## Contents

List of Contributors xi
Preface xvii

**Part One**  Speech Production and Development 1

*Sara Howard and Anette Lohmander*

1 Physical Structure and Function and Speech Production Associated with Cleft Palate 5

*Martin Atkinson and Sara Howard*

1.1 Introduction 5
1.2 The Hard and Soft Palates and the Velopharynx 6
1.3 The Tonsils and Adenoids 9
1.4 The Larynx 11
1.5 The Jaws, Dentition and Occlusion 12
1.6 Symmetry: Structure and Function 15
1.7 The Tongue 16
1.8 The Lips 18
1.9 Summary: Compensations Across Systems 19
References 19

2 The Development of Speech in Children with Cleft Palate 23

*Kathy L. Chapman and Elisabeth Willadsen*

2.1 Overview 23
2.2 The Impact of Clefting on Speech Production 24
2.3 Variables Impacting Speech Development for Young Children with Cleft Palate 25
2.4 Speech Development: Birth to Age Five 26
2.5 Conclusion 35
References 36

3 The Influence of Related Conditions on Speech and Communication 41

*Christina Persson and Lotta Sjögreen*

3.1 Introduction 41
3.2 Conditions Related to Structural Etiologies 42
3.3 Conditions Related to Neurological Aetiology 47
3.4 Conditions Related to a Combination of Structural and Neurological Aetiology 49
3.5 Clinical Implications 50
References 50

4 Surgical Intervention and Speech Outcomes in Cleft Lip and Palate 55
Anette Lohmander
4.1 Introduction 55
4.2 Basics of Surgery on Cleft Palate 57
4.3 Basics of Outcomes 64
4.4 Speech Outcomes 65
4.5 Conclusion 69
Appendix 4.A Review of Evidence and Methodology in Studies of Speech Outcome in Individuals Born with Cleft Lip and Palate 70
References 82

5 Secondary Management and Speech Outcome 87
John E. Riski
5.1 Introduction 87
5.2 Secondary Surgical Management of Velopharyngeal Incompetence 88
5.3 Secondary Pharyngeal Flap 88
5.4 Posterior Pharyngeal Wall Augmentation by Muscle Transposition 91
5.5 Studies Comparing Treatments of VPI 94
5.6 Posterior Pharyngeal Wall Augmentation by Implants and Injections 95
5.7 Velarplasty 96
5.8 Other Considerations in Managing VPI 97
5.9 Complications Secondary to Pharyngoplasties 99
5.10 Conclusions 99
References 100

6 Cleft Palate Speech in the Majority World: Models of Intervention and Speech Outcomes in Diverse Cultural and Language Contexts 105
Debbie Sell, Roopa Nagarajan and Mary Wickenden
6.1 Introduction 105
6.2 Speech Outcomes in a Majority World Context 106
6.3 Different Models of Provision 109
6.4 Attitudes/Cultural Aspects 115
6.5 Conclusion 119
References 119

Part Two Speech Assessment and Intervention 123
Anette Lohmander and Sara Howard

7 Phonetic Transcription for Speech Related to Cleft Palate 127
Sara Howard
CONTENTS

7.1 Introduction 127
7.2 What is Phonetic Transcription? 128
7.3 Why Transcribe? 129
7.4 What to Transcribe and How to Transcribe It 130
7.5 Features of Cleft Speech Production 131
7.6 Pitfalls of Transcription 134
7.7 Conclusion 138
Appendices 139
References 139

8 Instrumentation in the Analysis of the Structure and Function of the Velopharyngeal Mechanism 145
Debbie Sell and Valerie Pereira
8.1 Introduction 145
8.2 Visualization of the Velopharyngeal Mechanism 147
8.3 Multiview Videofluoroscopy 147
8.4 Nasendoscopy Procedure 151
8.5 Magnetic Resonance Imaging (MRI) 155
8.6 Variability in Practice 158
8.7 Future 162
References 162

9 Cross Linguistic Perspectives on Speech Assessment in Cleft Palate 167
Gunilla Henningsson and Elisabeth Willadsen
9.1 Introduction 167
9.2 Vulnerable Speech Sounds 168
9.3 Language Background of the Listener Assessing the Speech of Children with Cleft Palate 170
9.4 What Is Known about More Unfamiliar Languages? 173
9.5 Cross Linguistic Speech Samples 173
9.6 Influence on Assessment of Language Acquisition in the Young Child with Cleft Palate 176
9.7 Conclusion 177
References 177

10 Voice Assessment and Intervention 181
Lesley Cavalli
10.1 Introduction 181
10.2 Defining a Voice Disorder 181
10.3 Assessment 184
10.4 Instrumental Assessment 189
10.5 Vocal Handicap Measures 190
10.6 Treatment 191
10.7 Conclusion 195
References 196

11 Nasality – Assessment and Intervention 199
Triona Sweeney
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>11.2</td>
<td>Perceptual Assessment of Nasality and Nasal Airflow Errors</td>
<td></td>
</tr>
<tr>
<td>11.3</td>
<td>Instrumental Assessment of Nasality and Nasal Airflow Errors</td>
<td></td>
</tr>
<tr>
<td>11.4</td>
<td>Interpreting Results</td>
<td></td>
</tr>
<tr>
<td>11.5</td>
<td>Intervention</td>
<td></td>
</tr>
<tr>
<td>11.6</td>
<td>Conclusion</td>
<td></td>
</tr>
<tr>
<td>Appendix 11.A</td>
<td>Temple Street Scale of Nasality and Nasal Airflow Errors</td>
<td></td>
</tr>
<tr>
<td>References</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12 Articulation – Instruments for Research and Clinical Practice  
Fiona E. Gibbon and Alice Lee  
12.1 Introduction  
12.2 Electropalatography (EPG)  
12.3 Imaging Techniques  
12.4 Motion Tracking  
12.5 Conclusion  
Acknowledgement  
References

13 Psycholinguistic Assessment and Intervention  
Joy Stackhouse  
13.1 Introduction  
13.2 What is a Psycholinguistic Approach?  
13.3 A Psycholinguistic Assessment Framework  
13.4 Intervention from a Psycholinguistic Perspective  
13.5 Literacy: Phonological Awareness and Spelling  
13.6 Summary  
References

14 Early Communication Assessment and Intervention  
Nancy Scherer and Brenda Louw  
14.1 Introduction  
14.2 Assessment  
14.3 Intervention  
References

15 Phonological Approaches to Speech Difficulties Associated with Cleft Palate  
Anne Harding-Bell and Sara Howard  
15.1 Introduction  
15.2 Variability, Variation and Compensation  
15.3 Classification of Speech Difficulties Related to Cleft Palate  
15.4 Phonological Assessment of Speech Data Related to Cleft Palate  
15.5 Phonological Consequences of Speech Production Related to Cleft Palate  
15.6 Intervention  
15.7 Summary  
References

16 Speech Intelligibility  
Tara L. Whitehill, Carrie L. Gotzke and Megan Hodge
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.1</td>
<td>Introduction</td>
<td>293</td>
</tr>
<tr>
<td>16.2</td>
<td>Definition of Intelligibility and Related Concepts</td>
<td>294</td>
</tr>
<tr>
<td>16.3</td>
<td>Measurement Issues</td>
<td>294</td>
</tr>
<tr>
<td>16.4</td>
<td>Studies of Intelligibility in Speakers with Cleft Palate</td>
<td>296</td>
</tr>
<tr>
<td>16.5</td>
<td>Current and Future Developments</td>
<td>298</td>
</tr>
<tr>
<td>16.6</td>
<td>Conclusion</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>References</td>
<td>301</td>
</tr>
<tr>
<td>17</td>
<td>Communicative Participation</td>
<td>305</td>
</tr>
<tr>
<td></td>
<td>Christina Havstam and Anette Lohmander</td>
<td></td>
</tr>
<tr>
<td>17.1</td>
<td>Introduction</td>
<td>305</td>
</tr>
<tr>
<td>17.2</td>
<td>ICF</td>
<td>306</td>
</tr>
<tr>
<td>17.3</td>
<td>Communicative Participation</td>
<td>307</td>
</tr>
<tr>
<td>17.4</td>
<td>Conclusions and Clinical Implications</td>
<td>312</td>
</tr>
<tr>
<td></td>
<td>References</td>
<td>312</td>
</tr>
<tr>
<td>18</td>
<td>Evaluation and Evidence-Based Practice</td>
<td>317</td>
</tr>
<tr>
<td></td>
<td>Linda D. Vallino-Napoli</td>
<td></td>
</tr>
<tr>
<td>18.1</td>
<td>Introduction</td>
<td>317</td>
</tr>
<tr>
<td>18.2</td>
<td>Intervention for Speech Disorders</td>
<td>318</td>
</tr>
<tr>
<td>18.3</td>
<td>Evidence-Based Practice</td>
<td>319</td>
</tr>
<tr>
<td>18.4</td>
<td>The Systematic Review Process</td>
<td>323</td>
</tr>
<tr>
<td>18.5</td>
<td>Evidence Findings Establishing Therapy Effectiveness</td>
<td>325</td>
</tr>
<tr>
<td>18.6</td>
<td>Instrumentation – Visual Feedback</td>
<td>349</td>
</tr>
<tr>
<td>18.7</td>
<td>Surgery</td>
<td>350</td>
</tr>
<tr>
<td>18.8</td>
<td>Comments about Intervention Effectiveness</td>
<td>351</td>
</tr>
<tr>
<td>18.9</td>
<td>Intervention and the International Classification of Function (ICF)</td>
<td>352</td>
</tr>
<tr>
<td>18.10</td>
<td>Research Designs for Intervention Studies</td>
<td>352</td>
</tr>
<tr>
<td>18.11</td>
<td>Conclusions</td>
<td>352</td>
</tr>
<tr>
<td></td>
<td>Appendix 18.A Commonly Used Evidence Hierarchies for Intervention Studies</td>
<td>354</td>
</tr>
<tr>
<td></td>
<td>References</td>
<td>354</td>
</tr>
</tbody>
</table>

Index | 359