

Sparking Innovation To Improve the Lives of People with Kidney Disease

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Clin J Am Soc Nephrol 12: 1548–1550, 2017. doi: <https://doi.org/10.2215/CJN.04420417>

Introduction

CKD has recaptured the attention of the Department of Veterans Affairs (VA). Recent reports have illuminated the significant burden of CKD borne by veterans. Estimated to affect 16% of veterans (1), CKD is now the fourth most common diagnosis in the VA (2). Moreover, 13,000 veterans develop ESRD every year, representing nearly 10% of the incident dialysis population in the United States (3). Furthermore, the high morbidity and growing costs of caring for the veteran population with CKD recapitulates the findings seen in the private sector (3). Thus, the challenge of CKD looms large within the VA.

The VA has a legacy of innovation in the care of people with kidney failure (4). Half a century ago, the VA established the first national dialysis program for people with ESRD, and its physicians developed the arteriovenous fistula. In the 21st century, the VA pioneered the first United States bundled rate dialysis contract, and established joint venture dialysis units with the Department of Defense (DoD) as novel cost containment measures. To improve access to kidney care, VA founded telenephrology services and an electronic referral system for kidney transplant candidates. Nevertheless, because of growing volume, excess costs, and poor health outcomes, innovation targeting CKD remains a VA imperative.

The American Society of Nephrology (ASN) is a leader in the fight against kidney disease. As the largest provider of kidney health care in the United States, the VA also leads in the national campaign to eradicate kidney disease. Supporting the VA Kidney Program is VA's Center of Innovation (VACI), whose charge is to identify, test, and evaluate agile solutions to the agency's most pressing concerns. To do so, VACI cultivates partnerships with smart, disruptive organizations to facilitate exploration of new perspectives and promote problem solving—essential processes to overcome resistance to innovation (5).

Hence, the VA sought partnership with the ASN to advance their mutual goal of improving the quality and delivery of CKD health care. Partnership with Booz Allen Hamilton (BAH), the global consulting firm, brought added value to the innovation table through the sharing of BAH's culture of innovation and expertise in analytics, digital solutions, engineering, and science.

In February of 2017, the VA and ASN convened the inaugural Kidney Innovation Summit at the BAH Innovation Center in Washington D.C. to identify opportunities for innovation in the care of people with

CKD. An additional aim was to incentivize collaboration between groups most invested in the health care value chain: traditional innovators (*e.g.*, medical technology companies, academia), incumbent players (*e.g.* health insurers, health care systems), and insurgents (*e.g.*, clinical entrepreneurs, health care consumers) (6). Invited participants were charged with thinking deliberately about the unmet needs of people with CKD, and creating solutions to improve the way in which affected people lived their lives. VA principles were applied as a roadmap for kidney innovation, aiming to make care patient-centered, collaborative, data driven, of high value, and continuously improving (7).

The VA and ASN structured the Summit around three major sessions: CKD, RRT, and Kidney Transplantation. Importantly, each session was framed by a patient perspective to convey the need for innovation through the lens of human experience. A host of information sharing methods was employed including lightning talks, innovation showcases, and a participant pitch session. Dynamic communication strategies were used preferentially to crosspollinate ideas, spark new collaborations, and drive transformation of ideas into actionable deliverables. Critical to a sustainable environment in which innovation can mature, an overview session detailing complementary funding opportunities was held to highlight available alternative sources of support.

Four focus areas for innovation emerged from the Summit: (1) health system initiatives that foster early CKD detection, prevention, and treatment; (2) education and decision aids for people at risk for CKD and their caregivers; (3) data science developments that improve CKD care; and (4) rehabilitation of people with ESRD. Solutions to overcome the barriers to innovation in each of these four areas were elicited from and by the attendees, which included representatives from government, academia, nonprofit organizations, private industry, and patients with kidney disease and advocate groups.

Health System Initiatives Targeting Early CKD

Health system initiatives targeting CKD prevention and early detection are vital to reduce health disparities and improve the overall population health of veterans and other Americans. However, as noted at the Summit, one of every three veterans with CKD resides in a rural area. Limited access to care therefore is

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an important barrier to the implementation of the VA/DoD's CKD screening and management guidelines (1,8). Health system redesign is thus essential to mitigate the system-level factors that impair kidney patient access to care. In particular, models of care and technologies that surmount geographical barriers offer potential for reducing the adverse outcomes associated with late CKD detection and intervention.

Team-based models of care to facilitate rural veteran CKD screening and management were among the Summit proposals. At home, self-administered testing for kidney disease was also proposed as an alternative to medical center-based CKD screening. Particular support was voiced for the development of urine test kits of early biomarkers for kidney disease and to monitor CKD's progression in high-risk patients.

Enhanced health system teletechnology was also identified as a means to extend care to rural patients with CKD. For example, augmenting the VA e-Kidney mobile application prototype to feature biometrics reporting, medication and appointment reminders, and access to virtual nutrition clinics would expand its functionality beyond static education to empower active patient self-management. Further modifications to include bidirectional communication could also facilitate high-risk patient case management (1).

Kidney Disease Education and Decision Aids

As described by participants at the Summit, veterans and their caregivers experience multiple challenges that limit their awareness of kidney disease, its impact on their health and wellbeing, and ultimately, its prevention and treatment. Health behavior choices, including those related to nutrition, were cited as key but often unwitting decisions made by veterans and their caregivers that could have influenced the course of their illness. Proposed aids to enhance healthy food decision-making ranged from virtual nutrition clinics and grocery store tours, to cooking demonstration classes for patients and their families, and automated monthly nutrition report cards.

Decision aids to assist patients in managing their expectations and experience with self/home care dialysis and kidney donation were also identified as learning opportunities in need of innovation. Suggested home dialysis education aids included peer-to-peer coaching programs and booster training curricula for patients and caregivers to diminish the loss of skills over time reported by patients. To expand kidney donation opportunities, a living donation fact sheet, standardized screening process, and central education portal were cited as essential tools to develop. Coaching programs to improve clinician communication with patients regarding kidney health was also a clearly voiced need. Lastly, novel education methods were called for to encourage and sustain lifestyle interventions to reduce risk of kidney failure, such as exercise, fitness, weight control, and medical nutrition therapy.

Data Science to Advance Kidney Health Care

As emphasized at the Summit, the rapidly evolving field of data science offers unparalleled opportunities to enhance the wellbeing of populations and individuals with kidney disease and to substantially reduce avoidable health care utilization and expenditures. The feasibility of leveraging

VA's vast data resources to comprehensively assess the population health of veterans with CKD and provide insight into best practices is emerging (3,9). High priority for data science innovation was assigned to analytics techniques using artificial intelligence, including machine learning and natural language processing. In addition, data science developments in aggregation of big data to improve kidney health care was identified as a need. Prognostic models to forecast outcomes of relevance (*e.g.*, onset and/or progression of kidney disease, hospital admissions, fistula failure) and predict response to therapies and treatments were also recognized as innovation opportunities. And, novel data science methods to identify individuals at risk for kidney disease and enable deep phenotypic stratification were deemed essential by Summit panelists to advance precision medicine related to CKD.

Rehabilitation of People with ESRD

Impaired health-related quality of life and other poor outcomes characterize many people suffering from ESRD or its burdensome treatment. Per Summit panelists, transformation in the delivery of RRT was the lynchpin to the rehabilitation of people with ESRD. Processes of care and tools that promote personalized RRT and preemptive kidney transplantation were favored solutions. Examples included incremental dialysis, which if shown to preserve residual renal function, offers an alternative paradigm for incident ESRD care. Tailoring of RRT *via* suppression of colonic uremic toxins was another testable hypothesis proposed. Currently undergoing regulatory review, wearable artificial kidney devices would facilitate rehabilitation through enhanced patient autonomy. Additionally, patient-centered decision-making tools related to RRT and strategies to improve living donation transplantation awareness were cited as rehabilitation opportunities.

Conclusion

The ideas generated at the inaugural Kidney Innovation Summit demonstrate that the VA, in collaboration with the ASN, can help advance innovation in the prevention, early detection, and treatment of kidney disease. Using the focus areas identified at the Summit, the VA issued a broad agency announcement targeting kidney disease. Next, selected proposals will be tested for their feasibility and effectiveness in improving veteran health. Notable leaders have described innovation as the sparking of ideas that enable people to improve the way in which they live their lives (10). The VA looks forward to continued partnership with the ASN to illuminate the possibilities for all Americans with CKD to do just that.

Acknowledgments

We acknowledge the assistance of Ms. Michelle Fitts of Booz Allen Hamilton in capturing the focus areas for innovation identified at the Summit. Additionally, we thank the leadership of the Department of Veteran's Affairs Center of Innovation and the American Society of Nephrology for their incalculable support for the inaugural Kidney Innovation Summit.

The content of this article does not reflect the views or opinions of The American Society of Nephrology or the *Clinical Journal of the*

American Society of Nephrology. Responsibility for the information and views expressed therein lies entirely with the author(s).

Disclosures

None.

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Published online ahead of print. Publication date available at www.cjasn.org.