions
MRI Magnetic Resonance Imaging
PET Positron emission tomography
PTA pure tone audiogram
UHNS Universal Newborn Hearing Screening

Conditions

CSOM chronic suppurative otitis media
OME otitis media with effusion (glue ear)

Education

CPD Continuing professional development
CCST Certificate of Completion of Specialist Training
RCP Royal College of Physicians: SAC Specialist Advisory Committee of RCP
STA Specialist Training Authority
STC Specialist Training Committee of the Postgraduate Deanery

APPENDIX B Principles of care

The principles of care to which all patients with audio-vestibular needs are entitled are:

- Equal and timely access to uniformly good quality care delivered by trained professionals who maintain up-to-date knowledge
- Provision of optimal care unrestricted by resource limitation
- Services that is patient-centred.
- A family- and child-friendly environment for children's services, with adequate time to address the child's needs.
- Clear, unbiased, up-to-date information in a form accessible to all patients, their families and carers.
- Patients to be partners in planning case management and in strategic planning of services
- Adequate time and expertise for counselling for chronic disorders and disability as required.
- First language interpretation, including sign language, whenever needed in order to fully access care.
- All staff to have adequate time and resources for continuing education.
- Prompt access to other paramedical and medical disciplines for effective care e.g. physiotherapy, hearing therapy, geriatrics, paediatrics, neurology and psychology.
- Consent obtained and all tests and results discussed with children
- Care to Comply with the Children Acts and Disability Discrimination Act

Clinical governance, the application of quality standards to daily practice, adheres to accepted principles of care and ensures that these are delivered.

APPENDIX C Space Requirements

Recommendations for specialist space and environment for Audiology Services, for a population of 500,000, combined services for children and adults, Community and Hospital. The service may be delivered on several sites within the Unit, with the main base being the tertiary unit and secondary facilities as available. All rooms should meet Health and Safety requirements and be suitable for infection control. All sound proof booths should be electrically screened and have air conditioning that is quiet enough to meet NHS standards. All clinic and test rooms, offices and reception areas, to be networked to central server, regardless of locality. All facilities should have pushchair and wheelchair access. All children's areas must be child and family friendly.

PEADIATRIC

HEARING and VESTIBULAR- Tertiary Base for 500,000

5 large paediatric soundproof test booths with viewing areas

3 standard booths with viewing area for children

1 speech and language therapy room with viewing area

4 child friendly hearing aid fitting rooms

4 acoustically treated child friendly hearing aid prescription rooms

2 parent-counselling rooms

3 audiometric booths for evoked responses (OAE and ABR) suitable for a small baby in a cot/buggy

3 consulting rooms

A child friendly, purpose designed, dark, vestibular test room with play area

Reception area

Children's waiting area with nappy change area and room for breast-feeding

Offices for Service Manager, medical secretaries, hearing aid administration, consultants, trainees, non-medical staff and volunteers

Seminar/teaching /meeting room

Staff room

HEARING- Locality. Secondary for 100,000

Large paediatric sound treated test room with viewing area

2 Consulting rooms

Newborn hearing screening room, sound treated with preparation area

Children's waiting area with nappy change area and room for breast-feeding

Reception area

Administration office and secretary's office

ADULT

HEARING and VESTIBULAR: tertiary for 500,000 at main base (with Paediatric facility)

5 standard audiometric soundproof test booths

2 evoked response, electrically screened, sound-proof booths

2 large, dark, vestibular laboratories with sink and clean mains water

2 consulting rooms

3 acoustically treated hearing aid prescription rooms

5 hearing aid fitting rooms

3 comfortable rooms for hearing therapy

2 large rooms for group relaxation/rehabilitation classes for hearing and balance

1 Counselling and cognitive therapy room for vestibular patients

Waiting room with reception area

Offices for Service manager, 2 medical secretaries, hearing aid administration, therapists and audiologist and psychologists

Consultants and trainees offices and seminar / teaching room as for Children's services (see above)

HEARING AND VESTIBULAR locality secondary for 100,000

(Facilities for GP specialists and practice nurses and outreach clinics in Primary care facilities)

1 consulting room

1 nurse's room

APPENDIX D Equipment

Recommended specialist equipment for a population of 500,000. Includes facility for universal neonatal hearing screening (UNHS) and digital hearing aid provision. Equipment for several sites across hospital and community, with spare set of equipment to cover breakdowns and calibration. All departments should have text telephones for incoming and outgoing calls. IT systems for audit, appointments, databases, letter generation networked to a server with hardware outlets in every office and clinic room in every location.

HEARING-PAEDIATRIC

- 8 otoacoustic emissions systems (6 for screening)
- 4 auditory brainstem evoked response systems, including 1 screening machine
- 10 sets of distraction test equipment
- 10 sets for visual reinforcement audiometry
- 10 sets of toy test material for speech audiometry
- 2 children's wordlists on tape
- 5 hand-held sound field audiometers
- 5 sound level meters
- 12 clinical audiometers with insert earphones and conventional earphones and speaker outlet and bone conductors
- 4 hearing aid test boxes with real ear measurement and prescription programming
- 10 tympanometers some with facility to test up to 1000Hz probe tone
- *15 otoscopes (including 1 wall mounted in each clinical room/booth)
- *3 headlights for direct vision
- *10 diagnostic wall mounted microscopes for aural toilet with suction equipment (1/consulting room adults and children)
- *20 Jobson Horn probes and crocodile forceps for wax removal
- 2 sets of Equipment for syringing wax
- 2 video-otoscopes
- *4 ultrasonic cleaners (1/unit)
- *4 ear mould grinders with extraction facility (1/unit)
- *1 text telephone in each reception area, hearing therapy room and medical secretary's office
- *Ophthalmoscopes, sphygmomanometers, tuning forks, IDL mirrors, Seigles' specula and insufflator, spatulas etc.
- Children's furniture
- Other toys for children

HEARING –ADULT

*These items used for adults and children

6 clinical audiometers 3 tympanometers 2 tape recorders for speech testing 2 sound field systems 2 brainstem evoked response systems 2 otoacoustic emissions systems	3 real ear measurement system 3 environmental aids displays Comfortable relaxing chairs
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VESTIBULAR-CHILD

- Rotating chair
- Videonystagmoscope
- Bithermal caloric testing
- Fixed force plate posturography
- Frenzel's glasses
- Electro-oculography
- Videonystagmography
- Reclining couch
- Toys
- Full field optokinetic system
- Laser light for pursuit

VESTIBULAR-ADULT

- rotating chair
- 2 videonystagmoscope
- 2 bithermal caloric irrigators
- Dynamic posturography
- Frenzel's glasses
- Electro-oculography
- Videonystagmography
- 2 reclining couches with access steps
- 2 hand held optokinetic drums
- 1 full field optokinetic system
- 2 laser lights for pursuit

APPENDIX E Workforce

Recommended Workforce for a population of 500,000 vestibular and hearing combined, community and hospital sites, allowing for UNHS and Modernisation of the NHS including Digital Hearing aids and Clinical Governance. Staff in a team based at main unit and working across several sites and providing support for ENT clinics.

Professional	CHILD	ADULT	TOTAL
Audiological Physician (CAP+CCP A)	3	3	6*
Otologist	2	4	6
Non-Consultant Career Grade	6	1	7
GP Specialists	0	4	4
GP Nurse specialists	0	4	4
Specialist Health Visitors	2	0	2
SHO and SpR	2	2	4
Audiological Scientists grade C	1	1	2
B	2	2	4
A	1	3	4
Audiologist MTO5	1	1	2
MTO4	3	3	6
MTO3	3	4	7
MTO 2	2	8	10
MTO 1	0	2	2
ATO / screener	8	2	10
SALT for Hearing impaired	5	1	6
Educational Audiologists/ATHI	3	0	2
Deaf Role model	1	0	1
Sign Language teacher	1	0	1
Social worker/counsellor	1	1	2
Hearing Therapist	0	5	5
Physiotherapist/nurse therapist	0	3	3
Psychologist/CPN/Occupational therapist	1	1	2
Nurse/healthcare assistant	1	3	4
Medical secretary	3	3	6
Receptionists	5	5	10
A&C records staff	4	4	8

*Numbers of consultant medical staff (audiological physicians, paediatricians and otologists) may appear unrealistically high when extrapolated to the whole of the UK. Audiological Physicians care for both adults and children, Audiological Paediatricians care for children only and have not previously been included in National Manpower Workforce planning, in spite of the fact that they provide most of the paediatric Audiology service, either at consultant or NCCG level..

It has been difficult to estimate the numbers required across the UK as services at present are inequitable, and provided by different mixes of professionals to a variety of standards. The model above was taken from the combined staffing figures of 2 actual Health Authorities, which together have a ratio of 2WTE Audiological Physicians, 2WTE Audiological Paediatricians and 1 WTE Audiological scientist/500,000 population. Consideration was given to whether quality of care and waiting lists across community and hospital were satisfactory, and even this staffing structure was insufficient to meet the needs of this population, and did not include UNHS and NHS Modernisation. It was therefore felt that any less than this number of doctors would have further compromised the quality of care even if a matching number of Audiological scientists had been available. Numbers of MTO2 and ATO/screeners have been adjusted to anticipate UNHS and Modernisation. Clinical governance issues are now an accepted factor in business case planning.

APPENDIX F Throughput/Activity

Clinical risk management

- Appointment times for children assumes that the doctor is involved throughout the testing and that adequate numbers of audiologists are available to support this activity.
- Appointment times calculated below do not include time required for liaison work and reporting of results. Time needed for history taking, testing (where appropriate), examination, and discussion of the results with the patient and carer has been included.
- Where training grades form part of the team clinics should be designated training/service. Each consultant should dedicate 2 clinics/week to training. These clinics contain less patients/consultant so that teaching and supervision can meet the requirements of the Royal Colleges.

Recommendations for service clinics

- **Paediatric second tier appointments** include failed (second) screens, selected GP referrals and some third tier cases and require
30 minutes for an initial appointment and an hour (2 slots) for selected cases/doctor
15-30 minutes for follow-up patients/doctor.
- **Paediatric third tier or tertiary appointments** include assessment of multiply handicapped children, children with communication disorders, children needing second opinions, children for hearing aid fitting or review, and children with balance disorders, tinnitus, central auditory processing disorders, auditory neuropathy, and dysacusis require
60 minutes for new and some selected follow up cases/doctor
30 minutes for some follow-up cases/doctor
- **Adult, secondary or tertiary service** will depend upon the presenting problem. Main categories and recommendations are:

	<u>New Cases</u>	<u>Follow Up Cases</u>
• Hearing loss*:	30 Minutes	30 Minutes
• Tinnitus:	45 Minutes	30 Minutes
• Dysacusis and central processing	45 Minutes	30 Minutes
• Balance disorders:	1 Hour	30 Minutes
• Patients with learning disabilities:	1 Hour	45 Minutes

Adult Audiological medicine outpatients 4-6 new or 8 follow-up

*Communication with hearing impaired patients takes twice as long as with a hearing individual.

APPENDIX G Job Plan for Consultant Audiological Physician/Paediatrician

*Maximum 6 fixed sessions including 1 for teaching. Distribution between adult and paediatric will vary depending on whether the post is Audiological Physician or Paediatrician

DIRECT PATIENT CARE				
WORK IN SPECIALTY	WORKLOAD	NHDs ALLOCATED	CLINICAL SUPPORT	CONJOINED SERVICES
In-patient work Diagnostic and rehabilitative service to inpatients admitted under other specialties	Maximum 3 Audiovestibular assessments of adults and children 1-2/week	0.5	MTO 3-4 1 NHD/week	Geriatrics, ENT, Paediatrics, Infectious Diseases Neurology
Out-Patient Clinics* New patients Follow up patients Out-patient review of in-patients Outreach clinics On-call for audiological Emergencies	4-6 adult patients per clinic; up to 3 children 4-8 adult patients per clinic; up to 5 children	Maximum of 6 0.5 0 – 1 0 – 1	Technical Rehabilitative Therapist Multi- Disciplinary 2/NHD	Paediatrics ENT Genetics Ophthalmology Psychiatry Neurology Speech and Language Therapy
Specialised Services* Adult Vestibular Service Adult Tinnitus Adult Learning Disability Adult Dysacusis Child communication Special children Neonatal hearing service Paediatric vestibular service	3-5 per clinic 4-6 per clinic 4 per clinic 4 per clinic 3 per clinic 3 per clinic 4 per clinic 2 per clinic	1 1 0.5 2-4 1 0.5	Multidisciplinary 2/NHD	See above
WORK IN ACUTE MEDICINE	None	None	None	None
On-take and mandatory post-take rounds	None	None	None	None
ACADEMIC MEDICINE	MSc /Calman teaching	1	None	ENT and Paediatrics

Cont. p 36 / ...Supporting Activities

SUPPORTING ACTIVITIES

Teaching, training*

- Technicians
- Nurses
- Medical students
- Specialist Registrars
- Other doctors

Continuing professional development

Clinical Governance

- Lead Clinician
- Team member
- Clinical Audit (local and national)

Research

Administration and Management

- Departmental
 - Supervision of the rehabilitation service
 - Clinical directorship
- Local NHS bodies
 - Service planning
 - Supervision of screening and surveillance programmes

National professional work

- Professional Bodies
- Royal Colleges

TOTAL:

The number of fixed and flexible sessions worked by an individual consultant will not be consistent between consultants. The British Association of Audiological Physicians survey found that worked fixed sessions vary from 5 – 9 and include outpatient clinics, special clinics and teaching. The recommended number of fixed sessions is 5 - 6.