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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.

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"Of all of the forms of inequality, injustice in health is the most shocking and inhumane."

—Dr. Martin Luther King, Jr. (1929–1968)

Chronic kidney disease (CKD) has recently become recognized as a global public health problem.[1–3] CKD and, to a greater extent, ESRD are characterized by marked differences in incidence, prevalence, and/or complications across gender, age, race/ethnicity, socioeconomic status, and geographic boundaries. These traits may confer either protection or increased risk for certain health practices and medical conditions, suggesting there is much to learn beyond the traditional risk factors contributing to CKD and CKD-associated complications.[4–7] ESRD is one of the most dramatic examples of health disparities, with rates for minorities ranging from 1.5 to 4.0 times those of age-adjusted white counterparts,[6] despite similar rates for the early stages of CKD.[8] Although CKD is associated with increased rates of premature mortality,[9,10] adjusted ESRD survival rates are paradoxically better for minorities.[11] The Institute of Medicine notes that inequities in health outcomes can arise from within the health care system, such as the operation of health care systems, and the legal and regulatory climate or from ecologic factors, such as clinical appropriateness and need, and patient preferences, although significant overlap exists, for example, discrimination, biases and prejudice, stereotyping, and uncertainty. The Institute of Medicine defines disparities in health care as differences that generally represent institutional or provider biases that are unjust, even if unintentional (Figure 1).[12,13] Unfortunately, the contribution of factors such as patient beliefs and preferences are commonly overlooked when ascribing disparities to health care systems and/or providers.

The term "health disparities," however, is frequently used to describe the adverse health outcomes experienced by racial/ethnic minorities that occur in the context of broad historic and contemporary social and economic inequality,[14–16] as well as health care system factors.[12,17–19] *De facto* racial segregation remains prevalent within US health care systems, while limited revenues and reduced capacity for health care delivery constrain organizations dedicated to the care of poor and often largely minority populations.[20] Residential segregation, which was federal policy up to the civil rights movement[21] and continues today as mortgage discrimination, leads to racially divided communities that may

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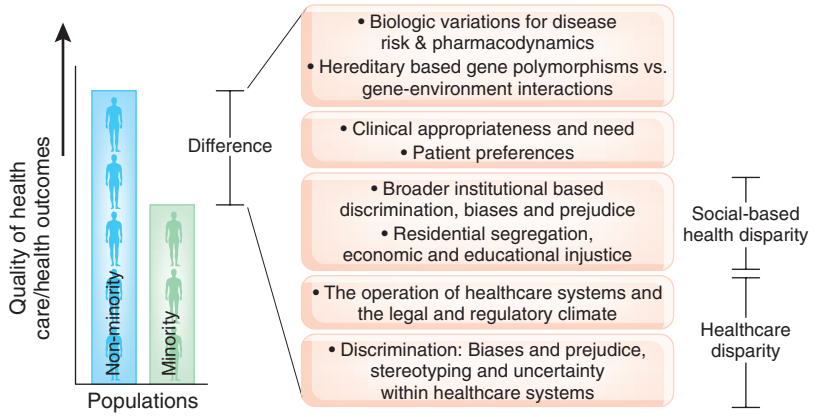

Figure 1. Differences, disparities, and discrimination. Adapted from reference [12], with permission.

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.[22,23] 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.[24] Dialysis facilities located in predominantly black communities have higher mortality rates and lesser compliance with recommended performance targets.[25] 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.[26] 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."[27]

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

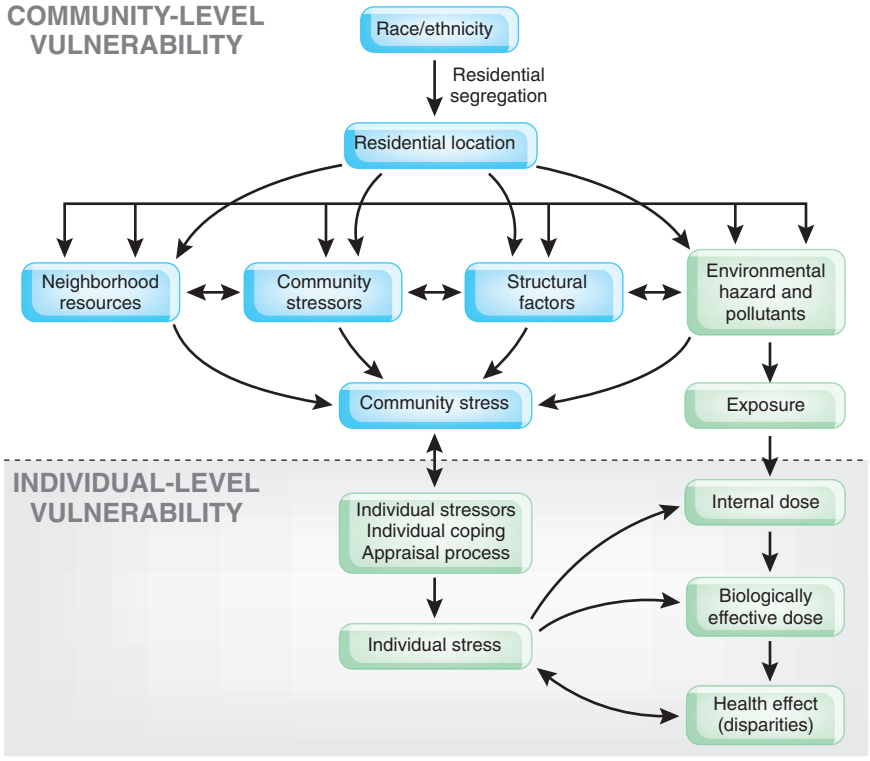

Figure 2. A framework for environmental health disparities. Reprinted from reference [23], with permission.

variations in health beliefs and practices, as well as distrust of the health care system, that extend across many of the nation's socioeconomic and culturally diverse communities.[28] In addition, the health care milieu is under increasing pressure to provide more comprehensive quality care in shorter visit times to more people and with more documentation while using fewer resources. The likelihood of overt or subtle conflicts between patients and providers/health care systems is markedly increased under such settings. Addressing the constellation of factors that influence health outcomes seems an arduous task for health care providers, yet it is health care providers, most commonly physicians, to whom the general community looks for leadership, not just for medical care, but for broader issues that affect health and well-being. For grasping more easily the multidimensional nature of CKD disparities, a theoretical framework can assist in understanding how the many sociocultural and environmental elements interact with biology to influence the initiation and progression of CKD (Figures 2 and 3),[23,29] as well as understanding the context of patient-specific needs, values, and preferences (Tables 1 and 2).[30]

Although understanding some of the broad differences in values can enhance our sensitivity and compassion for those 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.[31–36] Although there may be biologic variations among racial and ethnic groups, the emerging data from the human genome project suggest that these interracial variations are modest at best and much smaller than intraracial variations.[37,38] Indeed, biologic variations are more common across gender than race/ethnicity. Select biologically based factors may have both racial and nonracial contributions, such as hypovitaminosis D, which may be related to increased melanin and reduced ultraviolet conversion of previtamin D as well as nutritional deficiency. Hypovitaminosis D is associated with increased rates of CKD initiation factors such as hypertension and diabetes[39] and progression factors such as inflammation and fibrosis,[40] whereas vitamin D repletion may improve CKD-related mortality.[7] Environmental influences modify gene and/or receptor expression (gene–environmental) as supported by genetic linkage studies describing susceptibility genes for CKD.[41] 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.[41a] Sickle cell trait (approximately 8% of black individuals), which has traditionally been described as causing renal microinfarction and hyposthenuria[42] 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.[43] Racial variation

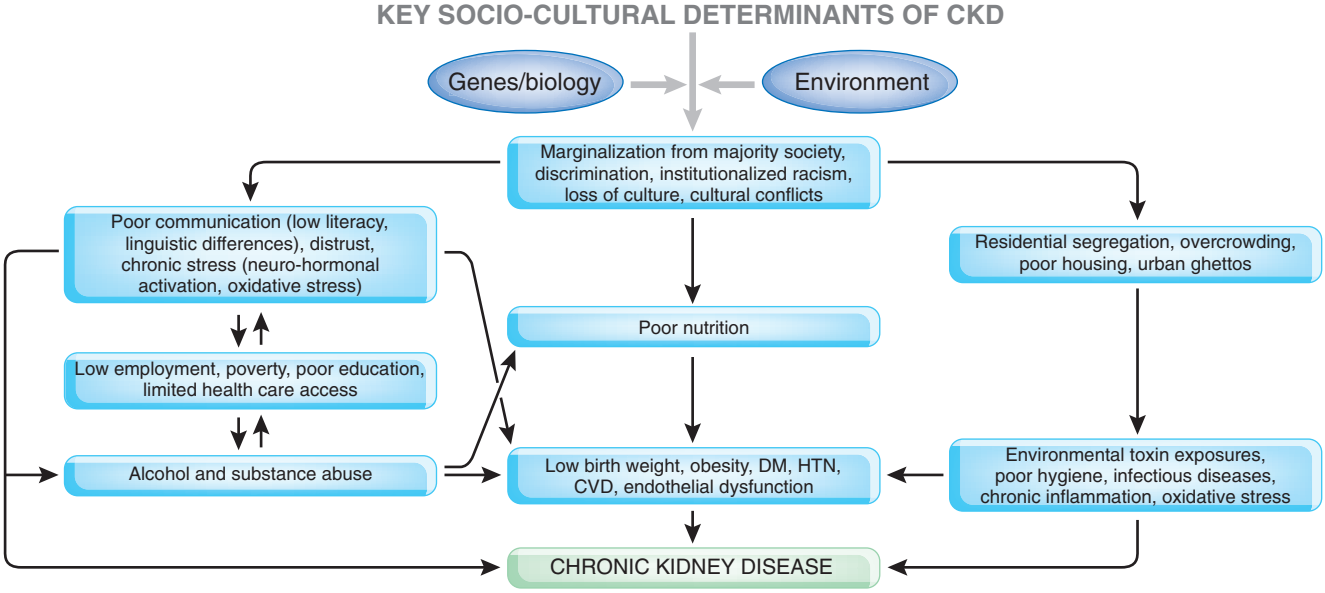

Figure 3. A framework for integrating key sociocultural determinants of CKD. Adapted from reference (29), with permission.

Table 1. Recognizing socioeconomic and/or racial/ethnic factors contributing to disparities in health outcomes

Health Care System Level	Institutionalized Influences on Patient Behaviors	Culture and Literacy
Under- or uninsurance, unstructured medical care systems and lack of enabling public policies reduce access to care for indigent and many minorities.	Institutional racism ([82–85])—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.	Gender and racial/ethnic differences in values and beliefs lead to disparities arising from both within and beyond the health care system.
Limited ability to afford recommended care—leads to delays in seeking care and poor adherence.	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) ([86–88]).	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 health care systems as patient insolence or ignorance—limits trust, hinders effective communication reduces adherence, and may influence health recommendations or availability of services.
Multiple payers and nonuniform provider incentives lead to marked variations in quality of care.	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.	Linguistic/Communication barriers: 48% of US is estimated to be functionally illiterate with higher rates among immigrants and indigent (often minority) ([91]).
Paucity of evidence-based data for women and minorities who are underrepresented in most trials.	Geocultural/socioeconomic differences ([89]) (urban and rural based health exposures, practices, and healthcare access issues; *e.g.*, Southeast US stroke belt, *etc.*).	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]).
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.	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 "Weathering"—the stress of being poor and marginalized in America.	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]).

in BP response to antihypertensive therapy has been reported,[44] and this could affect disparities in CKD. Sehgal[45] 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 has been recognized as an important factor in the development of CKD.[46] Gender-based genetic variability has been linked to differences in BP in both black[47] and white individuals.[48] In con-

Table 2. Socioeconomic class and values of key determinants of health[a]

Parameter	Poverty	Middle Class	Wealth
Food	Key question: Did you have enough? Quantity important.	Key question: Did you like it? Quality important.	Key question: Was it presented well? Presentation important.
Education	Valued and revered as abstract but not as reality.	Crucial for climbing success ladder and making money.	Necessary tradition for making and maintaining connections.
Destiny	Believes in fate. Cannot do much to mitigate chance.	Believes in choice. Can change future with good choices now.	*Noblesse oblige*.
Language	Casual register. Language is about survival.	Formal register. Language is about negotiation.	Formal register. Language is about networking.
Family structure	Tend to be matriarchal.	Tends to be patriarchal.	Depends on who has money.
World view	Sees world in terms of local settings.	Sees world in terms of national settings.	Sees world in terms of international view.
Time	Present most important. Decisions made for moment based on feelings or survival.	Future most important. Decisions made against future ramifications.	Traditions and history most important. Decisions made partially on basis of tradition and decorum.

[a]Adapted from reference ([95]).

trast to testosterone,[49,50] estrogens may attenuate CKD progression by lowering the cardiovascular stress response to adrenergic stimuli.[51]

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[31] and further contributes to the inability of such patients to receive adequate CKD and pre-ESRD care. Several recent studies[4,12,13,52,53] but not all[54,55] 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.

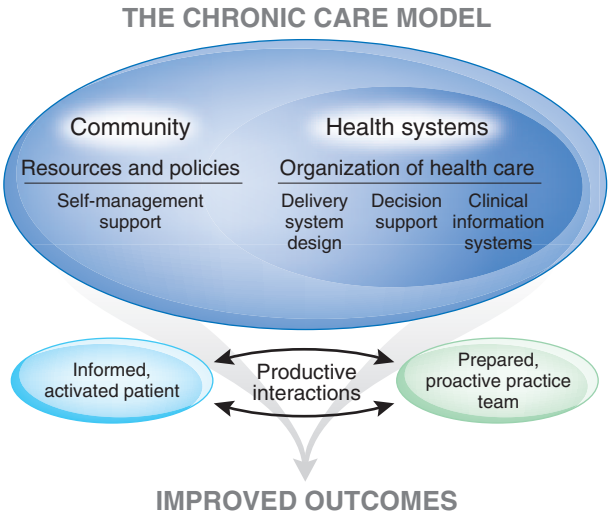

Figure 4. The chronic care model. Reprinted from reference ([74]), with permission.

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.*[55] 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,[56,57] except awaiting cadaveric-donor renal transplantation, for which standardized health care reduces the black–white difference but significant differences still exist,[58] most likely as a result of cultural health beliefs and practices. A recent report by Gao *et al.*[59] of >13,000 beneficiaries re-

Table 3. CKD: A call to action[a]

Patient–Provider Level	Community Level	Health Care System Level
CKD risk factor education (health promotion), screening/early detection, and targeting interventions for high-risk communities and populations (hypertension, diabetes, and proteinuria)	Large-scale CKD and CKD risk factor detection effective only if early treatment programs are available	Universal access to care, preferably using a chronic care model ([73,74]). Patient-centered approach with sensitivity to the nation's diverse cultural constituency
Increased awareness of cultural differences in primary values, world views, and thereby priorities	Increased organ donation, especially from minority communities	Automated reporting of estimated GFR by national laboratories
Effective written and oral communication, increased provider awareness of the high rate of functional illiteracy in the United States	Advocacy for social and health justice	Early nephrology referral for co-management to improve CKD treatment and attenuate complications
Biologic considerations in the genesis of health disparities		Renal care team approach to maximize adherence to guideline recommendations

[a]Adapted from reference ([96]).

ceiving 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.[60]

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,[61–63] 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.[64,65] 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.[66,67] Many of our health messages need to provide effective education for high-risk communities,[68,69] such as easily readable and linguistically appropriate CKD-related educational materials[70,71] and approaching patient encounters with a presumption of limited health literacy.[65] 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.[68]

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.[72] A more recent series of in-depth discussions with a geographically diverse group of nephrology practices

throughout the country identified economic reality/reimbursement and the difficulty in delivering multidisciplinary care as impeding attempts to improve quality for patients with CKD (R. Rettig, PhD, RAND Corporation, Washington, DC, personal communication, January 2008). A collaborative legislative agenda to improve care for patients with CKD developed by the Renal Physicians Association, American Society of Nephrology, National Kidney Foundation, and American Society of Pediatric Nephrology is focusing on appropriate funding for CKD care that is delivered in a CKD clinic or office setting. This agenda includes advocacy for Medicare coverage for educational efforts regarding CKD, including transplantation and dialysis options, as well as increased basic and health services research to advance knowledge about CKD and its treatment (A. Kliger, MD, Yale University School of Medicine, New Haven, CT, personal communication, January 2008). Additional approaches include advocacy for structured coordinated care systems and/or the use of disease management approaches to link economic incentives to improved clinical outcomes. Specific health care system approaches recently proposed by Dr. Jan Blustein include setting achievable performance targets (will help reduce "cherry picking"), providing targeted infusions of expertise or technology and of infrastructure investment in underresourced environments, and supplemental funding to those caring for high volumes of low-revenue patients.[20]

One approach that has been shown effective in delivering high-quality care for those with chronic disease by integrating many of these strategies is the chronic care model, which fosters productive interactions between informed patients who take an active part in their care and providers with resources and expertise (Figure 4).[73,74]

Research Approaches to Address Disparities

Dr. Claude Lenfant, former director of the National Institutes of Health National Heart, Lung, and Blood Institute, noted, "Enormous amounts of new knowledge are barreling down the information highway, but they are not arriving at the doorsteps of our patients, especially for a disproportionately high percentage of women, racial and ethnic minorities, and other high-risk groups in the US health care system."[75] He emphasized multidisciplinary or translational research approaches, including rigorous research, to improve health care systems and provider–patient interfaces. For CKD, this translates into research investments in renal biology and pathophysiology in the context of patient- and community-level influences.[76] Disparities in CKD have paved a unique roadmap for promising opportunities for research investment, including promising naturally occurring cost-effective interventions such as vitamin D[77] or emerging novel peptides such as FT061452, a glutathione precursor with vitamin implications,[78] 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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DISCLOSURES

None.

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