Making Sense of CKD Care:
So Many Guidelines, So Little Evidence

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National Kidney Disease Education Program

Annual California Area Diabetes Day
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U.S. Department of Health and Human Services
National Institute of Health

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Objectives

- Describe the burden of kidney disease in US, AI/AN
- Utilize lab tests for identifying and monitoring CKD and assessing risk for progression
- Describe interventions to slow progression of CKD
- Describe strategies for improving CKD outcomes in the primary care setting

CKD is reduced kidney function and/or kidney damage

- Chronic Kidney Disease
  - Kidney function
    - Glomerular filtration rate (GFR) < 60 mL/min/1.73 m^2 for ≥ 3 months with or without kidney damage

AND/OR

  - Kidney damage
    - ≥ 3 months, with or without decreased GFR, manifested by either
      - Pathological abnormalities
      - Markers of kidney damage, i.e., proteinuria (albuminuria)
        - » Urine albumin-to-creatinine ratio (UACR) > 30 mg/g

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Reference: National Kidney Foundation. K/DOQI Clinical Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification and Stratification. American Journal of Kidney Diseases. 2002; 39: (Suppl 1) S18.

More than 10% of U.S. adults *may* have CKD

- More than 20 million, aged 20 years or older

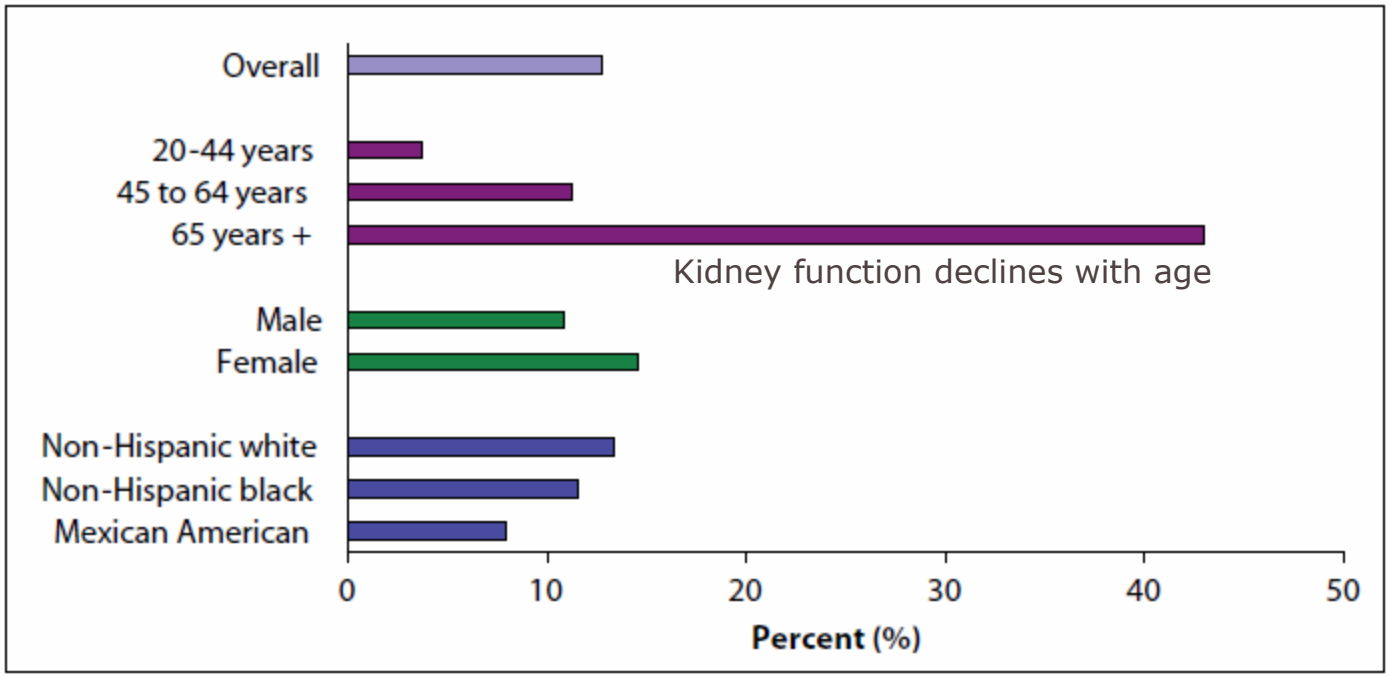

Figure legend: Percent with CKD among adult U.S. population by age, sex, and race/ethnicity.

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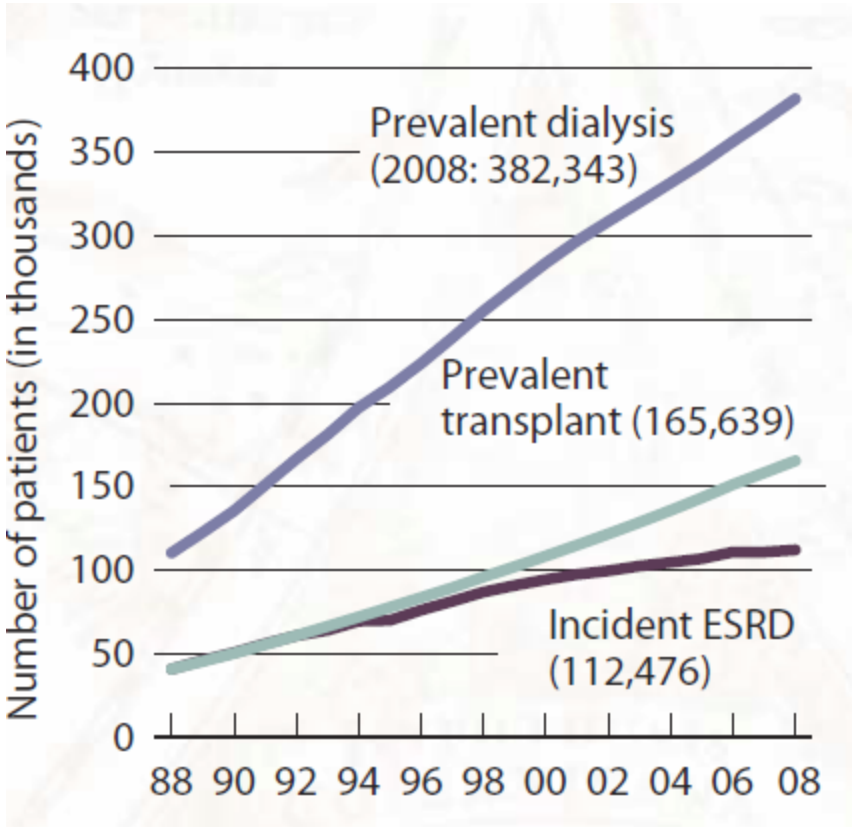
Reference: http://www.cdc.gov/diabetes/pubs/factsheets/kidney.htm (CDC, 2010)

ESRD Patient Counts, by Modality 2008



- Prevalent dialysis population
  - Increased 3.6% in 2008
  - Up 34.7% since 2000
- Transplant population
  - Increased 4.4% in 2008
- Incident population
  - Increased 1.4% in 2008

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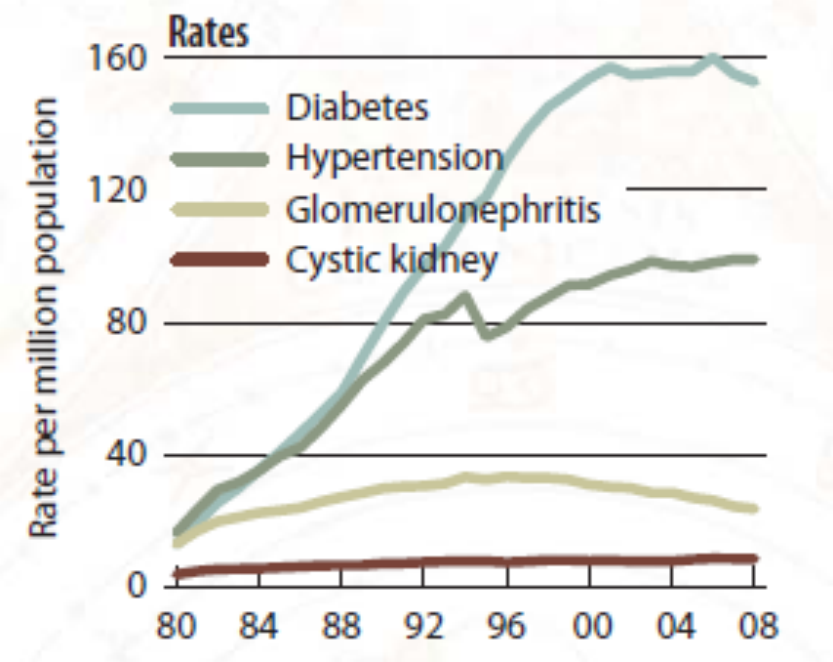
Reference: USRDS Annual Data Report (NIDDK, 2010)

Diabetes is the leading cause of ESRD, followed by hypertension

Incidence



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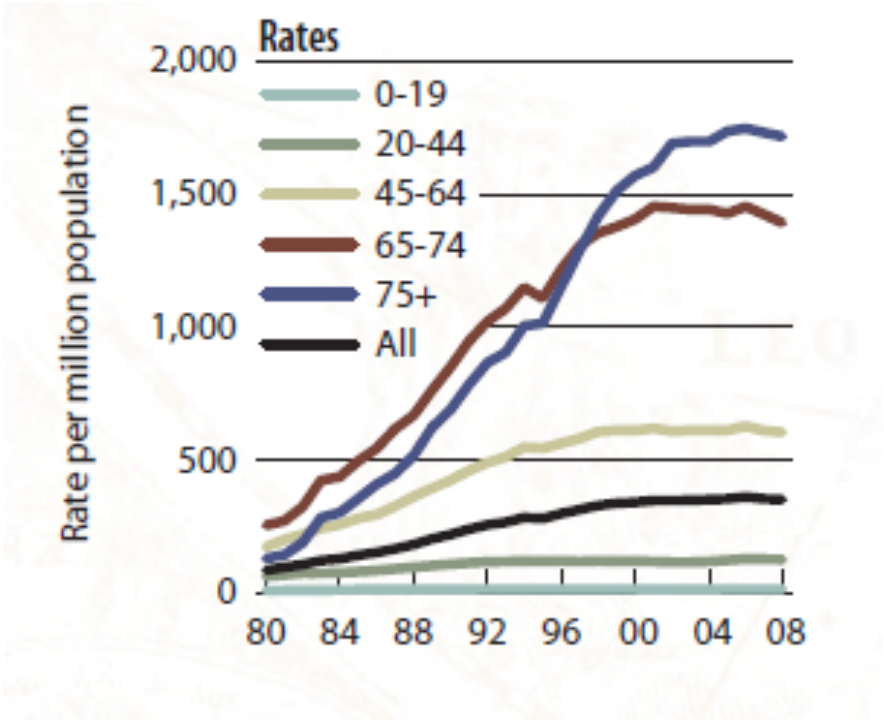
Reference: USRDS Annual Data Report (NIDDK, 2010)

The elderly population has the highest incidence rates of ESRD

Incidence



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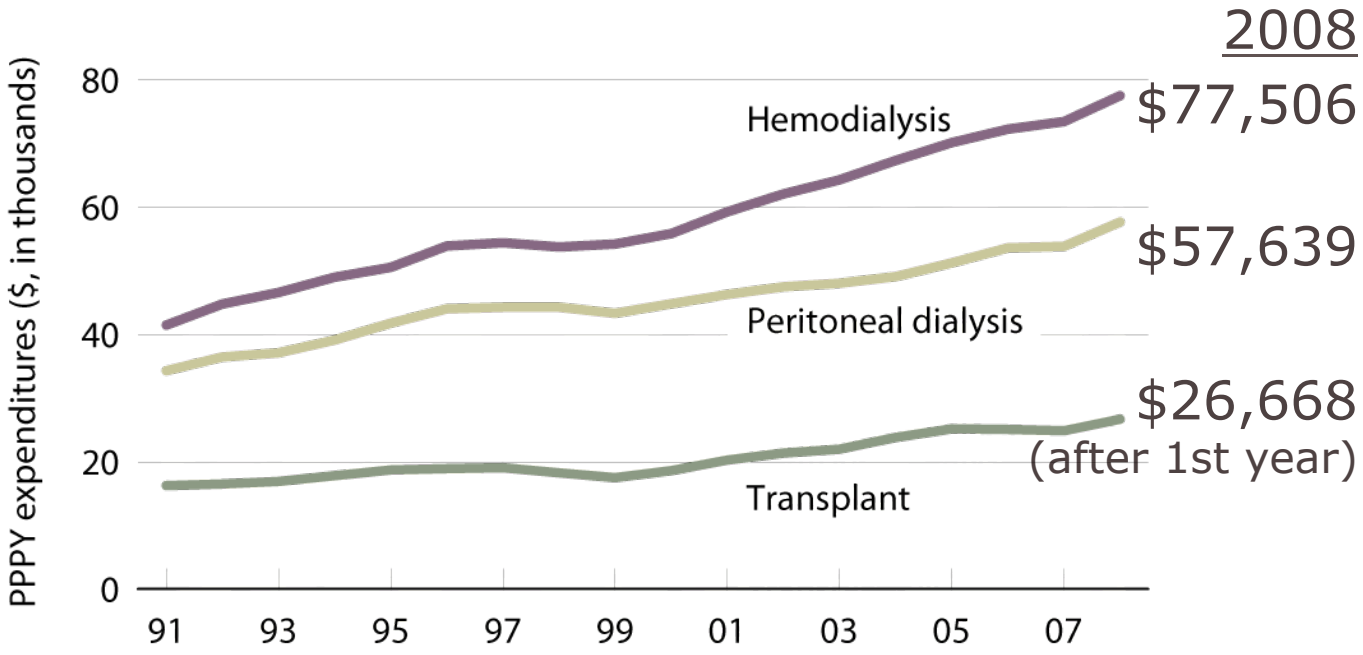
Reference: USRDS Annual Data Report (NIDDK, 2010)

Delaying the need for **Renal Replacement Therapy (RRT)** may be cost-effective.

Total Medicare ESRD expenditures, per person per year (PPPY)



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Reference: USRDS *Annual Data Report* (NIDDK, 2009)

Identify and Monitor CKD.

FUNCTIONAL ASSESSMENT

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CKD usually means fewer functioning nephrons.

Each kidney has about 1 million nephrons; slow loss may not be noticeable

- We have a large physiologic reserve.
- Slow, progressive loss of functioning nephrons may not be noticeable.
- The person with CKD may not feel different until more than three quarters of kidney function is lost.

What is the glomerular filtration rate (GFR)?

- GFR is equal to the sum of the filtration rates in all of the *functioning* nephrons.
- GFR is not routinely measured in clinical settings.
- Estimation of the GFR (eGFR) gives a rough measure of the number of functioning nephrons.

What is the GFR?

- Cardiac output (CO) = 6 L/min
- x 20% of CO goes to kidneys = 1.2 L/min
- x Plasma is 50% blood volume = 600 mL/min
- x Filtration Fraction of 20% = 120 mL/min

"Normal" serum creatinine may not be normal

- Serum creatinine levels reflect muscle mass, age, gender, race
- A typical "normal" reference range of 0.6–1.2 mg/dL listed on many lab reports does not account for muscle mass, age, gender, and race.
- A 28-year-old African American man with serum creatinine of 1.2 has an *eGFR > 60*.
- A 78-year-old white woman with serum creatinine of 1.2 has an *eGFR of 43.*

Use an estimating equation for eGFR

- The Modification of Diet in Renal Disease (MDRD) study equation is widely used for estimating GFR.
- The variables are serum creatinine, age, race, and gender.
- The estimate is normalized to body surface area.

$$\text{eGFR (mL/min/1.73 m}^2\text{)} = 175 \times (S_{cr})^{-1.154} \times (\text{Age})^{-0.203} \times (0.742 \text{ if female}) \times (1.212 \text{ if African American})$$

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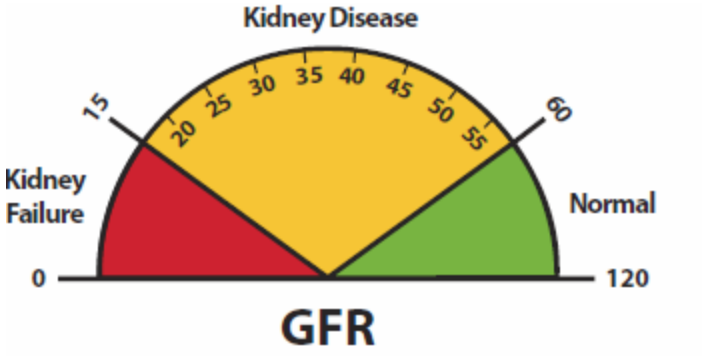
Reference:
Stevens et al. *J Am Soc Nephrol* 2007; 18:2749-2757; Poggio et al. *Am J Kid Dis* 2005; 46:242-252; Verhave et al. *Am J Kid Dis* 2005; 46:233-241

eGFR estimates the measured GFR

- eGFR is **not** the measured GFR.
- The formula to estimate GFR was derived from a population-based study.
- The eGFR is a good estimate of the risk of having decreased kidney function
- Like other risk predictors, when it is the solitary indicator it should be used cautiously, especially when diagnosing "disease"

How to explain eGFR results to patients

- Normal: $\geq$ 60 mL/min/1.73 m^2
- Kidney disease: 15–59 mL/min/1.73 m^2
- Kidney failure: < 15 mL/min/m^2



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Estimating equations are less reliable at higher GFR

- The National Kidney Disease Education Program (NKDEP) recommends reporting MDRD estimates greater than or equal to 60 as "≥ 60" rather than a numeric value.
- Interlaboratory differences in calibration of creatinine assays and the imprecision of measurements have their greatest impact in the near-normal range and, therefore, lead to greater inaccuracies for values ≥ 60.

Creatinine-based estimates of kidney function have limitations

- Do not use with:
  - Rapidly changing creatinine levels
    - Example: acute kidney injury
  - Extremes in muscle mass, body size, or altered diet patterns
  - Medications that interfere with the measurement of serum creatinine

Kidney function and eGFR decline with age

Reference Table for Population Mean eGFR from NHANES III

Age (years)	Mean eGFR (mL/min/1.73 m^2)
20–29	116
30–39	107
40–49	99
50–59	93
60–69	85
70+	75

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Reference: http://nkdep.nih.gov/professionals/gfr_calculators/gfr_faq.htm

Decreased Kidney Function vs Kidney Disease

- While there is an association between decreased eGFR and morbidity, even in elderly, this association does not mean causality
- Use diagnostic terms denoting *disease* with caution, especially in older people without evidence of kidney damage (e.g. elderly with eGFR 55)

Use urine albumin-to-creatinine ratio (UACR) to assess and monitor.

KIDNEY DAMAGE

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Urine albumin is a marker for kidney damage

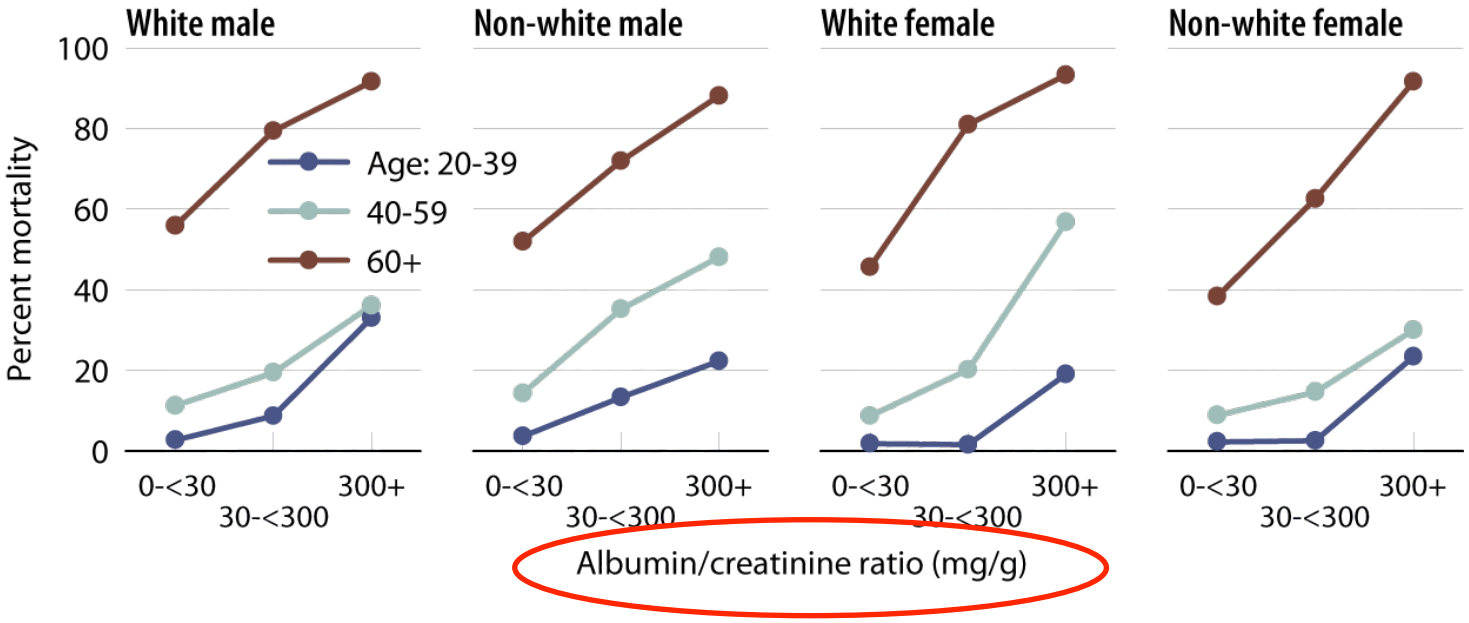
- Urine albumin measures albumin in the urine.
- An abnormal urine albumin level is a marker for glomerular disease, including diabetes.
- Urine albumin is a marker for cardiovascular disease and is a hypothesized marker of generalized endothelial dysfunction.

Urine albumin results are used for screening, diagnosing, and treating CKD

- Standard of diabetes care (annual screen)
- Diagnosis
  - Forty percent of people are identified with CKD on the basis of urine albumin alone.
- Prognosis
  - Important prognostic marker, especially in diabetes mellitus (DM)
  - Used to monitor and guide therapy
- Tool for patient education and self-management (such as A1C or eGFR)

Albuminuria is associated with mortality

NHANES 1988–1994 participants



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Reference: USRDS *Annual Data Report* (NIDDK, 2010)

Use urine albumin-to-creatinine ratio (UACR) for urine albumin assessment

- UACR uses a spot urine sample.
- In adults, ratio of urine albumin to creatinine correlates closely to total albumin excretion.
- Ratio is between two measured substances (not dipstick).

$$\frac{\text{Urine albumin (mg/dL)}}{\text{Urine creatinine (g/dL)}} = \text{UACR (mg/g)} \cong \text{Albumin excretion in mg/day}$$

- UACR of 30 mg/g is generally the most widely used cutoff for "normal."

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Reference: http://nkdep.nih.gov/resources/uacr_gfr_quickreference.htm

UACR quantifies all levels of urine albumin

- UACR is a continuous variable.
- The term albuminuria describes all levels of urine albumin.
- The term microalbuminuria describes abnormal urine albumin levels *not* detected by dipstick test.
  - 30 mg/g – 300 mg/g
- The term macroalbuminuria describes urine albumin > 300 mg/g.

Key Issues in Managing CKD

- Ensure the diagnosis is correct
- Monitor progression
- Implement appropriate therapy to slow progression
- Screen for CKD complications
- Educate the patient about CKD
- Prepare appropriately for kidney failure

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Staging

- eGFR is probably too narrow a basis on which to make diagnosis and prognosis (stage)
- Use of numbered stages promises more than it delivers. Instead use descriptive terms: moderate, severe, kidney failure
- Don't use measures which are not proven to associated with risk to inflate burden of CKD
- **Expect a multifactor predictor similar to Framingham – eGFR, UACR, age, DM status, BP control, new biomarkers**

Population vs Individual

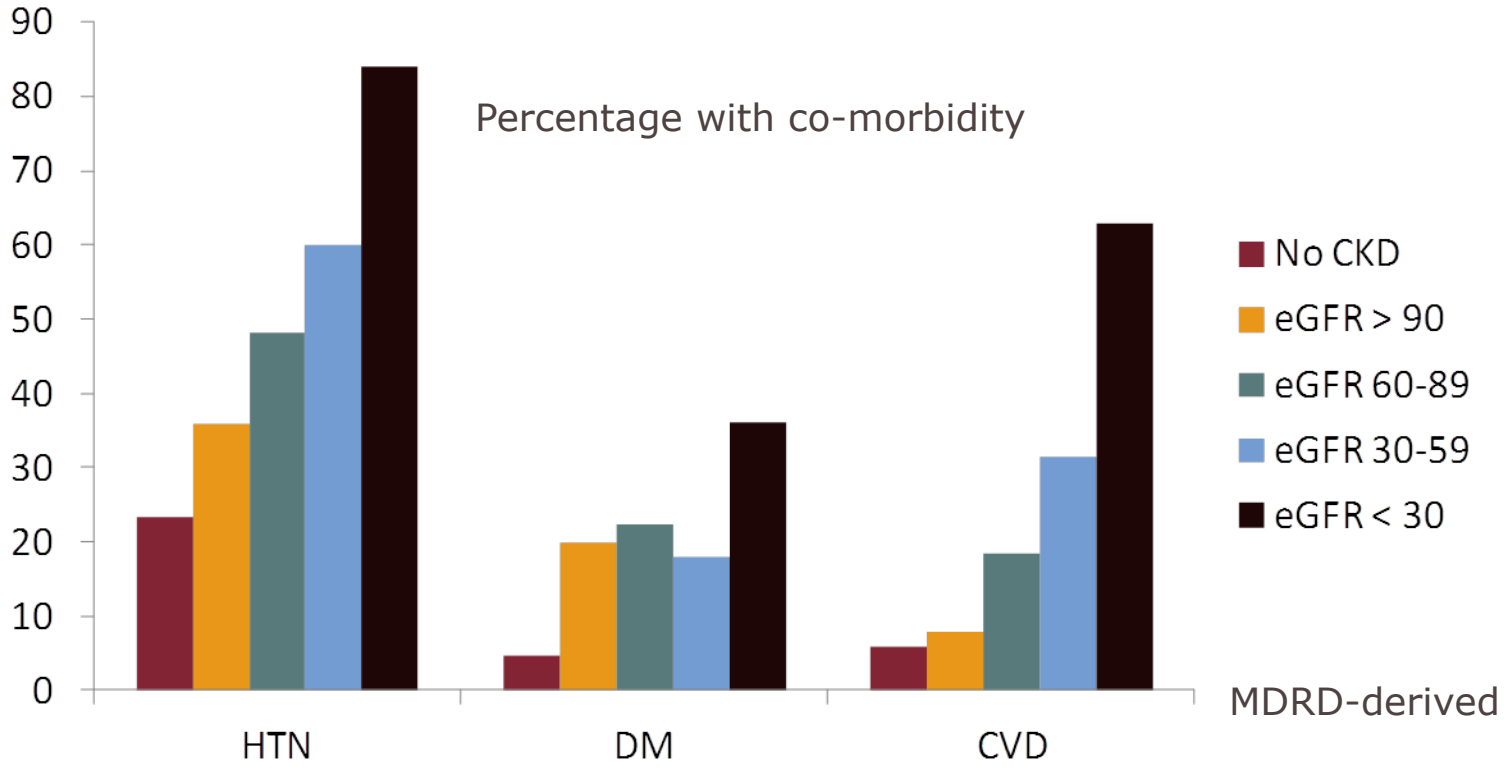
- Estimating equations are developed from data from groups of patients and may be best for describing risk for populations

- "It is counterintuitive that more patients are classified as having stage 3 of a chronic disease than earlier stages, ie, stage 1 and 2 combined, in sharp contradistinction to other chronic disease states such as heart failure. The result has been that the nephrology community appears to have undermined its own important work in public health by overdiagnosing a nonexistent disease in millions of elderly persons as well as in women …or in adults with larger muscle mass or other nutritional states associated with higher serum creatinine independent of kidney function. **Use of the epidemiological classification of such an imperfect surrogate as estimated GFR does not square with the clinical reality of patient diagnosis and treatment.**"

Kalantar-Zadeh, JAMA vol 307, 2012

Prevalence of co-morbidities by eGFR

NHANES 1999–2006



NHANES = National Health and Nutrition Examination Survey; eGFR = estimated GFR; HTN = hypertension; DM = diabetes mellitus; CVD = cardiovascular disease

Reference: Adapted from USRDS 2010 *Annual Data Report*

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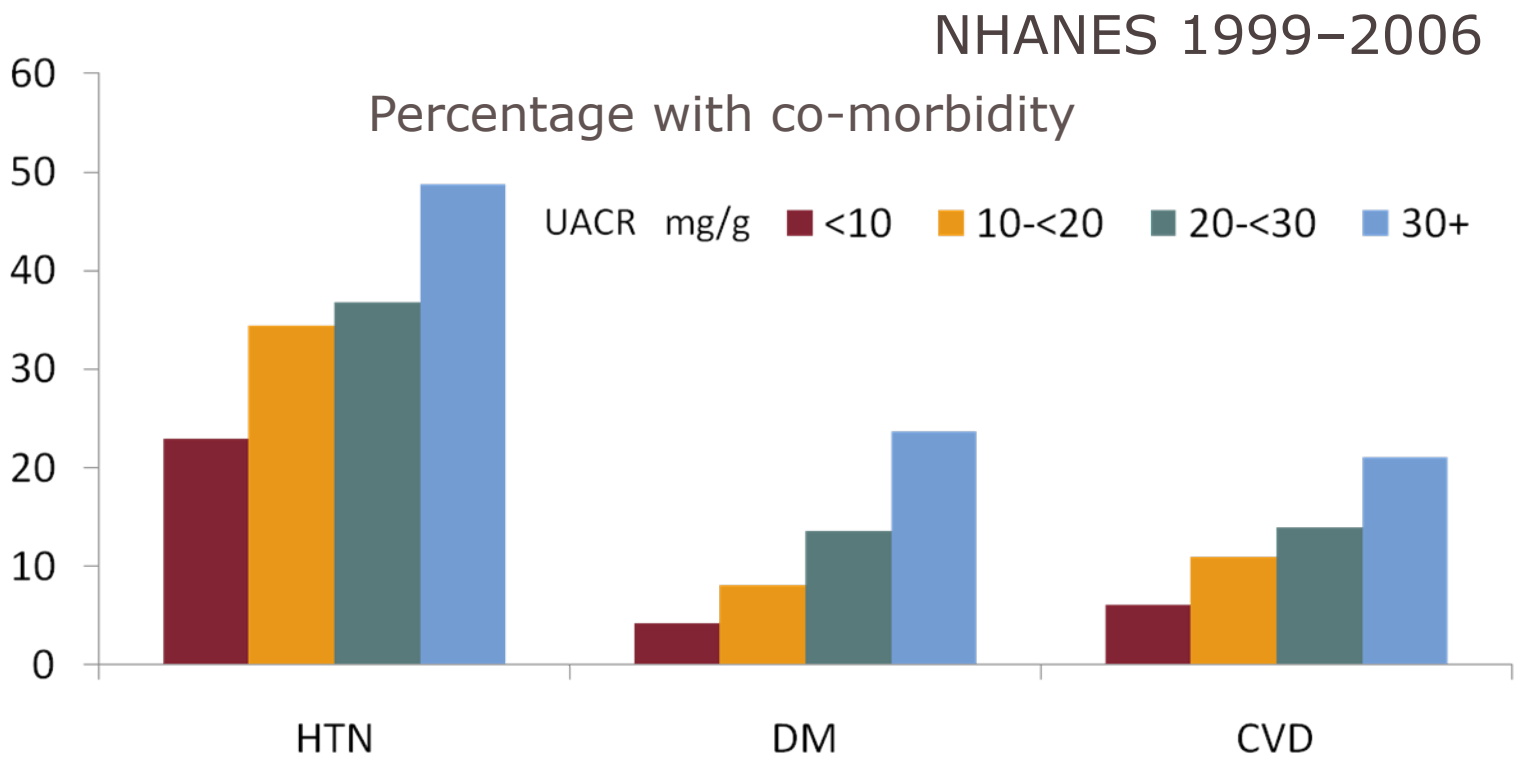
Prevalence of comorbidities by urine albumin



UACR = urine albumin to creatinine ratio

Reference: Adapted from USRDS 2010 *Annual Data Report*

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Therapy to Slow Progression of Chronic Kidney Disease (CKD)

Hypertension, Diabetes, Urine Albumin, And Cardiovascular Disease

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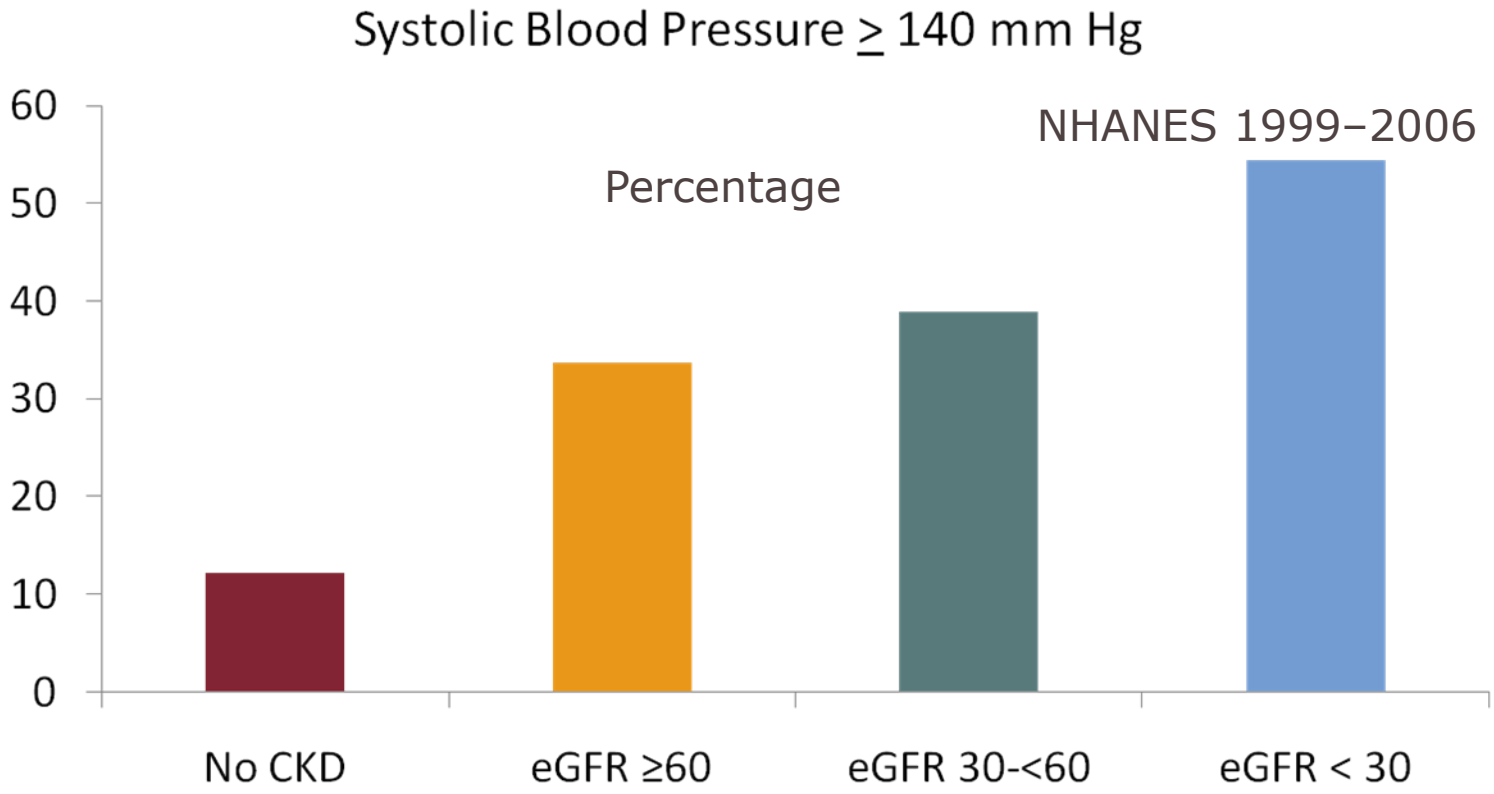
Blood pressure is poorly controlled in people with CKD



Reference: Adapted from USRDS 2009 *Annual Data Report*

Individualized blood pressure goals in CKD

- Target of < 130/80 mmHg is often recommended but without strong evidence.
- Uncontrolled hypertension (systolic blood pressure $\geq$ 160) is a major challenge.

Reference: Chobanian et al., 2003; Jafar et al., 2003

Lifestyle modifications help lower blood pressure in the general population

Modification	Recommendation	Lowers Systolic Blood Pressure by (Range)
Weight reduction	•Maintain normal body weight •Body mass index (BMI) 18.5–24.9 kg/m^2	5–20 mm Hg / ↓ 10 kg ~ 4 mm Hg / ↓ 5 kg
DASH	•Increase potassium (fruits and vegetables) and calcium (dairy) •DASH may be too high in protein, potassium and phosphorus for CKD	8–14 mm Hg
Physical activity	•At least 30 minutes most days	4–9 mm Hg
Moderate alcohol consumption	•Women: ≤ 1 drink per day •Men: ≤ 2 drinks per day	2–4 mm Hg
Sodium restriction	•2,300 mg per day •1,500 mg per day for hypertension, diabetes, and CKD	2–8 mm Hg

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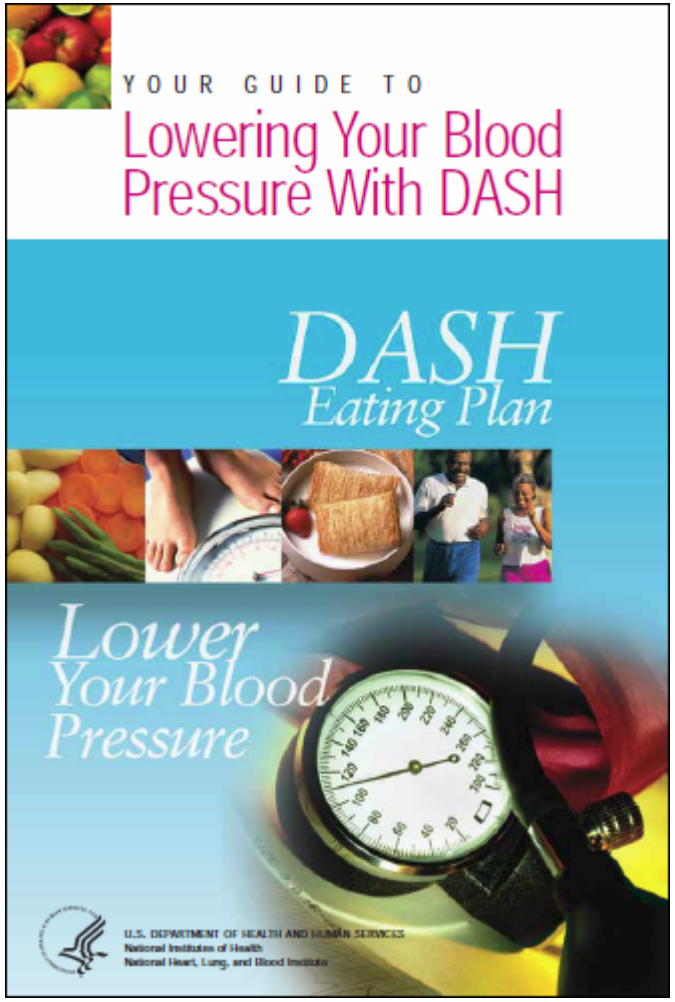
Reference: Chobanian et al., 2003; Neter et al., 2003; Dietary Guidelines, 2010

The DASH diet lowers blood pressure in the general population



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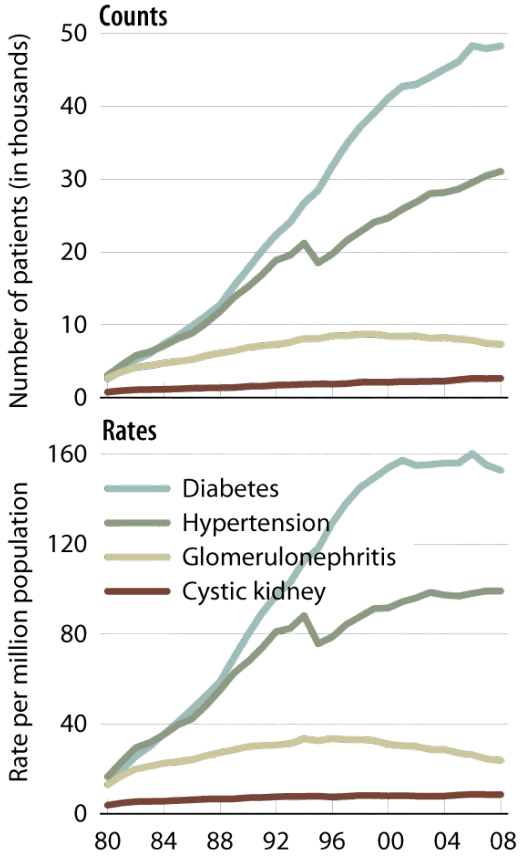
Reference: http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new_dash.pdf

Summary: The DASH diet may help prevent CKD, but it is not generally used with CKD

- DASH and DASH-Sodium patterns lower blood pressure.
- The lowest sodium level is the most effective, even with the usual (control) diet.
- The DASH pattern *may* be too high in protein, potassium, and phosphorus for CKD.

Diabetes is the leading cause of ESRD in the United States

Incidence



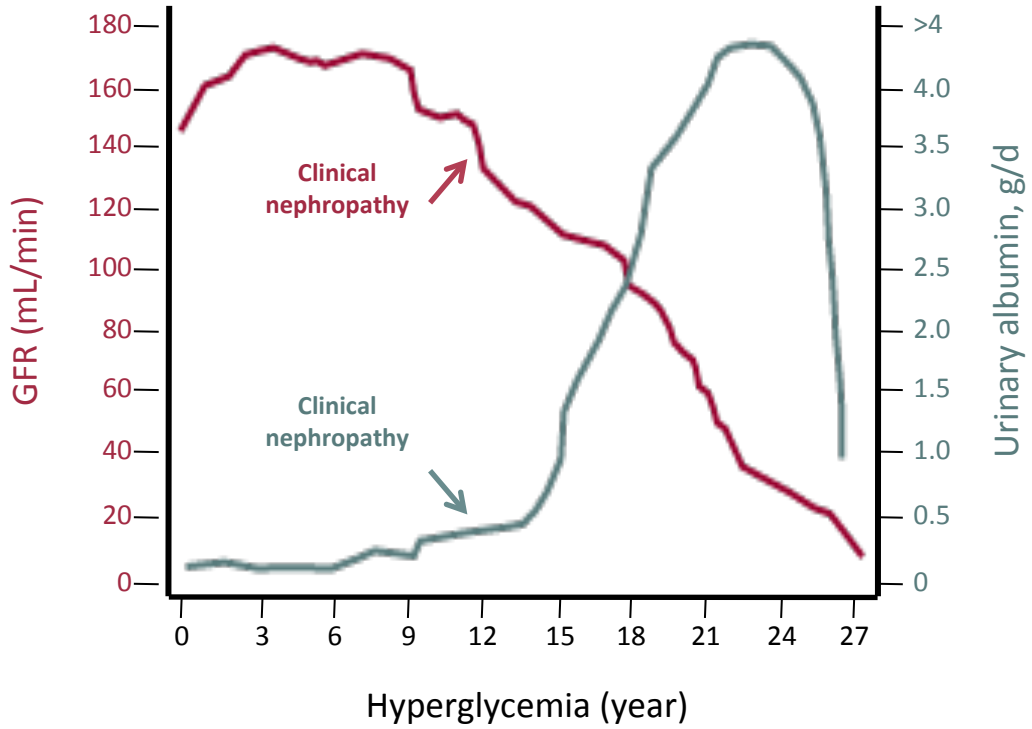
Reference: USRDS 2010 Annual Data Report

Hyperglycemia is associated with hyperfiltration

- Hyperfiltration
  - The initial response to hyperglycemia is an increase in GFR, followed by slow decline.
- Hypertrophy of glomerulus and tubule
  - Nephrons may be damaged or destroyed.
- Diabetic kidney disease generally, but not always, associated with progressive albuminuria.
  - Monitor eGFR and UACR.

Reference: Molitch et al., 2010; Retnakaran et al., 2006

Natural history of diabetic nephropathy: hyperglycemia causes hyperfiltration, may be followed by albuminuria



Reference: Adapted from Friedman, 1999

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Good glycemic control early may reduce CKD later

- There is evidence that control of newly diagnosed diabetes may help prevent CKD.
  - Type 1 diabetes (DM 1)
    - Diabetes Control and Complications Trial (DCCT)
  - Type 2 diabetes (DM 2)
    - United Kingdom Prospective Diabetes Study (UKPDS)

UKPDS: Control of newly diagnosed type 2 DM may lower risk of albuminuria

- Newly diagnosed, first 10 years
  - Median age: 54 years (48–60 years)
- Intensive control defined as A1C < 7.0% (compared to 7.9%)
- 34% reduction in albuminuria
- Long-term data not as clear

Reference: UKPDS 33, 1998; UKPDS 64, 2003

Good control of diabetes of long duration may not be as effective in slowing CKD

- The evidence is not strong.
- Control still matters for other organs.
- Advanced Glycated Endproducts (AGEs) may have altered or destroyed slow turnover proteins (glomerular barrier).

A1C goal is individualized in CKD

- Goal for the general population
  - A1C < 7%
- Less stringent goal may be appropriate for:
  - Frequent severe hypoglycemia
  - Limited life expectancy
  - Advanced microvascular (CKD) or macrovascular complications

Reference: Diabetes Care, (suppl 1) 2011

High protein diets are not recommended for DKD

- Dietary protein may increase GFR and renal blood flow rates. Animal protein may have greater effect than plant protein.
- Dietary protein is a source of nitrogen, phosphorus, potassium, and metabolic acids that need to be filtered and excreted by the kidneys.
- Animal protein intake may be a risk factor for increased urine albumin excretion in hypertension *and* diabetes.

Reference: Friedman, 2004; Bernstein et al., 2007, Wrone et al., 2003

Level of protein for DM and CKD may mean avoiding excessive intake

- RDA = 0.8 g protein/kg body weight (wt)
- American Diabetes Association (2008) recommendations:
  - Normal kidney function: 15–20% protein calories (usual)
  - Early CKD: "reduction" to 0.8–1.0 g/kg body wt
  - Advanced CKD: 0.8 g/kg body wt
- American Dietetic Association Evidence Library for Chronic Kidney Disease (accessed 2/4/2011)
  - 0.8–0.9 g/kg body wt
  - Protein-restriction may improve urine albumin (albuminuria)

Reference: Diabetes Care, 2008

Spontaneous improvement and/or increased frequency of hypoglycemia may indicate CKD is progressing.

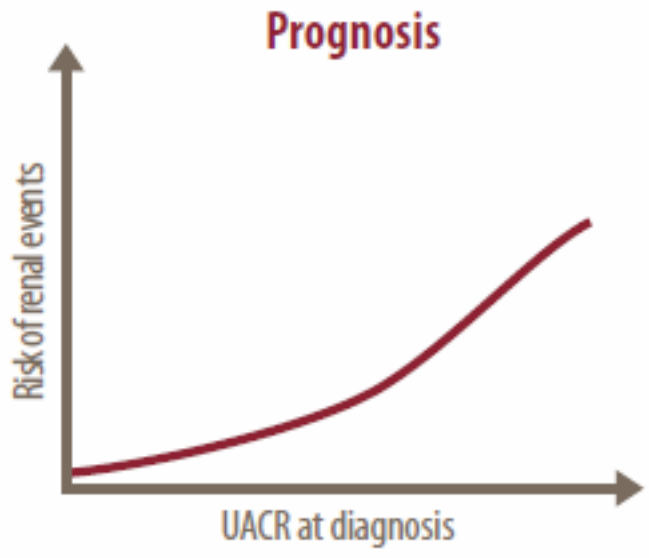
Risk factors for albuminuria

- Known risk factors
  - Hypertension
  - Diabetes
  - Smoking
  - Obesity
- Possible risk factors
  - High sodium intake
  - Excessive protein intake
  - Hyperlipidemia
  - Inflammation

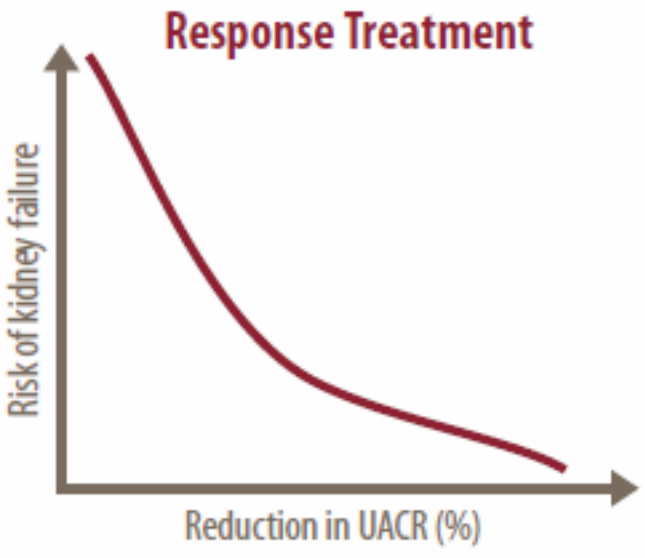
Reference: De Jong & Brenner, 2004

Elevated UACR is associated with risk of renal events; lowering UACR may lower risk of progression

Chronic Renal Insufficiency Cohort Study



RENAAL



Renal events = loss of half of eGFR, dialysis, or death

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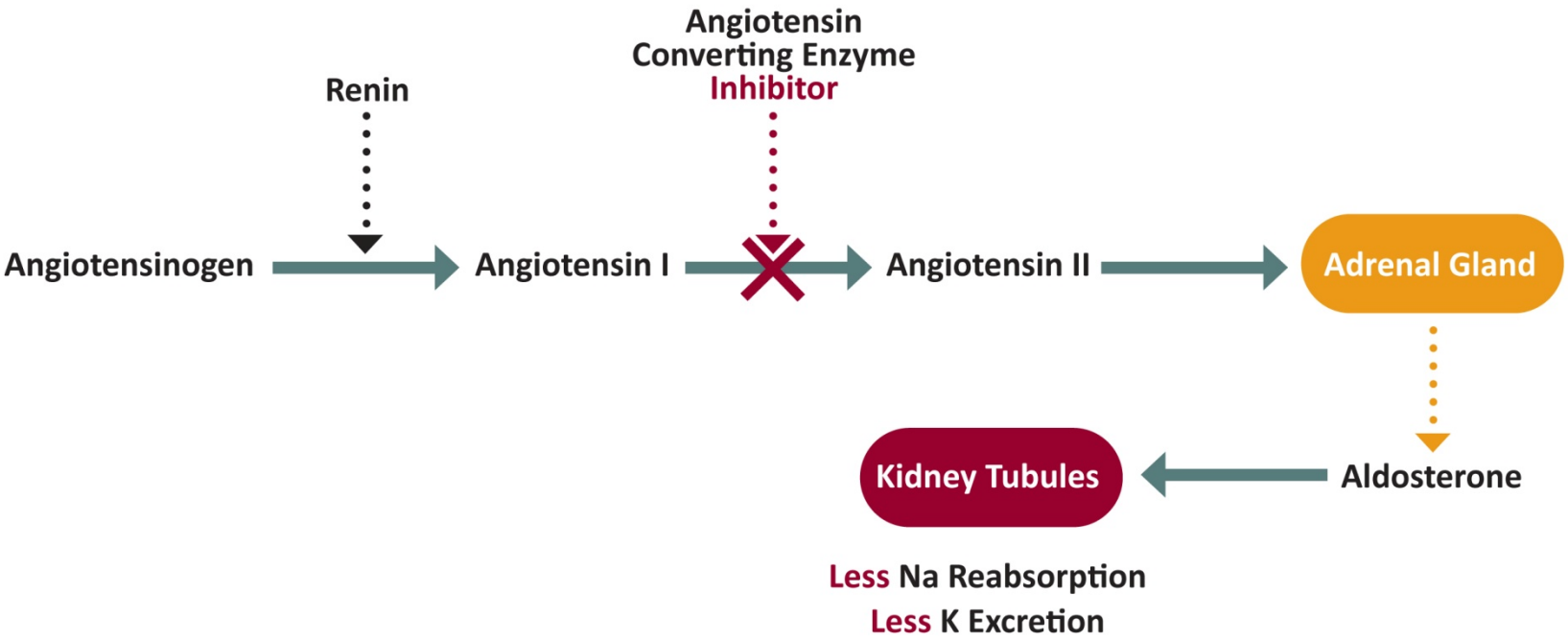
Reference: NIH, February 2010; De Zeeuw et al., 2004

ACEi and ARBs may be renoprotective

- Their effects are beyond blood pressure control.
- They also reduce protein in the urine.
- Sometimes these medications are prescribed to lower urine albumin levels in normotensive people.

Reference: Chobanian et al., 2003; Strippoli et al., 2010; Kunz et al., 2008

ACEi medications block the RAAS and increase the risk for hyperkalemia



Potassium restriction is not indicated in the absence of hyperkalemia

- Specific level of eGFR does not determine need for dietary potassium restriction.
- Restriction is to help achieve and maintain a safe serum potassium level ($\leq$ 5 mEq/L).
- The level of potassium restriction should be individualized.

Intentional weight loss is associated with decreased proteinuria

- Literature review showed weight loss was associated with decreased proteinuria.
  - Dietary restrictions
  - Exercise
  - Anti-obesity medications
  - Bariatric surgery
- No data to evaluate effect on CKD progression.

Reference: Afshinnia et al., 2010

Reducing sodium intake may reduce urine albumin levels

- In the Netherlands, higher sodium intake was associated with increased urine albumin excretion.
- In a 2006 literature review, increasing salt consumption was associated with worsening urine albumin.

Reference: Verhave et al., 2004; Jones-Jones-Burton et al., 2006

Interventions for reducing urine albumin

- Control blood pressure
- Reduce sodium intake
- Achieve good control of diabetes early; may help prevent albuminuria
- Reduce weight (if obese)
- Reduce protein intake, if excessive
- Achieve tobacco cessation

CVD is the leading cause of morbidity and mortality in people with CKD.

CARDIOVASCULAR DISEASE

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CKD complications are nontraditional risk factors for CVD

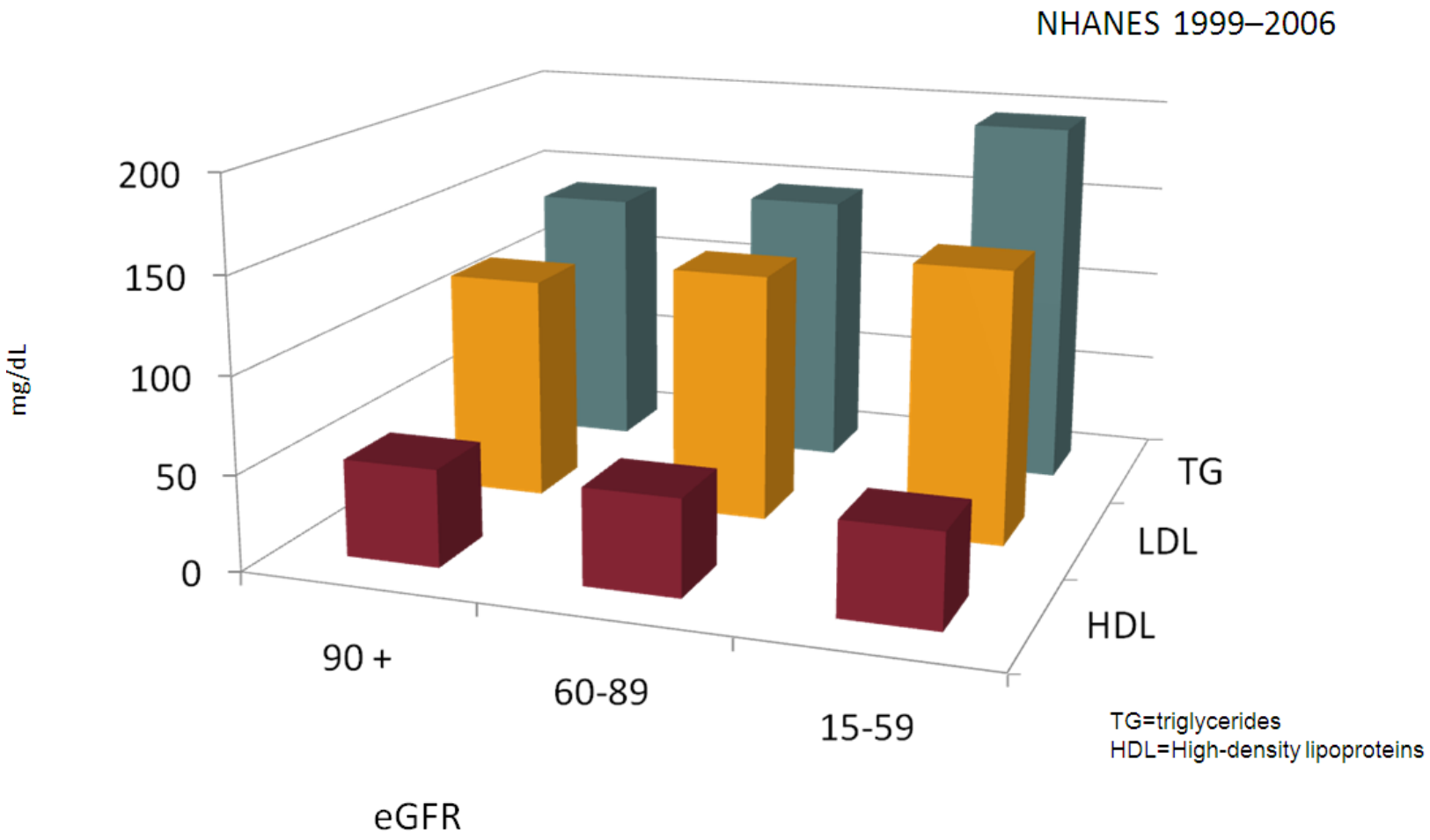
Traditional risk factors

- Hypertension
- Diabetes
- Dyslipidemia
- Smoking
- Age
- Inflammation

Nontraditional risk factors

- Albuminuria
- Anemia
- Abnormal metabolism of calcium and phosphorus

Lipid abnormalities may increase as eGFR declines



Reference: Adapted from Astor et al., 2008

Statins are used with caution in patients with CKD

- Statins reduce hepatic cholesterol synthesis.
- Statins significantly reduce all-cause and CVD mortality in persons with CKD.
- Their use does not appear to slow CKD progression but may reduce proteinuria.
- Monitor for potential side effects.
- Muscle toxicity or elevated liver function tests may be seen with statin use.

Reference: Navaneethan et al., 2009

Complications of CKD

- Anemia
  - Inadequate erythropoietin and iron
  - Hemoglobin and iron indices
- Hyperkalemia
  - Limit dietary potassium when serum level is elevated.
- Hypoalbuminemia
  - Poor oral intake (spontaneous reduction in protein)
  - Inflammation

Complications (continued)

- Metabolic acidosis
  - Maintaining serum CO2 > 22 mEq/L may be beneficial.
  - Animal protein is a source of metabolic acids.
  - Acidosis may be treated with supplemental bicarbonate.
- Bone disease in CKD
  - Calcium, phosphorus, vitamin D, parathyroid hormone
    - Use corrected calcium with hypoalbuminemia
  - Vitamin D supplementation may increase risk of hypercalcemia and hyperphosphatemia

Anemia Guidelines

"…But the company also had another key advocate within many of the nation's hospitals and clinics.

The most commonly used dosing guidelines that doctors in the field used were issued by a group organized by the National Kidney Foundation, which says it has measures in place to manage conflicts of interest. But Amgen was the "founding and principal sponsor" of the guidelines. Moreover, in 2006, of the 16 members of the foundation's panel that created the new dosing guidelines, 10 reported receiving consulting fees, speaking fees or research funds from Amgen or Johnson & Johnson's subsidiary, Ortho Biotech.

It recommended doses at the high end of the FDA target recommendations."

Washington Post 7/20/12

The Transition from Chronic Kidney Disease to Kidney Failure

Management changes as CKD develops and progresses to kidney failure.

U.S. Department of Health and Human Services
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Kidney failure is an eGFR < 15

- Kidneys cannot maintain homeostasis.
- Kidney failure is associated with fluid, electrolyte, and hormonal imbalances and metabolic abnormalities.
- End-stage renal disease (ESRD) means patient is on dialysis or has a kidney transplant.

Kidney disease education is a Medicare benefit

- eGFR < 30
- Medicare B
  - Individual pays 20%, deductible applies
- Qualified providers: physicians, physician assistants, nurse practitioners, and clinical nurse specialists
- Up to six sessions covered

The topics include many of the ones you already know about.

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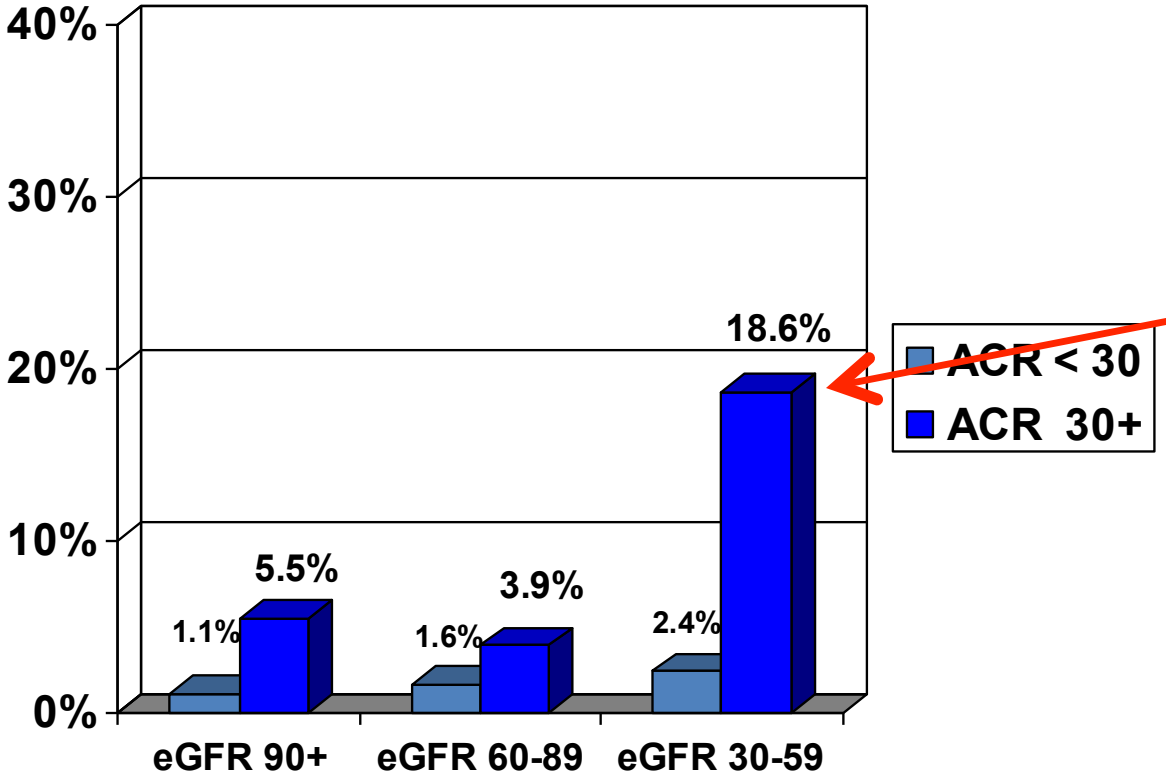
Challenges to Improving CKD Care

- CKD remains under diagnosed
- Implementation of recommended care is poor
- Many clinicians feel inadequately educated
  - Uncertain about how to interpret diagnostic tests
  - Unclear about clinical recommendations
  - Low confidence in their ability to successfully manage CKD
  - Indications for, and process of, referral poorly defined

Patient Awareness of CKD is Low General U.S. Population

"Have you ever been told by a doctor or other health care professional that you had weak or failing kidneys?"



NHANES 1999-2000:
4101 participants

< 20% of patients with moderate to severe CKD said yes

Most had seen a physician within the past year

Adapted from: Coresh, et al. JASN 2005

Awareness & Knowledge about CKD in Patients Seen by Nephrologists

Low Self-Rating Perceived Knowledge N=676	
No Knowledge of Hemodialysis / Peritoneal Dialysis	43% / 57%
Little or No Knowledge Re: Diagnosis	35%

Finkelstein, et al. Kidney International, 2008

Limited Awareness & Objective Knowledge N=401	
Unaware of CKD diagnosis	31%
Do not understand CKD implications, e.g. heart disease	34%
Do not understand kidney functions, e.g. urine production	34%
Do not understand terminology, GFR	32%

Wright, et al. AJKD 2011

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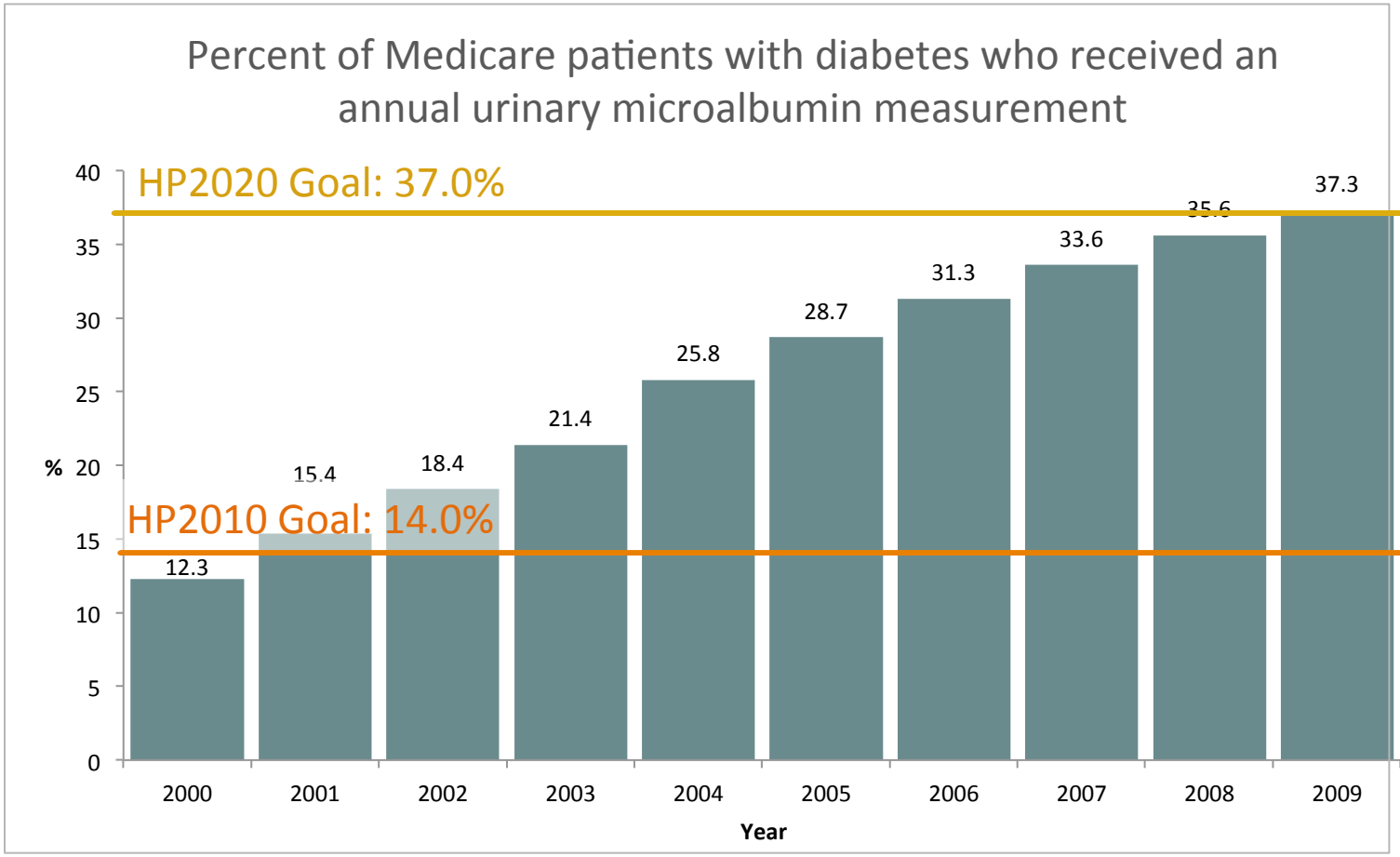
Healthy People 2020: CKD objectives

Increase proportion of persons with CKD	Baseline	Target
CKD 2: who know they have impaired renal function	7.3%	11.3%
CKD 4.1: who receive recommended medical evaluation with serum creatinine, lipids, and microalbuminuria	25.8%	28.4%
CKD 4.2: with type 1 or type 2 diabetes and CKD who receive recommended medical evaluation with serum creatinine, microalbuminuria, HbA1c, lipids, and eye exams	23.1%	25.4%
Reduce proportion of persons with CKD		
CKD 6.1: who have elevated blood pressure	74.1%	66.7%
CKD 6.2: who have elevated lipid levels	29.6%	26.6%

HP2020 D-12

Increase the proportion of persons with diagnosed diabetes who obtain an annual urinary microalbumin measurement



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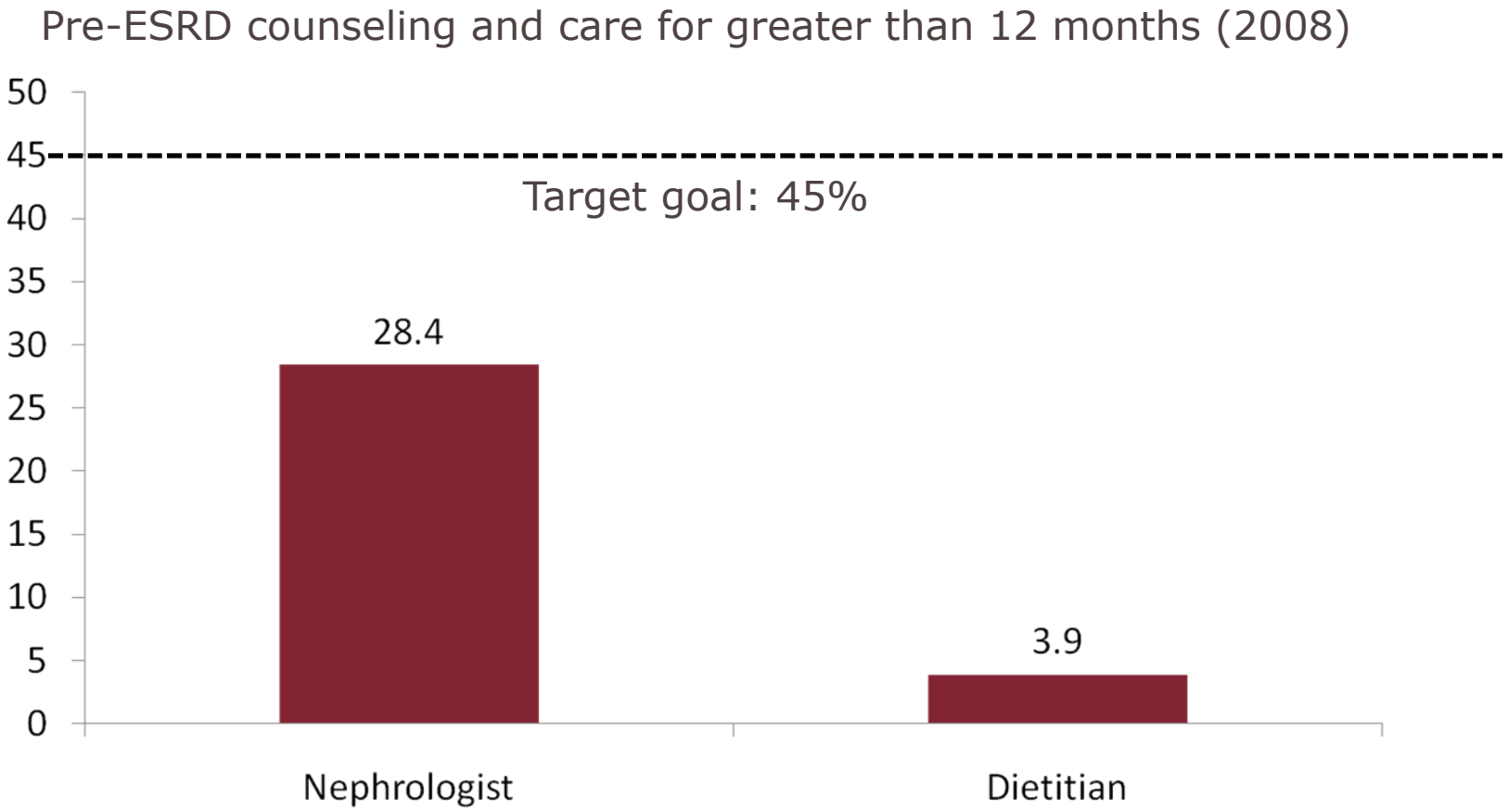
Healthy People 2010: Increase the proportion of treated chronic kidney failure patients who have received counseling on nutrition, treatment choices, and cardiovascular care 12 months before the start of renal replacement therapy.



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Reference: USRDS Annual Data Report (NIDDK, 2010)

Lack of Guidelines is Not the Problem in CKD

Defining optimal care is not the primary barrier to improved outcomes.

Delivering appropriate care to those who need it is the problem we must overcome.

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What Can Primary Care Providers Do?

Delay the need for renal replacement therapy

- Recognize and test at-risk patients: monitor eGFR and UACR
- Screen for anemia (Hgb), malnutrition (albumin), metabolic bone disease (Ca, Phos)
- Treat cardiovascular risk, especially with smokers and hypercholesterolemia
- Refer to dietitian for nutritional guidance
- Educate patients about CKD and treatment

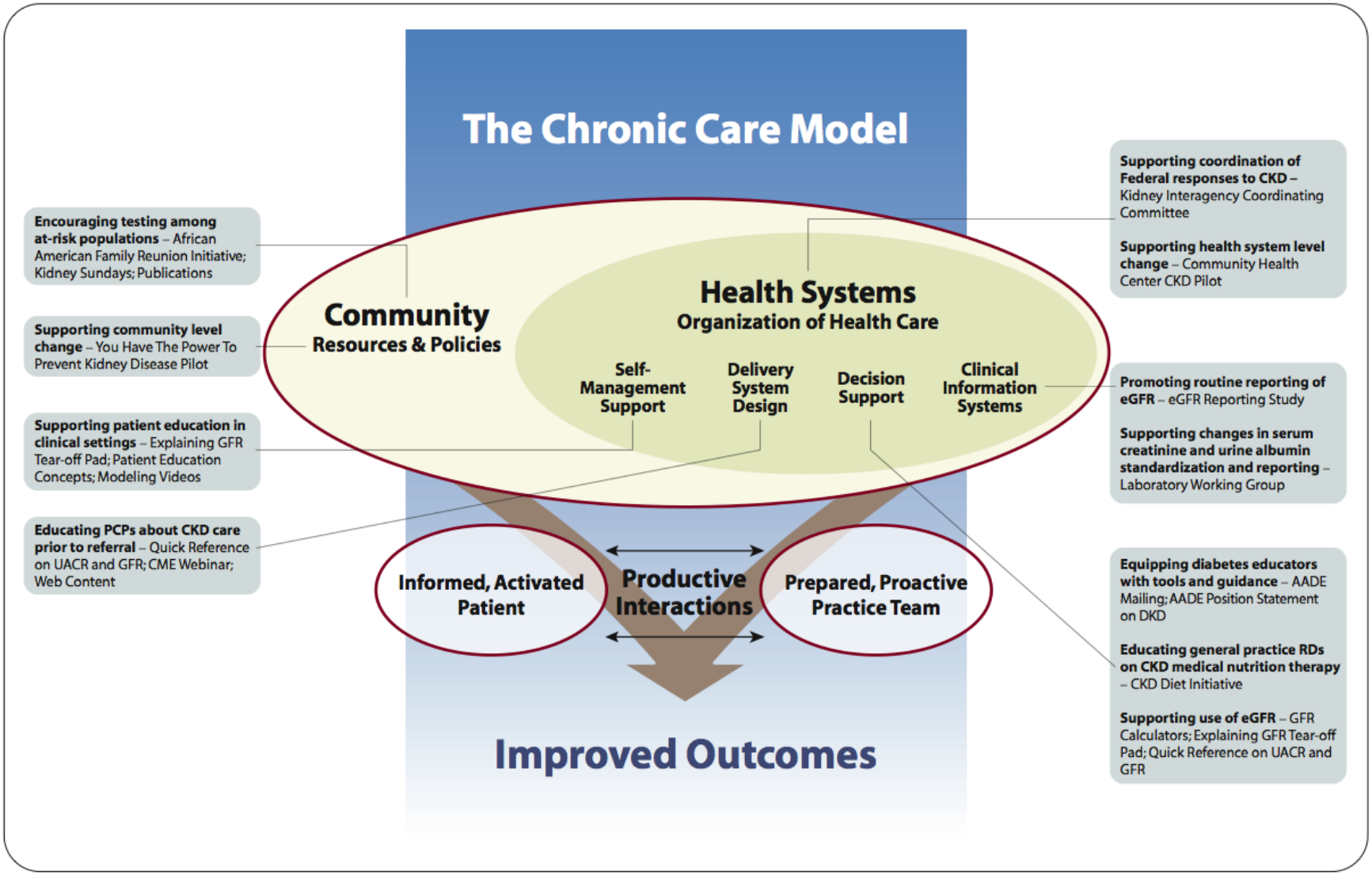
The National Kidney Disease Education Program

NKDEP aims to reduce the morbidity and mortality caused by kidney disease and its complications by:

- Improving early detection of CKD
- Facilitating identification of patients at greatest risk for progression to kidney failure
- Promoting evidence-based interventions to slow progression of kidney disease
- Supporting the coordination of Federal responses to CKD

The Care Model

Where NKDEP Activities Fit In



NKDEP/IHS Co-branded Patient Materials

Chronic Kidney Disease

What Does it Mean for Me?

NKDEP National Kidney Disease Education Program

Indian Health Service DIVISION OF DIABETES TREATMENT & PREVENTION

NKDEP National Kidney Disease Education Program

How well are your kidneys working?

Explaining Your Kidney Test Results

Your GFR result on _____ **was** _____
Date

☐ A GFR of *60 or higher* is in the normal

☐ A GFR *below 60* may mean kidney dise

☐ A GFR of *15 or lower* may mean kidney

What is GFR?

GFR stands for glomerular filtration rate. filter blood.

Your urine albumin result on _____
Date

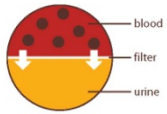
☐ A urine albumin result *below 30* is norma

☐ A urine albumin result *above 30* may mea

What is urine albumin?

Albumin is a protein found in the blood. the urine. A damaged kidney lets some alb your urine, the better.

Inside a *healthy* kidney

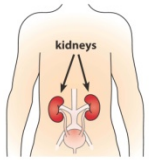


Your blood pressure result on _____
Da

Controlling your blood pressure may help

What your kidneys do

You have two kidneys. Their main job is to filter wastes and extra water out of your blood to make urine.



How your kidneys are checked

Two tests are used to check for kidney disease.

- A blood test checks your GFR, which tells how well your kidneys are filtering.
- A urine test checks for albumin in your urine, a sign of kidney damage.

Why your kidneys are being checked

You need to have your kidneys checked because you can't feel kidney disease. Kidney tests are very important for people who have diabetes, high blood pressure, or heart disease. These conditions can hurt your kidneys.

What happens if you have kidney disease

Kidney disease can be treated. The sooner you know you have kidney disease, the sooner you can get treatment to help delay or prevent kidney failure. Treating kidney disease may also help prevent heart disease.

Treatment goals are to:

- Keep your GFR from going down
- Lower your urine albumin

No matter what your results are:

- Keep your blood pressure, blood glucose, and blood cholesterol in your target range.
- Choose foods that are healthy for your heart and cut back on salt.
- Be more physically active.
- If you smoke, take steps to quit.
- Take medicines the way your provider tells you to.

Notes: _____

U.S. Department of Health and Human Services, National Institutes of Health

NIDDK National Institute of Diabetes and Digestive and Kidney Diseases

Indian Health Service DIVISION OF DIABETES TREATMENT & PREVENTION

For more information, visit www.nkdep.nih.gov or call 1-866-4 KIDNEY (1-866-454-3639).

The National Kidney Disease Education Program (NKDEP) is an initiative of the National Institutes of Health (NIH).

NIH... Turning Discovery Into Health

Revised March 2012 • NIH Publication No. 12-6220 • www.nkdep.nih.gov

2

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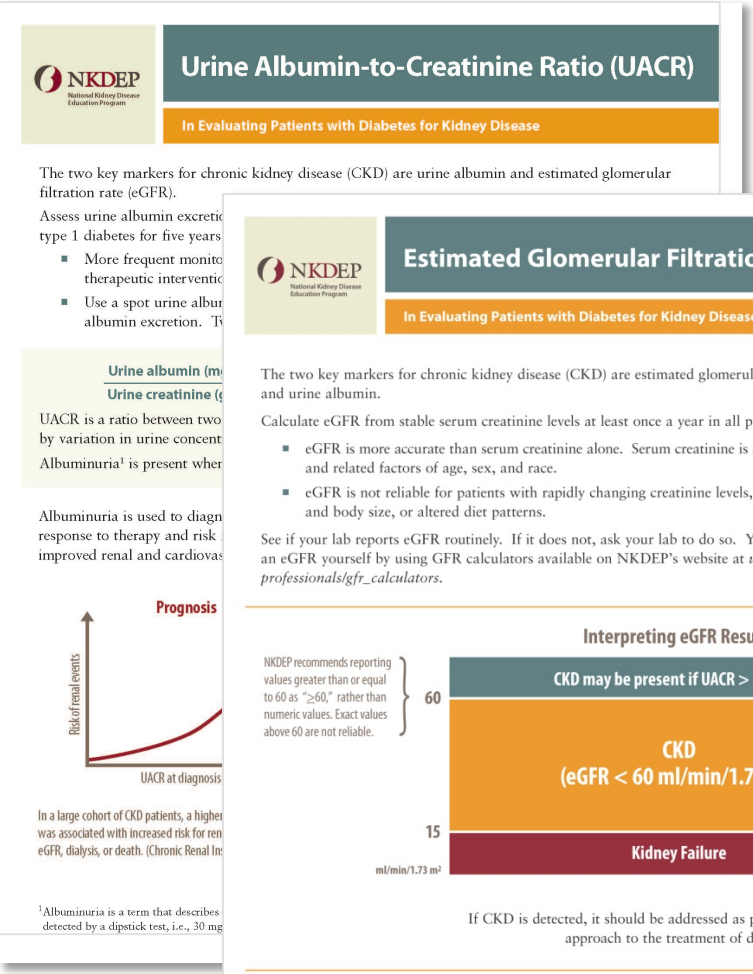
NKDEP/IHS Co-branded Professional Education Materials



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Urine Albumin-to-Creatinine Ratio (UACR)

In Evaluating Patients with Diabetes for Kidney Disease

The two key markers for chronic kidney disease (CKD) are urine albumin and estimated glomerular filtration rate (eGFR).

Assess urine albumin excreti
type 1 diabetes for five years

- More frequent monito
therapeutic interventic
- Use a spot urine albu
albumin excretion. T

Urine albumin (m
Urine creatinine (g

UACR is a ratio between two
by variation in urine concent

Albuminuria[1] is present wher

Albuminuria is used to diagn
response to therapy and risk
improved renal and cardiova

Prognosis

Risk of renal events

UACR at diagnosis

In a large cohort of CKD patients, a higher
was associated with increased risk for ren
eGFR, dialysis, or death. (Chronic Renal In

[1]Albuminuria is a term that describes
detected by a dipstick test, i.e., 30 mg

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Estimated Glomerular Filtration Rate (eGFR)

In Evaluating Patients with Diabetes for Kidney Disease

The two key markers for chronic kidney disease (CKD) are estimated glomerular filtration rate (eGFR) and urine albumin.

Calculate eGFR from stable serum creatinine levels at least once a year in all patients with diabetes.

- eGFR is more accurate than serum creatinine alone. Serum creatinine is affected by muscle mass, and related factors of age, sex, and race.
- eGFR is not reliable for patients with rapidly changing creatinine levels, extremes in muscle mass and body size, or altered diet patterns.

See if your lab reports eGFR routinely. If it does not, ask your lab to do so. You can also calculate an eGFR yourself by using GFR calculators available on NKDEP's website at *www.nkdep.nih.gov/professionals/gfr_calculators*.

Interpreting eGFR Results

NKDEP recommends reporting values greater than or equal to 60 as "≥60," rather than numeric values. Exact values above 60 are not reliable.

60 — CKD may be present if UACR > 30mg/g

CKD
(eGFR < 60 ml/min/1.73 m²)

15 — Kidney Failure

ml/min/1.73 m²

If CKD is detected, it should be addressed as part of a comprehensive approach to the treatment of diabetes.

U.S. Department of Health and Human Services
National Institutes of Health

NIDDK National Institute of Diabetes and Digestive and Kidney Diseases

Indian Health Service
Division of Diabetes Treatment & Prevention

For more information on UACR, eGFR, and kidney disease, go to *www.nkdep.nih.gov*.

The National Kidney Disease Education Program (NKDEP) of the National Institutes of Health aims to improve early detection of kidney disease, help identify patients at risk for progression to kidney failure, and promote interventions to slow progression of kidney disease.

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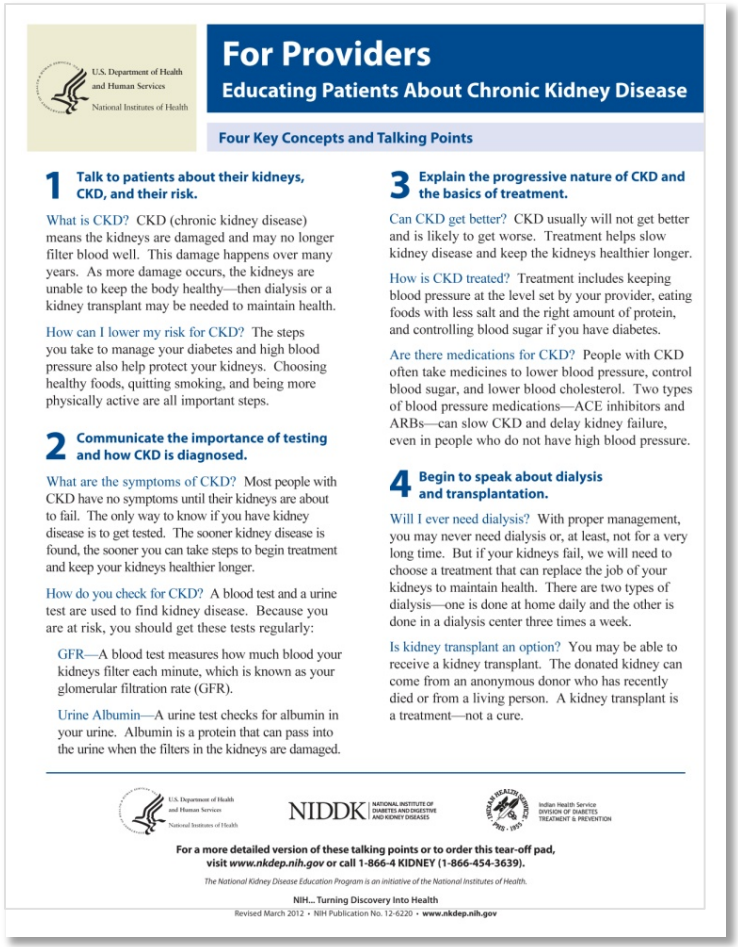
Revised March 2012 • NIH Publication No. 12-6286 • www.nkdep.nih.gov



U.S. Department of Health and Human Services
National Institutes of Health

For Providers

Educating Patients About Chronic Kidney Disease

Four Key Concepts and Talking Points

1 Talk to patients about their kidneys, CKD, and their risk.

What is CKD? CKD (chronic kidney disease) means the kidneys are damaged and may no longer filter blood well. This damage happens over many years. As more damage occurs, the kidneys are unable to keep the body healthy—then dialysis or a kidney transplant may be needed to maintain health.

How can I lower my risk for CKD? The steps you take to manage your diabetes and high blood pressure also help protect your kidneys. Choosing healthy foods, quitting smoking, and being more physically active are all important steps.

2 Communicate the importance of testing and how CKD is diagnosed.

What are the symptoms of CKD? Most people with CKD have no symptoms until their kidneys are about to fail. The only way to know if you have kidney disease is to get tested. The sooner kidney disease is found, the sooner you can take steps to begin treatment and keep your kidneys healthier longer.

How do you check for CKD? A blood test and a urine test are used to find kidney disease. Because you are at risk, you should get these tests regularly:

GFR—A blood test measures how much blood your kidneys filter each minute, which is known as your glomerular filtration rate (GFR).

Urine Albumin—A urine test checks for albumin in your urine. Albumin is a protein that can pass into the urine when the filters in the kidneys are damaged.

3 Explain the progressive nature of CKD and the basics of treatment.

Can CKD get better? CKD usually will not get better and is likely to get worse. Treatment helps slow kidney disease and keep the kidneys healthier longer.

How is CKD treated? Treatment includes keeping blood pressure at the level set by your provider, eating foods with less salt and the right amount of protein, and controlling blood sugar if you have diabetes.

Are there medications for CKD? People with CKD often take medicines to lower blood pressure, control blood sugar, and lower blood cholesterol. Two types of blood pressure medications—ACE inhibitors and ARBs—can slow CKD and delay kidney failure, even in people who do not have high blood pressure.

4 Begin to speak about dialysis and transplantation.

Will I ever need dialysis? With proper management, you may never need dialysis or, at least, not for a very long time. But if your kidneys fail, we will need to choose a treatment that can replace the job of your kidneys to maintain health. There are two types of dialysis—one is done at home daily and the other is done in a dialysis center three times a week.

Is kidney transplant an option? You may be able to receive a kidney transplant. The donated kidney can come from an anonymous donor who has recently died or from a living person. A kidney transplant is a treatment—not a cure.

U.S. Department of Health and Human Services
National Institutes of Health

NIDDK National Institute of Diabetes and Digestive and Kidney Diseases

Indian Health Service
Division of Diabetes Treatment & Prevention

For a more detailed version of these talking points or to order this tear-off pad, visit *www.nkdep.nih.gov* or call 1-866-4 KIDNEY (1-866-454-3639).

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National Institutes of Health

IHS Collaboration on NKDEP's Kidney Disease Education Lesson Series

- Lesson objectives
- Session starter
- Topics & Points to Cover
- Materials/Content for Learners
- Background/Clinical Information for Educators
- Sample Outcome Assessment Questions
- Additional Resources for Download

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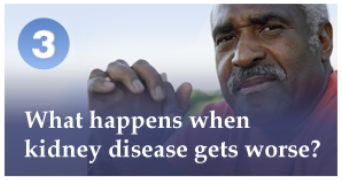

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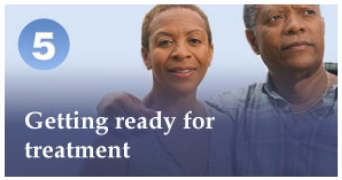

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CKD Diet Counseling (Medical Nutrition Therapy) Referral Form

NAME | DATE OF BIRTH | MEDICAL RECORD # (If applicable)

REASON FOR REFERRAL

Medical nutrition therapy for chronic kidney disease. Specific concerns or questions:

CKD DIAGNOSTIC CODE 585.___

BLOOD PRESSURE | WEIGHT | HEIGHT

RECENT WEIGHT CHANGE? ☐ YES ☐ NO

FOR DIABETICS YEAR OF DIAGNOSIS | A1C | MONTH/YEAR

LABORATORY ASSESSMENT (MOST RECENT VALUES)

PROTEINURIA ☐ NOT PRESENT ☐ IF PRESENT, SINCE MONTH/YEAR

UACR (URINE ALBUMIN-TO-CREATININE RATIO) MONTH/YEAR

eGFR (ESTIMATED GLOMERULAR FILTRATION RATE) MONTH/YEAR

K		HCO3		BUN		Ca		Phos		Hgb	
LDL		HDL		TG		iPTH		Vit D		Alb	

CURRENT MEDICATIONS (or attach list)

KNOWLEDGE

DOES THE PATIENT KNOW HE/SHE HAS KIDNEY DISEASE?	☐ YES	☐ NO	☐ DON'T KNOW
DOES THE PATIENT KNOW THE SEVERITY?	☐ YES	☐ NO	☐ DON'T KNOW
IS THE PATIENT AWARE THAT HE/SHE MAY NEED DIALYSIS?	☐ YES	☐ NO	☐ DON'T KNOW
PREVIOUS DIET COUNSELING FOR CKD?	☐ YES	☐ NO	☐ DON'T KNOW

ADDITIONAL INFORMATION

REFERRED BY _____

SIGNATURE _____ DATE _____

PHONE _____ EMAIL _____

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Considerations for nephrology referral

- Treat primary kidney diseases such as glomeruleronephritis.
- Prepare for renal replacement therapy, especially when eGFR is less than 30.
- Assist with diagnostic challenges.
- Rapid decrease of eGFR.
- Assist with therapeutic challenges related to CKD complications such as blood pressure, anemia, abnormal mineral metabolism and bone disorders, hyperkalemia, hyperphosphatemia, malnutrition, and secondary hyperparathryoidism.
- Assist with acute kidney injury.

Nephrology Referral

NAME

DATE OF BIRTH

FACILITY/PRACTICE AND RECORD NUMBER

REASON FOR REFERRAL

FOR DIABETICS YEAR OF DIAGNOSIS | RECENT A1C | MONTH/YEAR

COMPLICATIONS RETINOPATHY: ☐ BDR ☐ PDR ☐ NOT PRESENT ☐ NO DILATED EXAM

☐ NEUROPATHY ☐ PVD OTHER

ALBUMINURIA ☐ NOT PRESENT ☐ IF PRESENT, SINCE MONTH/YEAR

MOST RECENT UACR

HEMATURIA ☐ NOT PRESENT ☐ IF PRESENT, SINCE

URINE SEDIMENT

eGFR MOST RECENT eGFR MONTH/YEAR

BLOOD PRESSURE AT LAST VISIT | USUAL RANGE

ADDITIONAL EVALUATION ANA | RF | C3 | C4 | HBsAg | AntiHCV

SPEP | UPEP | RENAL U/S

OTHER

FAMILY HISTORY KIDNEY DISEASE ☐ NO ☐ YES IF YES, HOW RELATED

OTHER CONDITION(S) AND HOW RELATED

CURRENT MEDICATIONS *(or attach list)*

KNOWLEDGE DOES THE PATIENT KNOW HE/SHE HAS KIDNEY DISEASE? ☐ YES ☐ NO ☐ DON'T KNOW

DOES THE PATIENT KNOW THE SEVERITY? ☐ YES ☐ NO ☐ DON'T KNOW

IS THE PATIENT AWARE THAT HE/SHE MAY NEED DIALYSIS? ☐ YES ☐ NO ☐ DON'T KNOW

ADDITIONAL INFORMATION

REFERRED BY _____ DATE _____

CONTACT TELEPHONE _____ EMAIL _____

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For more information about why these data are important to share with the nephrologist, visit www.nkdep.nih.gov.

NKDEP/IHS Nephrology Telemedicine Clinic

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Lessons Learned

- CKD is part of primary care
- Changing patterns of care requires changing “the system” (CCM)
- Improvement in care results from changes implemented by physicians and non-physician health professionals
- Implemented through diabetes care delivery system; not specialty clinic based
- Surveillance and prevention are part of multisystem chronic disease control
- Emphasis on ensuring that patient received care from competent and interested individual, not referral

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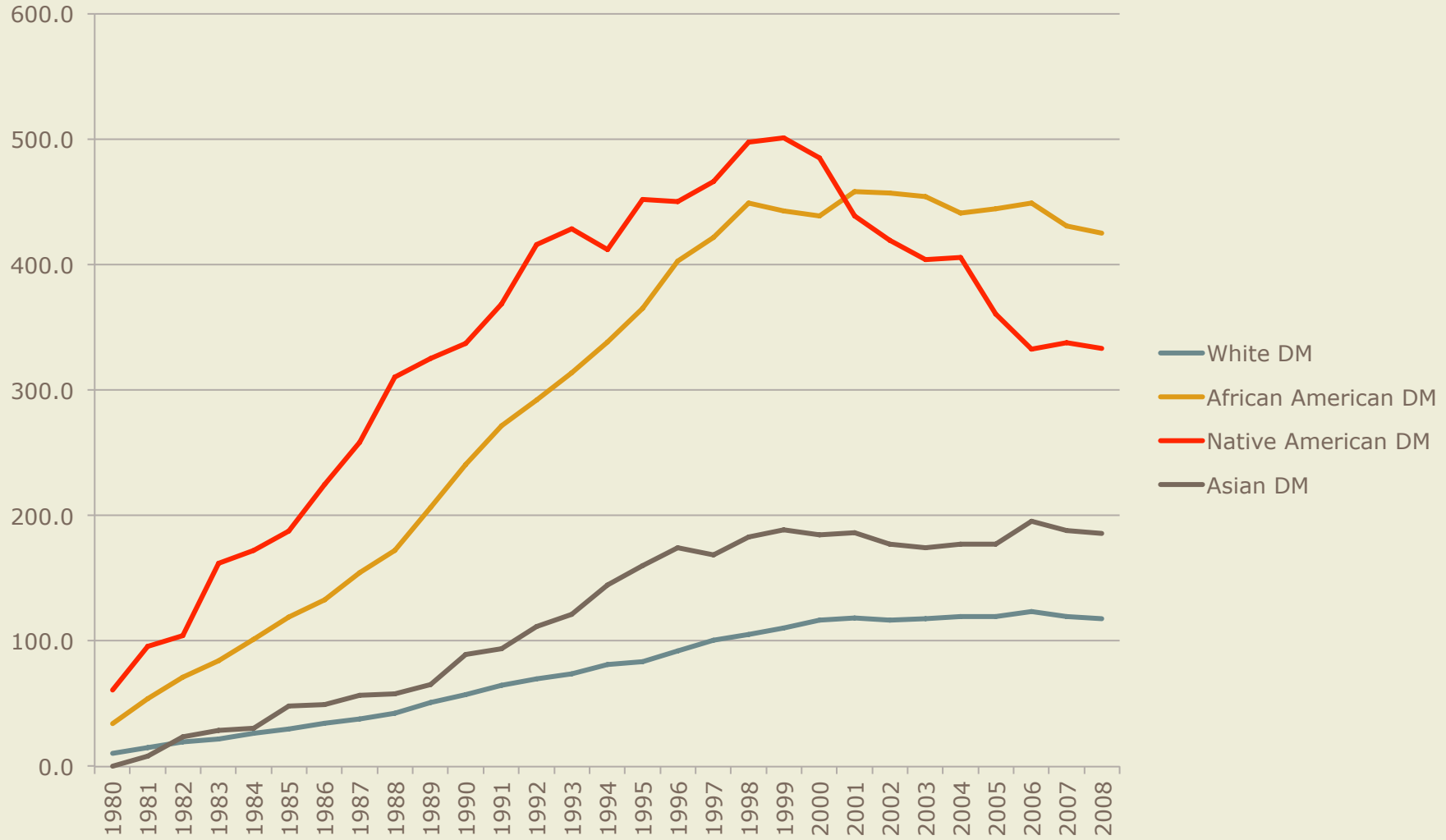
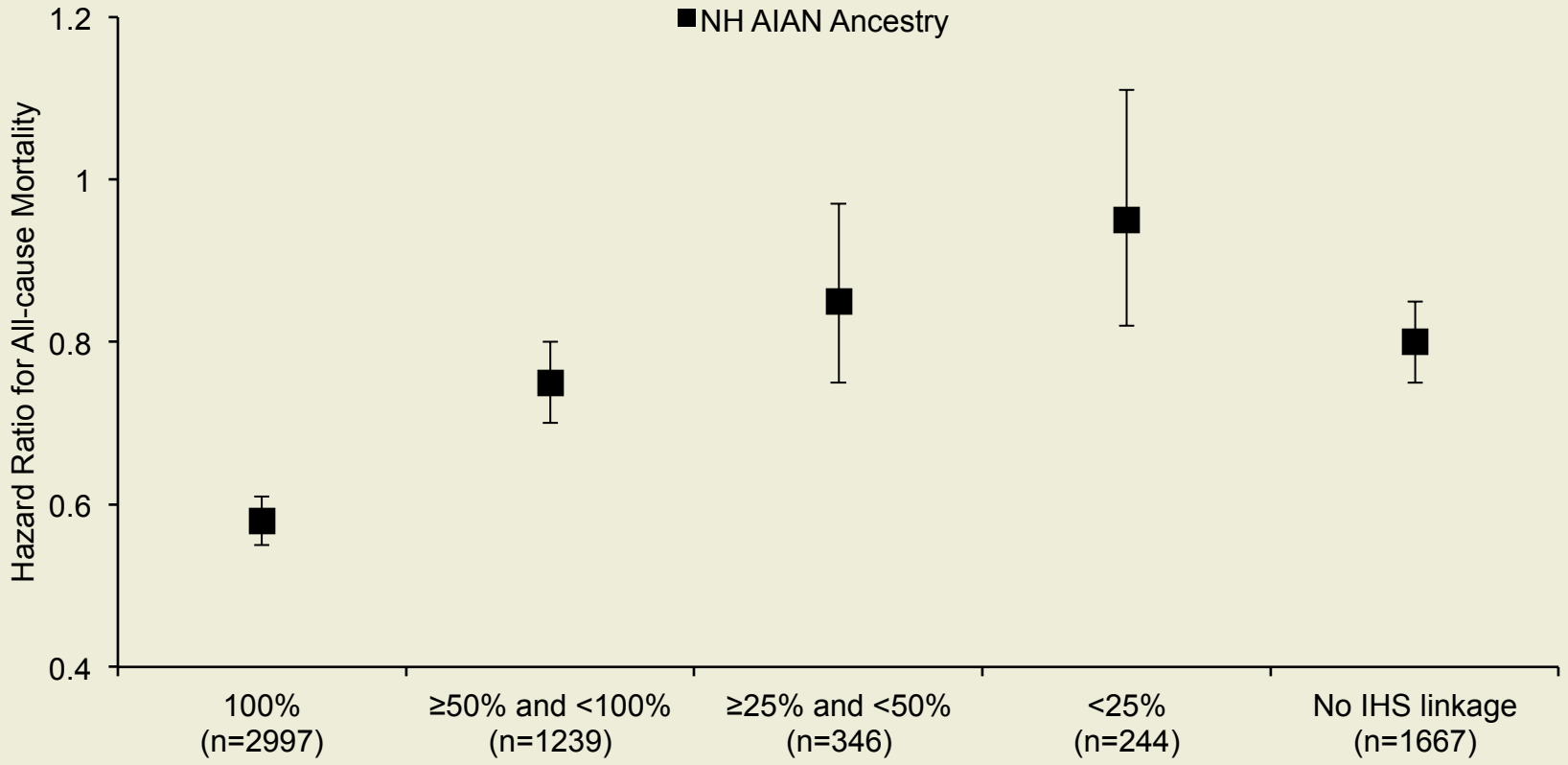
Incident Rates of ESRD due to Diabetes 1980-2008

per million population, by age, gender, race, & ethnicity



Survival of AI/AN with ESRD by Indian Heritage



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Improving CKD Care

- Improving the care of people with CKD requires changing clinical practice in settings where high risk populations are served
- Improving care of patients prior to referral to subspecialty care is necessary to provide better longterm outcomes and to promote self-management
- Indian Health Care is a model for improving care for people with diabetes and kidney disease
- NKDEP will collaborate closely with I/T/U to develop effective models for CKD intervention within the primary care setting

Questions & Comments

andrew.narva@nih.gov

All materials available:

http://nkdep.nih.gov/