

Mustafa Arici  
*Editor*

# Management of Chronic Kidney Disease

A Clinician's Guide

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## Preface

To study the phenomenon of dreams without books is to sail an enchanted sea while  
to study books without patients is to let us go to sea at all

William Osler

*To my admirable wife Esra, and my lovely daughters Ayse and Zeynep, for their love, support, time and patience, but above all, for them being “all my reasons” for life*

*To my parents and brothers, for their continuous love, encouragement and wisdom*

Chronic kidney disease is now a significant public health problem worldwide. CKD probably affects almost 10 % of general population. Incidence and prevalence of CKD figures are still rising especially in developing countries. The rise in CKD figures are fuelled by aging of the population and growing problems of obesity, diabetes, high blood pressure and cardiovascular diseases. Today, the number of CKD patients from stage 1 to 3 on dialysis exceeds the number of patients with end-stage renal disease (ESRD) by a factor of 50:10. Practising nephrologists come across much more CKD patients than dialysis or renal transplantation cases. CKD management is, therefore, a major item in the agenda of nephrology practice, and its pressure will increase more in the following years. Physicians in the other disciplines will also see more CKD patients in their daily practice due to increasing prevalence of CKD. This book covers adult CKD patients, starting from “at risk” for CKD to CKD stage 5 not on renal replacement therapies. The book’s major target audience is nephrologists and residents/fellows and attending physicians in nephrology. The book, however, may also serve as a multidisciplinary resource for many doctors, including family physicians, internists, endocrinologists, cardiologists, and geriatricists, who frequently encounter many CKD patients at earlier stages.

The book is intended to cover the whole journey of a CKD patient as:

- Defining and diagnosing CKD
- Assessing and controlling risk factors of CKD
- Stopping/slowing progression in CKD
- Assessing and managing complications of CKD
- Caring for CKD patients under special conditions
- Caring for CKD patients just before initiating renal replacement therapies

## Preface

To study the phenomena of disease without books is to sail an uncharted sea, while to study books without patients is not to go to sea at all.

William Osler

I am very pleased to offer the first edition of *Management of Chronic Kidney Disease: A Clinician's Guide*. Actually, there are many textbooks devoted to general nephrology or books that are particularly focused on dialysis or renal transplantation. However, there is a real deficiency of books devoted particularly to the care of chronic kidney disease (CKD) patients. This book attempts to fulfill this gap by providing a comprehensive, guideline-based, practice-oriented management plan for physicians who continuously take care of adult CKD patients.

Chronic kidney disease is now a significant public health problem worldwide. CKD globally affects almost 10 % of general population. Incidence and prevalence of CKD figures are still rising especially in developing countries. The rise in CKD figures are fuelled by aging of the populations and growing problems of obesity, diabetes, high blood pressure and cardiovascular diseases. Today, the number of CKD patients from stage 1 to 5 not on dialysis exceeds the number of patients with end-stage renal disease (ESRD) by a factor of 50–100. Practicing nephrologists come across much more CKD patients than dialysis or renal transplantation cases. CKD management is, therefore, a major item in the agenda of nephrology practice, and its pressure will increase more in the following years. Physicians in the other disciplines will also see more CKD patients in their daily practice due to increasing prevalence of CKD. This book covers adult CKD patients, starting from “at risk” for CKD to CKD stage 5 not on renal replacement therapies. The book's major target audience is nephrologists and residents/fellows and attending physicians in nephrology. The book, however, may also serve as a multidisciplinary resource for many doctors, including family physicians, internists, endocrinologists, cardiologists, and geriatrists, who frequently encounter many CKD patients at earlier stages.

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In the book, diagnostic and therapeutic approaches were presented according to latest staging system of CKD, from earlier to late stages. The book have some novel chapters such as “Quality of Life in CKD”, “Pain Management in CKD”, “CKD in Intensive Care Unit”, “CKD and Cancer”, “CKD Management Programs and Patient Education” and “Conservative/Palliative Treatment and End-of-Life Care in CKD”. These chapters aim to complement some neglected but substantial steps in CKD care. In this book, many special chapters were written by non-nephrologists but specialists of that particular field like radiologists, cardiologists, neurologists, surgeons, obstetricians, dermatologists, psychiatrists, etc. As CKD care needs a multidisciplinary action, this book intends to increase communication between different disciplines while looking after the same CKD patient.

All chapters start and end with boxes titled as “Before You Start: Facts You Need to Know” and “Before You Finish: Practice Pearls for the Clinician”. Most chapters have also “What the Guidelines Say You Should Do?” and “Relevant Guidelines” boxes for easy access to guidelines and guideline recommendations. These boxes will suffice to distill “practical practice pearls” from the bulky volumes of guidelines and other sources of information with a “5-min attention” of busy clinicians. Each chapter has a very selective list of references restricted to 15–20 in maximum. I encourage all who use this book to send their suggestions and comments both for the content and the design of the book.

The book is intended for a global coverage of CKD problem. The contributing authors are world-known experts in their fields and act as executive members of many national and international associations in nephrology. Most authors have participated in writing guidelines on CKD.

This book will not be possible were it not for so many people. Firstly, I have been fortunate that many distinguished authors, colleagues and friends have kindly accepted to contribute to this book. I would like to take this opportunity to thank them all very warmly. They have generously spent their most valuable hours to produce high-quality and up-to-date chapters. They were very considerate and rigorous during the review processes. Secondly, I would like to express my sincere gratitude to Portia Levasseur, the Developmental Editor for the book. Without her excellent support and enthusiasm, it will be impossible to hold this book in your hands. Last but not least, I thank all the staff of Springer, but particularly Sandra Lesny who gave me the opportunity to edit this book.

I also would like to acknowledge my mentors, colleagues, my residents/fellows and my students in Hacettepe University. I have learned many things from them and they helped me to be who I am. My major inspiration in nephrology practice is seeing the joy in the faces of patients when their CKD progression were slowed down or halted completely. It is a privilege for me to care for them and they have been the powerful source of my motivation, dynamism and knowledge.

Increasing the awareness of CKD, mounting the chances for early recognition and definition of CKD and managing better for preventing or delaying/halting progression of CKD and its complications were major aims of this book. If the readers will apply at least some of those to their clinical practice, the editor and the authors will feel rewarded for their efforts.

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# Chronic Kidney Disease: Basics and Clinical Assessment

## Before You Start: What You Need to Know

- Chronic kidney disease (CKD) is defined as having abnormalities of kidney structure or function for at least 3 months with implications for the health of the individual.
- CKD is classified based on cause (C), GFR category (R), GFR zone, and albuminuria (A) (C/A to A/R).
- CKD is common (1 in 10 million) and affects persons worldwide. Although not a single and well-defined public health problem worldwide.

CKD is easily distinguished from acute renal and the estimated GFR (eGFR) calculated using serum creatinine.

There is a strong graded and consistent relationship between the severity of the two biomarkers of CKD: reduced eGFR and increased albuminuria.

CKD is more common in the elderly, blacks, and individuals of African or Latino ancestry. Detection of CKD is best performed by using serum creatinine and eGFR, as well as urine albumin and albuminuria.

## 1.1 Introduction

Diseases of the kidney have afflicted humans from time immemorial. Medical interest in the detection and treatment of kidney disease can be traced to antiquity, but all past efforts have been

fragmentary and almost entirely focused on its symptomatic manifestations as a change in urine color (hematuria) and flow (obstruction) or pain due to stones or obstruction. It is only in the past decade that the actual burden of kidney disease has been documented and identified as a global public health problem [1, 2].

The traditional lineage of detecting and defining kidney disease is traced to Richard Bright (1789–1858), who in 1827 described the autopsy findings of the kidneys in 24 albuminuric, dropical patients who had died of kidney failure. Bright considered his disease an inflammatory lesion (nephritis) that was rather rare as reflected in his statement that “inflammation of one or both kidneys, as a primary idiopathic disease, is

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# What Is Chronic Kidney Disease?

1

Rajeev Raghavan and Garabed Eknoyan

## Before You Start: Facts You Need to Know

- Chronic kidney disease (CKD) is defined as having abnormalities of kidney structure or function for at least 3 months with implications for the health of the individual.
- CKD is classified based on cause (C), GFR category (G; G1 to G5), and albuminuria (A; A1 to A3).
- CKD is common (1 in 10 adults, 500 million persons worldwide), harmful, treatable, and a major public health problem worldwide.
- CKD is easily diagnosed from urinalysis and the estimated GFR (eGFR) calculated from serum creatinine.
- There is a strong graded and consistent relationship between the severity of the two hallmarks of CKD: reduced eGFR and increased albuminuria.
- CKD is more common in the elderly, males, and individuals of African or Latino descent.
- Detection of CKD is best accomplished with serial measurements of blood pressure, serum creatinine, and urinalysis in select populations at a higher risk of disease.

## 1.1 Introduction

Diseases of the kidney have afflicted humans from time immemorial. Medical interest in the detection and treatment of kidney disease can be traced to antiquity, but all past efforts have been

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