

# Diabetic Nephropathy

## Wisconsin Diabetes Essential Care Guidelines: Kidney Care

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# Diabetes

- The leading cause of kidney failure in the US
- Diabetic nephropathy 20-40% of people with diabetes
- Without intervention: progress to ESRD ~ 5-7 years
- Main influences on progression: glycemic control and BP
- Microalbuminuria confers twice the risk of progression

# ***Screening for Kidney Disease and Interpreting the Results***

- Typical Disease Course:
  - Microalbuminuria (small amounts of albumin)
  - Macroalbuminuria (large amounts of albumin)
  - loss of kidney function and ESRD
- Screening:
  - Type 2 diabetes- screened for microalbuminuria at the time of diagnosis and annually thereafter
  - Type 1 diabetes- screened at five years of disease duration or at the onset of puberty (whichever occurs first) and annually thereafter

# ***Screening for Kidney Disease and Interpreting the Results***

- More frequent screening may be indicated for certain groups:
  - Family history of kidney disease and/or Htn
  - History of poor glycemic control
  - African American, Hispanic, American Indian
- Albumin excretion can vary day to day and can be affected by other factors (uncontrolled BP, high blood glucose, fever, UTI, physical activity)
- Therefore recommended that elevated values be confirmed over ~ 3 – 6 months before microalbuminuria is definitively diagnosed

# ***Screening for Kidney Disease and Interpreting the Results***

- A routine UA for protein is not sensitive enough to detect microalbuminuria and is therefore not an appropriate test for early detection of diabetic kidney disease

<b>Condition</b>	<b>Value</b>
– Normal	< 30 mg/g
– Microalbuminuria	30-300 mg/g
– Macroalbuminuria	> 300 mg/g

# ***Screening for Kidney Disease and Interpreting the Results***

- Once a person has an albumin/creatinine ratio of  $>300$  mg/g (macroalbuminuria), urine protein excretion can be followed using the protein/creatinine ratio
- The protein/creatinine ratio is measured from a random urine sample and can be used to follow progression of kidney disease and response to therapy
- 24-hour urine collections for protein excretion are *not* needed, and wasteful

# Further Evaluation of Kidney Disease- Estimating GFR

- An estimated Glomerular Filtration Rate (eGFR), (calculated from a serum creatinine) is also recommended yearly in all adults with diabetes regardless of the degree of urine albumin excretion
- A substantial percentage of adults with diabetes have been found to have decreased eGFR in the absence of increased urine albumin

# Further Evaluation of Kidney Disease- Estimating GFR

- Calculating eGFR: The Modification of Diet in Renal Disease (MDRD) Study equation uses only serum creatinine, age, gender, and race.
  - While the MDRD Study equation requires a calculator with exponential functions, multiple online resources provide a calculator that estimates GFR:  
[http://www.kidney.org/professionals/kdoqi/gfr\\_calculator.cfm](http://www.kidney.org/professionals/kdoqi/gfr_calculator.cfm)
  - Also, many labs now automatically report eGFR with serum creatinine values

# Further Evaluation of Kidney Disease- staging

- Chronic kidney disease (CKD) should be staged according to the level of estimated GFR. Based on the level of estimated GFR, individuals can be placed into one of 5 stages

<b>Stage</b>	<b>Description</b>	<b>GFR (mL/min/1.73 m<sup>2</sup>)</b>
<b>1</b>	Kidney damage with normal or ↑ GFR	≥90
<b>2</b>	Kidney damage with mild ↓ GFR	60–89
<b>3</b>	Moderate ↓ GFR	30–59
<b>4</b>	Severe ↓ GFR	15–29
<b>5</b>	Kidney failure	<15 (or dialysis)

K/DOQI guidelines, *AJKD*, Vol. 39, No 2, Suppl 1, February 2002

- This is helpful in designing a clinical action plan

# Further Evaluation of Kidney Disease- Estimating GFR

- The MDRD equation is most accurate for individuals with estimated GFRs  $< 60$  ml/min/1.73 m<sup>2</sup> (stage 3 chronic kidney disease and higher)
- 24-hour urine collections for creatinine clearance are *not* needed, and wasteful
- A serum creatinine alone should not be used to estimate kidney function

# Using serum creatinine to “guess” level of renal function

	<b>24-yo Black Man</b>	<b>63-yo White Man</b>	<b>59-yo White Woman</b>
<b>SCr</b>	1.3 mg/dL	1.3 mg/dL	1.3 mg/dL
<b>GFR as estimated by MDRD Study equation</b>	≥60 mL/min/1.73 m <sup>2</sup>	59 mL/min/1.73 m <sup>2</sup>	45 mL/min/1.73 m <sup>2</sup>

# Stages of CKD

## A Clinical Action Plan

CKD Stage	GFR	Action (including action from preceding stages)
Stage 1: Kidney damage & normal or ↑ GFR	≥ 90	<ul style="list-style-type: none"> <li>• Diagnosis/treatment of underlying cause, comorbid conditions</li> <li>• Slowing progression</li> <li>• Cardiovascular disease risk reduction</li> </ul>
Stage 2: mild ↓ GFR	60-89	<ul style="list-style-type: none"> <li>• Estimate progression</li> </ul>
Stage 3: Moderate ↓ GFR	30-59	<ul style="list-style-type: none"> <li>• Evaluating and treating complications</li> <li>• Consider referral to a nephrologist</li> </ul>
Stage 4: Severe ↓ GFR	15-29	<ul style="list-style-type: none"> <li>• Preparation for RRT</li> <li>• Referral to a nephrologist</li> <li>• Referral for transplantation</li> </ul>
Stage 5: Kidney failure	< 15	<ul style="list-style-type: none"> <li>• Renal replacement therapy</li> </ul>

# ***Management of Kidney Disease***

- Angiotensin-converting Enzyme inhibitors (ACEi) or Angiotensin Receptor Blockers (ARBs) slow progression of diabetic kidney disease *independent of their effect on lowering blood pressure*
- The most common side effects (early decrease in GFR, hypotension, and hyperkalemia) can usually be managed without discontinuation of the agent
- With careful monitoring of therapy, most people, even those with low levels of GFR, can be treated

# *Management of Kidney Disease*

- In addition to ACEi/ARB, aggressive BP control is key
- Most people will require more than one agent to obtain the BP goal of < 130/80 mmHg
- If not at goal, other agents should be added (e.g., diuretics, beta-blockers, calcium channel blockers, or sympathetic antagonists)

**Note:** ACEi/ARB therapy should not be prescribed to women of childbearing age not using contraception or to pregnant women

# ***Referral to a Nephrologist and Coordination of Care***

- Caring for people with kidney disease is challenging. Early intervention and timely referrals for consultation with kidney experts and other specialty services can lead to optimal management of diabetes and kidney disease
- Nephrology referral is recommended in the following circumstances:
  - The estimated GFR is less than 30 ml/min/1.73 m<sup>2</sup>
  - Loss of kidney function is rapid (i.e., greater than 10-15 ml/min/year)
  - The blood pressure target cannot be achieved
  - For assistance in carrying out the clinical action plan

# ***Essential Patient Education for Kidney Disease***

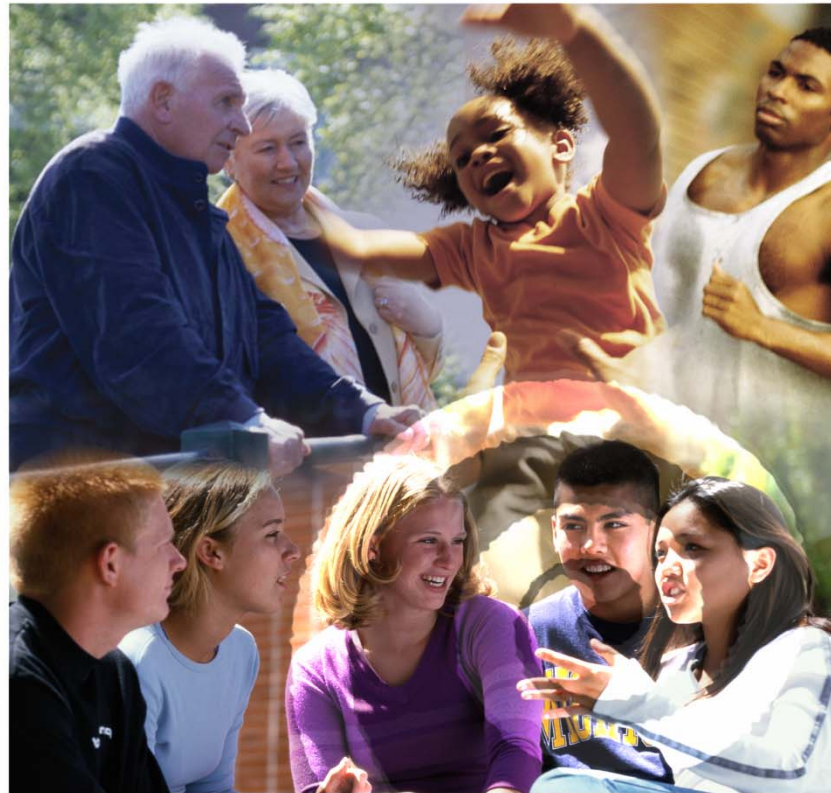
Education may include, but is not limited to, the following:

- Glycemic control is essential to prevent or slow progression of diabetic kidney disease
- Annual kidney function testing and appropriate follow-up are necessary
- People in early stages of decreased kidney function are typically asymptomatic

# ***Essential Patient Education for Kidney Disease***

- Hypertension plays a major role in kidney disease and should be treated aggressively- multiple medications are common for most people
- Lifestyle modifications are important in delaying or slowing the progression of kidney disease
- The importance of kidney function tests
- Benefits of early referral to a nephrologist for declining estimated GFR and what to expect from the visit

# Wisconsin Essential Diabetes Mellitus Care Guidelines 2004



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## Tools and Resources Included

Developed by The Wisconsin Diabetes Advisory Group

**Wisconsin  
Diabetes  
Essential  
Care  
Guidelines**



**New Updates  
expected!  
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Version Now**

## DIABETES PREVENTION AND CONTROL PROGRAM RESOURCES

The resource materials listed on this sheet are available free of charge to Wisconsin residents. To place an order, please indicate the quantity of each item and mail to the Diabetes Prevention and Control Program, Room 218, P O Box 2659, Madison, WI 53701-2659 or fax to (608) 266-8925. The resource materials are also available at Diabetes Program web page: <http://dhfs.wisconsin.gov/health/diabetes>.

Name of Requester \_\_\_\_\_

Organization/Business Name \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone No. \_\_\_\_\_  
(Include Area Code) ( \_\_\_\_\_ ) E-mail address \_\_\_\_\_

Title	Type	Language	Quantity
Wisconsin Diabetes Strategic Plan 2004 – 2009	Book – Health Care Professionals and Consumers	English	
Wisconsin Diabetes Mellitus Care Guidelines (Revised 2008) ❖	Book – Health Care Professionals	English	
Diabetes Resource Guide (2007)	Book – Health Care Professionals and Consumers	English	
2008 Burden of Diabetes in Wisconsin (specify counties or special populations desired)	2-sided Sheet – Health Care Professionals	English	
Wisconsin Diabetes Surveillance Report 2005	Book – Health Care Professionals and Consumers	English	
Students with Diabetes: A Resource Guide for Wisconsin Schools and Families (2008) ❖	Book – Health Care Professionals and Consumers	English	
Personal Diabetes Care Record (wallet card) (Revised 2005)	Cards – Consumer	English Spanish Hmong	
Diabetes Self-Management Information and Record Booklet (Revised 2005)	Booklet – Consumer	English Spanish Hmong	

❖ This is in the process of being updated. If you request one, we will put your name on a list to receive a revised copy when they are available.

Note: National Diabetes Education Program (NDEP) has a number of tools including: Control Your Diabetes for Life, Campaign Guide for Partners, A Diabetes Community Partnership Guide, and Making a Difference: The Business Community Takes on Diabetes. You can order or download from the NDEP website: <http://ndep.nih.gov>