Management Strategies for Patients with Diabetic Kidney Disease and Chronic Kidney Disease in Diabetes

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KEYWORDS

• Diabetes mellitus • Diabetic kidney disease (DKD) • Chronic kidney disease (CKD)
• Microvascular complications of diabetes

KEY POINTS

- Chronic kidney disease (CKD) is a common microvascular complication of diabetes mellitus.
- Diabetic kidney disease (DKD) is defined as CKD caused by diabetes mellitus, which is the leading cause of kidney failure in the United States.
- Albuminuria and estimated glomerular filtration rate are biomarkers used to monitor development and progression of DKD.
- Management strategies for DKD and CKD are complex and multifaceted, including lifestyle management and pharmacologic management.
- The number of pharmacologic agents available for use in DKD has grown tremendously, and further research continues to evaluate potential new biomarkers for monitoring DKD and potential new therapies that may slow progression of DKD.

INTRODUCTION

Diabetes mellitus (to be referred to as diabetes in text, DM in tables) is a chronic condition that leads to high medical costs, increased risks for developing life-altering and life-threatening complications, and contributes to significant morbidity and mortality in patients afflicted with this disease. In 2007, incidence rates for diabetes were 7.8 cases per 1000 people and projections were showing an expected increase in prevalence of 33% by 2050.[1] In 2012, total costs in the United States due to diabetes were in excess of $245 billion with the expectation that costs will continue to rise.[2] Patients with diabetes are at risk for developing an array of microvascular and macrovascular

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complications. Kidney disease is one of the most common microvascular complications of diabetes and has a significant impact on a patient's health care and potentially his or her quality of life. Diabetes is and has been the leading cause of kidney failure in the United States leading many individuals to come to rely on dialysis or the need for a kidney transplant.[3]

Between 2008 and 2012, the incidence of diabetic patients beginning treatment for end-stage renal disease (ESRD) rose by approximately 1000 patients.[2,3] More concerning, however, is that the prevalence of those already in treatment for ESRD increased by nearly 30,000 individuals over the course of 4 years (**Table 1**).[2,3] That is a nearly 14% increase in the prevalence of ESRD, which is a debilitating and life-threatening condition for those affected. It is for this reason that close attention must be paid to this important and life-altering complication of diabetes.

DEFINITION AND RISK FACTORS

Diabetic kidney disease (DKD), defined as chronic kidney disease (CKD) due to diabetes, occurs in approximately 20% to 40% of diabetic patients.[4] Not only does this make it a common complication, but it is also important to reiterate that diabetes mellitus remains the leading cause of ESRD in the United States.[4,5] Apart from having diabetes, there are multiple other risk factors that may help to predict who may develop DKD and to what severity (**Table 2**). Some of these include intrinsic factors, which are risk factors that cannot be altered. For example, differences in rates of DKD are seen across ethnic lines: African American, Hispanic, and Native American individuals continue to have higher incidences rates of development of ESRD.[4] Because these factors are not changeable, management targets those factors that are modifiable, such as glycemic control, blood pressure (BP), and lipid management. Both estimated glomerular filtration rate (eGFR) and albuminuria are the most useful biomarkers currently available for monitoring for progression of kidney disease. Glycemic control, BP, and dyslipidemia management all play a role in preventing the advancement of kidney disease when properly addressed.[6]

PATHOPHYSIOLOGY OF DIABETIC KIDNEY DISEASE

The pathophysiology of DKD is exceedingly complex. In brief, all anatomic components of the kidney are involved in the development and progression of DKD. The

Table 1
Incidence and prevalence of ESRD in DM patients from 2008 to 2012

	No. of Patients with DM Beginning Treatment for ESRD	No. of Patients with DM Living on Dialysis or with Kidney Transplant
2008	48,000	202,000
2012	49,000	229,000

Abbreviations: DM, diabetes mellitus; ESRD, end-stage renal disease.

Data from Centers for Disease Control and Prevention. National diabetes statistics report: estimates of diabetes and its burden in the United States, 2014. Atlanta (GA): US Department of Health and Human Services; 2014. p. 1-12; and Centers for Disease Control and Prevention. National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States, 2011. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention; 2011. p. 1-12.