



Resource Manual for Commissioning and Planning Services for SLCN

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CONTEXT

The aim of this section is to set out the context for this resource. This work forms part of a range of tools which can support leaders with service planning and delivery, in line with both government and local priorities.

It is essential for service providers to demonstrate quality and productivity and to:

- show value for money
- be able to provide a strong financial argument for the need to invest in services for people with speech, language, communication and swallowing needs
- demonstrate improvements in outcomes for individuals, families and society

Value for money is not about being the cheapest option but about delivering the most return (impact, best outcomes) for a given investment over time.

The key drivers for change to services include:

1. The broad context, which can be divided according to the following factors:
 - **P**olitical and **L**egislative factors
 - **E**conomic factors
 - **S**ocial factors
 - **T**echnological factors
2. The near or local context, including:
 - Localised policies
 - Addressing local needs
 - Service provision
 - Workforce
 - The evidence base

THE BROAD CONTEXT (MACRO-ENVIRONMENTAL ANALYSIS): FACTORS FROM THE WIDER WORLD

The Macro-environmental analysis commonly takes the form of a PEST analysis:

Political and legislative factors

Economic factors

Social factors

Technological factors

Political and legislative drivers

Devolution has resulted in changes to the powers of the different institutions across the UK.

The government in power at Westminster maintains responsibility for policy and legislation in relation to key areas including: tax, benefits, foreign affairs, international development,

trade and defence for the four countries of the UK. Government in Westminster is also responsible for health, social care and education in England, but these areas are devolved for Northern Ireland, Scotland and Wales.

As a result of devolution, each country of the UK may have different parties in power, with the possibility of increasing powers in the future. The impact of this is the diversification of policy and direction of travel.

Legislative drivers

The main areas of UK-wide legislation that are relevant include the following themes:

- Human Rights
- Disability Discrimination
- Equality

Though there is different local interpretation, these far-reaching legal instruments define the rights and responsibilities of people and those commissioning and providing services for them.

Public protection has also been strengthened through the introduction of registration of professionals, for example, through the Health Professions Council.

There is separate legislation relating to health, education and social services in each of the devolved administrations in England, Northern Ireland, Scotland and Wales.

Economic

The current challenging economic backdrop will have a significant impact on the financing of public services, with local planners and commissioners prioritising services which are value for money, evidence based and releasing cash through innovation.

Social

In order to plan and deliver services, it is essential to identify the demographic factors relevant to speech and language therapy (SLT) and the challenges that these bring.

- The population is aging: people are living longer.
- The birth rate is falling: most families are having fewer children
- The infant mortality rate is also falling, with more children surviving premature birth or health problems or injury in infancy.
- The urban population is growing.
- The proportion of the population in employment is falling.
- The proportion of the population with English as an additional language is increasing, particularly in urban areas.

THE NEAR OR LOCAL CONTEXT

Localised policies

Central to the new reforms is the emphasis on local decision-making within a national framework. Across the four countries of the UK there are requirements to provide services to accord with local need and influence. In England there is a particular focus on increasing the range of potential providers (plurality of provision) with commissioners having a role to stimulate the market.

For each country, arrangements have been established to assess whether commissioners are achieving better health outcomes for the local population. Part of this process will be an assessment of how well commissioners are performing against specified competencies/indicators/targets. For example, in Northern Ireland these targets are based upon high-level outcomes linked to local strategies.

With the devolution of power to local levels, there is a focus on developing more robust accountability. There is an emphasis on joint working to support integrated commissioning, service planning and provision across health, social care and education.

There are different approaches to this development with different structures and commissioning and performance management arrangements being established across the UK. The dominant theme in strengthening accountability is “putting service users at the centre” with respect to:

- Access and self-referral
- User voice at strategic to operational to individual case management
- Population/local engagement
- Information and advice for users, parents/ carers
- Patient Rights
- Self management of conditions

Some localities will be commissioning or planning speech and language therapy services as a single service whilst others will be commissioning integrated services, cutting across traditional boundaries, with health services integrated with education or social services. In many areas, this has already happened for children's services.

It is recognised that, often, no single agency can deliver best outcomes for their service users by working in isolation. Joint commissioning is advocated wherever the meeting the needs of individuals requires contributions from a number of agencies.

Similarly, some service planners or commissioners will be organising services around disease groups, such as services for persons who have survived a stroke. In either case, it will be important for speech and language therapy managers to liaise with other services to ensure that SLT provision is incorporated in their service plans.

Special arrangements are in place for commissioning services for unusual, low incidence or costly interventions. Speech and language therapy managers should identify the specialist commissioning procedures that may be required for individuals requiring

particular interventions such as costly augmentative communication aids, protracted or intensive interventions.

Addressing local needs

In general terms, the UK is experiencing a number of long-term demographic changes (some of which are identified above).

There is significant local variation within these general trends. It is important to understand what these changes and variations imply in relation to the provision of local SLT services. Other local factors to be taken into consideration include: employment, cost of living, housing, transport and, particularly, levels of deprivation.

There are information resources available online from which planners, commissioners and providers can find out more about local and regional demographic factors. Some of these can be found signposted on the RCSLT website www.rcslt.org.

Local public health teams will also be able to sign-post local services to relevant data and information for their area.

There will also be learning from data collected by services. The RCSLT has developed an online tool called Q-SET, the Quality Self-Evaluation Tool to help you collate local SLT service derived information <http://www.rcslt.org/resources/qset>. Q-SET should be used alongside national and local data to support service planning and evaluation of service delivery.

Through completing Q-SET, provider services can:

- use the resource every 9-12 months to review progress in meeting action plans and to demonstrate service enhancement
- compare their service with other similar service types e.g. urban, rural, acute, community, adult, paediatric, education, 3rd sector
- demonstrate that their service meets the needs of the service users
- identify areas of strength and generate action plans relating to areas of development.
- submit the results as part of the evidence for a clinical audit
- retain ownership of the monitoring and development of services ensuring that strong professional standards are maintained in the context of multi-agency teams

Service providers completing Q-SET will support commissioners to:

- reduce the 'postcode lottery' of service availability and quality
- have high quality information that is relevant and accessible
- have an overview of developments, trends and initiatives within the service
- have accurate and timely statistics to support performance management and monitoring
- collect data to contribute to the debates on benchmarking. Where benchmarks do not yet exist Q-SET will enable Commissioners to contribute to this in the future
- collect examples of good practice to inform other pieces of work and the development of services as a whole.

Locally derived information will help SLT services to illustrate:

- the numbers of patients/clients seen
- sources of referral
- amount of resource used in providing a service to the client e.g. number of sessions and skill mix
- nature and severity of the disorder, disability, psychosocial impact at the onset of intervention
- nature and severity of the disorder, disability, psychosocial impact at the completion of intervention.
- level of satisfaction with the service.

Service provision

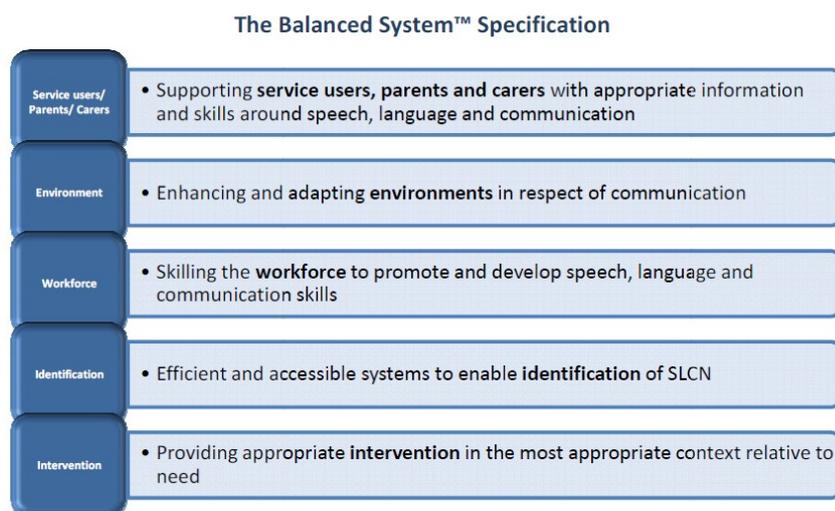
Speech and language therapists have a role in delivering specialist and targeted support to clients, carers and their families. Speech and language therapists can also reduce long-term demands on services by addressing immediate needs that arise from circumstance rather than underlying impairment. Providing training for the wider workforce is integral to the speech and language therapists core role, as outcomes for people with speech, language and communication needs SLCN are improved when the whole workforce is able to contribute appropriately to care pathways.

SLTs also work with the wider workforce contributing to the public health agenda, promoting health and well-being in respect of communication and swallowing. There is little awareness outside the profession of the role of speech and language therapists in preventing the development of speech and language impairments and the further impact and consequences of different speech, language and communication disorders upon health, education, social integration and employment.

The challenges of meeting the speech, language and communication needs (SLCN) of a given population are best understood through a social (participative) model. Key elements of a total service specification will start with:

- identifying the needs of the service user, parent or carer for support and information
- identifying/assessing and diagnosing specific SLCN and providing appropriate intervention.
- considering needs of service users within the environments they encounter
- training the wider workforce that interfaces with them to maximise opportunities for positive outcomes.

The balanced system (diagram 1) below illustrates the wider context for how SLTs contribute to this range of activities. The needs of service users should be considered in service specifications. The role of SLTs in supporting the active participation of service users in service planning, adapting the environment and enskilling the workforce is as relevant as the SLT role in identification and intervention.



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Workforce

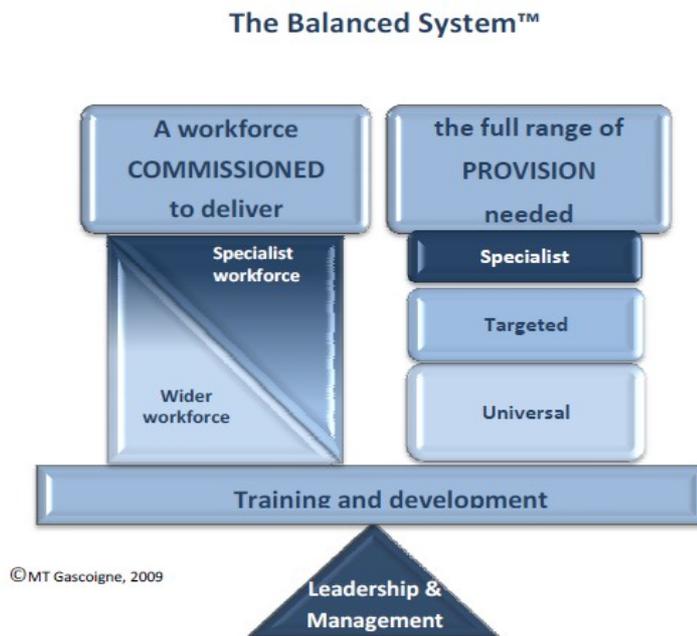
Careful planning of services, including joint commissioning, will help to shape the workforce and inform the skill mix required to deliver high quality services, improve outcomes and support value for money. Because the commissioning and planning of services relies on the evidence base for a given type of SLCN or model of practice, it is essential that clinical and managerial expertise from speech and language therapists is available to support innovation and quality of service design.

Speech and Language Therapists, as part of the wider workforce, may be employed by a range of organisations, including the third sector, social care and education or be working as private practitioners.

Equal Access to services is of importance to local decision makers. Local demographic profiling will inform workforce requirements. For example, bilingual staff and support workers are required in most areas to meet the needs of diverse communities. The appropriate skill mix should enable services to be family-centred and be culturally and linguistically appropriate and responsive. It may be necessary to consider increasing home delivered services or providing services in unusual locations.

The RCSLT also acknowledges the important role that Assistants and Support Workers have in the delivery of effective speech and language therapy services. Assistants and Support Workers are integral members of both speech and language therapy and multi-disciplinary teams, engaged in a wide range of clinical settings with diverse client groups, duties and responsibilities. http://www.rcslt.org/aboutslts/rcslt_statement_v3.pdf

In order to support more effective use of skill mix, SLT services also need to provide education and training of the wider workforce and not be focussed solely on direct patient / client care. For all services, this is critical to secure the appropriate balance of cost-effective universal, targeted and specialist services.



PRACTICAL CONSIDERATIONS

Many people involved in strategic planning, commissioning or reviewing services will not be familiar with speech and language therapy, its objectives, the needs of clients requiring speech and language therapy, the principles driving the profession, or the evidence base and the following points may support people.

- Where possible, draw on the evidence base.
- Communicate clearly and succinctly.
- Avoid using acronyms and provide a glossary of terms.
- Do not assume knowledge of local arrangements or the requirement to interface with other agencies
- Set your service in the context of local priorities.

The RCSLT's Communicating Quality 3 (CQ3) provides clear guidance on care pathways, clinical standards and issues related to quality assurance. This information should be used in submissions to support commissioning quality services.

The following guiding principles have been adopted and apply to all client groups. Services are to:

- be family centred and culturally and linguistically appropriate and responsive
- be comprehensive, coordinated and team based
- work with and communicate effectively with other services meeting the needs of the client
- be evidence based
- ensure equal access
- involve the family and carers
- include training and education of co-workers
- ensure practitioners continuing professional development and appropriate support.

Evidence of the impact of the service will be important to commissioners and providers. Providers will need to demonstrate the impact of their service, particularly when services are being reviewed. Determining the objectives of the service will support the process of outcome measurement. SLT services will need to provide information on outcomes achieved and levels of client satisfaction. Some of this information can be gathered through use of the RCSLT's Q-SET tool, as detailed above.

Managers of speech and language therapy services will need to equip themselves to engage effectively and positively with those who are commissioning or monitoring services. They will need to:

- identify who is commissioning or responsible for overseeing different services. For example, health commissioners may be working with commissioners for education/head teachers. It is important to identify who is taking the lead for each aspect of the service delivery in the locality.
- establish good working relationships and effective communication with those commissioners and planners for their area of responsibility.
- be aware of local priorities and commissioning plans and strategies.
- have a good understanding of the commissioning/planning/monitoring framework for the locality
- be equipped with local data, knowledge and evidence to the tendering process
- be clear of the unique contribution of the service to improving health, employment, education and social outcomes
- be able to clarify and demonstrate local working partnerships and collaborations
- provide data describing the service provided, (numbers and types of patients, numbers of attendances, health and social outcomes etc).

The RCSLT has developed a range of resources to support its members with Continuing Professional Development. CPD is a regulatory requirement for all SLTs and this requires all HPC Registrants to demonstrate how the CPD they have undertaken has sought to enhance service delivery and to be of benefit to service users. The RCSLT has endorsed this requirement through its own CPD standards. <http://www.rcslt.org/cpd/resources>

THE EVIDENCE BASE

The commissioning and planning of services must be informed by the evidence base of effective practices.

This Resource Manual SLCN is based on a synthesis of existing published research. The threshold for inclusion in the syntheses has favoured the most scientifically robust research methodologies which have often reflected medical (impairment) rather than social (participative) models of care.

In the section summaries, emerging practices that have not been included in the evidence synthesis, are referred to and should be considered alongside the syntheses. This tension between empirical evidence resulting from robust research, which by definition is retrospective, and the needs to encourage innovation and service re-design to support improvements in outcomes for people with speech, language, communication and swallowing difficulties is natural and unavoidable. Emerging practice will not have the same evidence base and therefore less empirically stringent measures of evidence need to be taken into account for these areas including professional consensus and measures of service user, parent or carer experience. However, because of the value of some emerging innovative practice, they have been included in this resource.

An overview of the methodologies employed in identifying practices that are included in this resource accompanies this document.

Using these resources

Speech and language therapy managers can assist commissioners by understanding their agenda and the objectives that they are to be assessed on.

The Royal College of Speech and Language Therapists is providing these resources to assist speech and language therapists in gathering the core data required to support service tendering agreements, service planning, monitoring arrangements and/or where services require specification.

Each part of these resources is focused on a specific area.

The resources provide:

- *The Contextual Synthesis*. This includes definitions, information on the incidence and prevalence of the disorder, key contribution of speech and language therapists, consideration of the implications and broader consequences of the disorder.
- *The Synthesis of Key Literature*. This summarises the evidence of the impact of speech and language therapy.

Each section within these resources gives succinct information to inform the factual content for any service planning activity. These include:

- Key points
- Topic –What is [the condition]?
- How many people have [the condition]?

- What causes [the condition]?
- How does this condition affect individuals?
- What are the aims/objectives of speech and Language therapy interventions for [this condition]?
- What is the management for people with [this condition]?
- What is the evidence for Speech and language therapy interventions in [this condition]?
- Studies
- Assessment methods
- Speech and language therapy interventions
- Summary
- References

This information will need to be put into context, using local information.

Other guidance and resource materials

It is recognised that service managers may wish to amplify or clarify, an aspect of their service by providing reference to other national or local research of relevance.

The RCSLT has a range of resources which can be used to further support and inform the commissioning, planning and provision of services for people with speech, language, communication and swallowing needs. These can be found on the RCSLT website: www.rcslt.org

The RCSLT is grateful to the experts from within the SLT community who contributed to the evidence published in this document.

METHODOLOGY FOR SYNTHESIS OF LITERATURE

Introduction

The focus of the interventional synthesis within these briefings is to provide a synopsis on the effectiveness of speech and language therapy interventions for each specific condition.

The interventional syntheses are produced by reviewers within the Information Resources Section (within the Health Economic and Decision Science Section) at the School of Health and Related Research (SchARR). Information specialists/reviewers for this bulletin were Diana Papaioannou and Anna Cantrell.

Methodology

The interventional syntheses are not intended to be a full systematic review within each topic area. However, they draw upon systematic review techniques to ensure that the syntheses are developed according to systematic, explicit and transparent methods. The intention of the syntheses is to consolidate twenty articles which represent some of the best research for each topic area.

Literature searching

Systematic literature searches were undertaken to identify a range of evidence for each interventional synthesis. The interventional syntheses do not attempt to consolidate all research within a particular topic area; rather they aim to present a careful selection of the most current research within that field. Therefore, the approach adopted for the literature search aims to be comprehensive reflecting this systematic and explicit approach.

Firstly, search terms were selected within the project team drawing on the expertise of four speech language professionals. This involved listing all possible synonyms describing the condition or population (for e.g. children/infant, stuttering/stammering) and combining those with terms to describe speech and language therapy. Terms were used in both free text and thesaurus searching. The following databases were used:

- ASSIA
- CINAHL
- The Cochrane Library (which includes the Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled trials, Database of Abstracts of Reviews of Effects, Health Technology Assessment Database and NHS Economic Evaluations Database).
- Linguistics and Language Behaviour Abstracts
- MEDLINE
- PsycInfo

All references retrieved from the literature searches were entered onto a Reference Manager Version 11 database using appropriate keywords.

Selecting and obtaining relevant articles

Articles for inclusion were selected to illustrate the range of good quality evidence within each topic area. An initial screening of articles was undertaken by the Information specialists/reviewers who adopted the following principles:

- Articles must be empirical research evaluating the effectiveness of a particular speech and language therapy intervention
- Only articles published in English language are included.
- In general, only the most current (1998-present) literature is included. However, exceptions were made to this if a particular article was felt to be important to include.
- Where possible higher level evidence was included (systematic reviews, randomised controlled trials). However, this research did not always exist in every topic area.
- Efforts were also made to seek out literature that provided a range of perspectives on interventions for each topic area, i.e. both quantitative and qualitative research.

Following initial screening, the remaining articles were examined by two members of the team; each having considerable speech and language therapy knowledge and experience. Approximately, twenty articles were selected by the two reviewers with disagreements being resolved by a third reviewer.

Assessing the quality of relevant articles

Formal quality assessment of the articles was not undertaken. Instead, quality assessment involved using checklists as a guide to give an indication of the overall quality of studies and highlight the main good and bad aspects of each study. For each interventional synthesis, the included study designs are listed and the problems with each study design noted. General observations on study quality are made and common errors within the studies, where appropriate, are specifically noted. The checklists used are one for quantitative and one for qualitative studies from the Alberta Heritage Foundation for Medical Research.¹ Additionally, when an identifiable study design was used, the appropriate Critical Appraisal Skills Programme (CASP) checklist was selected.²

Syntheses of the twenty articles

Each article was read in turn by one of the Information Specialists/reviewers. The key points were summarised including the objective of the study, the participants' characteristics, the methodology, the intervention, results and limitations. From this, articles were grouped into themes according to the factor being investigated (for e.g., length of intervention, personnel carrying out intervention, family involvement in treatment, nature of disorder). Results were summarised and drawn together within each particular theme and a summary paragraph provided at the end.

These syntheses first went out for review by selected individuals, identified by the research team, with particular expertise in the delivery or management of services to the

¹ LM Kmet, RC Lee, LS Cook (2004) Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields. Accessed at <http://www.ihe.ca/documents/hta/HTA-FR13.pdf> (Accessed on 25th September 2008, now no longer available)

² Critical Appraisal Skills Programme (2007) Appraisal Tools. Accessed at <http://www.phru.nhs.uk/Pages/PHD/resources.htm> on 9th January 2009.

specific client group. Comments were included in the second draft, which was then dispatched to those selected by the Royal College Speech and Language Therapists who were invited to attend a focus group day. These therapists gave detailed consideration to their specialist area and contributed to the more general discussion of one further area. Issues to be captured in the key points were also identified within the focus groups. These comments contributed to the third draft of the syntheses, which again went out to reviewers. In some cases, further work was required in order to modify the wording and reflect discussion.

Checklist for service managers involved in commissioning services

Have you presented incidence and prevalence figures and local demographic trends for the conditions in your area?

Have you provided information on local access and use of services in the context of the number expected and highlighted your approaches to inequalities?

Have you consulted systematically with users to inform development of this commissioning proposal?

Does your proposal fit/link with local cross agency priorities?

Have you outlined the range of services provided including training?

Have you made clear how this fits with future planning for your service over the next 3-5 years?

Have you stated the assumptions which underpin your thinking in the plan and for future developments?

Have you offered predictions about the likely impact of investment in the proposal?

Have you made clear where the risks are and what contingency plans you have put in place?

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RCSLT RESOURCE MANUAL FOR COMMISSIONING AND PLANNING SERVICES FOR SLCN

Voice

Voice Disorder

1. Key Points

1. Speech and language therapists have a unique role in identifying and analysing the specific nature of the vocal dysfunction. They contribute to differential diagnosis and facilitate the identification of appropriate management strategies.
2. Speech and language therapists working with dysphonic patients are members of a specialist multidisciplinary team and should be commissioned as part of such.
3. Direct speech and language therapy treatment of a person with the voice disorder is most frequently conducted in a one-to-one situation whereas most educational programmes aimed at preventing voice disorders or their relapse are conducted in groups
4. SLT intervention in dysphonia maximises a patient's benefit from other treatments e.g. surgery and medication, thus improving overall efficiency of the episode of care.
5. A large percentage of dysphonic patients are rendered unable to work by their symptom. SLT is key to restoring their vocal health and enabling both their return to work and prevention of future relapse.
6. Speech and language therapists may incorporate instrumental assessment and treatment with biofeedback devices as an integral part of their management of the person with the voice disorder.
7. Speech and language therapists have a key role in identifying vocal risk (particularly in those who are heavy voice users e.g. teachers, call centre workers) and in educating in methods of preventing vocal abuse.
8. Difficulties with social communication are a predominant feature in those with a vocal disorder. This can reduce access to recreation, education, employment, social integration, including forming relationships and expressing personality. It has a major impact upon the quality of life.
9. The use of voice amplifiers for those who are heavily dependent on using their voice in their work have been found to be effective in preventing dysphonia or relapse.
10. Speech and language therapy management involving both direct and indirect approaches is advocated.
11. There is evidence that persons having a voice disorder treated by a speech and language therapist particularly for paradoxical vocal fold dysfunction have a better outcome than those not treated in this manner
12. The level of input required does not have a simple linear relationship to the severity of the symptom; e.g. a patient with a severely abnormal speaking voice may only require one session of SLT input, whereas a patient with an apparently normal speaking voice may require six sessions.

2. What is a Voice Disorder?

Aphonia refers to a complete absence of voice. Dysphonia refers to voice changes, characterised by abnormality of pitch, volume, resonance and/or quality which can be inconsistent or constant, ranging from mild to severe and which may be inappropriate for the age, gender or culture of the speaker (RCSLT Clinical Guidelines, 2005).

Classification of voice disorder pervades the literature. There are a number of approaches and different terminology used to differentiate the presenting signs and symptoms in voice disorders. This can make it difficult to compare approaches and research into intervention and outcomes (Baker et al 2007, Oates & Winkworth 2008). In North America, Boone (2005) defined voice disorders as having an organic, functional, or neurogenic basis. Whilst in Australia, Baker (2008) has developed a Diagnostic Classification System for Voice Disorders (DCSVD) which classifies the main elements of the presenting syndrome as an ‘Organic’ or ‘Non-organic’ voice disorder, where the sub-group ‘Functional Voice Disorders’ is split into ‘muscle tension voice disorder’ and ‘psychogenic voice disorder’. Butcher et al (2007) further sub-divided ‘psychogenic voice disorders’ by classifying them as a Type 1 (5%) or Type 2 (95%).

In the UK, Mathieson (2001) described voice disorders as organic or behavioural in origin (see Table 1).

Table 1: Voice problems are classified as organic or behavioural (Mathieson 2001):

Organic	Behavioural
a) structural abnormalities: <input type="checkbox"/> congenital – e.g. laryngeal web, <input type="checkbox"/> acquired – e.g. trauma	a) hyperfunctional voice disorder(HFVD): <input type="checkbox"/> muscle tension dysphonia (MTD)– without changes in vocal fold mucosa (vocal strain/vocal misuse) <input type="checkbox"/> muscle tension dysphonia (MTD)– with changes in vocal fold mucosa e.g. vocal fold nodules, vocal polyps
b) neurogenic – e.g. Recurrent Laryngeal Nerve paralysis	b) psychogenic (PVD): <input type="checkbox"/> functional voice loss – e.g. conversion symptom
c) endocrinological – e.g. myxoedema	
d) laryngeal disease – e.g. neoplasms	

The current UK view of types of voice disorder does not use the model of separation reported in the literature, rather, in clinical practice a multifactorial aetiology model is used (see table 3 below). The multifactorial model has an inter-relationship between the four different elements of inflammation, neo-plastic/structural, muscle tension imbalance and neuromuscular which results in the presenting voice disorder (McGlashan, 2008).

3. How many people have a Voice Disorder?



There are a wide range of estimates of the incidence and prevalence of voice disorders.

Table 2: Incidence and prevalence of voice disorder

Incidence in UK	Prevalence	Gender
121/100,000 (Mathieson 2001)		8 females/1 male with psychogenic disorders (Mathieson 2001)
40,000 (Carding 2000)	15% teachers on voice clinic caseload (Morton & Watson, 1998; Bufton, 2000).	
28/100,000 (Enderby & Phillipp 1986)	20% of teachers reported voice problems during the teaching year (Russell et al 1998)	
89/100,000 in Glasgow (Enderby & Emerson citing Gordon 1995)	29.9% in Iowa, US study lifetime prevalence of voice disorder (Roy et al 2005). 6-9% of children, US study (cited in Hamdan et al 2009)	
	Student teachers had an increase in the prevalence of voice symptoms from 9.8% to 18.2% at the end of practice (Langridge et al 2004)	
	0.9-3/100,000 (Enderby & Davies 1989)	
	3-4% of Australians have a voice disorder – equates this figure to Western world (Russell 1999)	

4. What causes a Voice Disorder?

Aphonia/Dysphonia results from a range of laryngeal, respiratory and or vocal tract dysfunction. Aetiologies vary from accidents, neurological or systemic conditions, surgical procedures, viral infections, cancer, vocal abuse and misuse, emotional stress, trauma and illness.

- Specific conditions that affect voice include: laryngeal papillomatosis, laryngospasm, thyroid disease, presbylarynges, spasmodic dysphonia, vocal cord nodules, polyps, cysts, vocal cord paralysis, respiratory tract infection, cancer, extra oesophageal reflux disease, paradoxical vocal fold movement disorder (PVFMD) etc.
- Neurological conditions that affect the power, range and co-ordination of vocal musculature impacts on voice production and quality. Voice becomes affected in progressive neurological diseases such as multiple sclerosis, motor neurone disease and Parkinson's disease.
- Concomitant disorders can affect voice, such as, endocrine dysfunction, asthma, multiple chemical sensitivity, human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) (Harvey, 1997).

Table 3 illustrates the different aetiologies involved in causing a voice disorder (inflammation, neoplastic/structure, muscle tension imbalance and neuromuscular conditions). The causes can be multifactorial, and involve structural problems, be the manifestation of a complex neurological or a systemic disease process, behavioural, emotional and/or lifestyle factors (Mathieson 2001, McGlashan 2008).

Table 3: Aetiologies causing voice disorders and multifactorial causes (McGlashan 2008)

Inflammation		Neoplastic/Structural	
Infective	Non-infective	Mucosal	Endocrinological
Fungal Bacterial Tuberculosis Viral	LPR Trauma Allergy Drugs Autoimmune Rheumatoid-Arthritis Endocrinological	Deposits/Thickenings Nodules, Polypoid lesion Deficits/Tethering Cysts, Sulcus vocalis Microvascular lesions Ectasia	Myxoedema Other Mass effect Papillomatosis, Granuloma Framework trauma
Muscle Tension Imbalance		Neuromuscular	
Primary	Secondary	Hyperfunctional	Hypofunctional
Vocal demands/ Strain Occupational Psychogenic Presbylaryngis Gender identity	Inflammation Structural/ Neoplastic Neuromuscular Breathing disorders Postural abnormalities Congenital abnormalities	Spasmodic dysphonia Pseudobulbar Motor Neuron Disease Multiple Sclerosis	Vocal cord palsy/ paresis Parkinson's disease, Myasthenia Gravis Control/Coordination problem Tremor Myoclonus

The pitch and range of the voice changes throughout life. In children, voice disorders are mainly associated with voice misuse which can cause vocal fold nodules or 'screamer's nodules'. Additionally, voice quality is affected in 41% of those with a velopharyngeal insufficiency (VPI). Less common are psychological causes of voice disorders, such as, elective mutism. Organic pathologies include childhood acquired and congenital conditions e.g. papillomatosis, vocal fold palsy, laryngeal web, laryngomalacia and airway disorders and co-occurs with dysfluency and dyspraxia.

In adults, the main risk factors for chronic voice disorder include; being female, being aged between 40-59 years, using detrimental vocal patterns, high vocal demands, extra-oesophageal reflux, chemical exposures, smoking and frequent cold/sinus infections (Roy et al, 2005). It has been suggested (Baker 2008) that women may be more predisposed to develop Functional Voice

Disorders (FVD) because of vulnerabilities such as stress, anxiety, depression and coping with negative emotions.

People who use their voice professionally are at risk of occupational voice disorders, for example, call centre/telephone workers, actors, politicians, radio announcers, barristers, the clergy, singers, teachers and lecturers are dependent on effective and efficient voice use (Martin & Darnley, 2004). There are age related changes in voice and age-related dysphonia can occur, such as, presbylarynges with bowing or atrophy of vocal folds with incomplete glottal closure (Bloch & Behrman, 2001).

Chronic dysphonia can also occur in people who have experienced trauma or surgery that affects the larynx. It can also originate from a virus that causes chronic laryngitis, or in some cases from laryngopharyngeal reflux causing chronic hoarseness. Any voice loss lasting more than 10 days should be investigated as untreated voice disorders can result in complex disorders and there is an association with cancer (Mathieson, 2001). For some individuals, anxiety, depression, personality disorder or conversion reaction can result in the development of a psychogenic dysphonia (Aronson, 1990).

Individuals who undergo gender reassignment need to alter their pitch, intonation and vocal resonance to reflect the gender change (Mathieson 2001, Carding 2004).

5. How does a Voice Disorder affect individuals?

Each person's voice is individual to them in terms of quality, pitch, volume and tone. Voice is used to effect communication and reflects an individual's emotions, mood and self-image, while listeners draw inferences about a person from the way they sound (Mathieson, 2001). Communication can be affected by the impact of dysphonia on linguistic elements of language such as difficulty in signalling stress markers for emphasis.

The intrinsic and extrinsic musculature of the larynx works in balance to express emotion in the voice, providing a 'psychological impact' that conveys meaning to the listener (Rubin & Greenberg 2004). Psychological upset can interfere in normal voice production; stress can produce muscle tension, such as hypercontraction of the vocal musculature with a high larynx and tension in the suprahyoid musculature. Psychogenic voice disorders (PVD) can result from emotional stresses while voice loss itself can produce its own emotional stresses with consequent psychological impact. For example, individuals can feel their personality changes when they are unable to access their own voice, experiencing a 'loss of self', which only returns when their 'own' voice is restored.

Voice disorders in children impact on their ability to communicate with those around them and affects their ability to follow the curriculum, participate in class activities and interact appropriately with their peers and teacher and affected their ability to participate in important life events. Children and parents have reported a negative impact on their lives of having a dysphonia. Children reported that their voice drew too much attention affected their self-esteem and self-image and that they had experienced anger, sadness and frustration as a result of their dysphonia (Epstein et al 2009, Connors et al 2008).

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People use their voice to reflect their emotional state. Adults who use their voices professionally have a higher vocal loading (e.g. singers and teachers) or who need to work at extremes of vocal capacity, are most commonly affected by voice disorders. Voice problems impact on the work of professional voice users, affecting their ability for employment and are related to increased time off work (Epstein et al 2009, Trades Union Council 2009). Teachers have been identified as a group where voice disorders occur, in particularly in the early years of teaching practice (Kooijman et al 2007, Roy et al 2004, Morton & Watson 1998, Bufton 2000). Increased risks exist in specific areas of teaching namely physical education, vocal music, performing arts and in teaching chemistry (Thibeault et al 2002, Smith et al 1998, Kirchner et al 1998, Roy et al 2004) found Laryngeal trauma and laryngeal disease, such as cancer, may need surgical treatment, which may involve partial or total removal of the larynx and surrounding structures. If non-surgical treatments are indicated (e.g. chemo and/or radiotherapy), these too can affect the overall structure and function of the larynx, and affect the ability of the individual to produce phonation.

Table 4: Impact of voice disorders

ICF Dimension	Impact
Impairment	Phonation difficulties Vocal fatigue Altered voice quality Altered pitch Altered resonance Altered breath control for sustaining voice and volume Hyper and hypotension in musculature Vocal cord changes, e.g. oedema, inflammation, nodules Impact on speech & language development Pain/discomfort when vocalising
Activity	Diminution of a speaker's ability to communicate effectively Reduction in speaking time from discomfort on speaking Inability to communicate by phone Dependence on synthetic voice Reduction in communicative interactions Avoidance of difficult communicative environments Reliance on communicative partners Need for assistive/augmentative communication (e.g. amplification, writing)
Participation	Effect on ability to participate fully in educational curriculum Disruption of career in professional voice users, teaching, call centre workers and aerobics instructors Adverse effects on job performance, attendance, and future career choices Social isolation Limited participation Loss of autonomy Avoidance of situations
Well-being	Frustration, anxiety, mood, self-esteem, depression, repression of emotions, stress Impact on peer/adult perception Reduced self-image

6. What are the aims/objectives of SLT interventions for Voice Disorder ?

Speech and language therapists play a role in the prevention of voice disorders as there is significant evidence that courses run by speech therapists for those who depend upon their voice in their employment are less likely to have time off work associated with voice problems.

The SLT will contribute to identifying the cause of the voice problem, diagnosis and likely prognosis through working with the Otolaryngologist. The SLT works alongside the Otolaryngologist to diagnose the voice problem and to investigate influencing medical factors and assess the structure and function of the vocal mechanisms through indirect or direct techniques (Digital/ video-laryngoscopy, electroglottography, photoglottography, or kymography). The SLT will also make a perceptual assessment of vocal and respiratory behaviours to provide an accurate analysis of the voice (Speyer, 2008) and assess occupational/ psychosocial/lifestyle status. The individual's own perceptions will form part of the assessment as will considerations of personality, motivation, facilitators/ barriers to change, and personal gain (Rubin & Greenberg, 2004). Assessment will allow the SLT, in conjunction with the Otolaryngologist specialist and the individual concerned, to devise an appropriate intervention and management strategy to improve vocal functioning.

This assessment may take place at a specialist joint voice clinic, where the SLT and Otolaryngologist will see the individual together, sometimes along with other specialist staff. The joint voice clinic provides an effective way of sharing knowledge and information on investigations and assessments to identify the cause of the voice problem, to describe the structure and movement of the larynx and to evaluate appropriate courses of management and to make recommendations for ongoing management in collaboration with local services. Therapy aims will differ depending on a number of factors relating to the cause of aphonia/dysphonia. For example, voice therapy for behavioural voice problems aims to minimize or correct the inappropriate use of the voice to re-establish a normal phonatory function (Carding et al 1999, Gillivan-Murphy et al 2006).

Table 5: SLT aims in voice disorder categorised by the International Classification of Function and Disability (WHO ICF 2001) may include the following

ICF	Aim
Impairment	<input type="checkbox"/> alter vocal fold adduction
	<input type="checkbox"/> reduce supraglottic activity
	<input type="checkbox"/> improve laryngeal function
	<input type="checkbox"/> alter respiratory patterns
	<input type="checkbox"/> modify pitch
	<input type="checkbox"/> alter resonance
	<input type="checkbox"/> adjust articulatory tension
	<input type="checkbox"/> maximise laryngeal efficiency within individuals' physical limitations
	<input type="checkbox"/> laryngeal manipulation
	<input type="checkbox"/> maximise effectiveness of other types of treatment (medication, pre/post surgical)
	<input type="checkbox"/> develop optimum voice
Activity	<input type="checkbox"/> advise on use of voice
	<input type="checkbox"/> advise on strategies to sustain voice
	<input type="checkbox"/> advise on voice care, prevention
	<input type="checkbox"/> educate on voice care practices
	<input type="checkbox"/> maximise vocal effectiveness
	<input type="checkbox"/> educate on larynx function
	<input type="checkbox"/> educate on use of voice in different setting/environments
	<input type="checkbox"/> enable understanding of behaviours and identifying of emotions related to voice loss
	<input type="checkbox"/> support changes to behaviours related to voice loss
	<input type="checkbox"/> advise on treatment options
	<input type="checkbox"/> advice post surgery
	<input type="checkbox"/> develop communicative skills
Participation	<input type="checkbox"/> establish vocal skills necessary to meet educational, occupational and social needs
	<input type="checkbox"/> develop ability to socialise without harming the voice
	<input type="checkbox"/> develop ability to cope in different social settings
	<input type="checkbox"/> develop self-esteem as a communicator
Well-being	<input type="checkbox"/> address and reduce distress related to the voice problem
	<input type="checkbox"/> address psychological causes of voice problems
	<input type="checkbox"/> refer to appropriate agencies where psychological problems need specialist input

7. What is the management for Voice Disorder ?

Management decisions follow a detailed assessment which incorporates a team approach and instrumental and non-instrumental assessments. The needs of the individual will influence the management approaches adopted and specific joint goal setting for therapy targeting specific needs. The SLT will take a detailed case history, in addition to standard information this may include information on pertinent medical history, medication, drugs, Reflux Symptom Index,

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occupational and social vocal load, lifestyle, hydration level, smoking, alcohol usage, and Vocal symptom pattern.

Table 6: Steps in assessing voice (RCSLT Clinical Guidelines 2006)

Assessment	Approach
<i>Joint Assessment</i> Otolaryngologist & SLT	Visual examination Laryngeal imaging Laryngographically synchronised stroboscopy Rigid endoscopy Flexible fiberoptic/digital nasendoscopy Shimmer and jitter measurements
<i>Perceptual Assessment</i>	Study of the interrelation between speech subsystems Identification of parameters of voice contributing to the dysphonia Evaluation of each speech subsystem and potential for change Establishment of a baseline and a measure of overall severity
<i>Instrumental Assessment</i>	Aerodynamics Pitch Intensity Resonance Vibratory Cycle Vocal Quality
<i>Palpation of the Extrinsic Laryngeal Musculature Assessment</i>	Status of the extrinsic laryngeal musculature Position of the laryngeal cartilages at rest Position of the laryngeal cartilages during phonation Degree of muscle tension.
<i>Client Self-assessment</i>	Self- perception of voice Impact of the voice disorder and symptoms on their life Profile of voice use Questionnaire

These assessments contribute to achieving a differential diagnosis and in establishing causes and factors which can maintain a voice disorder.

Management approaches may be direct or indirect or a combination of both (see table 7) (Sellars et al, 2002). Direct intervention, might involve changing the physiological aspects of vocal production and indirect intervention may relate to psychosocial aspects pertaining to environmental, social, and emotional, medical and occupational aspects of voice.

Table 7: Indirect and direct techniques (Sellars et al 2002)

Indirect techniques	Direct techniques
History	Breath support
Normal voice	Co-ordination
Presenting features	Glottal attack
Voice rest	Pitch
	Laryngeal manipulation
Voice hygiene	Projection
	Airflow techniques

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Indirect techniques	Direct techniques
Life style	Intonation
Counselling	Rate
Posture	Resonance
Relaxation	Complexity
Management of laryngopharyngeal reflux	Visual biofeedback
	Generalise

Management of most voice disorders involves education, vocal-tract care and voice conservation (Carding et al. 1999). Management can include specific strategies: Vocal Function Exercises; advice on Vocal Hygiene; The Accent Method; or Estill Method (Carding et al, 1999). In psychogenic voice disorders, cognitive behaviour therapy (CBT) approaches have been effective (Butcher et al, 2007) as have combining approaches using voice, communicative exercises and interactive discourses (Andersson & Schalén, 1998).

Management of individuals undergoing gender reassignment includes both voice and communication training for male-to-female and for female-to-male to establish acceptable communication, pitch, intonation and resonance.

The speech and language therapist works as part of multidisciplinary team, which may include people from health, education, social and voluntary organisations. These team members will be included within the management process as appropriate along with the individual's family members and other relevant people in their communication environment. There are time implications for the education and training that SLTs provide to other professionals and family members. The multidisciplinary team will vary in regards to the age of the individual, Table 8 outlines those who may be included in the teams by age group.

Table 8: Speech and Language Therapists and suggested multidisciplinary team members

Age Group	Teams
0 - 2 years	Parent/Carer, ORL/ENT, Paediatrician, Neurologist, General Practitioner, Nursing Staff, Children's directorate
3 – 4years	Parent/Carer, ORL/ENT, Paediatrician, Neurologist, General Practitioner, Nursing Staff, Mental Health Team (e.g. Psychiatrist, Clinical Psychologist), Children's directorate
5 and 16 years	Parent/Carer, ENT, Paediatrician, Neurologist, General Practitioner and Education Staff, Nursing Staff, Mental Health Team (e.g. Psychiatrist, Clinical Psychologist), Children's directorate
17 years plus Adults	ORL/ENT, Neurologist, Mental Health Team (e.g. Psychiatrist, Clinical Psychologist), General Practitioner, Nursing Staff, Professional Voice Coach/Teacher, Social Work Team, relevant parties

Although the SLT works as part of a team, most therapy intervention is provided on a one to one basis. Group work may be used to augment individual sessions. The duration of intervention is dependent on the needs of the individual and can vary from one session to long term support.

While a benchmark study found typical mean of 6 sessions over 5 months there was a wide variation in contacts and duration of intervention (John et al, 2005).

Augmentative and Assistive Communication

Augmentative and Assistive Communication (AAC) refers to any system of communication that is used to enhance, supplement or replace voice, to help people with voice impairment to communicate in different environments. Voice amplifiers are the most commonly used augmentative communication device to assist those with voice disorders and have been found to prevent relapse in those who use their voice a lot in their work. These aids are used in facilitating communication when voice is sub-optimal for communication.

Cultural Diversity

Individuals who do not speak English well and have a voice disorder may need help to access services and, once seen, it will be important to ascertain both a sound and a language profile. Sound systems of the native language versus the sounds required for English will need to be assessed for their impact on voice. An interpreter may be required to conduct the SLT assessment to ensure it is both accurate and reliable and to facilitate understanding of therapy and implementation of treatment strategies. Timings of services need to be culturally sensitive, for example, not offering appointment times which coincide with religious observations (Communicating Quality 3, 2006).

8. What is the evidence for SLT interventions for Voice Disorder?

Studies

All studies were published in English, with the earliest being published in 1999. Five studies were conducted in the USA, three in the UK, three in other European countries (Finland, Italy and Poland), one in Australia and one in Israel. Four studies synthesised results from studies worldwide; two meta-analyses and two systematic reviews. The number of individuals who took part in the studies ranged from 4 to 116. The studies investigated the use of voice therapy in preventing voice disorders, the types of therapy used to treat voice disorders (direct, indirect, voice amplification, resonant therapy, expiratory muscle strengthening), voice therapy vs. no treatment, remote delivery of treatment and medical interventions for dysphonia.

Study Quality

With few exceptions, the studies focused on the teacher population. All studies used a number of measures to determine outcomes for patients, most of which were validated measures. The majority of studies draw heavily on self-reported measures of voice quality and therefore rely in the patients' perceptions of their voice. Where measures required ratings from speech language therapists, most studies provided two or more raters whose inter-rater reliability was measured, generally showing high degrees of correlation. In terms of study design, there were 6 randomised controlled trials, four clinical trials, four systematic reviews (2 meta-analyses), three interventional studies and one cohort study. The randomised controlled trials were of fair quality with their

strength being in good statistical analysis of results. Common errors include no detail of the randomisation process, small numbers participating in the study and high drop-out rates. Similarly the clinical trials had very small number participating and some self-selection to take part in the studies. The quality of the systematic reviews was mixed. The 2 Cochrane reviews by Ruotsalainen JH were of excellent quality and Cochrane reviews are generally considered to be high quality examples of the systematic review methodology. The reporting of the two meta-analyses (Whurr, R, 1998; Duffy, 2003) lacked detail. The interventional studies included small numbers of participants and as there was no comparison to treatment, it is difficult to attribute outcomes to the intervention. Generally, studies required a longer follow-up as few looked beyond immediately after the intervention.

Prevention of voice disorders

Four studies investigated the effectiveness of voice therapy in prevention of voice disorders. In three of these studies (like the majority of papers included in the interventional synthesis section), the population were school teachers. One study (Lehto, 2003) undertook a study amongst a population of telephone customer advisors.

Bovo (2006) undertook a study in which 64 female kindergarten teachers were randomised, with approximately half of the teachers attending a vocal care course whilst the remaining teachers received no preventative programme. The vocal care course consisted of two theoretical lectures each lasting 90 minutes, followed by two group therapy sessions, each 2 hours in length. The lectures covered anatomy and physiology of phonation, causes and predisposing factors of vocal pathology, vocal fatigue, vocal ergonomics and voice amplification. The practical sessions focused on training the teachers in efficient respiratory behaviour, laryngeal muscle relaxation, and other exercises. Teachers were encouraged to practice the exercises at home. Teachers receiving the vocal course showed significant improvement on a number of measures following the programme. The global grade of dysphonia, maximum phonation time and acoustic measures (jitter and shimmer) were all significantly improved in comparison to those who had not received the vocal course. Scores on the Vocal Handicap Index (a measure of impact of voice quality on patient's quality of life) improved after treatment and this was maintained at 12 month follow-up (however there had been some deterioration). It is important to note that teachers who took part were motivated followers of the vocal course; it appears non-motivated students dropped out.

Ruotsalainen (2007) undertook a systematic review to determine if direct and/or indirect vocal therapy can help prevent voice disorders. The systematic review identified two studies that matched the inclusion criteria. The authors conclude that there is insufficient evidence from these two poor quality randomised controlled trials to give at risk populations either direct or indirect voice training. This was a Cochrane systematic review; which are generally considered to be high quality examples of the systematic review methodology. However, this systematic review excluded all evidence that was not undertaken in the randomised controlled trial design. Other studies have been undertaken in this area demonstrating indirect and/or direct therapy is effective in preventing voice disorders.

An Australian study by Pasa (2007) investigated the effectiveness of vocal hygiene instructions and vocal function exercises in preventing voice disorders in 37 primary school teachers. The teachers were split into 3 groups: one receiving vocal hygiene instructions, one receiving vocal

function exercises (VFE), and the final group receiving no treatment. The vocal hygiene programme aimed to introduce healthy voice behaviours by discussing voice disorder prevalence, causes and impact, provision of strategies to reduce harmful vocal behaviours. The VFE programme involved teaching the participants four exercises which were to be practiced twice a day for 6 weeks. The two groups receiving treatment were seen four times over the 10-week period with the first session introducing the intervention, second and third sessions reviewing techniques and progress and the final session taking post-treatment assessments. The vocal hygiene group significantly improved on vocal knowledge and reported a reduced rate of vocal symptoms post-intervention and at follow-up. The VFE group showed no significant changes on these two items. There were no changes in report of vocal misuse behaviours at work, maximum phonation time and frequency range for all groups. There were no changes seen in participants receiving no treatment. In terms of satisfaction with the treatment programmes, participants were very positive and satisfied with both vocal hygiene and VFE treatment. However, some participants in the vocal hygiene group wanted VFE incorporated into the programme; whilst those in the VFE group wanted techniques to help care for their voices.

Lehto (2003) investigated the effects of short vocal training course on professional speakers' voice. This study was the one of only two studies to look at a population of professional voice users other than teachers. Thirty-eight customer advisors who used the telephone throughout their working hours at a call centre received a vocal training course for 2 days with a speech and language therapist. The first day focused on vocal hygiene and the theory of voice production, resonance and articulation, learning about different vocal exercises and how to use the voice more economically. The second day was spent practising the vocal exercises. After the 2 day workshop, participants attended a one day seminar to discuss topics around speech communication. Prior to the course, participants reported three symptoms as occurring once a month or quite often which were feeling of mucous in the throat, constant need to clear the throat and voice fatigue and dry throat. Following the vocal course, the report of these symptoms had decreased significantly. A post-treatment questionnaire indicated the course was well received and participants had learnt a lot about the use of the voice, some wanted longer training and more time to practice.

Treatment vs. no treatment for voice disorders

Two studies investigated the efficacy of voice treatment in comparison to no treatment for participants with a voice disorder. Niebudek-Bogusz (2008) looked at a population of teachers and MacKenzie (2003) looked at a general population. In 2005, John investigated voice therapy provision across seven speech and language therapy service providers within the UK.

Niebudek-Bogusz (2008) looked at 186 female teachers who had been referred because of chronic dysphonia. One hundred and thirty-three participants received vocal training whilst 53 who could not undertake training for various non medical reasons acted as a comparison group. All patients received vocal hygiene advice which included eliminating voice abuse, maintaining proper hydration of upper respiratory tract and avoiding irritants. The vocal training programme (VTP) conducted by 5 speech language therapists. There were four main elements in the programme 1) Breathing and relaxation exercises 2) Vocal function exercises 3) Resonant improvements exercises 4) Carryover exercises. The programme lasted 2-4 months with the number of sessions

ranging from 9-18, each lasting 45-60 minutes once or twice a week. Patients worked on techniques of correct voice emission and did this for 8-10 minutes daily. Prior to treatment, over 70% showed some signs of hyperfunctional dysphonia e.g. throat dryness, voice tiredness, lump in throat sensation. The VTP resulted in improvements in many of these symptoms. The number of participants who rated their voice as normal after the programme increased to 46.6% from 2.3%; this was not seen in the no treatment group. Teachers on the VTP also improved on maximum phonation time, voice frequency and intensity; the no treatment group did not. When patients were clinically examined, there was a significant decrease in patients who showed hyperfunctional dysphonia and vocal nodules.

MacKenzie (2003) undertook a randomised controlled trial to determine the overall efficacy of voice therapy for dysphonia. Two hundred and four participants who had experienced persistent hoarseness for at least two months were randomised to a treatment or no treatment group. The treatment group received treatment for up to 6 weeks which was tailored according to the patients needs. Treatment sessions lasted 45 minutes and the number of sessions depended on the nature of symptoms and patients' priorities. Treatment could be indirect i.e. concentrate on vocal hygiene instructions or direct i.e. practice techniques for vocal production. By the end of treatment, voice therapy had significantly improved self-rated quality of voice by the patient and the measurement of shimmer which was rated by an expert when the results were compared with those who had received no treatment. In terms of pathophysiology, no differences were noted. Psychological stress was not significantly reduced by vocal therapy. On quality of life measures, there was one significant effect in the treatment group related to reduced frustration which was not maintained at follow up. Voice therapy is effective in improving voice quality as rated by self-rated patients and observer rated methods.

John (2004) undertook a study to investigate the similarities and differences in outcomes of care provided by different speech and language therapy (SLT) services across the UK. Voice specialists from 7 SLT services in the UK were recruited and trained to rate patients using the Therapy Outcomes Measure which has 4 dimensions: 1) Impairment 2) Disability/activity 3) Handicap 4) Patient well-being. After, a period of 18 months, data had been collected in 240 cases of voice disorder. 183 (76%) had finished treatment and 57 (24%) were still in treatment. Accessing voice therapy was equal across the 7 services. The majority of patients made positive progress during treatment. A small number made negative changes and some did not change at all. There were, however, significant differences across the services in outcomes of treatment. The reason behind this seemed to be the reason for discharge. This was not always because treatment was complete; other reasons included self-discharge and non attendance. There were also significant differences in the number of contacts and duration of treatment across the seven services.

Amir (2005) investigated the effects of a voice course on 16 teachers, half of whom had voice pathologies (vocal nodules) and half who did not. The voice course consisted of 8 group treatment sessions led by a speech language pathologist and each lasting 45 minutes. The sessions included information on anatomy and physiology of voice production, vocal hygiene, respiration control and voice production (using a chant therapy approach). Participants were recorded before and after treatment and recordings were analysed acoustically and perceptually evaluated by 10 experienced speech pathologists. Most acoustic measures improved significantly after the voice course in both groups. The speech pathologists noted improvement in voice quality after the voice

course and this was more pronounced in those participants with pre-existing vocal nodules. However, it is difficult to attribute the positive findings to the voice course since no comparison group receiving no treatment was used in the study.

Direct vs. Indirect Voice Therapy

There has been much literature published around the effectiveness of direct vs. indirect voice therapy or a combination of direct/indirect voice therapy. The studies seem to use the same definitions for direct and indirect therapy. Direct therapy concentrates on modifying voice production so that is more efficient and appropriate by taking the form of vocal function exercises. Indirect therapy identifies contributing factors to the voice problem and educates patients in how to eliminate such factors aiming to improve voice quality. This is referred to as vocal hygiene instructions which are educational and include information about the anatomy and physiology of voice production.

Ruotsalainen (2007) undertook a Cochrane systematic review to evaluate the effectiveness of interventions to treat functional dysphonia. Six randomised controlled trials were found that looked at 163 treated individuals and 141 comparison individuals. No studies were found investigating direct therapy alone. One study investigated indirect voice therapy alone and 5 studies looked at the effectiveness of the combination of direct/indirect voice therapy. Measures included self-reported rating of voice quality, observer rated measures and acoustic analysis. The one study investigating indirect therapy alone found no difference between providing vocal hygiene instructions vs. no intervention on any measures. In terms of providing direct and indirect therapy, there is strong evidence of effectiveness. Improvements were seen as measured by self-report and observer rated measurement of voice quality and acoustic analysis. These effects were also shown to be maintained over time with two studies demonstrating that scores on self-reported vocal functioning was lower one year after treatment. This is a Cochrane review, which is generally considered to comprise high quality examples of the systematic review methodology.

Roy (2001) conducted a randomised controlled trial investigating the effects of vocal hygiene instructions vs. vocal function exercises for a group of teachers with a history of voice problems. Nineteen teachers received vocal function exercises (VFE), 20 received vocal hygiene instructions and the remaining 19 teachers received no treatment. The 2 treatment groups had 4 contacts with the clinicians over a 6-week period. The no treatment group had 2 contacts with clinicians. Post treatment, the only group to report a significant difference in the vocal handicap index score (self-perceived voice impact) was the VFE group. In comparison with the vocal hygiene group, the VFE group reported more overall improvement in voice quality and clarity in their speaking and singing voice. There were no differences in the self-reported compliance rate between the vocal hygiene and VFE groups.

Carding (1999) evaluated the efficacy of two programmes of therapy for patients diagnosed with nonorganic dysphonia. In this instance, nonorganic dysphonia was defined as 'a disorder voice with no apparent significant organic impairment in terms of laryngeal structure or function or minor laryngeal pathology that may be attributed to excessive voice use and abuse and no surgical intervention appropriate'. Forty-five patients were divided into three groups- a no treatment group, a group receiving indirect therapy and a group receiving both direct and indirect therapy (with a

strong emphasis on direct therapy). The two treatment groups received 8 weekly sessions lasting 40-45 minutes. All groups were assessed prior to, straight after and 6 months after treatment. On four measures (patient perception of vocal performance, speech language therapy student judgement of voice problem severity, laryngograph ratings and the acoustic measurement shimmer), teachers receiving direct/indirect voice therapy improved significantly in comparison to the other two groups. Other measures also showed a positive change but were not statistically significant. 86% patients in the no treatment group showed no improvement on any of the measures whereas 93% in the direct/indirect therapy group showed significant positive changes in voice quality. 46% teachers receiving indirect voice therapy showed positive changes in voice quality. Encouragingly of the 24 patients who improved following the treatment programme, 21 maintained benefits at 6 months.

Types and delivery of therapy

A number of studies investigated the relative merits of different treatments or approaches for voice disorders by comparing one or more treatments. These treatments were the Lee Silverman Voice treatment (LSVT), voice amplification, resonance therapy and expiratory respiratory muscle strength training. One study investigated the efficacy of providing treatment remotely.

El Sharkwai (2002) undertook a pilot study to evaluate the effects of the Lee Silverman Voice treatment (LSVT) for swallowing and voice in 8 patients with idiopathic Parkinson's disease. This programme is designed to improve the perceptual characteristics of the voice by treating the motor disorder associated with Parkinson's. Each patient received 16 sessions of treatment over a 4 week period. Sessions were delivered four times a week and were 50-60 minutes long. During sessions, patients practised three exercises which included maximum duration of sustained vowel phonation, maximum frequency range and maximum functional speed loudness drill. Patients were trained to speak louder and judge their loudness accurately and were assigned homework. Across the eight patients, vocal intensity during sustained vocal phonation and in reading had significantly increased following the LSVT. The incidence of all swallow motility disorders was also reduced.

Roy (2002) evaluated the effectiveness of voice amplification (VA) vs. vocal hygiene instructions for teachers with voice disorders. Forty-four teachers with a history of voice problems were randomly assigned to one of three groups: vocal hygiene instructions, voice amplification or a no treatment group. Over a 6 week period, the treatment groups had four contacts with the speech language pathologist. Treatment techniques and progress were reviewed in this time and compliance recorded. The vocal hygiene group received instructions on how to eliminate behaviours that are potentially harmful to the voice and replace those with better behaviours. The teachers in the VA group were given a voice amplification system to use within the classroom. Post-treatment, the VA group had significantly improved according to the voice handicap index, the voice severity rating scale and on acoustic analysis measures. No such increases were seen for the vocal hygiene and no treatment groups. Interestingly, the VA group reported significantly higher levels of compliance in adhering to their treatment programme which could account for the better results seen in this group.

In 2003, Roy carried out a further study investigating the relative effectiveness of three treatment programmes: voice amplification, resonance therapy and respiratory muscle training. Sixty-four teachers who presently had and/or had regularly experienced voice problems were randomised to

three groups. One group received an electronic voice amplification system (VA) to use in the classroom. The second group received resonance therapy (RT) which consisted of a neuromuscular training programme to enable production of a voice in a manner less traumatic to the vocal fold tissue, therefore reducing likelihood of injury. The third group received respiratory muscle training (RMT) to increase their ability to generate greater expiratory pressures. Treatment was delivered over 6 weeks and each patient had 4 appointments with the clinician. Teachers who received voice amplification or resonant therapy rated their voice difficulties as less severe following treatment whereas the respiratory muscle training group did not. In comparison to the RT and RMT groups, the VA group reported significantly more overall voice improvement, greater vocal clarity and ease of speaking after treatment. Compliance rates were significantly higher for the VA and RMT group, further evidence that VA appears to be relatively effortless and high compliance method to treat teachers with voice problems.

Wingate (2006) examined the efficacy of including expiratory muscle strength training (EMST) to conventional voice therapy when treating a group of 18 professional voice users. All patients received twice weekly sessions of voice therapy for 3 weeks which included vocal hygiene instructions and vocal function exercises. Following this period, half of the participants received EMST with the voice therapy. The EMST training consisted of a mouthpiece in which the participants breathed into in order to overcome a set threshold pressure. To achieve this, the patients had to breathe out with increasing expiratory effort and the threshold pressure could be increased gradually. Assessment post treatment revealed that voice therapy supplemented with ESMT seems more effective in improving voice quality than voice therapy alone. The voice handicap index and voice rating scale showed greater improvements in voice quality in these patients. Maximum phonation time and subglottal pressure at loud phonation also improved.

Mashima (2003) undertook a study to determine if voice therapy can be effectively delivered remotely. Seventy-two patients with voice disorders were assigned to either a conventional therapy group or a video-teleconference (VTC) group. Both groups received the same treatment methods and facilitation techniques which included voice therapy techniques, vocal function exercises, vocal hygiene instructions and explanation of their voice problem. The conventional group received therapy in the same room as the speech language therapist (SLT) whereas the VTC group participants received therapy in a different room to the SLT via a real time A-V system. Treatment was on average 5.7 number of sessions, each lasting on average 30 minutes. Mean time from enrolment to discharge was 9 weeks. 51/71 patients completed the treatment programme with similar rates of completion between the groups. Both groups improved significantly on self-rated voice quality (better for 90% subjects), acoustic analysis, patient satisfaction and fibre-optic laryngoscopy. There were no differences in outcomes between the groups. Of the 21 patients who did not complete therapy, 12 stated they had difficulty in keeping regular appointments and 4 because of their work schedules. This seems to provide evidence that telehealth provision of therapy could be useful.

Medical interventions

Two studies which were systematic reviews investigated the efficacy of medical interventions for voice disorders.

Whurr (1998) undertook what the author terms a meta-analysis of studies, published between 1986-1996, to assess the efficacy of Botulinum toxin injection for spasmodic dysphonia. Whurr selected 22 studies for inclusion in the meta-analysis, which demonstrated that Botulinum toxin is effective for patients with spasmodic dysphonia with the average treated patient showing 97% improvement. The average patient in the studies was a 51 year-old female who showed beneficial effects of Botulinum toxin after 4 days lasting for 10 weeks. However, it is important to note that the meta-analysis methodology is seriously flawed. A poor level of detail in reporting gives no information about the search process or selection procedure. Nevertheless, it provides a useful overview of the area with some statistical analysis.

Duffy (2003) undertook a systematic review to look at the effectiveness of all medical interventions for spasmodic dysphonia. One hundred and three studies were identified and divided into 3 categories of medical management of spasmodic dysphonia. The first treatment was recurrent laryngeal nerve section (RLN section); in which 20 studies were selected that described the effects in 810 patients. The types of studies investigating this intervention were lower level evidence. RLN section for adductor spasmodic dysphonia resulted in substantial improvement for the majority of patients. This improvement tended to be short term with recurrence within 3 years very common. RLN section seems appropriate for individuals who want longer lasting treatment than Botulinum toxin provides or who fail to respond to Botulinum toxin.

Botulinum toxin was investigated in 58 studies which included a total 4003 patients. Higher level evidence was found for this intervention which showed that this intervention results in a substantial improvement for the majority of patients. However, this improvement is temporary. There appear to be no contraindications for indefinite repeated injections of Botulinum toxin. These findings were backed up by the American Academy of Neurology (AAN) therapeutics and technology assessment subcommittee in 1990. Botulinum toxin was also found to be effective in treatment of other dysphonias for e.g. jaw, lingual and orofacial dystonias. However, dysphagia was a very common side effect when treating these dysphonias with Botulinum toxin. The authors note that further investigation is required into behavioural interventions (i.e. speech language therapy) to treat spasmodic dysphonia, which has the potential to reduce Botulinum toxin dose. Side effects for RLN section and Botulinum toxin included a weak breathy hoarse voice and dysphagia. For RLN section, there was the added side effect of respiratory distress occurring occasionally. It is important to note that this study is methodologically flawed. The literature searching process, study selection procedure and critical appraisal of included studies is poorly described.

Summary

Most studies investigating treatment or prevention of voice disorders are undertaken in populations at high risk of developing voice conditions. With only a few exceptions, studies were undertaken in populations of teachers. The majority of patients who take part in and complete the studies appear to be motivated for treatment whereas those who are not tend to drop out. In terms of preventing disorders, higher level evidence (a systematic review) did not support the provision of direct or indirect voice therapy whereas lower level evidence found therapy did improve voice quality. Voice therapy results in better outcomes for patients when compared with no treatment. In terms of types of therapy, voice amplifications seems a cheap, reliable and accepted form of therapy for teachers, with an advantage being that patients are highly compliant when given this treatment. Other treatments such as resonance therapy and expiratory muscle strengthening can result in positive outcomes for patients and treatment can be successfully delivered remotely. Voice therapy

programmes that combine aspects of direct and indirect therapy appear to be the most successful and are accepted well by patients. The medical intervention of Botulinum toxin for spasmodic dysphonia results in great improvements for the majority of patients.

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Voice

Study	Country	Study design	Subjects	Intervention
Amir, O (2005)	Israel	Interventional study	16 male teachers, mean age 38.1 years (7 with pre-existing laryngeal pathology, 9 without pre-existing laryngeal pathology)	Voice course of 8 sessions led by a speech and language pathologist. Subjects treated in groups of 8 and each session lasted 45 minutes.
Bovo, R (2006)	Italy	Randomised controlled trial	64 female full-time teachers	Short voice course consisting of 2 lectures, 2 group therapy sessions and exercises to complete at home
Carding, P N (1999)	UK	Clinical trial	45 patients with non-organic dysphonia. 12 males and 33 females. Mean age 43 years (range 18-71)	Indirect versus direct therapy versus no treatment 8 weekly sessions lasting 40-45 minutes each
Duffy, J R (2003)	Worldwide	Systematic review	103 studies	Medical interventions for spasmodic dysphonia. This includes recurrent laryngeal nerve section, Botulinum toxin and Miscellaneous medical treatments.
El Sharkawi, A (2002)	USA	Interventional study	8 subjects (2 women, 6 men) with idiopathic Parkinson's disease. Age range: 48-77	16 sessions of the Lee Silverman Voice Treatment. Over a four week period, 4 times per week, 50-60 minute sessions
John, A (2004)	UK	Cohort study	240 patients treated for voice disorder at 7 different service providers across the UK	Differences in treatment outcome at seven service providers in UK.
Lehto, L (2003)	Finland	Interventional study	48 customer advisors, using the telephone during working hours at a call centre	A short 2-day vocal training course
MacKenzie, K (2001)	UK	Randomised controlled trial	204 patients with dysphonia (hoarseness) for at least 2 months, aged 17-87	Voice therapy for up to 6 weeks versus no treatment
Mashima, P A (2003)	USA	Randomised controlled trial	72 patients with voice disorders 34 males, 38 females Mean age: 45 years	Voice therapy delivered remotely via audio-visual equipment (real-time) vs. face-to-face therapy

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Voice

Study	Country	Study design	Subjects	Intervention
Niebudek-Bogusz, E (2008)	Poland	Clinical trial	186 female teachers. Age 23-60 years, mean 38.7 years	A vocal training programme lasting 9-8 sessions. Sessions delivered by SLTs once or twice a week for 45-60 minutes over 2-4 mth period.
Pasa, G (2007)	Australia	Clinical trial	37 primary school teachers	Vocal hygiene instructions or vocal function exercises for preventing voice disorders vs. No treatment Four sessions over a 10 week period
Roy, N (2001)	USA	Randomised controlled trial	58 teachers with a history of voice problems (Present or regularly in the past)	Vocal hygiene instructions vs. vocal function exercise vs. no treatment.
Roy, N (2002)	USA	Randomised controlled trial	44 teachers with a history of voice disorders. 37 women and 7 men	Voice amplification vs. vocal hygiene instruction over a six week period.
Roy, N (2003)	USA	Randomised controlled trial	64 teachers with a history of voice problems (Present or regularly in the past)	Voice amplification vs. Resonance therapy vs. expiratory respiratory muscle training
Ruotsalainen JH (2007)	Worldwide	Systematic review	2 randomised controlled trials included	Prevention of voice disorders by indirect, direct or a combination of direct and indirect voice therapy
Ruotsalainen JH (2007)	Worldwide	Systematic review	6 randomised controlled trials included (163 participants in treatment groups and 141 in comparison groups)	Treatment of functional dysphonia by indirect, direct or a combination of direct and indirect voice therapy
Whurr, R (1998)	Worldwide	Sates it is a meta-analysis	22 studies included which incorporate 245 patients with spasmodic dysphonia	Botulinum toxin injections
Wingate, J (2006)	USA	Clinical trial	18 professional voice users (unknown occupation). 9 had dysphonia with vocal fold lesions, 9 had benign vocal lesions	Voice therapy +/- Expiratory muscle strength training



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