

## The Last Mile: Translational Research to Improve CKD Outcomes

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### Abstract

**The National Institute of Diabetes and Digestive and Kidney Diseases–supported Kidney Research National Dialogue asked the scientific community to formulate and prioritize research objectives that would enhance understanding of kidney function and disease and improve clinical outcomes. An engaged and growing group of investigators working in type 2 translation (from clinical evidence to implementation in the community) identified barriers to improving patient care in CKD and suggested research priorities to test translational strategies that have been effective for other chronic diseases.**

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The National Institute of Diabetes and Digestive and Kidney Diseases asked the community to identify research objectives that, if addressed, will enhance our understanding of kidney function and disease and improve clinical outcomes. The Kidney Research National Dialogue (KRND) welcomed all interested parties to submit, discuss, and prioritize ideas through an interactive website. Over 300 ideas were posted, covering all areas of kidney disease, including CKD type 2 translational research.

CKD is an important public health problem in the United States. The Centers for Disease Control and Prevention estimates that >15% of the United States population >20 years of age may have CKD, often in the setting of multiple other chronic conditions. Health disparities associated with CKD have been well described, including an incidence rate of ESRD that is more than three times higher among African Americans than white Americans. Despite the growing disease burden, awareness about CKD continues to be low, even among the populations at greatest risk for developing CKD. Many studies and networks have identified the natural history (e.g., the Chronic Renal Insufficiency Cohort Study and the Chronic Kidney Disease in Children Prospective Cohort Study) and the growing burden of CKD (e.g., US Renal Data System). Progress has been made in the identification of strategies to slow the progression of CKD, including renoprotective drugs, intensive glycemic control, and control of BP. Despite this, evidence, screening, detection, and treatment of CKD remain inadequate in the United States, particularly among the ethnic and racial minority groups that bear a disproportionate burden of CKD.

Type 2 translational research provides an opportunity to improve outcomes and reduce disparities in CKD through development and testing of new approaches to delivering care. This generally follows type 1 translational research, which uses the “bench-to-bedside”

paradigm to identify populations that benefit from scientific discoveries. Type 2 translational studies identify strategies that lead to the adoption, maintenance, and sustainability of these scientific advances in clinical practice. These efforts are diverse, ranging from effectiveness studies to pragmatic implementation approaches, and provide evidence-based interventions for subsequent use in population health. The chronic care model (1) provides a paradigm for improving outcomes using type 2 translation and has guided the development of interventions that reduce disparities in other chronic diseases. The chronic care model characterizes four aspects of health care (self-management support, delivery system design, decision support, and clinical information systems) and examines them within the context of the health system and the community in which it functions. It offers a framework for identifying system-level interventions that can engage both providers and patients in improving CKD detection and management (2,3).

The following research objectives were identified by KRND participants as opportunities to improve outcomes for patients with CKD. Benefits may be greatest if efforts focus on early-stage CKD, for which intervention is most likely to slow disease progression. Engagement of primary care providers (PCPs) and interdisciplinary collaboration with a wide range of health professionals and community-based health workers is needed, along with closer partnerships with individuals affected by CKD (Figure 1).

### Study Challenges in Self-Management and Health Literacy

Promoting self-management requires excellent provider-patient communication. New approaches to patient education and new ways to communicate with patients (including social media and other technology-based approaches) have not been broadly tested in

Due to the number of contributing authors, the affiliations are provided in the Supplemental Material.

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**Figure 1. | Translational research can lead patients and providers to improved outcomes by testing new approaches to all aspects of the CKD care delivery process.** These approaches include identifying and monitoring patients, developing useful decision support tools, promoting collaborative interdisciplinary care, and addressing low health literacy in high-risk populations and barriers to self-management issues. Forging new collaborations is crucial to the success of these research efforts.

kidney disease. Qualitative studies measuring provider-patient communication and methods to improve provider-patient interactions to translate science to patients, especially those from underserved communities, are needed.

- Approaches using new educational paradigms and new groups of health professionals have great potential to promote self-management. Future studies should explore use

of lay health educators and engagement of community-based and allied health professionals for the management of early-stage CKD.

- Family members may be great allies in implementing lifestyle, nutritional, and pharmacologic interventions. Parents, in particular, are the primary source of information for patients with pediatric CKD. Family-based interventions that

engage parents and others have facilitated patient self-management and medication adherence for patients with other chronic diseases and should be examined for CKD.

- The health literacy, numeracy, education, and cultural sensibilities of patients at high risk of poor CKD outcomes vary widely. Future efforts should focus on adapting existing educational materials to accommodate the needs of diverse populations with CKD and evaluating their effectiveness at imparting knowledge and self-efficacy skills.

### Promote Interdisciplinary Health Care

CKD often occurs in people with multiple chronic conditions. Thus, it is important that interventions not be too “kidney centric.” The Affordable Care Act provides opportunities to test strategies to improve care through system redesign, perhaps by cluster randomized trials within large health care systems. Important research questions include the following:

- The “medical neighborhoods” formed through accountable care organizations have the potential to improve care for people with chronic illness. Are these organizations effective in improving care for CKD?
- Inadequate communication between PCPs and specialists leads to poor outcomes. Do specific models of collaboration between generalists and nephrologists, including electronic consultation systems, better support comanagement of CKD?
- Diabetes is the leading cause of kidney disease. Is integration of kidney disease management into existing diabetes care process and clinics more effective than kidney disease management performed in subspecialty clinics?
- Multidisciplinary integrated care has resulted in significant improvements in diabetes care but has not been widely implemented in the delivery of CKD care. Are models that incorporate case management and integration of nursing, pharmacy, dietitian, and mental health professionals equally effective for kidney outcomes? Are there unique barriers to implementing multidisciplinary care for kidney disease?

### Improve Decision Support Tools

- While routine reporting of eGFR with serum creatinine results is nearly universal, studies have not demonstrated that reporting has changed PCP adherence to evidence-based care. Future studies should examine whether specific decision support tools improve adherence to evidence-based nephrology care.
- Decision support tools result in improved pharmacy management. There are opportunities to improve patient safety and reduce preventable AKI through pharmacy-led interventions. Future endeavors should help determine how such interventions can be adopted and maintained.

### Improve Health Information Technology to Create and Follow Virtual Cohorts of Patients with CKD

- Better information management tools are needed to help identify people with CKD using electronic medical records

and to create CKD patient cohorts. Additional tools to facilitate the inclusion of people with CKD into quality improvement efforts are essential for better population health management. Research to develop and test technologies that integrate with electronic health records to facilitate improved quality of care should be a priority.

### Develop and Track a Broad Range of Outcome Metrics

Clearly defined metrics are needed to measure the success of translational research. Traditional long-term outcomes (*e.g.*, death, dialysis, loss of half of kidney function) may not be optimally useful in studies involving patients with moderate renal injury, who may not be followed for >3–5 years. In addition to more frequently used proximal measures reflecting poor CKD outcomes (*e.g.*, hospital admissions, urine albumin-to-creatinine ratio, BP, and medication adherence), greater emphasis on safety signals (AKI events, drug toxicity), and patient-centered outcomes (such as quality of life, depression, safety-related events, and informed decision-making) may be useful.

### Forge New Collaborations

Collaborative partnerships represent a promising mechanism for funding translational research. Groups that have a large stake in interrupting CKD progression include the Centers for Medicare & Medicaid Services, health plans, community-based participatory research collaborations, community health centers, Clinical and Translational Science Awards–funded institutions, and organizations such as the Robert Wood Johnson Foundation.

### Conclusion

Opportunities to improve care for patients with CKD through type 2 translational research are substantial. They include addressing the patient within the context of the community, promoting self-management, reorganizing health care delivery to maximize the effectiveness of all members of the health care team, facilitating communication between generalists and specialists, and using information technology and decision support effectively to improve patient management and decision-making. Because effective interventions are likely to require interdisciplinary efforts with qualitative as well as quantitative outcomes, research approaches may need to be adjusted to include investigators with a broad range of expertise, to use varied research designs, and to measure innovative outcomes. Partnerships among funding agencies and community-based organizations may enhance the sustainability and promote progress.

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gov/about-niddk/offices-divisions/division-kidney-urologic-hematologic-diseases/kidney-research-national-dialogue/Pages/kidney-research-national-dialogue.aspx). Please visit this website for updates on KRND.

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