



# Advances in primary care approaches to chronic kidney disease; early identification, risk stratification, and cutting-edge therapies—a world kidney day overview

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## ABSTRACT

Chronic kidney disease (CKD) affects millions globally and is associated with high morbidity and mortality, including cardiovascular complications and progression to end-stage kidney disease (ESKD). Primary care practitioners play a critical role in early identification, risk stratification, and management of CKD due to the often asymptomatic nature of early-stage disease and the high prevalence of comorbidities such as diabetes and hypertension. World kidney day (WKD) serves as a vital platform to raise kidney health awareness, highlight the importance of early detection, and display advances in CKD management. Recent innovations in primary care, including refined risk stratification and emerging therapies such as SGLT2 inhibitors, GLP1 receptor agonists, and new drug classes, are transforming CKD treatment paradigms.

**Keywords:** World kidney day, Chronic kidney disease, End-stage kidney disease, SGLT2 inhibitors, Glomerular filtration rate, Statins, Heart failure, Hypertension, Albuminuria

### Implication for health policy/practice/research/medical education:

World kidney day (WKD) serves as a vital platform to raise kidney health awareness, highlight the importance of early detection, and showcase advances in chronic kidney disease (CKD) management. CKD is a growing global health burden, affecting approximately 10% of the world's population. As a progressive condition often asymptomatic in its early stages, CKD poses significant challenges for early diagnosis and timely intervention. Primary care providers are at the forefront of CKD management, playing a critical role in early detection, risk stratification, and the implementation of evidence-based interventions to slow disease progression and reduce cardiovascular morbidity and mortality. Recent advances in screening tools, biomarkers, risk prediction models, and therapeutic strategies have significantly enhanced the ability of primary care to manage CKD effectively. Fortunately, recent innovations in primary care, including refined risk stratification and emerging therapies such as SGLT2 inhibitors, GLP1 receptor agonists, and new drug classes, are transforming CKD treatment paradigms..

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## Introduction

Chronic kidney disease (CKD) is defined as abnormalities in kidney structure or function, present for more than three months, with implications for health (1). It is characterized by a glomerular filtration rate (GFR) below 60 mL/min/1.73 m<sup>2</sup> or markers of kidney damage such as albuminuria, irrespective of GFR (2). This disease is associated with a high risk of end-stage kidney disease (ESKD), cardiovascular events, hospitalization, and premature death (3). The global prevalence of CKD is estimated at over 700 million people, with a disproportionate burden in low- and middle-income countries and among vulnerable populations (4). Primary care is the first point of contact for most patients and is uniquely positioned to identify CKD early, monitor progression, manage comorbidities, and coordinate care (5). However, CKD remains underdiagnosed and undertreated in primary care settings due to its asymptomatic nature in early stages, lack of standardized screening protocols, and limited awareness among both patients and providers (6). Recent advances in diagnostics, risk prediction, and therapeutics have begun to address these challenges, offering new opportunities for proactive and personalized CKD management (7,8). Here, we sought to discuss of the advances in primary care approaches to CKD; early identification, risk stratification, and cutting-edge therapies, on the occasion of world kidney day (WKD).

## Search strategy

To identify relevant literature for this narrative review, a comprehensive search was conducted across multiple electronic databases, including PubMed, Scopus, Embase, Web of Science, EBSCO, DOAJ, and Google Scholar. The search strategy incorporated a combination of keywords and related terms, including ‘world kidney day’, ‘chronic kidney disease’, ‘end-stage kidney disease’, ‘SGLT2 inhibitors’, ‘glomerular filtration rate’, ‘statins’, ‘heart failure’, ‘hypertension’, and ‘albuminuria’.

## WKD; raising awareness and advancing CKD care

The WKD is a global health campaign observed annually to raise awareness about the importance of kidney health and the growing burden of CKD worldwide (9). Chronic kidney disease affects approximately 850 million people globally and is projected to become the fifth leading cause of death by 2040 if left inadequately addressed (10). The initiative promotes early detection, equitable access to care, and advances in clinical management to prevent the progression of kidney disease and improve patient outcomes (11). The WKD theme; are your kidneys ok? – detect early, protect kidney health, aims to accentuates the critical need for proactive kidney health screening and personalized treatment strategies (12). This focus aligns with recent advances in primary care aimed at early CKD identification, risk stratification, and the integration of

novel therapeutic options (12).

## Early detection of CKD

The cornerstone of early CKD detection lies in identifying individuals at increased risk (13). Uncontrolled blood pressure is a leading cause of CKD (14). Regular blood pressure monitoring and management are essential. Diabetes is also another major contributor to CKD (15). Patients with diabetes, especially those with poor glycemic control, require vigilant monitoring of kidney function (16). Moreover, a genetic predisposition can increase an individual's risk. Given that, kidney function naturally declines with age, making older adults more susceptible (17). Additionally, obesity is often linked to hypertension and diabetes, both of which affect kidney health (18). Patients with existing heart conditions are at higher risk for CKD (19). Meanwhile, previous episodes of acute kidney injury can predispose individuals to chronic kidney damage (19). On the other hand, long-term use of some medications, like nonsteroidal anti-inflammatory drugs can negatively affect kidney function (20).

## Importance of early detection and risk stratification in primary care

Chronic kidney disease often remains asymptomatic until advanced stages, which leads to delayed diagnosis and worsened clinical outcomes (21). Primary care is pivotal for early CKD screening, especially given that most asymptomatic patients present first in these settings (21). Routine screening for kidney function involves simple blood and urine tests that measure estimated GFR and albuminuria, essential markers of kidney health (22). Risk stratification tools help classify individuals according to their likelihood of CKD progression and cardiovascular complications (23). This stratification enables tailored care, guiding the intensity of monitoring, lifestyle interventions, and pharmacological treatment (4,23). Factors included in risk assessment models are age, presence of diabetes or hypertension, proteinuria levels, and baseline kidney function (24). Empowering primary care clinicians through guideline dissemination, advanced diagnostic tools, and education is crucial (6). Increasing awareness of at-risk populations, such as those with diabetes, hypertension, and family history of kidney disease, facilitates timely intervention, thereby reducing the incidence of ESKD (4,25).

## Cardiovascular risk management

Given the significantly elevated risk of cardiovascular disease and related complications in patients with CKD, the use of statin therapy to lower cholesterol levels and reduce the incidence of atherosclerotic cardiovascular events has become a well-established and standard component of medical management in this population (26). Statins have proven benefits in decreasing the progression of plaque buildup in the arteries, thereby

mitigating the risk of heart attacks, strokes, and other serious cardiovascular outcomes that are prevalent among individuals with impaired kidney function (27,28). In addition to addressing atherosclerosis, the management of heart failure and fluid overload is increasingly recognized as a crucial aspect of comprehensive care for patients with CKD (29). Heart failure is common in CKD due to factors such as hypertension, volume retention, and myocardial damage linked to both kidney dysfunction and systemic illness (30,31). Therapeutic strategies that incorporate beta-blockers help reduce heart rate and myocardial oxygen demand, improving cardiac function and patient outcomes (32). The advent of neprilysin inhibitors, often used in combination with angiotensin receptor blockers, has introduced an effective means to enhance natriuretic peptide activity, thereby promoting vasodilation and reducing cardiac remodeling in heart failure (33). Diuretics play an essential role in managing fluid retention, helping to control blood pressure and prevent volume overload, which can exacerbate both cardiac and kidney impairments (34,35). Overall, integrating these pharmacological approaches into the treatment regimen for CKD patients represents a holistic and evolving strategy aimed at tackling the complex interplay between kidney disease, cardiovascular health, and fluid balance (36,37). This comprehensive management approach ultimately aims to improve quality of life and reduce morbidity and mortality associated with CKD-related cardiovascular complications (38,39).

### Integration of social determinants of health

Emerging evidence highlights the role of social determinants, such as income, education, access to care, and neighborhood environment in CKD outcomes (40). Risk stratification models are beginning to incorporate these factors. For example, area-level deprivation indices can help identify patients at higher risk due to systemic inequities (41,42). Primary care teams can use this information to tailor interventions, such as connecting patients with community resources, transportation assistance, or financial counseling, thereby addressing upstream drivers of poor outcomes (43,44).

### Emerging therapies in primary care

While established treatments for CKD focus on managing underlying causes and slowing progression, several emerging therapies and refined management strategies are enhancing patient outcomes and offer promise for the future (45,46). The SGLT2 inhibitors (sodium-glucose cotransporter-2 inhibitors), originally developed for diabetes management, SGLT2 inhibitors have demonstrated remarkable kidney-protective effects, independent of their glucose-lowering properties (47,48). They reduce albuminuria and slow the decline in estimated GFR, and have been shown to reduce the risk of CKD progression and cardiovascular events (49). Their

administration is now recommended for patients with CKD, particularly those with diabetes, even in the absence of overt heart failure (50). Moreover, GLP-1 receptor agonists (glucagon-like peptide-1 receptor agonists) also show potential kidney benefits, including reductions in albuminuria (51); however, ongoing research is further elucidating their role in CKD management (52). Some studies found finerenone, as a non-steroidal mineralocorticoid receptor antagonist has significant benefits in reducing the risk of CKD progression and cardiovascular events in patients with diabetic kidney disease (53,54). It offers an alternative or complementary approach to existing treatments (54,55). Recent studies also detected that, endothelin receptor antagonists reduce proteinuria and slow CKD progression, particularly in specific types of kidney disease (56). A renewed focus on optimizing the management of hypertension, dyslipidemia, and anemia in CKD patients is crucial (39). This includes utilizing newer antihypertensive agents, statins, and erythropoiesis-stimulating agents or newer treatments for anemia as appropriate (57-59).

### Conclusion

In summary, advances in CKD management in primary care for early detection rely on risk factor-based screening and integration with cardiovascular and diabetes care; risk stratification guides personalized management, and emerging therapies based on molecular insights are an evolving area. Early detection of CKD is essential to prevent or delay progression to ESKD and reduce cardiovascular complications. Traditionally, CKD has been diagnosed using serum creatinine-based estimated GFR and urine albumin-to-creatinine ratio. While these remain the cornerstone of CKD screening, recent innovations have improved sensitivity, specificity, and accessibility. Collaborative care models, including nurse-led clinics and digital tools, enhance chronic disease management efficacy in primary care settings.

### Authors' contribution

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**Writing—original draft:** All authors.

**Writing—review and editing:** All authors.

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The authors declare that they have no competing interests.

### Ethical issues

Ethical issues (including plagiarism, data fabrication and double publication) have been observed by the authors.

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During the preparation of this work, the authors utilized *Perplexity* to refine grammar points and language style in writing. Subsequently, the authors thoroughly reviewed and edited the content as necessary, assuming full responsibility for the publication's content.

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