

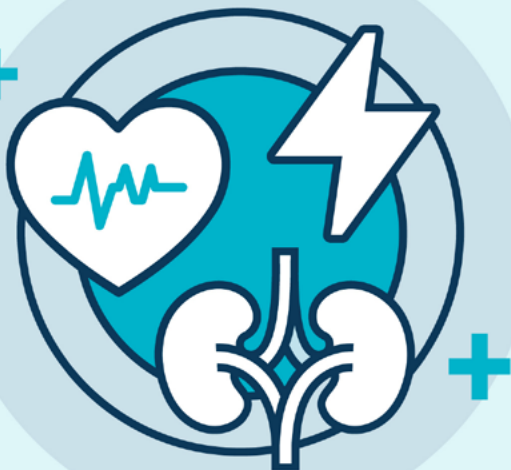
Cardio-kidney-metabolic syndrome:

AN OVERVIEW FOR PRIMARY CARE CLINICIANS AND TEAMS

Cardio-kidney-metabolic (CKM) syndrome is a systemic disorder that arises from pathophysiologic interactions among excess or dysfunctional adiposity, metabolic risk factors, chronic kidney disease (CKD) and the cardiovascular system.¹ These conditions amplify one another and, when combined, lead to multiorgan dysfunction, higher rates of adverse cardiovascular outcomes and increased mortality. More detailed information on the prevention, detection, evaluation and management of CKM syndrome is available in the American Heart Association/American College of Cardiology guideline, developed in collaboration with other medical societies.¹



Data indicate that more than **1 in 4** U.S. adults have at least one CKM-related condition and approximately **1 in 12** have at least two coexisting CKM-related conditions.²



Cardio-kidney-metabolic syndrome staging¹

Stage 0: No CKM risk factors

Stage 1: Excess and/or dysfunctional adiposity

Stage 2: Metabolic risk factors and/or moderate- to high-risk CKD

Stage 3: Subclinical cardiovascular disease (CVD) in CKM syndrome

Stage 4: Clinical CVD in CKM syndrome

Stages of CKM syndrome¹

- **Stage 0:** No CKM risk factors
 - Representative finding is optimal cardiometabolic health.
- **Stage 1:** Excess and/or dysfunctional adiposity
 - Representative findings and conditions include overweight or obesity, increased waist circumference and prediabetes.
- **Stage 2:** Metabolic risk factors and/or moderate- to high-risk CKD
 - Representative findings and conditions include metabolic syndrome, type 2 diabetes, hypertension, hypertriglyceridemia and moderate- to high-risk CKD.
- **Stage 3:** Subclinical CVD in CKM syndrome
 - Representative findings and conditions include subclinical atherosclerotic cardiovascular disease (ASCVD) or subclinical heart failure, high predicted 10-year CVD risk and very high-risk CKD.
- **Stage 4:** Clinical CVD in CKM syndrome
 - Representative findings and conditions include coronary heart disease, stroke, heart failure, atrial fibrillation and peripheral artery disease.



Assessment of CKM syndrome in adults 18 years and older

Routine assessment

Body mass index

Waist circumference

Blood pressure

Fasting blood glucose/A1C

Lipid panel

Estimated glomerular filtration rate

Stages 2 to 4: Urine albumin-to-creatinine ratio

Selective assessment (based on clinical context)

Fibrosis-4 (FIB-4) index*

Coronary artery calcium scoring

B-type natriuretic peptide testing

*The FIB-4 index is used to assess risk for liver fibrosis related to metabolic dysfunction-associated steatotic liver disease. Information from references 1 and 3.



Predicting Risk of Cardiovascular Disease EVENTS (PREVENT)

PREVENT equations can be used to estimate 10- and 30-year risk for ASCVD, heart failure and total CVD to inform CKM syndrome staging and guide treatment decisions.¹ Access the PREVENT calculator on the American Heart Association website.

CKM syndrome interventions within a prevention framework

Level of prevention	Clinical context	Possible interventions
Primordial	Before CKM risk factors develop	• Preserve cardiovascular health and minimize CKD/CVD risk, with emphasis on Life's Essential 8 • Prevent obesity
Primary	Excess and/or dysfunctional adiposity and/or other CKM risk factors without detectable atherosclerosis	• Optimize lifestyle factors • Support weight loss/management • Address ABCs • Manage CKD risk
Secondary	Subclinical atherosclerosis or high predicted CVD risk	• Optimize lifestyle factors • Escalate preventive interventions • Address ABCs • Consider guideline-directed medical therapy* in appropriate patients
Tertiary	History of heart failure, clinical ASCVD (e.g., MI, ischemic stroke, PAD) or revascularization for ASCVD	• Optimize lifestyle factors • Support cardiac rehabilitation • Maximize appropriate preventive therapies • Address ABCs • Implement guideline-directed medical therapy* in appropriate patients • Consider condition-specific therapy (e.g., anticoagulant therapy, antiplatelet therapy, selected anti-inflammatory therapy) as indicated

ABCs = A1C, blood pressure and cholesterol; ASCVD = atherosclerotic cardiovascular disease; CKD = chronic kidney disease; CKM = cardio-kidney-metabolic; CVD = cardiovascular disease; MI = myocardial infarction; PAD = peripheral artery disease.

***Examples of guideline-directed medical therapy used in appropriate patients with CKM syndrome include an angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker, a sodium-glucose cotransporter-2 inhibitor, a glucagon-like peptide 1 receptor agonist and a nonsteroidal mineralocorticoid receptor antagonist.**

Information from references 1 and 3-8.



Across CKM syndrome stages, care should emphasize lifestyle optimization, risk factor management, appropriate use of guideline-directed medical therapy and ongoing risk reassessment with patient engagement.

References

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