



April 2017

# ELDER CARE

## A Resource for Interprofessional Providers

### Chronic Kidney Disease in Older Adults

Corinne Self, M.D. and Bijin Thajudeen, M.D., Department of Medicine, University of Arizona College of Medicine

Chronic kidney disease (CKD) has multiple causes, all characterized by progressive loss of nephrons and kidney function, and frequently leading to end-stage renal disease (ESRD). The prevalence of CKD is 32.6% in people over age 60 compared with 14.8% in the overall US population. It is important not to confuse normal age-related reduction in kidney function with CKD. But, early recognition/treatment of CKD can slow loss of renal function, reduce the risk of ESRD, and improve quality of life.

#### Estimating Kidney Function

Kidney function is measured in terms of blood filtration through the renal filtering system and is called “estimated glomerular filtration rate” or eGFR. The higher the eGFR, the better the kidneys are functioning. There are a number of eGFR calculators available, but it is unclear which are most accurate in older adults.

Classically, eGFR calculators relied on serum creatinine levels, but creatinine levels can be affected by the loss of muscle mass that often accompanies aging. More recently, blood cystatin C levels have been used to estimate eGFR and are more accurate as cystatin C is less affected by loss of muscle mass. If cystatin C is not available, current recommendations are to use the MDRD, CKD-EPI, or BIS equations (Table 1). However, renal dosing for many drugs, especially older ones, is based on the older Cockcroft-Gault equation. When prescribing for patients with CKD, check the drug manufacturer’s prescribing information about which approach was used to determine renal dosing.

Finally, note that renal function cannot be reliably assessed with creatinine levels alone. Age, sex, and race are also important and are considered in the various equations.

#### The Aging Kidney

There is a natural decline in renal function (and measured eGFR) with age due to loss of renal mass and damaged kidney filtering mechanisms. Renal function steadily declines starting at about age 30, with the steepest decline occurring after age 75. Generally, however, reductions in

renal function do not progress to the point of ESRD. The natural age-related decline in renal function can often be differentiated from CKD by the lack of proteinuria, lack of biochemical abnormalities, and lack of concomitant chronic illnesses associated with impaired renal function.

#### Causes of CKD

Major causes of CKD in older adults include hypertension, diabetes mellitus, ischemic nephropathy, and urinary tract obstruction. In addition, long-term use of proton-pump inhibitors has recently been linked to CKD.

Type-2 diabetes and systolic hypertension have the largest effect on progression of CKD in older adults. Fortunately, disease progression can be slowed by appropriately treating these conditions. Older adults with CKD are more susceptible to acute kidney injury (AKI) events, which in turn, may contribute to further progression of CKD.

#### Screening for CKD

The US Preventive Services Task Force states that there is insufficient evidence to assess the benefits and harms of screening for CKD in asymptomatic adults. However, it is common in practice for older adults to have an assessment of renal function as part of their annual medical evaluation.

Guidelines suggest diagnosing CKD and initiating further evaluation in any patient with an eGFR of  $<60\text{ml}/\text{min}/1.73\text{m}^2$  or other markers of kidney damage (e.g., proteinuria, elevated creatinine level) for more than 3 months. Recently, however, there have been proposals that a diagnosis of CKD in older adults should not be made in the absence of other indicators of CKD unless the eGFR is below  $45\text{ml}/\text{min}/1.73\text{m}^2$  (see Glasscock article on references and resource list).

#### Management of CKD

Management relies on modifying risk factors to slow the progression of CKD. Agents such as angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) may be used when patients have proteinuria to

#### TIPS ABOUT CHRONIC KIDNEY DISEASE IN OLDER ADULTS

- CKD is different than normal age-related reduction in kidney function.
- CKD should be suspected if estimated glomerular filtration (eGFR) is  $<60\text{ml}/\text{min}/1.73\text{m}^2$ , if eGFR is trending downward, and if the patient has proteinuria or risks for CKD.
- When possible, calculate eGFR using a cystatin C-based equation (Table 1). If measurement of cystatin C is not available, use a standard creatinine-based equation.
- CKD increases risks for cardiovascular disease, malnutrition, physical disability, frailty, cognitive decline and dementia. As a result, care for patients with CKD should involve an interprofessional approach, which should be adopted early.

# ELDER CARE

Continued from front page

Formula	Significance	Online Calculator
Modification of Diet in Renal Disease (MDRD) Equation	Less accurate at GFR >60 ml/min/1.73 m <sup>2</sup> and at older age	<a href="http://www.mdcalc.com/mdrd-gfr-equation/">http://www.mdcalc.com/mdrd-gfr-equation/</a>
Cockcroft Gault Equation	Less accurate at lower levels of GFR Is the standard used for dosing most medications	<a href="http://www.mdcalc.com/creatinine-clearance-cockcroft-gault-equation/">http://www.mdcalc.com/creatinine-clearance-cockcroft-gault-equation/</a>
Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) Creatinine Equation	Can overestimate GFR in older individuals	<a href="https://www.qxmd.com/calculate/calculator_251/egfr-using-ckd-epi">https://www.qxmd.com/calculate/calculator_251/egfr-using-ckd-epi</a>
CKD-EPI Cystatin C Equation	More accurate for older individuals and those with sarcopenia	<a href="https://www.kidney.org/professionals/kdoqi/gfr_calculator">https://www.kidney.org/professionals/kdoqi/gfr_calculator</a>
CKD-EPI Creatinine-cystatin C equation	Most accurate estimate of GFR in older individuals	
Berlin initiative study (BIS) equation	Reliable for use in older adults with stage 1–3 CKD	<a href="http://touchcalc.com/bis2.html">http://touchcalc.com/bis2.html</a>

improve glomerular filtration. These drugs, however, may also predispose older patients to acute kidney injury by decreasing overall vascular perfusion of the kidneys; they can also cause hyperkalemia. Renal function and potassium levels should be checked 1-2 weeks after starting or increasing the dose of ACEIs or ARBs.

Treatment also involves addressing known underlying risk factors, such as blood pressure and glycemic control. In addition, care should be taken to dose a patient's medications based on eGFR (Table 2), and medications known to damage kidneys should be avoided. Major culprits include non-steroidal anti-inflammatory drugs, radiocontrast agents, aminoglycosides, amphotericin B, calcineurin inhibitors, and others. Efforts to reduce the number and severity of acute kidney injury episodes is another important component of CKD management.

### When is Specialty Care Needed?

Referral to a nephrologist should be considered when the eGFR is <45 ml/min/1.73m<sup>2</sup>, when renal function is trending

downward, when proteinuria is present, or when a medical condition is thought to be contributing to reduced eGFR.

### Associated Disease Concerns

Older adults with CKD are at higher risk of developing cardiovascular disease, malnutrition, physical disability, frailty, and cognitive decline. A multidisciplinary care approach focusing on cardiovascular risk factor modification should be included in the goals of treatment for these patients. Clinicians caring for older adults with CKD should also incorporate preservation of functional status as a component of routine care.

It is important to identify CKD in older adults in its early stages so that necessary resources can be organized to provide appropriate care. Simplification of medication regimens, support from ancillary health care workers, emphasis on maintaining physical activity, and other principles of geriatric care are particularly applicable to older adults with CKD.

Medication	Allopurinol	Famotidine	Gabapentin	Metoclopramide	Spironolactone
Antivirals Acyclovir					
Famciclovir	Amoxicillin	Fluconazole	Glyburide	Opioids (most preparations)	Statins (most preparations)
Valacyclovir	Atenolol	Fluoroquinolones	Metformin	Ranitidine	Thiazide diuretics

### References and Resources

- Fung E, Kurella Tamura M. Epidemiology and public health concerns of CKD in older adults. *Adv Chronic Kidney Dis.* 2016;23(1):8-11.
- Glasscock R, Delanaye P, El Nahas M. An age-calibrated classification of chronic kidney disease. *JAMA.* 2015;314(6):559-560.
- National Institute of Diabetes and Digestive and Kidney Diseases. <https://www.niddk.nih.gov/health-information/>
- National Kidney Foundation. <https://www.kidney.org/>
- United States Renal Data System. 2016USRDS annual data report: Epidemiology of kidney disease in the United States.
- National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2016.

## Interprofessional care improves the outcomes of older adults with complex health problems.

Editors: Mindy Fain, MD; Jane Mohler, NP-c, MPH, PhD; and Barry D. Weiss, MD  
 Interprofessional Associate Editors: Tracy Carroll, PT, CHT, MPH; David Coon, PhD; Marilyn Gilbert, MS, CHES;  
 Jeannie Lee, PharmD, BCPS; Marisa Menchola, PhD; Francisco Moreno, MD; Lisa O'Neill, DBH, MPH; Floribella Redondo; Laura Vitkus, BA  
 The University of Arizona, PO Box 245069, Tucson, AZ 85724-5069 | (520) 626-5800 | <http://aging.arizona.edu>

Supported by: Donald W. Reynolds Foundation, Arizona Geriatrics Workforce Enhancement Program and the University of Arizona Center on Aging

This project was supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant number U1QHP28721, Arizona Geriatrics Workforce Enhancement Program. This information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government.