

Evaluating the Effectiveness of Voice Therapy
Second Edition



Evaluating the Effectiveness of Voice Therapy

Functional, Organic and Neurogenic
Voice Disorders

Second Edition

Paul Carding

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List of Contributing Authors

Paul Carding Dip CCS., PhD., FRCSLT



Professor Paul Carding has worked as an academic and clinical researcher for more than 25 years. He is currently Professor of Speech Pathology at Australian National Catholic University (Brisbane, Sydney and Melbourne). He also holds several other honorary positions including Senior Research Fellow at University College London (UK), Honorary Professor at Newcastle University (UK) and Visiting Professor at Strathclyde University (UK). Prof Carding has been awarded over \$4 million in research grant

funding and has published over 100 peer-reviewed articles as well as 15 book chapters and two books. He has supervised over 20 PhD and Masters students to completion and has been a keynote speaker at over 50 international conferences.

Prof Carding is a Fellow of the Royal College of Speech and Language Therapists (UK) and an honorary member of the Royal Society of Medicine (UK). He is also Speech Pathology national advisor to the Otolaryngology National Clinical Trials Office (UK). For over 20 years he was voice advisor to the Royal Shakespeare Company (UK). He is a regular reviewer of manuscripts for four international academic journals and has examined PhD students from a number of universities around the world.

Marianne Bos-Clarke BSc., MSc., MRCSLT

Marianne is the Lead Speech and Language Therapist for Voice and ENT at the Royal Devon and Exeter NHS Foundation Trust and a Lecturer at the University of St. Mark and St. John, Plymouth. In 2004, Marianne completed an MSc in Voice Disorders with distinction at Newcastle University. With over fifteen years of specialist experience in managing voice disorders, Marianne has taught widely, presented at conferences and published several articles. Research interests include Solution Focused Brief Therapy in voice therapy, the therapeutic application of the Estill model of voice and the effectiveness and

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content of voice therapy – particularly in functional dysphonia. Marianne is currently training to be a Certified Master Teacher of Estill.

Sherry Fu BSc., PhD.

Dr Sherry Fu has been practicing as a bilingual speech-language pathologist for over 11 years in the fields of voice disorders, head and neck cancer and bilingual speech and language disorders. She is currently assistant professor of Department of Audiology and Speech Language Pathology at the Mackay Medical College (Taiwan) and part-time bilingual speech-language pathologist at Taipei American School (Taiwan). Dr Fu is also a supervisory board member of the Speech-Language-Hearing Association of Taiwan.

Sue M Jones BSc., MSc., MRCSLT

Sue M. Jones has been working with Clinical Voice Disorders for 34 years. She co-directs the Voice Clinic Services at University Hospital of South Manchester, UK and heads a team of specialist voice therapists. Sue holds an MSc in Voice Research (Newcastle University) and is an adviser on Voice Disorders to the Royal College of Speech and Language Therapists as well as being the RCSLT representative for the British Laryngological Association. She has previously been a director of the British Voice Association. Sue published *Laryngeal Endoscopy and Voice Therapy: A Clinical Guide* (Compton Publishing) in 2016. She also specialises in the management of the injured professional singer and has worked in partnership with singing teachers and vocal coaches. Sue has led the development of a national training programme for perceptual analysis in the UK and presented extensively at major national and international meetings.

Patricia Gillivan Murphy BSc., MSc, PhD

Patricia Gillivan-Murphy has over twenty five years clinical experience in voice disorders, with particular focus on clinical research over the past ten years. Currently, she works at the Mater Misericordiae University Hospital, Dublin as a Clinical Specialist (Voice). She carries a clinical caseload of patients with voice and swallowing disorders, teaches at an undergraduate and post graduate level and engages in clinical research. She is the clinical lead in Fiberoptic Endoscopic Evaluation of Swallowing (FEES) and teaches FEES locally and nationally. She achieved a Masters in clinical research (voice) in 2004 and a PhD in 2013 both from the University of Newcastle upon Tyne, UK. She has published research findings from studies on voice treatment effectiveness in teachers and voice tremor characteristics in Parkinson's disease.

Chloe Walton BA., MSpPathSt

Chloe Walton is a speech pathologist who completed her Master of Speech Pathology studies in 2009 at the University of Queensland, Australia. She has worked for several years within tertiary and private settings. During this time she has participated in a number of voice research projects. She has a particular clinical interest in the management of functional dysphonia and presented her findings at international forums including the Speech Pathology Australia National Conference in 2013. The resultant article entitled “Is more intensive better? Client and Service Provider Outcomes for Intensive versus standard therapy schedules for functional voice disorders” was published in the *Journal of Voice*. Chloe is currently a PhD student at Australian Catholic University where she is undertaking research into voice outcomes following surgical and behavioral management of patients with unilateral vocal fold paralysis.



Dedication

The first edition of this book was dedicated to my family. It is a matter of enormous pride and comfort to me that this second edition is also dedicated to them.

Kate, my wife, remains a constant source of support and energy to me and I could not have written this book without her. James and Jeni are still my inspiration and I am hugely proud of them both.

Acknowledgements

I am extremely grateful for the dedication and expertise of my co-authors. Thank you so much for your support and hard work.

A good decision is based on knowledge not on numbers.

Opinion is the medium between knowledge and ignorance.

Knowledge without justice ought to be called cunning rather than wisdom.

Plato (427–374 BCE)

Foreword

It is a great pleasure to introduce this second edition of a unique and outstanding publication – *Evaluating the Effectiveness of Voice Therapy: Functional, Organic and Neurogenic Voice Disorders*. Professor Paul Carding is a leading proponent of evidence-based voice therapy worldwide and it is wonderful to watch his nurturing of a whole new generation of research-aware Speech and Language Therapists.

In any sphere of medicine, it is hard to establish a robust evidence base. No field is more challenging in this regard than that of client centred therapies, where the treatment choices are influenced by a wide range of patient and therapist factors and where controlling for variation in the delivery and acceptance of therapy interventions is equally problematic. Having first of all neatly summarised the core process of modern treatment evaluation, Paul and his team of highly specialised coauthors have done a marvellous job in assembling all the latest evidence sources in the published literature and presenting them in a lucid way, highly suited to the demands of busy clinicians seeking to review treatment options. The writing is uniformly scholarly, yet readable and the hard work of approaching a multi-layered topic has been done for the reader by the authors. While the general sections are invaluable to researchers and enquiring clinicians alike, the team has not shied away from the more demanding task of assessing the specific evidence for specific physical conditions, such as nodules, mass lesions and Parkinsonism.

This remarkable book serves several purposes. It presents evidence upon which treating therapists may formulate session plans with maximal cost efficacy, while pointing the way to evaluation of the relevant outcomes, in the context of what is already known. This volume therefore offers a comprehensive toolkit: literature appraisal; skills acquisition; highlights of key existing papers; and benchmarks against which to assess one's own practice.

This up to the minute volume is a most welcome addition to the published literature.

Janet A Wilson, B.Sc., MD, FRCS(Ed), FRCS(Eng), FRCSLT(Hon)
Professor, Otolaryngology and Head and Neck Surgery
Newcastle University, UK

Foreword

In *Evaluating the Effectiveness of Voice Therapy: Functional, Organic and Neurogenic Voice Disorders*, Professor Carding has created an invaluable resource for students, clinicians and researchers interested in the behavioral management of common voice disorders. It provides an extremely logical and coherent approach to this topic by first establishing a solid foundation in the basic concepts related to gathering and assessing the quality of scientific evidence for treatment efficacy and effectiveness. Subsequent chapters are then devoted to cogent reviews of the evidence that currently exists for the effectiveness of voice therapy in treating specific types of voice disorders, as well the state-of-the art in voice outcome measures. The book concludes with a very balanced summary of the current evidence for voice therapy effectiveness, with practical suggestions about the types of future research that is needed to continue to build the evidence base.

For students in training to be voice clinicians, *Evaluating the Effectiveness of Voice Therapy: Functional, Organic and Neurogenic Voice Disorders* provides a wealth of clearly presented information about the current state of the evidence for voice therapy effectiveness; it also demonstrates the type of clinical reasoning that is critical for students to learn so that they can continue to interpret and apply new research findings as independent clinicians. For practicing clinicians, it can help facilitate informed treatment decisions and provide the information needed to explain the scientific bases for such decisions to colleagues, patients and their families. Finally, for researchers, this book literally provides a roadmap for pursuing the types of research that is needed to advance clinical practice in the behavioral management of voice disorders.

Robert E. Hillman, Ph.D.
Massachusetts General Hospital
Harvard Medical School
Boston, USA

Foreword

Electronic communication reaches deep into society, work and the eyes, minds and hands of children. However, these typed words fail to convey context, social and emotional import and, ultimately deeper layers of meanings. It appears that true depth communication requires the human voice. Voice remains the most powerful, effective and, therefore, most used communication medium of our age and therefore the protection and restoration of vocal health is one of the greatest responsibilities of healthcare and health research.

This book is a beacon lit to signal the need to scale-up research efforts into voice disorders. It is also a light to attract those seeking a way to advance the field for benefit of both patients and voice science per se. With all health care coming under global scrutiny, this signal could not be more timely. Professor Carding set out his stall here by putting the importance and design of voice research upfront, for all that follows in terms of describing disorders and their care depends entirely on evidence. Voice therapy has come of age and this book, as well as clearly laying out ways of treatment and research, is a wonderful celebration of this moment in time. I know both serious and casual readers will quickly join the party.

Martin Birchall, FRCS

Professor of Laryngology, Consultant Laryngologist and Head and Neck

Surgeon and NIHR Senior Investigator

University College London



Introduction

The first edition of the book entitled *Evaluating Voice Therapy: Measuring the Effectiveness of Treatment* was published early in 2000. A number of significant developments have happened in the field of voice disorders since that time. For example, in 2000, The Voice Handicap Index (Jacobson *et al.*, 1997) had only just started to be used and other significant patient reports such as the Voice Activation and Participation Profile (Ma and Yiu, 2001) and The Voice Symptom Scale (Deary *et al.*, 2003) had not been published. Similarly, the pivotal evidence for intensive voice treatment for patients with Parkinson's disease (Ramig *et al.*, 2001) was not to be published until October 2001. The first Cochrane systematic review of voice therapy for any type of voice disorder did not happen until 2007 (Ruotsalainen *et al.*, 2007). In fact, arguably, the whole evidence-based practice movement had hardly begun to gather impetus – Sackett's seminal book on how to practice and teach evidence-based medicine (Sackett *et al.*, 1998) was not published in 1998. Greenhalgh's equally influential book on how to read a research paper (Greenhalgh, 2001) did not follow until 2001. And since the first edition of this book there have been a large number of new and important studies of voice therapy effectiveness for many different types of voice disorder. Ironically, the number of studies probably means that the busy voice clinician is unlikely to be unable to keep up. One of the purposes of this book is therefore to provide the voice clinician with all of the relevant speech pathology intervention effectiveness evidence for a range of different voice disorders

This second edition, entitled *Measuring the Effectiveness of Voice Therapy: Functional, Organic and Neurogenic Voice Disorders*, provides a summary and critical appraisal of all of the relevant speech pathology treatment effectiveness studies published between 2005 and 2015. As the title suggests, this represents an evaluation of the literature across the three main etiological groups of voice disorders that readily utilise speech pathology as a primary and/or adjunct treatment modality. Similar to the first edition, the book contains several preliminary chapters on the importance of study design and techniques for measuring voice outcomes over time. However, these chapters have been significantly re-written. This is followed by a series of chapters that critically

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evaluate the effectiveness of voice therapy in Functional Voice Disorders (Chapter 3), Vocal Nodules (Chapter 4), Organic Voice Disorders (Chapter 5), Unilateral Vocal Fold Paralysis (Chapter 6) and Neurological Voice Disorders: Parkinson's Disease (Chapter 7). I am hugely grateful to my co-authors for their devotion and commitment to writing these chapters. The final chapter allows for a look into the future and asks whether we have enough high quality studies, how do we apply the findings to individuals in our practice and how do we embark on the next phases of the dissemination of our evidence base.

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The need for evidence of treatment effectiveness

Paul Carding

Why do we still need evidence of treatment effectiveness?

All people involved in health care have the same goal: to provide the most effective care available and to achieve the best outcome for the patient. Evidence of treatment effectiveness is central for (a) patient care, (b) professional integrity, (c) service provision and (d) clinical research. It is important to explain these concepts further.

Patient care

Evaluating the evidence of treatment effectiveness allows clinicians to provide patients with the best treatment possible. It allows for the delivery of the intervention most likely to improve the patient's outcome for a given clinical condition. Patients have every right to think that they are being offered the most up-to-date and efficacious (and efficient) intervention, given their presenting condition and individual circumstances. Evidence of the efficacy of treatment is necessary to “offer an improved quality of life ... as effectively as possible to the maximum number of people” (Enderby, 1995). Patient expectation has become more focused with increased ability to access information from the internet.

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Professional integrity

Clinicians have a professional obligation to provide the “best” treatment for the individual patient. The treating clinician needs to access the evidence, assess the accuracy of this information, determine the suitability of the evidence for the individual client and discuss whether this intervention is the most appropriate and effective option. It is therefore incumbent upon the practising clinician to be up-to-date with the evidence (or at least able to access this information) and be sufficiently skilled to deliver the treatment that is indicated, as described by Hoffman *et al.* (2013):

“When we integrate the best available evidence with information from our clinical knowledge, patients and practice context, the reasoning behind our clinical decisions becomes more apparent and this serves to reinforce both our professional accountability and our claim of being a health professional” (page 6).

Service provision

Governments, policy-makers and service providers are inevitably concerned with health expenditure. The allocation of limited financial resources is based (although not exclusively) on information about the efficacy and effectiveness of current interventions. They wish to maximise the provision of health resources to the largest population possible.

“The competitive edge will go to the health care professionals who can demonstrate most effectively – based on hard data what beneficial outcomes their services can deliver” (Boston, 1994).

Clinical research

Many specialist areas of speech pathology have developed from an anecdotal base and some still lack an academic, or even theoretical, underpinning (Reilly *et al.*, 2004). Whilst this is no longer the case in many areas of voice therapy, there are still many questions about clinical practice that remain unanswered. Collation and critical appraisal of the evidence of effectiveness of intervention, highlights areas of strength but also areas of research weakness. Some areas of voice therapy only have a small and poor quality evidence base and this requires significant research investment to provide valuable data to support (and change) clinical practice. Other areas of voice therapy have a well established evidence

the need for evidence of treatment effectiveness

base, although here too important clinical questions have yet to be answered. These will be highlighted in the subsequent chapters of this book

The concept of evidence-based practice

Clearly linked to this pursuit of evidence of treatment effectiveness is the concept of evidence-based practice (EBP). The critical evaluation and dissemination of treatment effectiveness is a key aspect of EBP but not the only one. For example, EBP is also concerned with diagnostic effectiveness. The definition of EBP has been refined over time. It is now commonly considered to be the integration of the best research evidence with clinical expertise and the patient's own unique values and circumstances (Hoffman *et al.*, 2013). This is perhaps more holistic than the original definition of evidence-based medicine provided by Sackett and colleagues (Sackett *et al.*, 1998): "Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients" (page 2). Evidence-based healthcare has also been described as "a discipline centred upon evidence-based decision-making about groups of patients, or populations, which may be manifest as evidence-based policy-making, purchasing or management (Gray, 1997). The key to all of these definitions is that EBP is considered a way of implementing practice that involves an individualised, thoughtful process of using the evidence to make the best decisions for any given patient.

Greenhalgh (2001) reminds us that the main enemy of EBP is expert opinion. Whilst expert opinion can of course be a highly valuable source of information, it is not strictly evidence at all unless it can be supported by high quality scientific data. Expert opinion can be very biased and it is perhaps more common than we care to admit. This is "eminence-based" rather the "evidence-based" practice. Equally misleading is pseudo-expert opinion. For example, modern media outlets may enable (and even encourage) irresponsible reporting of "evidence" which may be "believed" by the undiscerning reader. It is incumbent upon any professional to judge the quality of the evidence via critical appraisal and certainly not to rely on the reports of potentially biased and/or unqualified journalists.

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Levels of evidence

Not all sources of published evidence are equal. Clinicians and researchers (as well as the public) are required to differentiate strong from weak evidence. It is common to refer to hierarchies of evidence which provide a ranking according to the relative value from high to low. It is a useful means of identifying study types of varying levels of methodological trustworthiness (i.e., free from bias). In general, studies that are higher in the hierarchy represent more robust methodology and hence produce results of efficacy which are scientifically strong and more likely to be trustworthy. A low level or weak study implies that there has been no or little scientific evaluation, or that the methodology used limits the trustworthiness or generalisability of the results. These matters of methodological design are the subject of Chapter 2. Table 1 is a simplified version of a hierarchy of evidence developed by the National Health and Medical Research Council of Australia (1999).

Table 1: Hierarchies and Levels of Evidence for Intervention Effectiveness

Level	Study design
I	A systematic review of Level II studies
II	Randomised controlled trial
III-1	Pseudo-randomised controlled trial
III-2	Comparative study with concurrent controls <ul style="list-style-type: none">• non-randomised• experimental trial• cohort study• case-control study• interrupted time-series with control group
III-3	Comparative study <i>without</i> concurrent controls <ul style="list-style-type: none">• historical control study• two or more single arm study• interrupted time-series without a parallel control group
IV	Case series Case studies

It is however important to note that it would be misleading to think that a poorly designed or implemented randomised controlled study is superior to a well designed controlled group study (for example). The ranking of evidence in a hierarchy is not a substitute for accurate critical appraisal. Equally, as discussed in Chapter 2, some areas of clinical practice are in their relative infancy and

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hence, in these areas, Level IV case studies and series are highly appropriate. Finally, it is important to note that Level I evidence in the Table below does not represent an efficacy study with data at all. Rather it is a collation of the evidence from previously published Level II studies. Again, this will be explained in detail in Chapter 2.

It has been argued that the hierarchy listed in Table 1 is quite difficult to understand and refers to a number of study designs which rarely occur in behavioural sciences such as voice therapy practice. Many authors prefer to use the levels of evidence from the Joanna Briggs Institute for Evidence-based Nursing and Midwifery for the evaluation of treatment (www.joannabriggs.edu.au). The levels of evidence appear to be less complicated and clearly applicable to behavioural interventions. This hierarchy also includes different Level IV evidence which acknowledges opinion of respected authorities, clinical experience and reports of expert committees. Strictly speaking this is not evidence at all but has been adopted in some areas of speech pathology where there is an absence of any other information of intervention effectiveness. Fortunately, for the evaluation of voice therapy effectiveness, this Level IV is not required (and not reported on in this book). Nevertheless, for the purposes of completeness, the Joanna Briggs levels of evidence are presented in Table 2 below.

Table 2: The Joanna Briggs Institute Levels of Evidence for Intervention Effectiveness

Level	
I	Evidence obtained from a systematic review of all relevant randomised controlled trials
II	Evidence obtained from at least one properly designed randomised controlled trial
III-1	Evidence obtained from well-designed controlled trials without randomisation
III-2	Evidence obtained from well-designed cohort or case control analytic studies, preferably from more than one centre or research group
III-3	Evidence obtained from multiple time series, with or without the intervention Dramatic results in uncontrolled experiments
IV	Opinion of respected authorities, based on clinical experience, descriptive studies or reports of expert committees

Based on Joanna Briggs Institute for Evidence-based Nursing and Midwifery (www.joannabriggs.edu.au)

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The structure of this book

The next chapter addresses the importance of study design in determining the effectiveness of treatment. This includes a description of the more common designs used, as well as details concerning study validity and statistical concepts. The following five chapters address the literature and evidence base for particular types of voice disorders: Functional Voice Disorders (Chapter 3), Vocal Nodules (Chapter 4), Organic Voice Disorders (Chapter 5), Unilateral Vocal Fold Paralysis (Chapter 6) and Parkinson's Disease Voice Disorder (Chapter 7). Each of these chapters includes a summary table of all relevant voice treatment efficacy and effectiveness studies. Chapter 8 is concerned with voice outcome measurement; first, it describes the importance of choosing the most appropriate measure before summarising the most common voice outcome measures used in the literature. A summary table of studies that have used each of the more common outcome measures is provided. The final chapter includes a summary of the state of the evidence base for the speech pathology treatment of voice disorders and a consideration of the priorities for future research in this field of expertise.

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The importance of study design

Paul Carding

The nature and quality of the study design is crucial when considering the treatment effectiveness evidence base in any given field. The assessment of the evidence is essentially a process of determining how “believable” and relevant the study is/studies are. Key to this assessment is the identification of the types of study that have been used to measure the relationship between treatment and outcome. There may be many reasons why a patient has improved and it may be misleading to assume that because the improvement results from the treatment given. The quality of evidence is essentially a hierarchy of study design which is more likely to prove that the change in a patient’s performance is a direct result of the treatment rather than from spontaneous improvement or from other (non-controlled) interacting factors. To be confident of the cause and effect relationship between treatment and outcome we need to be as convinced as possible (we can never be absolutely sure) that there has been appropriate control of independent and dependent variables and accurate data interpretation.

There are three fundamental reasons why we might not believe the evidence presented from a particular study. These are as follows:

(1) *Using the wrong type of study design for the question*

The study used the wrong design to answer the specific research question. There are many study designs available (see section below) and that is because “no size fits all”. Using the wrong study design will result in no direct answer to the research question or a biased answer to the question.

