Overview of Racial Disparities in Kidney Disease Outcomes

10th Annual National Summit on Health Disparities
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Assistant Dean for Clinical and Translational Science,
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Potential Conflicts of Interest**#

* Activities within the last year
  - Grants: 1
  - Honoraria: 2
  - Consulting: 3
  - Advisory Boards: 4
  - Speaker Bureau: 5
  - Financial Ownership: 6

# None related to this talk
Kidney Disease

1 in 9 Adults in the U.S. Has Chronic Kidney Disease... Do You?
Despite Low Prevalence of CKD Minorities have a Higher Prevalence of ESRD

**Relative prevalence of stage 1 - 3 CKD (MDRD GFR)**

- **White**: 1
- **Black**: 0.92
- **Hispanic**: 0.58

**Relative prevalence of ESRD**

- **White**: 1
- **Black**: 3.89
- **Hispanic**: 2.74
- **Native American**: 1.56
- **Asian**: 1.45

**References**

- USRDS 2002 Annual Data Report
Impact of CKD Health Inequities

- If Minority ESRD rates could be lowered to that of whites ESRD costs would fall by >$10 Billion*/yr

*A million seconds ago was 12 days. *A billion seconds ago was 31 years.

Estimated excess costs if minority ESRD point prevalence rate = White ESRD point prevalence rate based on USRDS 2004 point prevalence counts and adjusted point prevalence rates (not adjusted for estimated differences in transplant and other ESRD specific costs)

<table>
<thead>
<tr>
<th>Category</th>
<th>Dollars (Billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESRD Costs</td>
<td>41.5</td>
</tr>
<tr>
<td>NIH</td>
<td>30.9</td>
</tr>
<tr>
<td>ESRD Costs without excess minority cases</td>
<td>28.7</td>
</tr>
<tr>
<td>Excess costs from disparities</td>
<td>12.8</td>
</tr>
</tbody>
</table>
Health Equity Through Action on the Social Determinants of Health

• Improve the conditions of daily life

• Tackle the inequitable distribution of power, money, and resources – the structural drivers of those conditions of daily life – globally, nationally, and locally.

• Develop a workforce trained in the social determinants of health, and raise public awareness about the social determinants of health.


Introduction

• Uninsured adults (more likely to be minority) have poor access to health care and poor health outcomes.
  – Adults with lower educational attainment also have poor health outcomes

• The new Health Care Reform law requires everyone to get health coverage - the “Individual Mandate”.

• Little is known about the association between lack of insurance or low educational attainment and the development of end-stage renal disease (ESRD) or death in patients with or at high risk for kidney disease.
Today’s Objective

In a population with CKD or at high risk for CKD examine the association of:

• Health insurance and progression to ESRD/death
• Educational attainment and chronic disease prevalence/death

Data: NKF Kidney Early Evaluation Program (KEEP)

• Nationwide program to screen individuals at high risk for CKD defined as adults with DM, HTN, or a family history of kidney disease, DM, or HTN.
Deaths (per year) potentially averted in the United States

<table>
<thead>
<tr>
<th>Year</th>
<th>Deaths potentially averted by medical advances (see footnotes)</th>
<th>Deaths potentially averted by eliminating education-associated excess mortality (see footnotes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>60,000</td>
<td>0</td>
</tr>
<tr>
<td>1998</td>
<td>65,000</td>
<td>0</td>
</tr>
<tr>
<td>1999</td>
<td>70,000</td>
<td>5,000</td>
</tr>
<tr>
<td>2000</td>
<td>75,000</td>
<td>10,000</td>
</tr>
<tr>
<td>2001</td>
<td>80,000</td>
<td>15,000</td>
</tr>
<tr>
<td>2002</td>
<td>85,000</td>
<td>20,000</td>
</tr>
</tbody>
</table>

Methods: Education and Chronic Diseases/Death

- The study cohort included 61,457 KEEP participants screened between 2000-2010
  - Mean follow-up: 3.9 years
  - Analyses adjusted for demographics, access to care, behaviors, and comorbid conditions.

- Outcomes: Prevalence of major chronic diseases and probability of death over time.
Association between self-reported educational attainment and chronic diseases.

Logistic regression models adjusted for demographics, access to care, behaviors, and comorbid conditions.

N = 61,457 eligible KEEP participants.

Cochran-Armitage trend tests: All P < 0.001.
Probability of survival by educational attainment

Among KEEP participants - Less education – much lower likelihood of survival

Risk of Mortality Among KEEP Participants with Hypertension Associated by Level of Educational Attainment (vs < HS education)

<table>
<thead>
<tr>
<th>Level of Educational Attainment</th>
<th>Hypertension (HR, 95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School (HS)</td>
<td>0.81 (0.71-0.92)</td>
</tr>
<tr>
<td>Some College</td>
<td>0.82 (0.72-0.94)</td>
</tr>
<tr>
<td>College Grad</td>
<td>0.73 (0.64-0.84)</td>
</tr>
</tbody>
</table>

Health Insurance and Health

• 2010: 49.1 million people or 18.4% of those younger than 65 years, lacked health insurance in the United States

• Mortality rates decreased in states that expanded Medicaid coverage to the same group as that gaining coverage under the Affordable Care Act.

Methods: Insurance and ESRD/Death

• The study cohort included 86,588 KEEP participants screened between 2000-2011
  – Age > 65 years excluded (to not include Medicare).
  – Participants receiving dialysis or transplant at the time of screen were also excluded.

• Outcomes: time to renal replacement therapy (RRT/ESRD) and time to death.
  – Followed up to December 31, 2011
### Characteristics of the KEEP Population (< 65 yrs)

<table>
<thead>
<tr>
<th>Insurance Status</th>
<th>All</th>
<th>None</th>
<th>Public</th>
<th>Private</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>86,588</td>
<td>24,035</td>
<td>8,927</td>
<td>53,626</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>48.1</td>
<td>46.4</td>
<td>50.6</td>
<td>48.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male (%)</td>
<td>31.4</td>
<td>33.9</td>
<td>36.1</td>
<td>29.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>White (%)</td>
<td>44.7</td>
<td>37.0</td>
<td>40.3</td>
<td>48.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Black (%)</td>
<td>34.5</td>
<td>29.9</td>
<td>43.7</td>
<td>35.1</td>
<td></td>
</tr>
<tr>
<td>Other (%)</td>
<td>20.8</td>
<td>33.1</td>
<td>16.0</td>
<td>15.9</td>
<td></td>
</tr>
<tr>
<td>Hispanic (%)</td>
<td>14.6</td>
<td>29.2</td>
<td>10.4</td>
<td>8.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Education≤12 (%)</td>
<td>12.2</td>
<td>23.1</td>
<td>20.0</td>
<td>6.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Saw physician in past yr (%)</td>
<td>81.7</td>
<td>66.0</td>
<td>92.2</td>
<td>87.0</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Participants **without insurance** were **younger**, more likely to be **Hispanic**, **had ≤ 12 yrs of education**, and **less likely to have seen a physician** in the past year.
Results

• Of 86,588 participants
  – 27.8% had no form of insurance
  – 10.3% had public insurance
  – 61.9% had private insurance
  – 15.0% had CKD
  – 63.3% hypertension
  – 27.7% diabetes

• Of participants with CKD, 29.3% had no health insurance
Relative risk of ESRD [no insurance vs private] adjusted for age, sex, race, ethnicity, education and smoking.

Rates of ESRD per 1,000 person-years:
- Overall: 0.94
- No CKD: 0.07
- Stage 1-2: 2.15
- Stage 3a: 2.55
- Stage 3b: 18.1
- Stage 4-5: 169.2

Relative risk of ESRD adjusted for age, sex, race, ethnicity, education and smoking.
Relative risk of death [no insurance vs private] adjusted for age, sex, race, ethnicity, education and smoking

Rates of death per 1,000 person-years

<table>
<thead>
<tr>
<th>Stage</th>
<th>Overall</th>
<th>No CKD</th>
<th>Stage 1-2</th>
<th>Stage 3a</th>
<th>Stage 3b</th>
<th>Stage 4-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates</td>
<td>2.79</td>
<td>1.99</td>
<td>6.47</td>
<td>6.68</td>
<td>15.1</td>
<td>24.0</td>
</tr>
</tbody>
</table>

Relative Risk
Summary

• Mortality and ESRD rates increased with worsening kidney function, whether or not participants had insurance.

• **ESRD**: *Uninsured KEEP* participants were **72% more likely to develop ESRD** and begin RRT.

• **Death**: *Uninsured KEEP* participants were **82% more likely to die** than privately insured participants.
The Way Forward

- Universal Health Care
- Holistic Approach to Chronic Care
Does Health Care Reform = Universal Health Care?

Bureaucracy defends the status quo long past the time when the quo has lost its status.

- Laurence J. Peter
  US educator & writer
  (1919 - 1988)
Holistic Approach to Chronic Care

EXAMPLES

- Interventions to improve health care delivery
- Health professional (nurse or pharmacist) - led care?
- Appointment reminder systems
- Patient and health professional directed educational interventions
- System level support for patient self-monitoring

Conclusion: In Patients with CKD and CKD Risk Factors

• Lack of insurance is an independent risk factor for *early death* and *ESRD*

• Considering the high morbidity, mortality and costs in this population, these data strongly suggest *access to appropriate health insurance coverage is warranted.*
"The greatest obstacle to discovery is not ignorance – it is the illusion of knowledge.

-Daniel Boorstin
Every man is guilty of all the good he didn't do!

- Voltaire
CKD: A Call to Action

Patient-Provider Level
- Risk factor education with targeted early interventions for high-risk individuals
- Increased awareness of cultural differences in primary values, world views
- Effective communication
- Understanding socio-cultural & biologic contributions to health disparities

Health Care System
- Universal access to care, (chronic care model)
- Patient centered approach with sensitivity to the nation’s cultural diversity
- Automated GFR reporting
- Early referral for co-management
  -- Team approach to maximize care

Community Level
- Small area analysis to identify community specific needs
- Advocacy for social & health justice
- Increased organ donation, especially from minority communities

THE CHRONIC CARE MODEL

Community

Resources and policies

- Self-management support

Health systems

Organization of health care

- Delivery system design
- Decision support
- Clinical information systems

Informed, activated patient

Productive interactions

Prepared, proactive practice team

IMPROVED OUTCOMES

The Chronic Care Model (Wagner EH. Eff Clin Pract. 1998;1:2-4)
Does Health Care Reform = Universal Health Care?
Bureaucracy defends the status quo long past the time when the quo has lost its status.

Laurence J. Peter
US educator & writer
(1919 - 1988)
A Framework for Integrating Key Socio-Cultural Determinants of CKD

### Table 1b: Characteristics of the KEEP Population (Aged < 65)

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>None</th>
<th>Public</th>
<th>Private</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>86,588</td>
<td>24,035</td>
<td>8,927</td>
<td>53,626</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CKD stages 1-5 (%)</td>
<td>15.0</td>
<td>15.8</td>
<td>22.4</td>
<td>3.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ACR ≥ 30 mg/g (%)</td>
<td>9.9</td>
<td>11.7</td>
<td>14.5</td>
<td>8.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>63.3</td>
<td>61.2</td>
<td>74.1</td>
<td>62.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>BP controlled (%)</td>
<td>45.2</td>
<td>42.8</td>
<td>51.6</td>
<td>45.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>27.7</td>
<td>28.5</td>
<td>41.5</td>
<td>25.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Gluc. Controlled (%)</td>
<td>23.4</td>
<td>25.4</td>
<td>23.0</td>
<td>22.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CVD (%)</td>
<td>16.6</td>
<td>15.6</td>
<td>29.0</td>
<td>15.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Saw a physician in the past yr (%)</td>
<td>81.7</td>
<td>66.0</td>
<td>92.2</td>
<td>87.0</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Results

- Crude mortality rates increased with advancing CKD stages, whether or not participants had insurance.

- Crude rates of ESRD were very low in participants with eGFR $\geq 45$ mL/min/1.73 m$^2$ and increased dramatically as kidney function worsened.
“If you don't take care of your body, where will you live?”

- Author Unknown
Chronic Kidney Disease

• Presence of kidney damage
  • e.g., albuminuria or eGFR ≤ 60 mL/min/1.73m² for ≥ 3 months.¹

• Affects over 25 million adults in the U.S (1/8 to 1/9).²

• CKD may be asymptomatic until advanced.

• If left untreated, can progress rapidly to ESRD and death
  • Mainly premature CVD, 20% annual ESRD mortality rate.¹,²

• Racial/Ethnic minorities & CKD
  • Similar early CKD rates, but 2-4x ESRD rate
  • Reduced access to care/risk factor control
  • Genetic?, increased stress/inflammation?, other?
  • *Paradoxical increased ESRD longevity*

RACIAL DIFFERENCES IN THE INCIDENCE OF TREATMENT FOR END-STAGE RENAL DISEASE

Stephen G. Rostand, M.D., Katharine A. Kirk, Ph.D., Edwin A. Rutsky, M.D., and Brenda A. Pate, B.S.
“Of all the forms of inequality, injustice in health is the most shocking and inhumane.”

Dr. Martin Luther King, Jr. - 1966
RACIAL DIFFERENCES IN THE INCIDENCE OF TREATMENT FOR END-STAGE RENAL DISEASE

Stephen G. Rostand, M.D.,
Katharine A. Kirk, Ph.D.,
Edwin A. Rutsky, M.D.,
and Brenda A. Pate, B.S.
### Race-Specific Risks for Diseases Causing Renal Failure among Patients Treated for ESRD - 1974-1978

Jefferson County, Alabama

<table>
<thead>
<tr>
<th>Disease</th>
<th>Number of Cases</th>
<th>Yearly Incidence per 100,000</th>
<th>Relative Risk (Black vs. White)</th>
<th>Relative Risk 95% Confidence Limits</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>296</td>
<td>9.1</td>
<td>4.2</td>
<td>3.3-5.3</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Unknown</td>
<td>67</td>
<td>2.1</td>
<td>3.8</td>
<td>2.1-5.9</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Glomerulonephritis *</td>
<td>39</td>
<td>1.2</td>
<td>3.3</td>
<td>1.4-5.7</td>
<td>&lt;0.0002</td>
</tr>
<tr>
<td>Hypertension *</td>
<td>76</td>
<td>2.3</td>
<td>17.7</td>
<td>5.2-31.3</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>26</td>
<td>0.8</td>
<td>3.4</td>
<td>1.1-6.5</td>
<td>&lt;0.0013</td>
</tr>
<tr>
<td>Interstitial renal disease</td>
<td>66</td>
<td>2.0</td>
<td>3.3</td>
<td>1.8-5.0</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Polycystic disease</td>
<td>11</td>
<td>0.33</td>
<td>0.8</td>
<td>0.1-2.5</td>
<td>0.735</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>0.33</td>
<td>1.2</td>
<td>0.2-3.4</td>
<td>0.760</td>
</tr>
</tbody>
</table>

*One patient of unknown race was omitted from each group.

+Chi-square for comparison of two Poisson distributed rates.5,6
Case Vignette

- African American female, aged 64 y, 97 kg, with prolonged history of type 2 diabetes, hypertension, CAD, hyperlipidemia
- BP 148/88, HbA1c – 6.8, Echo – LVH, nl EF, eGFR – 26 mL/min/1.73m²
- Current medications
  - Glipizide
  - Losartan
  - Lasix
  - Aspirin (ASA)
  - Atorvastatin

- What biologic factor(s) might influence her clinical outcome outcome?
- Besides aggressive ESRD/CVD pharmacologic risk factor control what are non-pharmacologic considerations for optimizing her outcome?
- What is her prognosis compared to the general community, especially if she reaches ESRD?
Black – White Mortality Rates

Mortality Rate - African American & Whites
(US Census Bureau, 2010)

Crude Annual Mortality US Dialysis Patients:
African Americans vs. Whites (USRDS 2009)

Dialysis: Reversal of relative black/white mortality rate in the general population

“Despite the disparity in ESRD care, current thinking, supported by more than 30 previous studies, is that black patients receiving dialysis survive longer than their white counterparts” - Kucirka, LM et al. JAMA 2011;306:620-626
“However, the commonly cited survival advantage for black dialysis patients applies only to older adults, and those younger than 50 years have a higher risk of death.”

Mortality hazard ratios in 124,029 hemodialysis patients
(16% Hispanics, 49% non-Hispanic whites, and 35% non-Hispanic African Americans during a 5-year observation period, 2001-06)

"Survival advantages of African American and Hispanic hemodialysis patients may be related to differences in nutritional and inflammatory status."

Inflammation and the Paradox of Racial Differences in Dialysis Survival

- National cohort of 554 white and 262 black incident dialysis patients in 81 clinics for 3 yrs
- No difference in median CRP between black and white patients (3.4 vs. 3.9 mg/L).
- Adjusted* mortality was significantly lower for African Americans versus Caucasians (34% versus 56%)
  - age, gender, dialysis modality, smoking, BMI, diabetes, BP, cholesterol, CVD, CHF, comorbid disease, Hb, albumin, CRP, IL-6.

Inflammation and the Paradox of Racial Differences in Dialysis Survival

- Risk varied by CRP/IL6 tertile
- Relative hazards for blacks vs. whites in each CRP tertile
  - Low: 1.0 (95% CI, 0.7–1.4),
  - Middle: 0.7 (95% CI, 0.4–1.3),
  - High: 0.5 (95% CI, 0.3–0.8).
- Similar results across tertiles of IL-6 & when accounting for transplantation as a competing event.

"Racial differences in survival among dialysis patients are not present at low levels of inflammation but are large at higher levels. Inflammation may explain, in part, the racial paradox of ESRD survival."

Dialysis and Mortality

• Paradoxical survival for minorities, mainly > 50 yrs
• May be related to a resistance to effects of inflammation
• Excellent cohort for studying survival genes/biomarkers and survival related gene-environment interactions
• Excellent cohort for testing interventions to enhance survival
Potential Contributory Factors for the African American Survival Differential Between Younger Versus Older Dialysis Patients

<table>
<thead>
<tr>
<th>Potential Mechanism</th>
<th>Description</th>
<th>Suggested Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower transplant rate in African Americans</td>
<td>African Americans could be steered away from transplants because of the general perception of lower mortality on dialysis therapy. This could inflate artificially the survival advantage (similar to Japanese dialysis patient survival).</td>
<td>Use survival models that adjust for competing censorship.</td>
</tr>
<tr>
<td>Inclusion of Hispanics in the reference group</td>
<td>Pooling “white” or “nonblack” patients into a single reference leads to the inclusion of Hispanic whites (and in some cases Asians), who traditionally have better survival, analogous to blacks.</td>
<td>Exclude minorities from the reference groups.</td>
</tr>
<tr>
<td>Higher background mortality of young African Americans</td>
<td>In persons 15-44 years of age, minorities have higher death rates from homicide, motor vehicle accident, suicide, and drug overdose.</td>
<td>Adjust for background mortality disparities of the non-ESRD population.</td>
</tr>
<tr>
<td>Differences in insurance mix</td>
<td>Younger African Americans have less insurance, whereas in older patients, there is more parity in insurance coverage.</td>
<td>Adjust for insurance mix in multivariate models.</td>
</tr>
<tr>
<td>Differences in trust of institutions</td>
<td>Younger African Americans may have an even greater distrust of institutions, including medical establishments, leading to delayed/reduced visits and/or lesser adherence even if access to care is available.</td>
<td>Adjust for adherence surrogates in multivariate models.</td>
</tr>
<tr>
<td>Age permissibility of genetic factors</td>
<td>Age may exert a permissive or effect-modifying role on the genetic factors that impact on survival.</td>
<td>Conduct gene expression studies.</td>
</tr>
</tbody>
</table>

Abbreviation: ESRD, end-stage renal disease.

Case Vignette

- African American female, aged 64 y, 97 kg, with prolonged history of type 2 diabetes, hypertension, CAD, hyperlipidemia

- BP 148/88, HbA1c – 6.8, Echo – LVH, nl EF, eGFR – 26 mL/min/1.73m²

- Current medications
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- What biologic factor(s) might influence her clinical outcome?
- Besides aggressive ESRD/CVD pharmacologic risk factor control what are non-pharmacologic considerations for optimizing her outcome?
- What is her prognosis compared to the general community, especially if she reaches ESRD?
Potential Barriers in Access and Quality of Health Care

**System**
- Lack of health insurance
- Availability of providers
- Type of providers and their resources
- Location of services
- Organization of care

**Provider**
- Knowledge
- Attitudes and bias
- Lack of technical or interpersonal skills
- Communication
- Decision-making (participatory) style
- Patient-centered care
- Physician social concordance with patient

**Patient**
- Knowledge
- Attitudes
- Cultural beliefs
- Health behaviors
- Language
- Health Literacy
- Social support
- Religious beliefs
- Fear
- Self-efficacy
- Preferences
- Psychosocial Socioeconomic status
- Trust

Access to Care: Effect of Single Payer System on CV Procedure Rates Among ESRD Patients

Literacy

United States – 99%

48% of U.S. adults cannot read well enough to use a bus schedule

The L.A. Workforce Literacy Project, 2004
ILLITERATE?
WRITE FOR FREE HELP.

ILLITERACY FOUNDATION
806 MAIN STREET

www.StrangeCosmos.com