

# The Kidney Disease Initiative and the Division of Diabetes Translation at the Centers for Disease Control and Prevention

Ann Albright, PhD, RD, Nilka Ríos Burrows, MPH, Regina Jordan, MPH, and Desmond E. Williams, MD, PhD

---

Kidney disease is the ninth leading cause of death in the United States. In 2000, more than 26 million adults were estimated to have chronic kidney disease (CKD), placing them at risk of progressing to kidney failure. The number of new cases of kidney failure treated by using dialysis or transplantation in the United States has more than doubled since 1990, and it is expected to continue to increase with the aging of the population and the increasing prevalence of such risk factors as diabetes. In recognition of this problem, Congress passed legislation to build capacity and infrastructure at the Centers for Disease Control and Prevention (CDC) for a public health approach to CKD. This Kidney Disease Initiative at the CDC includes surveillance, epidemiology, state-based demonstration projects, and economic studies. The objectives, in collaboration with partners, are to assess and monitor the burden of CKD in the United States, determine its risk factors and rates of preventive practices, develop methods to identify and monitor populations at risk of developing CKD, document the costs of kidney disease, and develop models to help predict the progression of this disease and test the cost-effectiveness of various public health strategies for preventing CKD.

*Am J Kidney Dis* 53(S3):S121-S125. © 2009 by the National Kidney Foundation, Inc.

**INDEX WORDS:** Diabetes burden; kidney disease; public health; prevention; management and care; partnerships.

---

**K**idney disease ranks as the ninth leading cause of death in the United States.<sup>1-4</sup> In 2000, an estimated 26 million, or 13%, of US adults had chronic kidney disease (CKD), but most were undiagnosed.<sup>3</sup> Early detection and treatment of patients with CKD can help prevent or delay cardiovascular death and progression to kidney failure treated by using dialysis or transplantation.<sup>5</sup>

The spectrum of CKD extends from kidney damage, often first detected as microalbuminuria, to kidney failure. In the United States, the number of new cases of treated kidney failure has doubled since 1990 and is expected to continue to grow with the increasing prevalence of diabetes.<sup>4,6</sup> In 2005, more than 100,000 persons initiated therapy for kidney failure in the United States, and diabetes and hypertension accounted for more than 70% of these new cases. In that year, total Medicare expenditures for treatment of patients with kidney failure reached \$20 billion.<sup>4</sup> By 2020, nearly 800,000 are projected to be living on dialysis therapy or with a kidney transplant, and Medicare costs are projected to almost triple to \$54 billion.<sup>4</sup> In 2005, the death rate was 6 times greater in persons 65 years or older treated by using dialysis than in those in the general Medicare population, and by 2020, more than 125,000 persons are projected to die of kidney failure.<sup>4</sup>

The Kidney Disease Initiative, which was congressionally mandated in 2006 in recognition of

the growing problem of kidney disease, is intended to build capacity and infrastructure at the Centers for Disease Control and Prevention (CDC) for a public health approach to CKD in the United States.<sup>7</sup> The initiative currently includes surveillance, epidemiology, and state-based demonstration projects and economic studies in collaboration with partners from other government agencies, universities, and national organizations.

## THE KIDNEY DISEASE INITIATIVE AT THE CDC Surveillance and Epidemiology

The CDC is collaborating with partners from the University of Michigan and Johns Hopkins University to develop and establish a surveillance system for all stages of CKD that could monitor national trends and identify research needs. This activity entails identifying the relevant data sources and measures for a CKD

---

*From the Division of Diabetes Translation, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA.*

*Address correspondence to Nilka Ríos Burrows, MPH, 4770 Buford Hwy NE, Mailstop K10, Atlanta, GA 30341. E-mail: nrrios@cdc.gov*

© 2009 by the National Kidney Foundation, Inc.

0272-6386/09/5303-0115\$36.00/0

doi:10.1053/j.ajkd.2008.06.037

surveillance system that would work seamlessly with other kidney-related surveillance efforts, such as the US Renal Data System (USRDS) and the National Diabetes Surveillance System (NDSS). In addition, the CDC provides supplemental funding for measures of kidney disease in the National Health and Nutrition Examination Survey (NHANES) and the Health, Aging, and Body Composition study, the latter a study that targets people 70 years or older.<sup>8</sup>

### Screening Demonstration Project

The CDC also is collaborating with partners from the National Kidney Foundation (NKF) on a project called CKD Health Evaluation and Risk Information Sharing (CHERISH) to develop a screening and demonstration program for detecting people with CKD or those at high risk of developing CKD in the United States. The screening algorithm has been developed by using NHANES data and will be tested through 8 demonstration sites in 4 states. In contrast to the NKF Kidney Early Evaluation Program (KEEP),<sup>9</sup> the CKD screening algorithm in CHERISH was modeled as a function of risk factors in NHANES, and the target population is informed by the model, the estimated CKD prevalence, and other factors. In addition, the battery of tests used in CHERISH is less comprehensive than those used in KEEP.

### Health Outcomes and Economics

The CDC is conducting a cost-of-illness study to estimate the direct and indirect costs of CKD in the United States and a cost-effectiveness study using a lifetime simulation model to assess the costs and benefits of various interventions in CKD care and prevention.

The objectives of the Kidney Disease Initiative are to: (1) assess and monitor the burden of CKD and its risk factors and related preventive practices in the United States, (2) develop methods to identify populations at risk of developing CKD, (3) develop public health strategies to prevent the development of CKD and reduce its progression to kidney failure, and (4) develop models to assess the economic burden of CKD. These objectives support the Healthy People 2010 goal of reducing new cases of kidney failure, its complications, associated disability

and death, and economic costs and improving the management of risk factors.<sup>10</sup> In keeping with the objectives of the initiative, the CDC convened an expert panel meeting to outline recommendations for comprehensive public health strategies to prevent the development and progression of CKD in the United States.<sup>7</sup> The accompanying articles in this supplement summarize the presentations made by the expert panel members during this meeting.

The Kidney Disease Initiative is housed within the CDC Division of Diabetes Translation (DDT).<sup>7</sup> The DDT formed a Kidney Disease Interest Group at the CDC comprising members from other divisions, centers, and offices at the agency, including the Division of Heart Disease and Stroke Prevention and the Division of Adult and Community Health in the National Center for Chronic Disease Prevention and Health Promotion, the National Center for Environmental Health, the National Center for Health Statistics, the National Center for Infectious Diseases, and the National Office of Public Health Genomics.<sup>7</sup> In addition, the DDT is building collaborative relationships and developing an external partner network with the National Kidney Disease Education Program and other offices at the National Institutes of Health (NIH), the Centers for Medicare and Medicaid Services, the Department of Veterans Affairs, and other national groups and interested partners.<sup>7</sup>

Diabetes, the leading cause of kidney failure, accounted for nearly half of the new cases of treated kidney failure in 2005,<sup>4</sup> and many of the interventions to prevent diabetes-related complications affect the prevention and control of kidney disease.<sup>5,11–18</sup> Proper diabetes management has been shown to prevent or delay the onset of kidney disease.<sup>11</sup> For example, better blood glucose control decreases the risk of kidney disease by 40% in people with type 1 or type 2 diabetes,<sup>12,13</sup> and control of blood pressure decreases the risk of kidney disease by about 33%.<sup>14</sup> Furthermore, treating patients with early diabetic kidney disease by decreasing blood pressure can reduce the decrease in kidney function by 30% to 70%.<sup>15–18</sup> However, the number of people in the United States with diagnosed diabetes reached nearly 18 million in 2007, with an additional 6 million estimated to have diabetes but not know

it and at least another 57 million adults estimated to be at risk of developing diabetes.<sup>19</sup>

### THE DDT AT THE CDC

Through the DDT, the CDC seeks to eliminate the preventable burden of diabetes through leadership, research, programs, and policies that translate science into practice. The CDC works with partners to provide a national surveillance system for diabetes, provide support and recommendations for public health decisions, promote management practices to ensure good care and education for people with diabetes, and inform the public about the disease.

A key component of the DDT surveillance activities is the development, maintenance, analysis, and dissemination of data in the NDSS.<sup>6</sup> The NDSS is a comprehensive collection of diabetes-related data from national- and state-based surveys, including such household surveys as the NHANES, such telephone surveys as the Behavioral Risk Factor Surveillance System, the National Vital Statistics System, the USRDS, and other data sources. NDSS data have been used to determine trends in the magnitude of diabetes and its complications, identify health service research needs in the area of diabetes, develop and monitor national health objectives, detect changes in health care practices, facilitate program planning and the development of educational materials, and allocate resources. In addition, the CDC leads the consensus development process in 13 agencies, including the CDC and other governmental agencies and public and private organizations, that is needed to create the National Diabetes Fact Sheet, which summarizes the latest estimates on diabetes and its complications in the United States.

Because increasing rates of diabetes in young people are a growing public health concern, the CDC, with support from the NIH, funded a multicenter study to examine diabetes in US children and adolescents.<sup>20</sup> In collaboration with partners, the CDC has also developed public health initiatives to address the burden of diabetes in other special populations, such as women and American Indians and Alaska Natives, among other initiatives.<sup>21,22</sup>

For people already living with diabetes, its related complications may be prevented or delayed with early detection, improved delivery of

care, and better education about self-management.<sup>12-14</sup> The CDC works with many research partners, managed care organizations, and community health centers to translate scientific data into higher quality care and assess how accepted standards of diabetes care are applied in clinical care settings.<sup>23</sup> The CDC and its partners also explore population-based quality of care by examining disparities in diabetes care and developing strategies to improve existing practices.<sup>6,24</sup>

The CDC provides funding to diabetes prevention and control programs in the 50 states, 8 current and former US territories, and the District of Columbia to help address the burden of diabetes in all communities.<sup>25</sup> Through programs that address access to care and quality of care, the CDC aims to reduce the economic burden of diabetes, which involved total (direct and indirect) medical costs estimated at \$174 billion in 2007.<sup>26</sup> The DDT has set forth 5 national objectives, which seek to improve rates of receiving: (1) 2 or more hemoglobin A<sub>1c</sub> tests annually, (2) annual foot examinations, (3) regular dilated eye examinations, (4) annual flu vaccinations, and (5) pneumococcal vaccination to help reduce the risk of complications from diabetes and improve quality of life in people with the disease.

In collaboration with the NIH, the CDC sponsors the National Diabetes Education Program (NDEP), which aims to help people with diabetes better manage the disease and promote policies that improve quality of care and access to care.<sup>27</sup> The NDEP comprises a network of more than 200 public and private partners, including 6 national minority groups that develop community interventions and tools to improve care and prevention for communities with a high burden of diabetes.<sup>27</sup>

Data from the NDSS indicate that encouraging trends in the incidence of diabetes complications are now emerging. In the population with diabetes, after many years of increase the incidence of treatment for diabetes-related kidney failure in those younger than 75 years is now decreasing, and the incidence of treatment for kidney failure in those 75 years or older leveled off during 1999 to 2005.<sup>28,29</sup> Furthermore, in southwestern American Indians with diabetes, a group with disproportionately high rates of diabetes<sup>30</sup> and kidney failure, the incidence of treatment for patients

with diabetes-related kidney failure decreased by 31% between 1993 and 2001, a decrease that occurred in all age groups and in both men and women.<sup>31</sup>

Although the burden of diabetes and its complications is alarming,<sup>6</sup> recent studies have found that lifestyle changes that include moderate weight loss and exercise can prevent the onset of type 2 diabetes in adults at high risk.<sup>32,33</sup> The lifestyle intervention worked equally well for men and women and all racial/ethnic groups, and it was most effective in people 60 years or older. Based on this research, the CDC has initiated primary prevention pilot programs in multiple states and is developing methods to identify people at high risk of diabetes, policies to help these people reduce their risk, and public health programs that will slow the incidence of diabetes.<sup>25</sup>

## CONCLUSION

The CDC will continue to work with its partners to strengthen the surveillance of diabetes and its complications (including kidney disease) and support prevention research, public health interventions, and education. In the case of CKD, increased awareness, early detection and evaluation, and improved treatment for patients with the earlier disease stages and its risk factors are critical to delay or prevent the development, progression, and complications of this disease in the population at risk. We know that early detection and treatment can help prevent or delay cardiovascular death and progression to kidney failure. The Kidney Disease Initiative at the CDC is designed to provide public health strategies for promoting kidney health and to improve outcomes and quality of life for those living with kidney disease.

## ACKNOWLEDGEMENTS

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC.

*Support:* None.

*Financial Disclosure:* None.

## REFERENCES

1. Heron MP, Hoyert DL, Xu J, Scott C, Tejada-Vera B: Deaths: Preliminary Data for 2006. *Natl Vital Stat Rep* 56:4-5, 2008
2. Coresh J, Astor BC, Greene T, Eknoyan G, Levey AS: Prevalence of chronic kidney disease and decreased kidney function in the adult US population: Third National Health and Nutrition Examination Survey. *Am J Kidney Dis* 41:1-12, 2003
3. Coresh J, Selvin E, Stevens LA, et al: Prevalence of chronic kidney disease in the United States. *JAMA* 298:2038-2047, 2007
4. US Renal Data System: USRDS 2007 Annual Data Report. The National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2007
5. Brenner BM, Cooper ME, de Zeeuw D, et al, for the RENAAL Study Investigators: Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy. *N Engl J Med* 345:861-869, 2001
6. Centers for Disease Control and Prevention: National Diabetes Surveillance System. Available at: [www.cdc.gov/diabetes/statistics](http://www.cdc.gov/diabetes/statistics). Accessed January 28, 2008
7. Centers for Disease Control and Prevention: Kidney Disease Initiative. Available at: [www.cdc.gov/diabetes/projects/kidney](http://www.cdc.gov/diabetes/projects/kidney). Accessed January 28, 2008
8. National Institutes of Health: Health ABC Description. Available at: [www.nia.nih.gov/ResearchInformation/ScientificResources/HealthABCDescription](http://www.nia.nih.gov/ResearchInformation/ScientificResources/HealthABCDescription). Accessed January 28, 2008
9. National Kidney Foundation: Kidney Early Evaluation Program (KEEP) annual data report 2006. *Am J Kidney Dis* 49:S1-S130, 2007 (suppl 3)
10. US Department of Health and Human Services: Healthy People 2010 (ed 2). With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington DC, US Government Printing Office, 2000
11. American Diabetes Association: Nephropathy in diabetes. *Diabetes Care* 27:S79-S83, 2004 (suppl 1)
12. The Diabetes Control and Complications Trial Research Group: The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 329:977-986, 1993
13. UK Prospective Diabetes Study Group: Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 352:837-853, 1998
14. UK Prospective Diabetes Study Group: Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes (UKPDS 38). *BMJ* 317:703-713, 1998
15. UK Prospective Diabetes Study Group: Efficacy of atenolol and captopril in reducing risk of macrovascular and microvascular complications in type 2 diabetes (UKPDS 39). *BMJ* 317:713-720, 1998
16. Lewis EJ, Hunsicker LG, Clarke WR, et al, for the Collaborative Study Group: Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with nephropathy due to type 2 diabetes. *N Engl J Med* 345:851-860, 2001
17. Parving HH, Lehnert H, Brochner-Mortensen J, Gomis R, Andersen S, Arner P, for the Irbesartan in Patients with Type 2 Diabetes and Microalbuminuria Study Group:

The effect of irbesartan on the development of diabetic nephropathy in patients with type 2 diabetes. *N Engl J Med* 345:870-878, 2001

18. Lewis EJ, Hunsicker LG, Bain RP, Rohde RD: The effect of angiotensin-converting-enzyme inhibition on diabetic nephropathy. The Collaborative Study Group. *N Engl J Med* 329:1456-1462, 1993

19. Centers for Disease Control and Prevention: National Diabetes Fact Sheet: General Information and National Estimates on Diabetes in the United States, 2007. Atlanta, GA, US Department of Health and Human Services, Centers for Disease Control and Prevention, 2008

20. SEARCH Study Group: SEARCH for Diabetes in Youth: A multicenter study of the prevalence, incidence and classification of diabetes mellitus in youth. *Control Clin Trials* 25:458-471, 2004

21. Centers for Disease Control and Prevention: Initiative on Diabetes and Women's Health. Available at: [www.cdc.gov/diabetes/projects/women](http://www.cdc.gov/diabetes/projects/women). Accessed January 28, 2008

22. Centers for Disease Control and Prevention: Native Diabetes Wellness Program. Available at: [www.cdc.gov/diabetes/projects/diabetes-wellness](http://www.cdc.gov/diabetes/projects/diabetes-wellness). Accessed January 28, 2008

23. Brown AF, Gregg EW, Stevens MR, et al: Race, ethnicity, socioeconomic position, and quality of care for adults with diabetes enrolled in managed care: The Translating Research Into Action for Diabetes (TRIAD) Study. *Diabetes Care* 28:2864-2870, 2005

24. Centers for Disease Control and Prevention: National Diabetes Collaborative. Available at [www.cdc.gov/diabetes/projects/collaborative](http://www.cdc.gov/diabetes/projects/collaborative). Accessed January 28, 2008

25. Centers for Disease Control and Prevention: Diabetes: Disabling Disease to Double by 2050. Available at:

[www.cdc.gov/nccdphp/publications/aag/pdf/diabetes.pdf](http://www.cdc.gov/nccdphp/publications/aag/pdf/diabetes.pdf). Accessed January 28, 2008

26. American Diabetes Association: Economic costs of diabetes in the U.S. in 2007. *Diabetes Care* 31:1-20, 2008

27. National Institutes of Health: National Diabetes Education Program. Available at [www.ndep.nih.gov](http://www.ndep.nih.gov). Accessed January 28, 2008

28. Centers for Disease Control and Prevention: Incidence of end-stage renal disease among persons with diabetes—United States, 1990-2002. *MMWR Morbid Mortal Wkly Rep* 54:1097-1100, 2005

29. Burrows NR, Li Y, Geiss LS: Incidence of end-stage renal disease among persons with diabetes in the United States continues to decline. *Diabetes* 57:S76A, 2008 (suppl 1; abstr 266-OR)

30. Burrows NR, Geiss LS, Engelgau MM, Acton KJ: Prevalence of diabetes among Native Americans and Alaska Natives, 1990-1997: An increasing burden. *Diabetes Care* 23:1786-1790, 2000

31. Burrows NR, Narva AS, Geiss LS, Engelgau MM, Acton KJ: End-stage renal disease due to diabetes among southwestern American Indians, 1990-2001. *Diabetes Care* 28:1041-1044, 2005

32. Knowler WC, Barrett-Connor E, Fowler SE, et al, for the Diabetes Prevention Program Research Group: Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 346:393-403, 2002

33. Tuomilehto J, Lindström J, Eriksson JG, et al, for the Finnish Diabetes Prevention Study Group: Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med* 344:1343-1350, 2001