

Short Communication

Improving Morbidity and Mortality Associated with Chronic Kidney Disease

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Abstract

The rising prevalence of chronic kidney disease raises questions on the approaches that can be taken to decrease morbidity, mortality and cost. Some measures that have been discussed suggest adequate control of Chronic Kidney Disease (CKD) risk factors, such as diabetes and hypertension. Potential avenues of mortality and cost reduction such as early screening, a multidisciplinary model of care and primary care involvement are discussed here.

Introduction

CKD is defined as decreased kidney function or the presence of kidney damage for three or more months with parameters such as eGFR < 60 mL/min/1.73 m² or urinary albumin excretion of ≥ 30 mg/day [1]. In the United States, the prevalence of CKD from 2013-2016 was 14.8 percent (CI=13.6-16.1, with 6.9 percent (CI=6.2-7.6) with stage 3-5 CKD [2]. Medicare spending in 2016 for all patients with CKD was greater than \$79 billion. An additional \$35 billion was spent on patients with End Stage Renal Disease (ESRD), representing 23% of Medicare's fee for service spending [3]. With the rising prevalence and cost of healthcare for patients with CKD and the subsequent progression to ESRD, it is important to identify factors that would lead to earlier detection, better treatment and identification and control of risk factors.

Morbidity and Mortality of CKD

The United States Renal Data System (USRDS) reported that in 2016, Medicare patients with CKD had a mortality rate of 122.6 per 1,000 patient years compared to 43.1 for patients without CKD. In addition, rates of all cause hospitalization for CKD increased with disease severity [4]. In an article published by the International Society of Nephrology, a GFR < 60 ml/min/1.73 m² was found to be associated with a greater risk of complications such as drug toxicity, metabolic and endocrine dysfunction, CVD and death compared to patients with a history of CKD but conserved GFR [5]. There was a relatively constant risk of all outcomes for patients with an eGFR 75-105 ml/min/1.73 m² with an increased relative risk for eGFR of < 60 ml/min/1.73 m². This suggests that early detection of renal dysfunction to prevent or slow progression of renal dysfunction can improve morbidity and mortality. They state that due to the high prevalence and cost associated with CKD and its complications, certain countries have developed public health programs aimed towards early detection and treatment. However, follow up studies have yet to determine the efficacy of these measures.

Assessing for microalbuminuria (albumin excretion that exceeds normal physiologic excretion but is below the level of detection for total protein) using albumin-specific dipsticks has been recommended by the National Kidney Foundation for Diabetic patients with increased risk of CKD [6]. If positive, an albumin-creatinine ratio should be

obtained to confirm proteinuria within 3 months. A value greater than or equal to 30 mg/g warrants further evaluation. A study showed that screening patients with hypertension, diabetes mellitus and age greater than 55 yielded a low number needed to screen of 8.7 (95% CI=8.5-9.0) [7]. In subsequent follow up, the risk of end stage renal disease was low, which could suggest decreased morbidity secondary to early detection and increased efforts to slow progression of disease.

Controlling risk factors for CKD is another avenue to consider. Diabetes and hypertension were both shown as independent risk factors that reduce kidney function and in patients with both risk factors, eGFR was significantly reduced by 25.6% [8]. Diabetic kidney disease was also found to be independently associated with high atherogenic load and increased systolic blood pressure in patients with type 1 diabetes [9], which not only worsen kidney function but also contribute to the develop of cardiovascular disease. Interestingly, diabetes seems to impact cardiovascular mortality more than CKD mortality. The PREVENT study was a cross sectional cohort study that showed that patients who screened positive for microalbuminuria had the highest incidence of cardiovascular death over a 3 year follow up period [10]. Therefore, controlling cardiovascular risk factors in CKD will improve mortality.

Approach and Recommendations for Care

The overall recommendation for early screening of CKD are in high risk patients, such as those with hypertension and diabetes mellitus. Screening with albumin specific dipstick to assess for microalbuminuria has been shown to be the best screening tool with follow up confirmatory albumin to creatinine ratio. In patients with positive screening tests, management of vascular risk factors and comorbidities should adhere to a primary care model [11]. The American Society of Nephrology suggests an optimal time of consultation for specialists is at stages 3-4 [12]. Otherwise, lifestyle modifications and pharmacologic interventions for risk factor control can be managed by primary caregivers. These interventions include smoking cessation, dietary salt restriction of less than 2 g daily, protein restriction to 0.8g/kg of ideal body weight, weight loss to BMI between 20-25 and physical activity of 30 minutes daily for cardiovascular health [13]. In patients with an albumin to creatinine ratio greater than or equal to 30mg/g, blood pressure should be less than 130/80 and started on an ACE inhibitor or ARB [13]. HbA1c

should also be maintained at below 7% [3,13] It is important for physicians, especially those in primary care, to understand the basic principles and steps in screening, managing risk factors and referring to specialists at an appropriate time. These skills should be emphasized at the medical student level so that they may be prepared to recognize and treat kidney disease appropriately when they begin their training as interns due to the growing prevalence, morbidity, mortality and healthcare cost associated with CKD.

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