

Trends in Quality of Care for Patients with CKD in the United States
Supplemental Material
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Supplemental Table 1. CKD-specific Guideline Recommendations.

Intervention	Recommendation	Strength of Recommendation/Level of Evidence	Source
BP Measurement	"In predicting risk for outcome of CKD, identify the following variables: 1) cause of CKD; 2) GFR category; 3) albuminuria category; 4) other risk factors and comorbid conditions."	Not Graded	KDOQI ¹
BP Control	"In patients with hypertension and diabetes or renal disease, the BP goal is <130/80 mmHg."	Not Graded	JNC 7 (2003) ²
BP Control	"In the population aged ≥18 years with chronic kidney disease (CKD), initiate pharmacologic treatment to lower BP at systolic BP ≥140 mm Hg or diastolic BP ≥90 mm Hg and treat to goal systolic BP <140 mm Hg and goal diastolic BP <90 mm Hg."	E*	JNC 8 (2014) ³
Diabetes Control	"We recommend a target hemoglobin A1c (HbA1c) of 7.0% to prevent or delay progression of the microvascular complications of diabetes, including DKD."	1A [†]	KDOQI ⁴
Diabetes Control	"For microvascular disease prevention, the A1C goal for nonpregnant adults in general is <7%." "Conversely, less stringent A1C goals than the general goal of <7% may be appropriate for patients with a history of severe hypoglycemia, limited life expectancy, advanced microvascular or macrovascular complications, extensive comorbid conditions, and those with longstanding diabetes in whom the general goal is difficult to attain despite DSME, appropriate glucose monitoring, and effective doses of multiple glucose-lowering agents including insulin."	A [†] C [§]	ADA ⁵
ACEi/ARB	"We recommend that an ARB or ACE-I be used in both diabetic and non-diabetic adults with CKD and urine albumin excretion > 300 mg/24 hours (or equivalent)."	1B [¶]	KDIGO CKD ⁶
ACEi/ARB	"We suggest that an ARB or ACE-I be used in diabetic adults with CKD and urine albumin excretion 30–300 mg/24 hours (or equivalent)."	2D ^{¶¶}	KDIGO CKD ⁶

ACEi/ARB	"We suggest that an ARB or ACE-I be used in nondiabetic adults with CKD ND and urine albumin excretion of 30 to 300 mg per 24 hours (or equivalent*) in whom treatment with BP-lowering drugs is indicated."	2D ^{ff}	KDIGO BP ⁷
Statin	"In adults aged ≥50 years with eGFR <60 ml/min/1.73 m ² but not treated with chronic dialysis or kidney transplantation (GFR categories G3a-G5), we recommend treatment with a statin or statin/ezetimibe combination."	1A [†]	KDIGO Lipid ⁸
Statin	"In adults aged ≥50 years with CKD and eGFR ≥60 ml/min/1.73 m ² (GFR categories G1-G2) we recommend treatment with a statin."	1B [¶]	KDIGO Lipid ⁸
NSAIDs	"Avoid in people with GFR <30 ml/min/1.73 m ² " "Prolonged therapy is not recommended in people with GFR <60 ml/min/1.73 m ² " "Avoid in people taking RAAS blocking agents"	Not Graded	KDIGO CKD ⁶

* E - Expert Opinion

† 1A - Level 1 "We recommend," High Quality of Evidence

‡ A - Clear evidence from well-conducted, generalizable, randomized controlled trials that are adequately powered or compelling nonexperimental evidence or supportive evidence from well-conducted randomized controlled trials that are adequately powered

§ C - Supportive evidence from poorly controlled or uncontrolled studies

¶ 1B - Level 1 "We recommend," Moderate Quality of Evidence

ff 2D - Level 2 "We suggest," Very Low Quality of Evidence

CKD = chronic kidney disease, BP = blood pressure, ACEi = Angiotensin converting enzyme inhibitor, ARB = angiotensin receptor blocker, NSAID = nonsteroidal anti-inflammatory drug, GFR = glomerular filtration rate, HbA1c = Hemoglobin A1c, DKD = diabetic kidney disease, DSME = diabetes self management education, ND = non-dialysis, RAAS = renin-angiotensin-aldosterone system, KDOQI = Kidney Disease Outcomes Quality Initiative, JNC = Joint National Committee, ADA = American Diabetes Association, KDIGO = Kidney Disease Improving Global Outcomes.

Supplemental Table 2. ICD-9 Codes used in the Analysis.	
Diagnosis	ICD-9 Diagnosis Codes
CKD	250.4, 250.41, 250.42, 250.43, 249.4, 403, 403.01, 403.1, 403.11, 403.9, 403.91, 404, 404.01, 404.02, 404.03, 404.1, 404.11, 404.12, 404.13, 404.9, 404.91, 404.92, 404.93, 445.81, 446.21, 572.4, 580, 580.8, 580.89, 580.9, 581, 581.0, 581.1, 581.2, 581.3, 581.8, 581.89, 581.9, 582, 582.1, 582.2, 582.4, 582.8, 582.81, 582.89, 582.9, 583, 583.1, 583.2, 583.4, 583.6, 583.7, 583.8, 583.81, 583.89, 583.9, 584, 584.5, 584.6, 584.7, 584.8, 584.9, 585, 585.1, 585.2, 585.3, 585.4, 585.5, 585.6, 585.9, 586, 587, 588, 588.8, 588.81, 588.89, 588.9, 593.7, 593.89, 593.9, 642.1, 646.2, 753, 753.1, 753.11, 753.12, 753.13, 753.14, 753.15, 753.16, 753.17, 753.19, 753.2, 753.21, 753.22, 753.23, 753.29, 753.3, 794.4
Hypertension	401, 401.1, 401.9, 405.01, 405.09, 405.1, 405.11, 405.19, 405.9, 405.91, 405.99, 997.91
Diabetes	V58.67, 250.0, 250.00, 250.01, 250.02, 250.03, 250.10, 250.10, 250.12, 250.20, 250.4, 250.40, 250.42, 250.5, 250.50, 250.51, 250.52, 250.6, 250.60, 250.61, 250.62, 250.63, 250.7, 250.70, 250.71, 250.72, 250.80, 250.82, 250.83, 250.90, 250.92

ICD = International Classification of Diseases, CKD = chronic kidney disease.

Supplemental Table 3. Performance on CKD Quality Indicators in the U.S. Office-based Ambulatory Practices Analyzing All Medications Listed.

Quality Indicator	2006-2008	2009-2011	2012-2014	p-value*	p-value for trend [†]
ACEi/ARB use in CKD patients with Hypertension	45%	39%	40%	0.24	0.081
Statin use in CKD patients age ≥50	29%	30%	36%	0.11	0.012
NSAID use in CKD patients	2%	3%	5%	<0.001	<0.001

*Chi-squared test, unadjusted.

† p-value for trend from 2006 to 2014, adjusted for Age, Sex, Race/Ethnicity, Hypertension, Diabetes, Congestive Heart Failure, and Cardiovascular Disease.

CKD = chronic kidney disease, ACEi = Angiotensin converting enzyme inhibitor, ARB = angiotensin receptor blocker, NSAID = nonsteroidal anti-inflammatory drug.

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