Diet Counseling for People with Diabetes and Kidney Disease

Tuesday, May 20, 2014
1-2 PM ET (12-1 PM CT)

Sponsored by the National Diabetes Education Program and the Diabetes Care and Education Practice Group of the Academy of Nutrition and Dietetics
NDEP / DCE Partnership

Ann Constance, MA, RD, CDE
NDEP Liaison for DCE

Partnership Activities:
• Organizing joint webinars
• DCE co-brands and promotes NDEP publications
• DCE featured in NDEP’s December 2013 Partner Spotlight
Webinar Logistics

• All lines are muted
• Two ways to ask questions during Q&A period:
  1. Type your question into the question section and we will read your question aloud.
  2. Click the “raise hand” icon and we will call your name and unmute your line allowing you to ask your question.
Presenter

Andrew S. Narva, MD
Director
National Kidney Disease Education Program
National Institutes of Health
Diet Counseling for People with Diabetes and Kidney Disease

Diabetes Care and Education Practice Group
Academy of Nutrition and Dietetics

Andrew S Narva, MD
National Kidney Disease Education Program
Objectives

- Burden of kidney disease due to DM (DKD) in US
- Laboratory tests for identifying and monitoring DKD and assessing risk for progression
- Interventions to slow progression of DKD
- NKDEP tools for dietitians
CKD is reduced kidney function and/or kidney damage

- **Chronic Kidney Disease**
  - Kidney function
    - Glomerular filtration rate (GFR) < 60 mL/min/1.73 m² 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

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.
“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.

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

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.
- **eGFR estimates the measured GFR**
- eGFR is **not** the measured GFR.
How to explain eGFR results to patients

- Normal: > 60 mL/min/1.73 m²
- Kidney disease: 15–59 mL/min/1.73 m²
- Kidney failure: < 15 mL/min/m²
Urine albumin is a marker for kidney damage

- Urine albumin measures albumin in the urine.
- An abnormal urine albumin level is often the earliest marker for kidney disease complicating 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)
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).

\[
\text{Urine albumin (mg/dL)} = \frac{\text{UACR (mg/g)}}{\text{Urine creatinine (g/dL)}} \approx \text{Albumin excretion in mg/da}
\]

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

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.
Explaining urine albumin

Your urine albumin result on [_______] was [_______].

☐ A urine albumin result below 30 is normal.

☐ A urine albumin result above 30 may mean kidney disease.

What is urine albumin?

Albumin is a protein found in the blood. A healthy kidney does not let albumin pass into the urine. A damaged kidney lets some albumin pass into the urine. The less albumin in your urine, the better.

Inside a healthy kidney

blood
filter
urine

Inside a damaged kidney

blood
filter
urine
albumin
Natural history of diabetic nephropathy: hyperglycemia causes hyperfiltration, may be followed by albuminuria

Reference: Adapted from Friedman, 1999
Prevalence of Diabetes; United States, 2005-2008

25.8 million people with diabetes; 8.3% of the US population

2005-2008 National Health and Nutrition Examination Survey
2011 National Diabetes Fact Sheet
Prevalence of Diabetic Kidney Disease (DKD) Among Adults with Diabetes; United States, 2005-2008

<table>
<thead>
<tr>
<th>Prevalence (%)</th>
<th>Total</th>
<th>Albuminuria</th>
<th>Impaired GFR</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.5%</td>
<td></td>
<td>16.8%</td>
<td>10.8%</td>
<td>6.9%</td>
</tr>
</tbody>
</table>

Albuminuria = ACR ≥30 mg/g
Impaired GFR = eGFR <60 ml/min/1.73m²

*JAMA 305:2532-2539, 2011*
10-Year Mortality in Type 2 Diabetes in the United States

Mortality in persons without diabetes or kidney disease

*Standardized to age, sex, and race of study population

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

Diabetes is the leading cause of ESRD, followed by hypertension

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)

Reference: USRDS Annual Data Report (NIDDK, 2009)
Key Issues in Managing DKD

- 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
Therapy to Slow Progression

- Hypertension
- Diabetes
- Urine Albumin
- CVD Risk Factors
Blood pressure is poorly controlled in people with CKD

Systolic Blood Pressure ≥ 140 mm Hg

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No CKD</td>
<td>10%</td>
</tr>
<tr>
<td>eGFR ≥60</td>
<td>30%</td>
</tr>
<tr>
<td>eGFR 30-&lt;60</td>
<td>40%</td>
</tr>
<tr>
<td>eGFR &lt; 30</td>
<td>50%</td>
</tr>
</tbody>
</table>

Reference: Adapted from USRDS 2009 Annual Data Report
Individualized blood pressure goals in CKD

- Target of < 140/90 mmHg endorsed by JNC 8.
- Uncontrolled hypertension (systolic blood pressure > 160) is a major challenge.
- Issue of BP goal with elevated albuminuria unresolved.

Reference: Chobanian et al., 2003; Jafar et al., 2003
ACEi and ARBs are renoprotective

- Effects are beyond blood pressure control.
- Reduce protein in the urine.
- Sometimes these medications are prescribed to lower urine albumin levels in normotensive people.
- Small increase in creatinine may reflect efficacy

Reference: Chobanian et al., 2003; Strippoli et al., 2010; Kunz et al., 2008
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 (≤ 5 mEq/L).
- The level of potassium restriction should be individualized.
The DASH diet lowers blood pressure in the general population

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.
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
Treating Hyperglycemia in Patients with Chronic Kidney Disease

- Hyperglycemia harms kidneys.
- Intensive glycemic control increases the risk of severe hypoglycemia.
- Evidence that intensive glycemic control reduces the kidney complications of diabetes is based almost exclusively on prevention of micro- and macroalbuminuria.
- The benefits of intensive glycemic control must be balanced against the potential harm of this intervention.
- Hypoglycemia may be a sign that kidney disease has progressed.
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)
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
Spontaneous improvement and/or increased frequency of hypoglycemia may indicate CKD is progressing.
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
  - 0.8–0.9 g/kg body wt
  - Protein-restriction may improve urine albumin (albuminuria)

Reference: Diabetes Care, 2008
Effect of DKD on the Risk of Renal Events in ADVANCE

HR = 22.2 (95% CI 7.6-64.7)

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

Chronic Renal Insufficiency Cohort Study        RENAAL

Prognosis

Risk of renal events

UACR at diagnosis

Response Treatment

Risk of kidney failure

Reduction in UACR (%)

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

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

- Higher sodium intake is 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
CVD is the leading cause of morbidity and mortality in people with CKD.

CARDIOVASCULAR DISEASE
CKD complications are nontraditional risk factors for CVD

<table>
<thead>
<tr>
<th>Traditional risk factors</th>
<th>Nontraditional risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>Albuminuria</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Anemia</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>Abnormal metabolism of calcium and phosphorus</td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Inflammation</td>
<td></td>
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</table>
Effect of DKD on the Risk of Cardiovascular Disease in ADVANCE

HR = 3.2 (95% CI 2.2-4.7)

HR = 5.9 (95% CI 3.5-10.2)

Lipid abnormalities may increase as eGFR declines

Reference: Adapted from Astor et al., 2008
Statins are used 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.
- Muscle toxicity or elevated liver function tests may be seen with statin use.

Reference: Navaneethan et al., 2009
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

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Knowledge of Hemodialysis / Peritoneal Dialysis</td>
<td>43% / 57%</td>
</tr>
<tr>
<td>Little or No Knowledge Re: Diagnosis</td>
<td>35%</td>
</tr>
</tbody>
</table>


## Limited Awareness & Objective Knowledge N=401

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaware of CKD diagnosis</td>
<td>31%</td>
</tr>
<tr>
<td>Do not understand CKD implications, e.g. heart disease</td>
<td>34%</td>
</tr>
<tr>
<td>Do not understand kidney functions, e.g. urine production</td>
<td>34%</td>
</tr>
<tr>
<td>Do not understand terminology, GFR</td>
<td>32%</td>
</tr>
</tbody>
</table>

*Wright, et al. AJKD 2011*
## Healthy People 2020: CKD Objectives

**Increase proportion of persons with CKD**

<table>
<thead>
<tr>
<th>Description</th>
<th>Baseline</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>CKD 2: who know they have impaired renal function</td>
<td>7.3%</td>
<td>11.3%</td>
</tr>
<tr>
<td>CKD 4.1: who receive recommended medical evaluation with serum creatinine, lipids, and microalbuminuria</td>
<td>25.8%</td>
<td>28.4%</td>
</tr>
<tr>
<td>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</td>
<td>23.1%</td>
<td>25.4%</td>
</tr>
</tbody>
</table>

**Reduce proportion of persons with CKD**

<table>
<thead>
<tr>
<th>Description</th>
<th>Baseline</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>CKD6.1: who have elevated blood pressure</td>
<td>74.1%</td>
<td>66.67%</td>
</tr>
<tr>
<td>CKD 6.2: who have elevated lipid levels</td>
<td>29.6%</td>
<td>26.6%</td>
</tr>
</tbody>
</table>
**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.

Pre-ESRD counseling and care for greater than 12 months (2008)

Reference: USRDS Annual Data Report (NIDDK, 2010)
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., PTH)
- Treat cardiovascular risk, especially with smokers and hypercholesterolemia
- Refer to dietitian for nutritional guidance
- Educate patients about CKD and treatment
NKDEP and the Care Model
Where NKDEP Activities Fit In

The Chronic Care Model

**Community Resources & Policies**
- Encouraging testing among at-risk populations – African American Family Reunion Initiative; Kidney Sundays; Publications
- Supporting community level change – You Have The Power To Prevent Kidney Disease Pilot
- Supporting patient education in clinical settings – Explaining GFR Tear-off Pad; Patient Education Concepts; Modeling Videos
- Educating PCPs about CKD care prior to referral – Quick Reference on UACR and GFR; CME Webinar; Web Content

**Health Systems Organization of Health Care**
- Self-Management Support
- Delivery System Design
- Decision Support
- Clinical Information Systems

**Health Systems**

**Improved Outcomes**

**Informed, Activated Patient**

**Productive Interactions**

**Prepared, Proactive Practice Team**

**Supporting coordination of Federal responses to CKD – Kidney Intermency Coordinating Committee**

**Supporting health system level change – Community Health Center CKD Pilot**

**Promoting routine reporting of eGFR – eGFR Reporting Study**

**Supporting changes in serum creatinine and urine albumin standardization and reporting – Laboratory Working Group**

**Equipping diabetes educators with tools and guidance – AADEd Mailing: AADEd Position Statement on DKA**

**Educating general practice RDs on CKD medical nutrition therapy – CKD Diet Initiative**

**Supporting use of eGFR – GFR Calculators, Explaining GFR Tear-off Pad; Quick Reference on UACR and GFR**
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 ____________

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 __________________
NKDEP CKD Diet initiative

- General Practice Dietitians
  - *Assessment, Management and Treatment Guide for CKD*
  - Patient factsheets
  - Five training modules
    - Certificate Training Program

- Dietetic Educators (academic and internships)
  - Focus group with educators
    - Not comfortable with CKD and little clinical experience
    - Slide deck and case studies
Reference: http://nkdep.nih.gov/resources.shtml
The dietetic educator materials suite

- **Chronic Kidney Disease 101: Nutrition Intervention**
  - Overview of kidney function and kidney disease
  - Diet information and medical nutrition therapy
- Outpatient case studies
Educating the educators

- Academy of Nutrition and Dietetics’ Nutrition and Dietetics Educators and Preceptors Practice Group
  - Original five training modules—self study
  - Overview presentation and others?
    - How to implement the NKDEP materials in the classroom and with interns
  - Cases will be presented in a simulated E.H.R.
Incident Rates of ESRD due to Diabetes 1980-2008

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

[Graph showing incident rates of ESRD due to diabetes from 1980 to 2008 for different groups: White DM, African American DM, Native American DM, and Asian DM.]
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
Questions & Comments

andrew.narva@nih.gov

http://nkdep.nih.gov/
Additional Patient Education Resources

Joanne Gallivan, MS, RD
Director, National Diabetes Education Program
National Institute of Diabetes and Digestive and Kidney Diseases
National Institutes of Health
CPEU Certificate

• Everyone who is registered on the DCE website will receive an email within the next 24 hours that contains a link to the CPE certificate

• If you are an RD, please use this link to obtain and print your CPE certificate

• If you do not receive the email please contact DCE at dcewebinars@gmail.com
NDEP Certificate of Completion and Evaluation

• Certificate of Completion
  – ndep@hagersharp.com

• Webinar Evaluation

• Webinar Recording will be posted on the NDEP Webinars page
  – ndep.nih.gov/resources/webinars
  – All participants will be notified when recording and slides are available
Questions and Answers
Thank you!

National Diabetes Education Program
A program of the National Institutes of Health and the Centers for Disease Control and Prevention

www.ndep.nih.gov
1-800-860-8747
TTY: 1-866-569-1162