Contents

Preface — xvii

Ralph J. Panos, MD

1 Introduction and Definition of Chronic Obstructive Pulmonary Disease COPD — 1
1.1 Definition of Chronic Obstructive Pulmonary Disease (COPD) — 2
1.1.1 Preventable — 2
1.1.2 Progressive — 2
1.1.3 Treatable — 3
1.1.4 Airflow Obstruction That Is Not Reversible [Persistent] — 4
1.1.5 Major Point of Confusion: “Reversibility” — 4
1.1.6 Inflammation — 5
1.1.7 Lung/Pulmonary — 6
1.1.8 Exacerbation — 6
1.2 Diagnostic Criteria — 6
1.3 Staging Disease Severity — 7
1.4 COPD Is a Syndrome — 8
1.5 Genetic Factors — 8
1.6 Clinical Symptoms and Differential Diagnosis — 9
1.7 Imaging — 10
1.8 Treatment — 10
1.9 Conclusion — 11
1.10 Summary Points — 11
References — 11

Ralph J. Panos, MD

2 Epidemiology and Economic Consequences of COPD — 14
2.1 Introduction — 14
2.2 Epidemiology — 15
2.2.1 Risk Factors for COPD Development — 15
2.2.1.1 Tobacco Smoke — 15
2.2.1.2 Passive or Environmental Tobacco Smoke Exposure — 16
2.2.1.3 Non-tobacco Smoke Factors — 16
2.2.1.4 Occupational Exposures — 16
2.2.1.5 Air Pollution — 17
2.2.1.6 Sex — 18
2.2.1.7 Infections — 18
2.2.2 Prevalence — 18
2.2.2.1 United States — 19
2.3 Economics — 21
4.9.3 Mixed Impairment with Both Airflow Obstruction and Lung Restriction — 54
4.10 Interpretation of Spirometry Results — 54
4.10.1 Reference Equations — 54
4.10.2 Racial Differences in Reference Equations — 58
4.10.3 The Lower Limit of the Normal (LLN) Range — 59
4.10.4 What is Considered to Be Abnormal? — 60
4.10.5 Determine Predicted Values and % of Predicted Values — 60
4.10.6 Interpretation of Spirometry Test Results for Impairment Patterns — 60
4.10.7 Airflow Obstruction — 60
4.10.7.1 Possible Restrictive Lung Defect — 61
4.10.7.2 Mixed Impairment Pattern — 62
4.10.7.3 Controversy for Determination of Airflow Limitation/Obstruction — 62
4.10.7.4 Bronchodilator Response — 63
4.11 Summary Points — 64
References — 64

William L. Eschenbacher, MD

5 Radiology: Use of Lung Imaging to Help in the Identification of Patients with COPD — 66
5.1 Introduction — 66
5.2 Chest Radiographs — 66
5.3 Computed Tomography (CT) Scans — 67
5.3.1 CT Scans and Emphysema — 67
5.3.2 CT Scans and Air-trapping — 68
5.3.3 CT Evaluation of Airway Changes in COPD — 69
5.3.4 CT Scans for COPD Phenotypes — 70
5.3.5 Lack of Correlation Between CT Findings and Spirometric Results for COPD — 70
5.3.6 CT Scans for Smoking-related Interstitial Lung Diseases — 71
5.3.7 Use of Low Dose CT Scans for Surveillance for Lung Cancer — 72
5.4 Other Advanced Imaging Techniques in COPD — 72
5.4.1 PET Scans — 72
5.4.2 MRI Scans — 73
5.5 Summary Points — 73
References — 74

Michael T. Borchers, PhD, Gregory Motz, PhD

6 Pathogenesis of COPD — 76
6.1 Introduction — 76
6.2 Chronic Bronchitis — 77
6.3 Emphysema — 77
<table>
<thead>
<tr>
<th>Section</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contemplation</td>
<td>113</td>
</tr>
<tr>
<td>Preparation</td>
<td>114</td>
</tr>
<tr>
<td>Action</td>
<td>114</td>
</tr>
<tr>
<td>Maintenance</td>
<td>115</td>
</tr>
<tr>
<td>The 5 A's Model</td>
<td>116</td>
</tr>
<tr>
<td>Step 1: ASK</td>
<td>116</td>
</tr>
<tr>
<td>Step 2: ADVISE</td>
<td>117</td>
</tr>
<tr>
<td>Step 3: ASSESS</td>
<td>117</td>
</tr>
<tr>
<td>Step 4: ASSIST</td>
<td>117</td>
</tr>
<tr>
<td>Step 5: ARRANGE</td>
<td>117</td>
</tr>
<tr>
<td>Motivational Interviewing</td>
<td>121</td>
</tr>
<tr>
<td>Clinical Effectiveness of Motivational Interviewing for Treating Tobacco Use Disorder</td>
<td>123</td>
</tr>
<tr>
<td>Developing Competency in the Use of Motivational Interviewing</td>
<td>123</td>
</tr>
<tr>
<td>Interventions</td>
<td>123</td>
</tr>
<tr>
<td>Nicotine Replacement Therapies and Medications</td>
<td>125</td>
</tr>
<tr>
<td>Other Nicotine Sources</td>
<td>125</td>
</tr>
<tr>
<td>Conclusion</td>
<td>128</td>
</tr>
<tr>
<td>Summary Points</td>
<td>128</td>
</tr>
<tr>
<td>References</td>
<td>129</td>
</tr>
</tbody>
</table>

8 Fostering Patient Self-Management of COPD 131

<table>
<thead>
<tr>
<th>Section</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>131</td>
</tr>
<tr>
<td>Clinician Skills</td>
<td>131</td>
</tr>
<tr>
<td>Stages of Change</td>
<td>133</td>
</tr>
<tr>
<td>Patient Self-Management Skills</td>
<td>134</td>
</tr>
<tr>
<td>Self-Management Tasks</td>
<td>135</td>
</tr>
<tr>
<td>Medication Adherence</td>
<td>136</td>
</tr>
<tr>
<td>Exacerbation Action Plans</td>
<td>139</td>
</tr>
<tr>
<td>Coping with Breathlessness</td>
<td>140</td>
</tr>
<tr>
<td>Exercise</td>
<td>141</td>
</tr>
<tr>
<td>Nutrition</td>
<td>142</td>
</tr>
<tr>
<td>Self-Management Programs</td>
<td>142</td>
</tr>
<tr>
<td>Pulmonary Rehabilitation</td>
<td>143</td>
</tr>
<tr>
<td>Living Well with COPD</td>
<td>144</td>
</tr>
<tr>
<td>Chronic Disease Self-Management Program</td>
<td>145</td>
</tr>
<tr>
<td>Shared Decision-Making</td>
<td>146</td>
</tr>
<tr>
<td>End-of-Life Discussions</td>
<td>149</td>
</tr>
<tr>
<td>Integrated Care Teams</td>
<td>150</td>
</tr>
<tr>
<td>Conclusion</td>
<td>150</td>
</tr>
</tbody>
</table>
9 Natural History, Phenotypes, and Gender Differences in COPD
9.1 Natural History of COPD
9.2 Factors Influencing Lung Function in COPD
9.2.1 Lung Growth and Early Life Events
9.2.2 Cigarette Smoking
9.2.3 Genetic Susceptibility
9.2.4 Advancing Age
9.2.5 Emphysema
9.2.6 Bronchodilator Responsiveness
9.2.7 Early Disease
9.2.8 Biomarkers
9.3 Role of COPD Exacerbations and Progression of Disease
9.3.1 Lung Function Decline
9.3.2 Quality of Life
9.3.3 Mortality
9.3.4 Factors Associated with COPD Exacerbations
9.4 COPD Phenotypes
9.4.1 Different Phenotypes of COPD
9.4.2 Genetic: Alpha 1-antitrypsin Deficiency
9.4.2.1 Therapeutic Implications
9.4.3 Anatomic: Emphysema-Hyperinflation Phenotype
9.4.3.1 Therapeutic Implications
9.4.4 Physiologic: Bronchodilator Responsive/COPD-Asthma Overlap Syndrome
9.4.4.1 Therapeutic Implications
9.4.5 Clinical Frequent Exacerbator
9.4.5.1 Therapeutic Implications
9.4.6 Clinical: Chronic Bronchitis/Mucous Producer
9.4.6.1 Therapeutic Implications
9.5 Gender Differences in COPD
9.5.1 Reasons for Gender Differences in COPD
9.5.1.1 Change in Tobacco Consumption Trend
9.5.1.2 Tobacco Susceptibility
9.5.1.3 Biologic Differences
9.5.2 Epidemiology
9.5.3 Clinical Features and Phenotypic Differences
9.5.4 Comorbidities
9.5.5 Treatment Disparities
13.2.4 Healthcare Utilization — 252
13.2.5 Management — 253
13.2.5.1 Pharmacologic Treatment — 253
13.2.5.2 Pulmonary Rehabilitation — 253
13.3 Anxiety — 254
13.3.1 Prevalence — 255
13.3.2 Manifestations — 256
13.3.3 Management of Anxiety — 256
13.3.3.1 Pharmacotherapy — 256
13.3.3.2 Nonpharmacotherapy — 256
13.4 Panic Attacks — 257
13.4.1 Prevalence — 257
13.4.2 Treatment of Panic Disorder — 258
13.5 Cognitive Impairment — 259
13.5.1 Prevalence — 259
13.5.2 Manifestations — 260
13.5.3 Management — 261
13.6 Social Interactions — 261
13.7 Effect of COPD on Caregivers — 262
13.8 Conclusion — 263
13.9 Summary Points — 263
References — 264

Ralph J. Panos, MD

14 Management of Stable Chronic Obstructive Pulmonary Disease — 275
14.1 Management of Stable COPD — 275
14.1.1 Breathlessness — 276
14.1.2 Cough — 278
14.1.3 Sputum Production — 279
14.2 Guidelines for the Management of COPD — 280
14.2.1 GOLD Guidelines for the Management of COPD — 281
14.3 Pharmacologic Treatment of COPD — 283
14.3.1 Phosphodiesterase Inhibitors — 284
14.3.2 Macrolides — 284
14.3.3 Mucolytics — 286
14.3.4 Supplemental Oxygen — 286
14.4 Nonpharmacologic Treatment of COPD — 286
14.5 Management of COPD-related Nonpulmonary Co-morbidities — 288
14.6 Summary Points — 288
References — 288
Nishant Gupta, MD

17 Inpatient Management of Acute COPD Exacerbations — 335
17.1 Introduction — 335
17.2 Definition and Risk Factors — 336
17.3 Risk Factors for COPD Exacerbations — 336
17.4 Etiology of COPD Exacerbations — 337
17.5 Triage to Home Versus Hospital for Management of Exacerbations — 338
17.6 Hospital Management of COPD Exacerbations — 340
17.6.1 Pharmacologic Therapies for the Management of COPD Exacerbations — 341
17.6.1.1 Supplemental Oxygen — 341
17.6.1.2 β adrenergic Agonists — 341
17.6.1.3 Anticholinergic Agents — 342
17.6.1.4 Glucocorticoids — 342
17.6.1.5 Antibiotics — 343
17.6.1.6 Other Therapies — 344
17.6.2 Mechanical Ventilation for Acute Exacerbations of COPD — 346
17.6.2.1 Noninvasive Positive Pressure Ventilation (NIPPV): — 346
17.6.2.2 Invasive Mechanical Ventilation — 347
17.7 Hospital Discharge and Follow Up — 349
17.8 Conclusion — 350
17.9 Summary Points — 350
References — 351

Sara M. Krzywkowski-Mohn Ed.D, FNP

18 Primary Care and Interaction with Specialty Care for the COPD Patient — 357
18.1 Introduction: A Healthcare System in Crisis and New Models of Care — 357
18.2 The Patient Centered Family Medical Home Model — 358
18.3 How Does the PACT Team Differ from Traditional Roles/Responsibilities? — 359

References — 351
18.4 General Roles of the PACT Team — 361
18.5 Care Management of the COPD Patient PACT Roles and Responsibilities — 361
18.5.1 The Patient — 361
18.5.2 Clerical Associate (CA) — 362
18.5.3 The Clinical Associate — 362
18.5.4 Nurse Case Manager — 363
18.5.5 The Provider — 363
18.6 COPD and PACT — 364
18.7 Summary Points — 366
References — 367

Ralph J. Panos, MD

19 Integrating Supportive, Palliative, and End of Life Care for COPD — 369
19.1 Introduction — 369
19.2 COPD Disease Course and Management — 370
19.3 Patient and Caregiver Burden — 371
19.4 Prognostication of Duration and Quality of Life in COPD — 373
19.5 Advanced Care Planning Discussions Between Providers and Patients with COPD and Their Families — 374
19.6 Timing and Content of Discussions — 376
19.6.1 Early Stage COPD — 376
19.6.2 Later Stage COPD — 377
19.7 Symptom Management — 379
19.7.1 Dyspnea — 379
19.7.2 Anxiety and Depression — 380
19.7.3 Other Symptoms — 380
19.8 Bereavement — 381
19.9 Effectiveness of Palliative Care — 381
19.10 Conclusion — 382
19.11 Summary Points — 382
References — 383

Index — 389