Manual on Tuberculosis, HIV and Lung Diseases:
A Practical Approach

System requirement:
• Windows XP or above
• Power DVD player (Software)
• Windows media player 10.0 version or above (Software)

Accompanying CD ROM is playable only in Computer and not in DVD player.
Kindly wait for few seconds for CD to autorun. If it does not autorun then please do the following:
• Click on my computer
• Click the drive labelled JAYPEE and after opening the drive, kindly double click the file Jaypee
CD Contents

- Handbook of Anti-Tuberculosis Agents
- Guidelines on HIV Testing
Manual on Tuberculosis, HIV and Lung Diseases: A Practical Approach

© 2009, Jaypee Brothers Medical Publishers

All rights reserved. No part of this publication and CD ROM should be reproduced, stored in a retrieval system, or transmitted in any form or by any means: electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the editors and the publisher.

This book has been published in good faith that the material provided by contributors is original. Every effort is made to ensure accuracy of material, but the publisher, printer and editors will not be held responsible for any inadvertent error(s). In case of any dispute, all legal matters are to be settled under Delhi jurisdiction only.

First Edition: 2009
ISBN 978-81-8448-630-8
Typeset at JPBMP typesetting unit
Printed at
To
Our parents
Shri Sardari Lal and Smt Durga Devi
Shri Mohan Lal Handa and Smt Suhag Rani
For their heavenly blessings

Our teachers
For their inspirations
Rajay Arora and Ankur Arora
For their cheerful enthusiasm

Diya and Mukul
For their unconditional support
Contributors

De Muynck Aime
WHO (SEARO)
New Delhi, India

DD Arora
Medical Director
City Polyclinic
C-49, East of Kailash
New Delhi, India

Raksha Arora
Professor
Department of Obstetrics and Gynecology
Maulana Azad Medical College
New Delhi, India

VK Arora
Director and Principal
Santosh Medical College
Ghaziabad
Uttar Pradesh, India

VH Balasangameshwara
Microbiologist
FIND, Geneva

Rani Balasubramanian
Deputy Director Senior Grade
Tuberculosis Research Center (ICMR)
Mayor VR Ramanathan Road
Chetput, Chennai
Tamil Nadu, India

D Behera
Director, LRS Institute of TB and Respiratory Diseases
New Delhi, India

VK Chadha
Senior Epidemiologist
National Tuberculosis Institute
No.8, Bellary Road, Bengaluru
Karnataka, India

Devesh Chauhan
Radiologist, LRS Institute of TB and Respiratory Diseases
New Delhi, India

SK Chhabra
Vallabhbhai Patel Chest Institute
University of Delhi
New Delhi, India

KK Chopra
Deputy Director
New Delhi Tuberculosis Center
Jawaharlal Nehru Marg
New Delhi, India

VK Dhingra
Director
New Delhi TB Center
New Delhi, India

CK Dua
Professor
Department of Anesthesia
Santosh Medical College
Ghaziabad, Uttar Pradesh
India

Geeta Goswami
Microbiologist
Santosh Medical College
Ghaziabad, Uttar Pradesh
India

Harleen Grewal
Professor
Section of Microbiology and Immunology
The Gade Institute
Armour Hansen Building
University of Bergen
N-5021, Norway

KB Gupta
Professor and Head
Department of Chest and TB Medical College
Rohtak, Haryana, India

Vdaya Aditya Gupta
Resident
VP Chest Institute
New Delhi, India

M Hanif
Bacteriologist
New Delhi Tuberculosis Center
Jawaharlal Nehru Marg
New Delhi, India

Anneke C Hesseling
The Gade Institute
Armour Hansen Building
University of Bergen
N-5021, Norway

Geeta Goswami
Microbiologist
Santosh Medical College
Ghaziabad, Uttar Pradesh
India

Harleen Grewal
Professor
Section of Microbiology and Immunology
The Gade Institute
Armour Hansen Building
University of Bergen
N-5021, Norway

KB Gupta
Professor and Head
Department of Chest and TB Medical College
Rohtak, Haryana, India

Vdaya Aditya Gupta
Resident
VP Chest Institute
New Delhi, India

M Hanif
Bacteriologist
New Delhi Tuberculosis Center
Jawaharlal Nehru Marg
New Delhi, India

Anneke C Hesseling
The Gade Institute
Armour Hansen Building
University of Bergen
N-5021, Norway
Manual on Tuberculosis, HIV and Lung Diseases: A Practical Approach

AK Janmeja
Professor and Head
Department of Chest Diseases and Tuberculosis
Government Medical College
Chandigarh, Punjab, India

SK Jindal
Professor
Postgraduate Institute of Medical Sciences
Chandigarh, Punjab, India

Raj Kumar
Senior Lecturer
Department of Respiratory Medicine
Vallabhbhai Patel Chest Institute
University of Delhi
New Delhi, India

Suman Laal
Assistant Professor
NYU School of Medicine
C/o VA Medical Center
423 East, 23rd Street
Room 18123N
New York

Mamatha M Lala
Division of Pediatrics and Perinatal HIV
BJ Wadia Hospital for Children
Parel, Mumbai
Maharashtra, India

HK Makker
Consultant Physician (Respiratory Medicine)
North Middlesex University Hospital
London, UK

Sonia Malik
Microbiologist
National Institute of Communicable Diseases
New Delhi, India

Yatin Mehta
Director
Department of Anesthesiology and Critical Care
Escorts Heart Institute and Research Center, Okhla Road
New Delhi, India

Anshu Mittal
Epidemiologist
New Delhi TB Center
New Delhi, India

M Muniyandi
Tuberculosis Research Center
Chennai, Tamil Nadu, India

Nair Nani
Medical Officer
WHO (SEARO)
New Delhi, India

CN Paramasivan
FIND
Geneva

Rajendra Prasad
Professor and Head
Department of TB and Chest Diseases, KG Medical University, Lucknow
Uttar Pradesh, India

M Pushparaj
Resident
All India Institute of Medical Sciences (AIIMS)
New Delhi, India

S Rajpal
Medical Officer
New Delhi TB Center
New Delhi, India

Rajeswari Ramachandran
Deputy Director Senior Grade
Tuberculosis Research Center (ICMR)
Mayor VR Ramanathan Road
Chetput, Chennai
Tamil Nadu, India

Jaideep S Rana
The Union
New Delhi, India

BB Rewari
Consultant, National AIDS Control Organization
New Delhi, India

N Selvakumar
Deputy Director
Tuberculosis Research Center
Chennai, Tamil Nadu, India

Ashok Shah
Department of Respiratory Medicine, VP Chest Institute
University of Delhi
PO Box 2101, New Delhi, India

JB Sharma
Professor
Department of Gynecology
AIIMS, New Delhi, India

Sangeeta Sharma
Pediatrician, LRS Institute of TB and RD, New Delhi, India

Krishna K Singh
NYU School of Medicine
New York

Heidi Syre
The Gade Institute
Armuer Hansen Building
University of Bergen
N-5021, Norway

Alok Vashishtha
National AIDS Control Organization
New Delhi, India

VK Vijayan
Director
VP Chest Institute, University of Delhi
New Delhi, India

N Wilson
Director, India Resource Center
The Union, New Delhi, India

Susan Zolla-Pazner
NYU School of Medicine
New York
The book *Manual on Tuberculosis, HIV and Lung Diseases: A Practical Approach* is fourth one in the series of practical management manuscripts dealing with the management of TB, HIV and Lung Diseases. It includes discussions about the critical issues involved in various manifestations of the diseases frequently encountered by practicing physicians and pulmonologists. The unique feature of the book is the presentation of different aspects of the diseases as experienced by the eminent practitioners in the field of Respiratory Medicine and Tuberculosis and their hands-on experience in dealing with the conditions to achieve the successful outcome. The chapters have been written in the background of their rich academic knowledge gained from day-to-day dealing with the patients.

The editors have included chapters related to the latest aspects of tuberculosis, HIV and lung diseases. Chapters on Chronic Obstructive Pulmonary Diseases (COPD), Bronchial Asthma and Constraints of their Management have also been included. Special efforts have been made to include Smoking Cessation which causes COPD and Lung Cancer.

The chapters in this book are arranged in a scientific sequence in a flow to aid easy understanding. The topics included provide relevant theoretical basis, practical management strategies as well as new advancement in the particular subject. This multi-authored book has been conceived with compilation of case oriented practical approach chapters, concisely blended with updated information to cater to the needs of the present day demand in medical curricula. The book is also equipped with the latest advances in diagnosis and management of tuberculosis in the form of annexures at the end of the book. The annexures include guidelines for various activities under Tuberculosis Control Programme of Government and also National AIDS Control Organization.

Prof VK Arora, a dynamic person with a clear vision, is a source of inspiration for young and brooding doctors in the field of tuberculosis and respiratory medicine. He is presently working as Vice-Chancellor of Santosh University and Director and Principal, Santosh Medical College and Hospital (Maharaji Education Trust), Ghaziabad. He is Vice-Chairman of the Tuberculosis Association of India. He was earlier Director, LRS Institute of Tuberculosis and Respiratory Diseases and was also holding prestigious position as Additional Director General of Health Services in the Ministry of Health and Family Welfare in Government of India. He is a well-known academician and has to his credit a number of national and international awards and citations. In his endeavor to guide and inspire the practitioners of Respiratory Medicine and Tuberculosis, he has devoted his valuable time to the preparation of this textbook with a practical approach. I congratulate him on his efforts to bring out this case-based practical approach manual for the benefit of medical fraternity.
I do hope that the strategic guidelines as recommended by the National and International experts, included as annexures, will prove useful for exploring new areas of research and planning for prevention, control and treatment of Tuberculosis, HIV and Lung Diseases. The book deserves a place in the library of every medical college and health care providing institutes. It will also be a precious resource material for doctors in training.

SP Agarwal
Secretary General
Indian Red Cross Society
President, TAI
Formerly, Director General of Health Sciences
(Government of India)
Preface

Tuberculosis, HIV infection and lung diseases are three burning health problems encountered among people. Though much effort is being made by Government and private health sector to tackle these problems, yet a lot needs to be done in terms of their early detection, prompt and effective treatment and overall awareness about these diseases among masses and updating the knowledge about these diseases in the health care professionals. An updated Manual on Tuberculosis, HIV and Lung Diseases: A Practical Approach is being published with this objective in mind. Written with elucidation and comprehension with latest references, it shall prove useful not only for pulmonologists and general physicians but also for program managers and postgraduate students.

I have included chapters related to the latest aspects of tuberculosis, newer drugs, TB vaccination and recent advances, i.e. on genome of tuberculosis and stem cell therapy in pulmonary diseases. Similarly, chapters related to HIV and lung diseases have been included with special reference to latest developments in recent time.

The chapters in the book have been arranged in a scientific sequence in a flow to aid easy understanding and updating the existing knowledge of readers. The case studies and reports illustrating management protocols are given to aid in understanding the applicability of knowledge imparted. Each chapter mentions the existing knowledge, its limitations, recent advances and future needs of the topics covered with latest references and case histories. Various standard guidelines and management protocols have been added in the Annexures to serve as a ready reference.

I hope this book will enlighten and educate the medical fraternity to lead a crusade against these dreaded diseases.

VK Arora
Acknowledgements

A book of this magnitude would not have been possible but for the cooperation and hard work rendered by our contributors in preparing the chapters. My sincere thanks to all the experienced authors for their contribution in bringing out this book.

I am thankful to Dr KK Chopra, Deputy Director, New Delhi TB Center for helping me compiling and editing this book. He has spared a lot of time from his busy schedule.

My special thanks to Dr DD Arora, Dr Atam Prakash, Dr Naresh Kumar Handa, Dr Rohit Sarin and Dr Pooja for their insight and guidance. They are especially close to my heart for years as relatives. I am really indebted to them for continuously giving their encouragement and support.

My thanks are due to my family members who have stood by me during the course of compiling this book.

I am grateful to M/s Jaypee Brothers Medical Publishers (P) Ltd, New Delhi for bringing out this book in such a good shape.
Contents

1. Evidence-based Medicine (EBM) 1
   DD Arora, VK Arora

2. Epidemiological Situation of Tuberculosis and its Trends in India 52
   VK Chadha

3. Global Progress towards TB Control Targets 67
   De Muynck Aime, Nair Nani

4. How to Measure Impact of TB Control? 84
   KK Chopra, VK Arora

5. Annual Risk of Tuberculous Infection as an Epidemiological Indicator in the Present Scenario 92
   VK Chadha

6. Multidrug Resistant Tuberculosis: A Clinical Case Based Approach 103
   Rajendra Prasad

7. Geriatric Tuberculosis in South-East Asia Region 122
   VK Arora, KK Chopra

8. Paradoxical Response to Chemotherapy in Tuberculosis 137
   AK Janmeja

9. Challenges of Management of XDR-TB 143
   KK Chopra, VK Arora

10. Genomics of Tubercle Bacilli and its Clinical Relevance 151
    Geeta Goswami, VK Arora

11. Cross-resistance among Anti-TB Drugs 179
    VK Dhingra, VK Arora

12. Tuberculosis in General Gynecological Practice: A Practical Approach 184
    JB Sharma, Sangeeta Sharma, Pushparaj M

13. Miliary Tuberculosis 197
    VK Vijayan

14. Female Pelvic Tuberculosis: A Diagnostic and Management Challenge 207
    Raksha Arora, VK Arora
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Female Genital Tuberculosis</td>
<td>211</td>
</tr>
<tr>
<td></td>
<td>KK Chopra, Raksha Arora</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Issues in Development of New Vaccines Against Tuberculosis</td>
<td>218</td>
</tr>
<tr>
<td></td>
<td>KK Chopra, VK Arora</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>New TB Drugs Development</td>
<td>223</td>
</tr>
<tr>
<td></td>
<td>KK Chopra, VK Arora</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Advocacy, Communication and Social Mobilization—Tools and Benefits</td>
<td>232</td>
</tr>
<tr>
<td></td>
<td>Anshu Mital, VK Arora</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Advances in Sputum Smear Microscopy</td>
<td>242</td>
</tr>
<tr>
<td></td>
<td>M Hanif, VK Arora</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Advances in the Laboratory Diagnosis of Tuberculosis</td>
<td>251</td>
</tr>
<tr>
<td></td>
<td>Heidi Syre, Anneke C Hesseling, Harleen MS Grewal</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Conventional and Automated Detection of Acid Fast Bacilli</td>
<td>265</td>
</tr>
<tr>
<td></td>
<td>Heidi Syre, Harleen MS Grewal</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Expanding Liquid Culture System for Tuberculosis</td>
<td>274</td>
</tr>
<tr>
<td></td>
<td>CN Paramasivan, Balasangameshwara</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Drug Susceptibility Testing for Second-line anti-TB Drugs in LJ Medium</td>
<td>282</td>
</tr>
<tr>
<td></td>
<td>N Selvakumar</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Biosafety in Mycobacteriology</td>
<td>285</td>
</tr>
<tr>
<td></td>
<td>Sonia Malik, VK Arora</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>HIV/TB Coinfection</td>
<td>295</td>
</tr>
<tr>
<td></td>
<td>Krishna K Singh, Susan Zolla-Pazner, Suman Laal</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>HIV Related Lung Diseases in Children</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td>Mamatha M Lala</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Universal Work Precautions and Post-exposure Prophylaxis (PEP) for HIV following Needle Stick Injury</td>
<td>336</td>
</tr>
<tr>
<td></td>
<td>BB Rewari, Alok Vashishtha</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Radiology of TB, HIV and Lung Health</td>
<td>349</td>
</tr>
<tr>
<td></td>
<td>Divesh Chauhan, VK Arora</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Magnitude of the Problem of Smoking in South-East Asia</td>
<td>379</td>
</tr>
<tr>
<td></td>
<td>Raj Kumar, Nitin Goel</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Smoking and Tuberculosis</td>
<td>389</td>
</tr>
<tr>
<td></td>
<td>Ashok Shah, Uday Aditya Gupta</td>
<td></td>
</tr>
</tbody>
</table>
31. Tobacco Cessation: A Clinical Topic
   *Jaideep S Rana, N Wilson*
   399

32. Pharmacology of Smoking Cessation
   *Anshu Mittal, VK Arora*
   407

33. Recent Advances in COPD—Indian Perspective
   *SK Jindal*
   421

34. Constraints of Management of COPD in Resource Limited Countries
   *S Rajpal, VK Arora*
   434

35. Critical Respiratory Care in Avian Influenza Patients in Resource Limited Countries
   *CK Dua, VK Arora*
   445

36. Critical Care in Respiratory Failure
   *Yatin Mehta, Mayank Vats*
   462

37. COPD—Definition and Management
   *SK Chhabra*
   483

38. Constraints of Management of Bronchial Asthma in Resource Limited Countries
   *Sanjay Rajpal, VK Arora*
   499

39. Epidemiology of Obstructive Sleep Apnea
   *HK Makker*
   516

40. Lung Cancer
   *D Behera*
   534

41. Stem Cell Therapy in Pulmonary Medicine
   *KB Gupta*
   569

42. Investigation of Tuberculosis Outbreaks including MDR
   *Rani Balasubramanian, Rajeswari Ramachandran, M Muniyandi*
   577

**Annexures**
1. DOTS-Plus Guidelines
3. Operational Guidelines for ART Centers
4. Environmental and Biomedical Waste Management Plan for RNTCP-II
5. Revised Schemes for NGOs and Private Providers

**Index**