Race, Gender, and Socioeconomic Disparities in CKD in the United States

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ABSTRACT
Chronic kidney disease (CKD) is a national public health problem beset by inequities in incidence, prevalence, and complications across gender, race/ethnicity, and socioeconomic status. As health care providers, we can directly address some factors crucial for closing the disparities gap. Other factors are seemingly beyond our reach, entrenched within the fabric of our society, such as social injustice and human indifference. Paradoxically, the existence of health inequities provides unique, unrecognized opportunities for understanding biologic, environmental, sociocultural, and health care system factors that can lead to improved clinical outcomes. Several recent reports documented that structured medical care systems can reduce many CKD-related disparities and improve patient outcomes. Can the moral imperative to eliminate CKD inequities inspire the nephrology community not only to advocate for but also to demand high-quality, structured health care delivery systems for all Americans in the context of social reform that improves the ecology, health, and well-being of our communities? If so, then perhaps we can eliminate the unacceptable premature morbidity and mortality associated with CKD and the tragedy of health inequities. By so doing, we could become global leaders not only in medical technology, as we currently are, but also in health promotion and disease prevention, truly leaving no patient behind.

share low-income status but often differ in wealth, community assets, exposure to heavy metals or excess ambient air particulate matter, and other variables that may influence CKD-related outcomes. Geographic analyses revealed community-level poverty was strongly associated with higher ESRD incidence but was a more powerful predictor for black than for white individuals. Dialysis facilities located in predominantly black communities have higher mortality rates and lesser compliance with recommended performance targets. As we refine our understanding of health disparities, we might be able to move beyond the racial and ethnic background as the defining risk for CKD progression and directly target the underlying biologic and sociocultural factors for which race and ethnicity may be surrogates.

WHY FOCUS ON HEALTH DISPARITIES?

As the recognized world leader in health technology and medical care, the persistence of health inequities in the United States is an indictment of the institutionalization of moral apathy and likely contributes to our new ranking as last in preventable deaths among developed nations. Dr. Steven Schroeder, former president of the Robert Wood Johnson Foundation, presents a compelling case for concentrating strategies on the less fortunate to improve the health of the American people noting “that since all of the actionable determinants of health—personal behavior, social factors, health care, and the environment—disproportionately affect the poor, strategies to improve national health rankings must focus on this population.”

One challenge for the nephrology community as well as the broader medical community is to rethink how we might improve each element that conspires to constrain the health outcomes we are trying to achieve, not just those limited to a procedure or prescription. The focus of this review is to bring greater awareness of and discuss strategies to address some of the key social and environmental factors that contribute to CKD disparities and improve US health care systems to care effectively for an increasingly diverse CKD patient population.

CULTURAL, ENVIRONMENTAL, AND SOCIOECONOMIC INFLUENCES ON HEALTH OUTCOMES

“It is much more important to know what sort of a patient has a disease, than what sort of disease a patient has.”

—William Osler (1849–1919)

Further complicating strategies for effective health care delivery are the multiple...
we see as different from ourselves, patient-centered care reminds us that it is also important not to generalize and use a “one size fits all” approach. Increased acculturation and integration both across and within racial/ethnic and socioeconomic boundaries have led to diffusion and/or assimilation of the many values commonly attributed to a specific group. Nonetheless, the insight into the origin and existence of such values is important in enabling a better understanding of “what sort of patient has a disease.”

**BIOLOGY AND VARIATIONS IN HEALTH OUTCOMES**

Specific to CKD are marked variations in the prevalence of key risk factors such as diabetes, hypertension, and albuminuria across socioeconomic, gender, and racial/ethnic groups that play an important role in group differences in the prevalence, progression, and complications of CKD. Increased rates of overexpression of TGF-β1 and/or a higher prevalence of specific TGF-β1 polymorphisms in black individuals may contribute to CKD progression and complications. Sickle cell trait (approximately 8% of black individuals), which has traditionally been described as causing renal microinfarction and hyposthenuria but not CKD, may in fact be an important unrecognized factor for CKD progression and complications.

Rates of hypertension incidence did not differ among middle-class black and white individuals who had similar levels of baseline BP and body mass index and were followed for 7 yr. Racial variation

**KEY SOCIO-CULTURAL DETERMINANTS OF CKD**

- **Genes/biology**
  - Marginalization from majority society, discrimination, institutionalized racism, loss of culture, cultural conflicts
  - Environmental toxin exposures, poor hygiene, infectious diseases
  - Residential segregation, overcrowding, poor housing, urban ghettos
  - Environmental toxin exposures, poor hygiene, infectious diseases, chronic inflammation, oxidative stress

- **Environment**
  - Low birth weight, obesity, DM, HTN, CVD, endothelial dysfunction
  - Alcohol and substance abuse
  - Low employment, poverty, poor education, limited health care access
  - Poor nutrition

- **Chronic Kidney Disease**

*Figure 3.* A framework for integrating key sociocultural determinants of CKD. Adapted from reference (29), with permission.
Table 1. Recognizing socioeconomic and/or racial/ethnic factors contributing to disparities in health outcomes

<table>
<thead>
<tr>
<th>Health Care System Level</th>
<th>Institutionalized Influences on Patient Behaviors</th>
<th>Culture and Literacy</th>
</tr>
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<tbody>
<tr>
<td>Under- or uninsurance, unstructured medical care systems and lack of enabling public policies reduce access to care for indigent and many minorities.</td>
<td>Institutional racism (62–85)—leads to high rates of unemployment, loss of confidence, and lack of trust in large institutions, including health systems. Mistrust reinforced by media focusing on health care failures, further influences health beliefs and practices such as delays in seeking care, poor adherence, low levels of organ donation.</td>
<td>Gender and racial/ethnic differences in values and beliefs lead to disparities arising from both within and beyond the health care system.</td>
</tr>
<tr>
<td>Limited ability to afford recommended care—leads to delays in seeking care and poor adherence.</td>
<td>Residential segregation—Inferior educational systems, low literacy rates, increased poverty, increased exposure to environmental toxins (e.g., small particulate matter, lead) fewer quality health care resources and community assets (e.g., fewer and reduced access to healthy foods and safe parks to meet CKD-related diet and lifestyle recommendations) (66–88).</td>
<td>Cultural barriers: Conflicts around gender and racial/ethnic learned differences (e.g., sexism, racism, class-ism), primary cultural values (axiology) and world-views of how we come to knowledge (epistemology) (90). These conflicts may be perceived by providers or healthcare systems as patient insolence or ignorance—limits trust, hinders effective communication reduces adherence, and may influence health recommendations or availability of services.</td>
</tr>
<tr>
<td>Multiple payers and nonuniform provider incentives lead to marked variations in quality of care.</td>
<td>Increased stress and/or depression, and low self esteem, often manifest as maladaptive coping behaviors (e.g. overeating, drinking, smoking, substance abuse), increased nocturnal BP, sympathetic activity, and oxidative stress.</td>
<td>Linguistic/Communication barriers: 48% of US is estimated to be functionally illiterate with higher rates among immigrants and indigent (often minority) (91).</td>
</tr>
<tr>
<td>Paucity of evidence-based data for women and minorities who are underrepresented in most trials.</td>
<td>Geocultural/socioeconomic differences (89) (urban and rural based health exposures, practices, and healthcare access issues; e.g., Southeast US stroke belt, etc.).</td>
<td>Lack of awareness among many health professionals of high rates of low literacy among many patients limits effective communication, and increases a sense of isolation and indifference by the healthcare system. These factors may reduce adherence (92).</td>
</tr>
<tr>
<td>Gender- and race-based biologic differences and ability of environmental factors (e.g., stress, nutritional deficiencies, toxin exposures) and diverse cultural diets to alter enzyme activity, gene expressions, and receptor densities and/or polymorphisms, etc., for an array of signaling and/or metabolic pathways that may affect disease progression and clinical response to pharmacologic interventions.</td>
<td>Low SES and increased wealth disparity add to delays in seeking care and reduced adherence due to reduced ability to take off work without losing income or job, more restrictions for transportation and child/elder care responsibilities. Collectively known as &quot;Weathering&quot;—the stress of being poor and marginalized in America.</td>
<td>For many recent immigrants English is a second language. Many African Americans, especially older ones speak Ebonics (not slang or bad English), a linguistic construct derived from English words superimposed by slaves on the syntax and grammatical structure of native African language to sound like English, and passed on across generations to children prior to entering the school system (93). Sounds like English, but is not English (e.g., Gullah) (94).</td>
</tr>
</tbody>
</table>

in BP response to antihypertensive therapy has been reported, and this could affect disparities in CKD. Sehgal assessed overlap between white and black individuals in response to antihypertensive drugs in 12,000 individuals and found that 81 to 95% had similar response for diastolic BP and 83 to 93% for systolic BP, reinforcing heterogeneity within race as much as across race. Gender-based genetic variability has been recognized as an important factor in the development of CKD. Gender has been recognized as an important factor in the development of CKD. Gender-based genetic variability has been linked to differences in BP in both black and white individuals.
Trast to testosterone, estrogens may attenuate CKD progression by lowering the cardiovascular stress response to adrenergic stimuli.

HEALTH CARE SYSTEMS AND VARIATIONS IN HEALTH OUTCOMES

“You can always count on Americans to do the right thing, after they’ve tried everything else.”
—Winston Churchill (1874–1965)

Despite the high level of national wealth in the United States, the lack of adequate health insurance for many of the nation’s indigent and working middle class is also disproportionately common among racial and ethnic minorities and further contributes to the inability of such patients to receive adequate CKD and pre-ESRD care. Several recent studies but not all have highlighted racial and ethnic disparities within the health care delivery system, ranging from reduced levels of quality services to poor outcomes. Several of these findings underscore the institutionalization of biases within many health care delivery systems, whereas others point to no insurance, underinsurance, lack of access to quality care, and/or multiple payer or nonuniform systems of care as the major driving forces for disparities in health care outcomes.

Although many studies have demonstrated that improvements in access and standardization of care can reduce disparities in many chronic health conditions, many CKD-related outcomes remain outliers. Examining diabetes-related complications in an ethnically diverse population with standardized health care coverage, Karter et al. found similar or reduced rates of complications in minority enrollees in comparison with white enrollees, with the exception of developing ESRD, which was significantly more common across all minority groups compared with white individuals. This unique finding that only CKD outcomes did not improve for minorities when care was standardized suggests that there may be non–health care system factors that are important for kidney-related outcomes and/or that additional novel quality care indicators are important for patients with CKD. ESRD is unique, in that most patients are covered by Medicare, and is generally characterized by equity in access to care, except awaiting cadaveric-donor renal transplantation, for which standardized health care reduces the black–white difference but significant differences still exist, most likely as a result of cultural health beliefs and practices. A recent report by Gao et al. of >13,000 beneficiaries re-

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Table 2. Socioeconomic class and values of key determinants of health

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Poverty</th>
<th>Middle Class</th>
<th>Wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>Key question: Did you have enough? Quantity important.</td>
<td>Key question: Did you like it? Quality important.</td>
<td>Key question: Was it presented well? Presentation important.</td>
</tr>
<tr>
<td>Language</td>
<td>Casual register. Language is about survival.</td>
<td>Formal register. Language is about negotiation.</td>
<td>Formal register. Language is about networking.</td>
</tr>
<tr>
<td>Family structure</td>
<td>Tend to be matriarchal.</td>
<td>Tends to be patriarchal.</td>
<td>Depends on who has money.</td>
</tr>
<tr>
<td>World view</td>
<td>Sees world in terms of local settings.</td>
<td>Sees world in terms of national settings.</td>
<td>Sees world in terms of international view.</td>
</tr>
<tr>
<td>Time</td>
<td>Present most important. Decisions made for moment based on feelings or survival.</td>
<td>Future most important. Decisions made against future ramifications.</td>
<td>Traditions and history most important.</td>
</tr>
</tbody>
</table>

*aAdapted from reference (95).*

Figure 4. The chronic care model. Reprinted from reference (74), with permission.

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trast to testosterone, estrogens may attenuate CKD progression by lowering the cardiovascular stress response to adrenergic stimuli.
Table 3.  CKD: A call to action*

<table>
<thead>
<tr>
<th>Patient-Provider Level</th>
<th>Community Level</th>
<th>Health Care System Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>CKD risk factor education (health promotion), screening/early detection, and targeting interventions for high-risk communities and populations (hypertension, diabetes, and proteinuria)</td>
<td>Large-scale CKD and CKD risk factor detection effective only if early treatment programs are available</td>
<td>Universal access to care, preferably using a chronic care model [23,74]. Patient-centered approach with sensitivity to the nation’s diverse cultural constituency</td>
</tr>
<tr>
<td>Increased awareness of cultural differences in primary values, world views, and thereby priorities</td>
<td>Increased organ donation, especially from minority communities</td>
<td>Automated reporting of estimated GFR by national laboratories</td>
</tr>
<tr>
<td>Effective written and oral communication, increased provider awareness of the high rate of functional illiteracy in the United States</td>
<td>Advocacy for social and health justice</td>
<td>Early nephrology referral for co-management to improve CKD treatment and attenuate complications</td>
</tr>
<tr>
<td>Biologic considerations in the genesis of health disparities</td>
<td></td>
<td>Renal care team approach to maximize adherence to guideline recommendations</td>
</tr>
</tbody>
</table>

*Adapted from reference (19).

Receiving care through the Department of Defense, a standardized health care delivery system, found similar rates of provider compliance for black and white patients for stages 3 and 4 CKD targets. Follow-up on ESRD rates will help to provide insights into the effects of quality care on CKD progression across gender and racial/ethnic groups. Despite several study limitations, these findings strongly support the possibility for dramatic attenuation of socioeconomic, gender, and racial/ethnic disparities for patients who have CKD and are treated within a standardized or single-payer health care delivery system.

THE WAY FORWARD: STRATEGIES FOR REDUCING DISPARITIES AND FUTURE RESEARCH DIRECTIONS

“When you have exhausted all possibilities, Remember this… you haven’t.”  
—Author Unknown

What can or should government, industry, and physicians do to address the racial/ethnic disparities in CKD care? The Department of Health and Human Services has created a strategy for value-driven CKD health care initiatives that includes focusing on health disparities, developing and measuring CKD quality and efficiency metrics at the dialysis facility and nephrologist level, reporting outcomes including consumer/payer choice incentives, reforming reimbursement, supporting interoperable health information technology, and promoting evidence-based care and coordinated care.

As a medical profession, we too frequently believe that many health issues are beyond our impact, citing them as societal issues, not realizing that we are society, while our apathy and inaction only perpetuate the current state of affairs. For a moment, let’s imagine that we actually embrace the moral imperative of health equity: What might be implemented to improve our understanding and respect of our patients’ diverse cultural values, transform our institutions and social structures to promote health and well-being, and generate the advocacy skills that will be needed to make universal access and quality uniform health care a reality?

Effective Communication

Lack of effective communication, including issues such as limited health literacy, is a pervasive and independent risk factor for poor health outcomes. A renewed emphasis on current provider education and the education of future generations of providers that might include structured fellowship training for sensitivity to cultural, socioeconomic, and gender diversity; leadership in health promotion and disease prevention; and actionable skill sets to engage in transforming health care systems and advocating for relevant health and health care policies as part of a comprehensive approach to high-quality CKD and ESRD care. Many of our health messages need to provide effective education for high-risk communities, such as easily readable and linguistically appropriate CKD-related educational materials and approaching patient encounters with a presumption of limited health literacy. Specific suggestions for improving communication at a health care system level include making cultural competency a core institutional value, ongoing training and evaluation on cultural competency issues, collecting demographic data to allow assessment of potential disparities in quality, collecting data on patients’ primary language to help guide service provision and translation services, and promoting providers and staff diversity in targeted communities and involving consumers and community leaders in the design of local programs and services.

Medical Advocacy for Improved Health Care Systems

In 2003, a stakeholder group identified 19 key barriers to optimizing CKD care in the United States, such as the lack of adequate reimbursement, difficulty of providing care coordination and non-physician services, and the lack of availability of both primary care and specialty physicians. A more recent series of in-depth discussions with a geographically diverse group of nephrology practices...
Disparities in CKD have paved a unique roadmap for promising opportunities for research investment, including promising naturally occurring cost-effective interventions such as vitamin D77 or emerging novel peptides such as FT061452, a glutathione precursor with vitamin implications,28 which are more likely to be highly embraced by low-resource and minority communities.

CONCLUSIONS

“The secret of the care of the patient is caring for the patient.”

—Francis Peabody (1881–1927)

Inequities in the incidence, prevalence, and treatment of CKD/ESRD are well documented and vary among different minority groups. Despite the progress made, many of the diverse factors that influence the initiation and progression of CKD and the disparities therein are not fully understood. Although modifiable risk factors, such as culture, socioeconomic status, and access to medical care, contribute to a large proportion of CKD disparities, additional risk factors, from emerging biomarkers to providing structured and coordinated health care delivery, remain to be defined more clearly. To improve the care of diverse communities, medical research alone is insufficient. Efforts to address lingering social injustices that perpetuate limited educational opportunities, socioeconomic imbalances, and limited access to health care are needed to ensure that the contributions of advancing medical care will have a clinically relevant impact on improving patient outcomes (Table 3).

The nephrology community has the opportunity to address not only inequities within health care systems but also many of the sensitive issues that underlie the propagation of community-level health disparities, including elimination of injustices embedded within the social systems that influence health and health care and the promotion and inculcation of community-level and personal responsibility for health- and health care-related behaviors.79–81 In addition, the nephrology community can take a leadership role in a re-conceptualization of the medical community’s understanding of health so that our society and health-related systems are focused on well-being and true prevention, not just early detection or reactive acute care. The word “health” is derived from the Anglo-Saxon root “hale,” which means to be whole. Our present focus on medical care and creating a medical care workforce must change to a broader focus on health, enabling us to recapture the true calling of the physician, and the actualization of a vision of insurance, medical, and related systems of “health” care that can provide uniform quality care based on the patient as a human being and truly considering care as holistic.

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None.

REFERENCES
from the NHANES III. Arch Intern Med 167: 1159–1165, 2007
42. Schlitt L, Keitel HG: Pathogenesis of hyposplenuria in persons with sickle cell anemia or the sickle cell trait. Pediatrics 26: 249–254, 1960
45. Sehgal AR: Overlap between whites and blacks in response to antihypertensive drugs. Hypertension 43: 566–572, 2004
60. Straube BM: The imperatives for change in the US health care payment and delivery systems are clear. Adv Chronic Kidney Dis 15: 7–9, 2008