



Clinical leadership:  
*Advancing coordinated  
patient care*



Fresenius Medical Care North America  
2016 Annual Medical Report





### Our mission

To deliver superior care that improves the quality of life of every patient every day, and set the standard by which others in the health care industry are judged

# 6.5%

## reduction in hospital admissions in patients seen in Fresenius Vascular Care

Source: 2015 FMCNA data



Fresenius Medical C

# Coordinated



## 14,253 days

in the hospital eliminated over a 12-month period in the clinics enrolled in the DHR pilot

Source: 2015 FMCNA data

Inpatient admissions per member per year changed from 1.75 to 1.34, a 23.4% reduction.

The readmission rate changed favorably from 25% to 20%.

Source: 2015 FHP data



**2,200+**  
dialysis facilities

**-59%** Mean phosphate binder pill burden\*

From 9.7 pills/day at baseline to 4.0 Velphoro pills/day (p<0.0001)

**+95%** Increase in number of patients in serum phosphorus range\*

Phosphorus range from 3.5 to 5.5 mg/dL (p<0.0001)

\*A cohort of in-center hemodialysis patients prescribed Velphoro as part of routine clinical care was observed for 4-6 months, compared to baseline.

Source: 2015 FMCNA RTG data

are North America  
patient care



**82%**  
of ESA patients  
using the long-lasting  
ESA Mircera® in  
February 2016

Source: 2015 FKC data

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## From the Chief Executive Officer

# Coordinated patient care

**Twenty years.** That's how long it has been since we became the nation's first and only vertically integrated renal company. During that time, we have become the continent's undisputed leader in dialysis services and products. We have provided over 250 million life-sustaining dialysis treatments to more than 1.2 million Americans with end-stage renal disease (ESRD). And we have manufactured and sold over 238,000 hemodialysis machines and 533 million dialyzers.

Through it all, we have been guided by a singular focus: improving the quality of life of every patient, every day. This concept of continuous improvement—of challenging ourselves to do more and be more for our patients—has driven us to places that few would have expected.

And it is why, two decades after our founding, we are so much more than a dialysis company.

We are nephrologists, cardiologists, vascular surgeons, and hospitalists. We are nurses, pharmacists, lab technicians, and insurance specialists.

We are a high-performing network of clinicians, caregivers, and technology focused on delivering care to patients where and when they need it most—at home, in the physician's office, in the hospital, or in the clinic.

We are where our patients are.

We have an obligation to help our patients live their lives to the fullest. It's a responsibility we take very seriously, and it's one of the many reasons I could not be prouder of the more than 60,000 women and men who work at Fresenius Medical Care North America.

The results speak for themselves. On the pages that follow, you will see the impact of our single-minded dedication to our patients. Across the full spectrum of care, we have deployed interventions, care improvements, and clinical leadership that have had a dramatic impact on the overall quality of care.



For some companies, 20 years is a lifetime. But at Fresenius Medical Care North America, we are just getting started.

And we couldn't be more excited about what the next 20 years will bring.

Ronald J. Kuerbitz  
Chief Executive Officer  
Fresenius Medical Care North America

## From the Chief Medical Officer

# Clinical leadership

Fresenius Medical Care North America (FMCNA) is driven to lead efforts to migrate the US health care system toward value-based payment systems and coordination of care for patients with advanced kidney disease and high-cost chronic illnesses. To organize efforts across our organization, we have assembled an array of medical and clinical leaders who are uniquely positioned to provide counsel to, support for, and leadership of an enterprise that aligns with the clinical understanding of the science of medicine and the delivery of care to people with these difficult health needs.

Fresenius Medical Care North America is led by a team of dedicated and committed clinical leaders who view their role as fostering a health delivery system that is unique in scope, breadth, and depth and who are committed to care for the whole patient, integrating quality, safety, and efficiency with services, products, and expertise.

It is a privilege to help guide this group of talented and dedicated people in the quest to change the fundamentals of health delivery for chronically ill individuals and to advance our understanding of how to boost their quality of life and address their impaired physical and psychological needs, while being good stewards of our health resources. Whether it is the lifesaving dialysis treatment at Fresenius Kidney Care, an organized care transition from a Sound Physicians-staffed hospital, the integration of FreseniusRx pharmacists into the interdisciplinary team caring for patients, the advent of a smaller peritoneal dialysis machine from the Renal Therapies Group, or research on novel ways to protect patients during their course of therapy from RRI or Frenova, our patients are the central focus of attention in all of these efforts. Our clinical leadership is organized to evolve and maximize FMCNA's impact on the lives of these people who trust us for helping them live better and more productive lives.

As we move our Fresenius Health Partners business into a position of full health care responsibility for many of our patients, I am grateful that FMCNA—using sound judgment and forethought—provides a path toward care that leads to successful, productive lives for our patients. This year's Annual Medical Report is designed to highlight the clinical leaders and a sampling of their projects and medical approaches for each of our portfolio businesses. We applaud their commitment and expect a high level of attention, urgency, and focus on ways to



drive clinical activities toward the best patient outcomes and the delivery of extraordinary service while under the care of physicians, nurses, and staff affiliated with Fresenius Medical Care North America.

*FW Maddux MD*

Franklin W. Maddux, MD, FACP  
Executive Vice President for Clinical & Scientific Affairs  
Chief Medical Officer  
Fresenius Medical Care North America

# Fresenius Kidney Care

Improving the quality of life for every patient, every day

Highlighting our expertise in caring for people with kidney disease, our dialysis services business is now called Fresenius Kidney Care (FKC). Fresenius Kidney Care is focused on providing high-quality, personalized care to people living with end-stage renal disease (ESRD). With a new name and mantra (Thrive On) rolled out this year, FKC's identity better aligns with the personal, high-touch care that has always been the mission of its clinical care teams. FKC is central to FMCNA's network of chronic care providers, services, and products. It is focused on delivering renal replacement therapy through an evidence-based approach and an organized system, which allows patients to receive the right care at the right time from an interdisciplinary team of caregivers. Medical leadership plays a key role in defining the quality agenda and highlighting areas for improvement that lead to higher quality, safety, and efficiency for delivering care to more than 200,000 patients annually.

## Influenza immunization

Respiratory infections and pneumonia are significant causes of dialysis patients' hospitalization and death. Influenza is a common precursor of these complications. The Centers for Disease Control and Prevention and the Peer Kidney Care Initiative<sup>1</sup> recommend that dialysis patients and staff be vaccinated against influenza. Accurate documentation of a patient's immunization status—which focuses attention on those lacking or refusing vaccination—is

a key feature of an effective immunization program. For the 2015-2016 influenza season, Fresenius Kidney Care committed to documenting the influenza vaccination status for all patients and developed novel educational materials and tracking programs to achieve that goal.

The Fresenius Kidney Care Flu Immunization Tracking Report was designed to help all members of the clinic



# 98.5%

Fresenius Kidney Care patients who had their vaccination status documented

As of December 31, 2015

Source: 2015 FKC data

## Leadership profile



### Jeffrey L. Hymes, MD

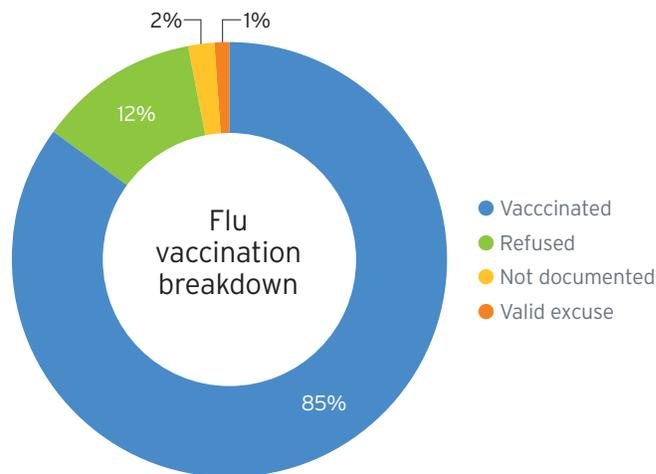
Senior Vice President  
Chief Medical Officer

Dr. Jeffrey Hymes is a graduate of Yale College and the Albert Einstein College of Medicine. He served his medical internship and residency at Yale New Haven Medical Center and received subspecialty training in nephrology at Boston University. Dr. Hymes is board certified in internal medicine, nephrology, and critical care. He was a co-founder of REN Corporation in 1986 and National Nephrology Associates (NNA) in 1998, serving as NNA's president and chief medical officer from 1998 to 2004. He is the chairman of the Fresenius Kidney Care Pharmacy and Therapeutics Committee.

staff contribute to meeting this important company goal. The report displays active patients in the clinic and visually identifies patients who have been immunized, patients who still need to get their flu shot, and patients who cannot receive a flu shot due to contraindications. The nurse can quickly identify patients to approach and encourage about getting vaccinated. Feedback from the clinics indicates that this is a clear and concise tool to help them in this mission.

As of December 31, 2015, 98.5 percent of Fresenius Kidney Care patients had their vaccination status documented; furthermore, the identification of the 12 percent of patients refusing this important protection has allowed us to provide them with focused education and support.

<sup>1</sup> The Peer Kidney Care Initiative ("Peer") is a collaborative quality initiative that leverages public and private data sources to inform patients, physicians, dialysis provider organizations, payers, and state and federal governments about the past, present, and future states of dialysis patient care.



Achieving high rates of influenza vaccination helps protect this vulnerable group of patients.

## Key outcome metrics: Mortality and hospitalization

At Fresenius Kidney Care, there are many measures of performance. Outcome measures of highest impact include mortality, hospitalization, quality of life, and experience of care. Over the past 10 years, the outcomes of both mortality and hospitalization have declined steadily over time. Yet, the declines of 27 percent in mortality and 22 percent in hospitalization do not diminish the ongoing challenges we face to further reduce these clinical endpoints toward levels that are perceived as best practices in the highest performing and most reliable facilities. To achieve additional reductions, Fresenius Medical Care North America is committed to looking beyond the dialysis treatment delivered toward broader clinical conditions that our patients face, to address their medical and social needs that lead to poorer outcomes. Fresenius Kidney Care is embracing a culture that looks at these four outcomes with the perspective of the experience and goals of the patient in mind.

**27%** 

**Reduction in mortality** per patient-year from 2005 to 2015 among all permanent dialysis patients (excluding withdrawals)

Source: QE-080 Executive Quality Summary Report

**22%** 

**Reduction in hospital days** per patient-year from 2005 to 2015 among all permanent dialysis patients (HD and PD)

Source: QE-080 Executive Quality Summary Report

“We are committed to continuously improving the quality of the care and patient experience we deliver. Whatever our level of achievement, we always try to do better.”

– Jeffrey L. Hymes, MD

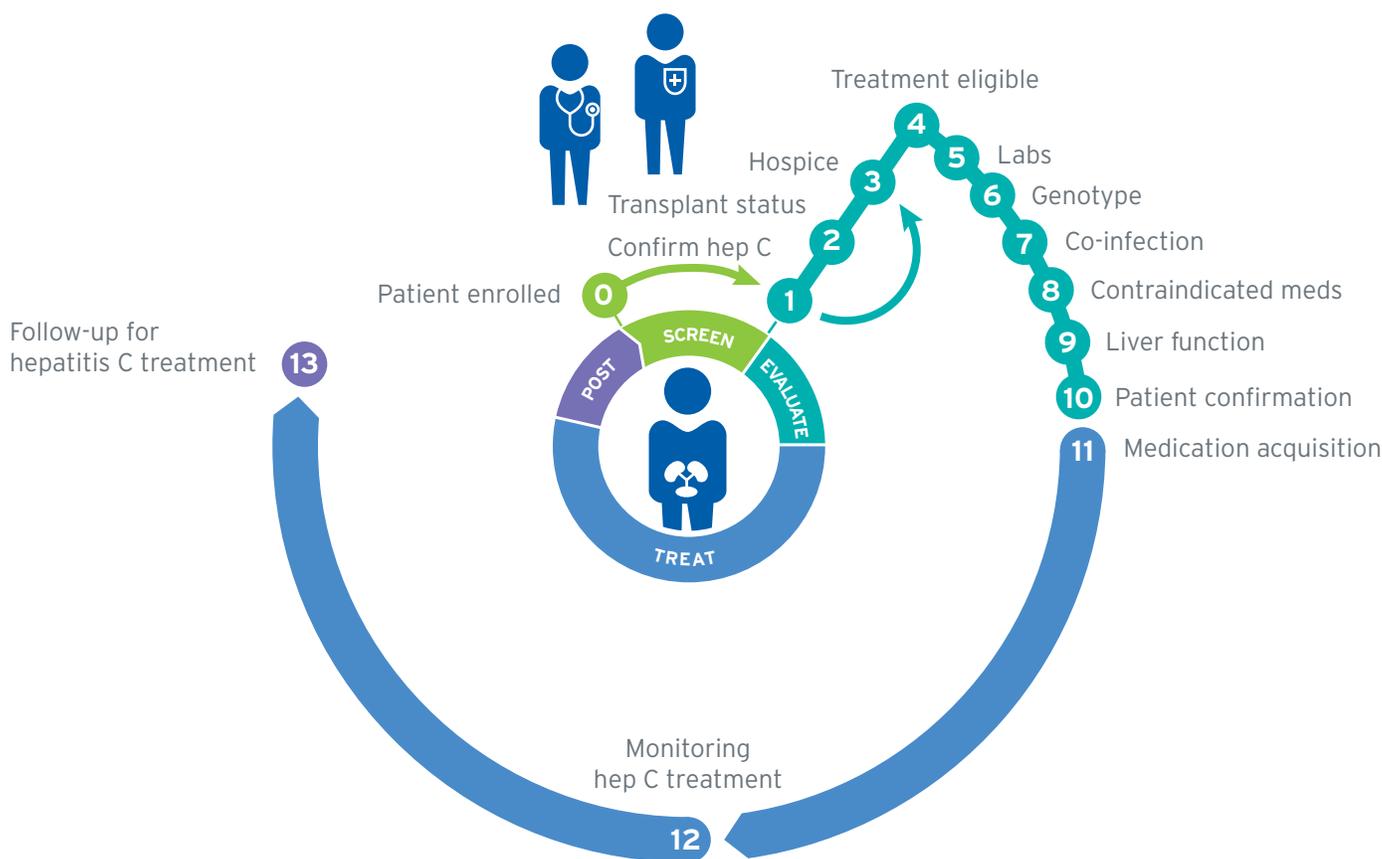
## Hepatitis C initiative—A collaboration between FreseniusRx and Fresenius Kidney Care

Hepatitis C is a viral infection of the liver that can cause cirrhosis, liver cancer, and reduced survival in affected patients. Furthermore, end-stage renal disease (ESRD) patients with hepatitis C are at increased risk of mortality, hospitalization, infections, and cardiovascular events. Compared with the general population in whom the prevalence is about 1 percent, up to 15 percent of hemodialysis patients may be infected with hepatitis C. For most

patients, the traditional treatment with interferon and ribavirin is too toxic or ineffective. The availability of newer drugs called direct-acting antiviral (DAA) agents have revolutionized the treatment of hepatitis C for nondialysis patients, but since these are cleared by renal action, they cannot be used easily in dialysis patients. A new combination DAA drug, Zepatier, has been developed for patients with kidney disease.

The availability of these drugs prompted FMCNA to develop the Hepatitis C Challenge, with a stated goal to eradicate hepatitis C from our renal disease patient population. To achieve this goal, patients with active hepatitis C were identified. Based on the results of testing, in mid 2016 appropriate treatment commences under a multidisciplinary care coordination effort between FreseniusRx and Fresenius Kidney Care.

### Hepatitis C care coordination pathway



The challenge of coordinating the identification, typing, and treatment options for those patients who have chronic hepatitis C has afforded Fresenius Medical Care North America the chance to coordinate care across our many resource assets and provide an end-to-end pathway to help patients achieve the greatest opportunity for a cure of their illness.



The development of a value-based medication delivery model supplies key medications to patients efficiently and effectively, as represented by the Mircera and oral Calcitriol projects.

## Medication efficiency

Medication efficiency is defined as the achievement of equivalent or improved clinical outcomes with fewer or less costly resources. Two projects that demonstrate success in implementing this principle are the deployment of oral calcitriol for treatment of metabolic bone disease, and Mircera for the treatment of ESRD-related anemia.

### Oral Calcitriol

Patients with ESRD have disordered metabolism of vitamin D, phosphorus, and calcium, leading to a distinct form of bone disease referred to as renal osteodystrophy. Treatment includes dietary restriction of phosphorus, use of oral phosphate binders, and the administration of an active form of vitamin D. Clinical physicians would typically prescribe the more expensive intravenous vitamin D analogues. In 2014, the Fresenius Kidney Care Pharmacy and Therapeutics Committee undertook an evaluation of the medical literature and recommended that oral calcitriol be offered as an alternative to the intravenous medications. FMCNA's Corporate Medical Advisory Board reviewed and confirmed this suggestion, and a multitiered treatment algorithm was created that delivers oral Calcitriol during dialysis.

Outcomes from this project demonstrate that equivalent control in phosphorus, calcium, and parathyroid hormone (PTH) can be achieved with oral dosing of calcitriol during hemodialysis in place of intravenous vitamin D. These changes were achieved without significant adjustments in other therapy such as dialysate calcium and the use of calcium containing phosphate binders. The data suggest that hospitalization and mortality rates for patients receiving oral Calcitriol are equivalent to those receiving IV vitamin D.

At the end of 2015, 55 percent of all Fresenius Kidney Care patients were receiving oral Calcitriol, representing an efficient use of health care resources to manage metabolic bone disease.

### Mircera

Renal tissues produce a hormone (erythropoietin) necessary to stimulate the production of red blood cells in the bone marrow. In ESRD this production is markedly reduced, resulting in anemia in most patients. A bioengineered version of this hormone, Epogen®,

became available more than 25 years ago and represents a class of medications called erythropoiesis-stimulating agents (ESAs). In 2014, a longer acting ESA, Mircera, became available in the United States, after a seven-year worldwide experience. Mircera's advantages included less frequent administration, lower cost, and a safety and efficacy profile similar to that of Epogen.

After thorough review of published data on Mircera, the Corporate Medical Advisory Board approved the proposal to initiate the introduction of this ESA. An algorithm with electronic calculations was developed for Mircera. Upon approval, the Mircera Adoption Program began, following rigorous safety and concurrent monitoring standards.

By the end of 2015, more than 100,000 Fresenius Kidney Care patients had received Mircera, resulting in the expected treatment response for renal anemia. Fresenius Kidney Care has documented an excellent safety profile for Mircera. In addition to direct drug cost savings, clinical staff experienced a reduction in work load related to the twice-monthly regimen, compared to the 13 monthly injections required for Epogen.

## Medical Advisory Board

Three teams of physicians, referred to as Medical Advisory Boards, advise Fresenius Kidney Care regarding policy, algorithm development, and operational initiatives. The teams also support quality improvement projects and the overall corporate quality agenda with focus on clinical targets, medication efficiency projects, and outcome analysis.

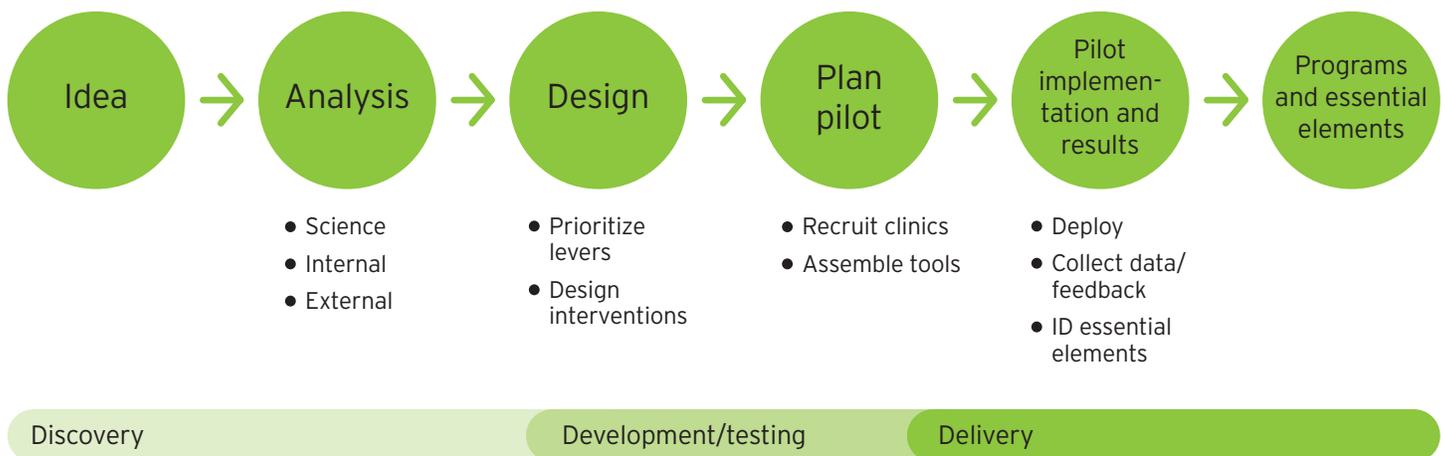
Structurally, there are two Division Medical Advisory Boards (dMAB) with a participating member from each region within the East Division and the West Division. A subset of the dMAB members also serve on the Corporate Medical Advisory Board (cMAB), which is responsible for oversight of the division-level MAB activities along with providing counsel to FMCNA around each of its clinical care businesses.

# Clinical Innovation Initiatives

## Building the future: Innovative thinking

The Clinical Innovation Initiatives (CII) group is a multidisciplinary team within Fresenius Medical Care North America's (FMCNA) Medical Office that plans and executes pilot projects designed to improve clinical care. The CII team combines its IT, clinical, analytical, and project management skills to examine science, internal policies, and care processes with a mandate to create novel, advanced workflows and processes that result in improved patient outcomes and care. The CII team partners with Fresenius Kidney Care clinics to design and deploy these new care processes to identify and document the essence of best practice clinical care. In addition, the team collaborates with other internal FMCNA teams to determine how to benefit from these learnings across the FMCNA enterprise.

### Clinical innovations flow to enterprise product development



## Leadership profiles



### **Dugan Maddux, MD, FACP**

Vice President  
FMCNA, Kidney Disease Initiatives

Dr. Dugan Maddux graduated from Vanderbilt University and attended medical school at the University of North Carolina. After completing her residency in internal medicine and a fellowship in nephrology, she joined the Danville Urologic Clinic in Danville, Virginia, where she practiced nephrology for 18 years. She was instrumental in the development of a nephrology-focused electronic health record and of Voice Expeditions, a nephrology oral history project that is a collection of interviews of the early dialysis pioneers.

### **Karen G. Butler, MSN, RN**

Vice President  
FMCNA, Clinical Innovation Initiatives

Karen Butler received a bachelor's degree in nursing from Pace University and a master's of science in nursing informatics from American Sentinel University. With over 25 years of health care experience, Karen's service includes acute and chronic hemodialysis, renal case management, anemia business management, business systems analysis, and clinical technology transfer. She serves as a member of the FMCNA Nursing Advisory Board.

## Overview of the Dialysis Hospitalization Reduction Pilot process



## Dialysis Hospitalization Reduction

Fresenius Medical Care's Dialysis Hospitalization Reduction (DHR) project combines an internally developed predictive model for high hospitalization risk identification with interdisciplinary team interventions to reduce hospitalization for dialysis patients in our care. The local DHR interdisciplinary team enrolls patients in the project based on their ranking in the predictive model and uses ongoing huddles and meetings to track and discuss how best to communicate with, and intervene on behalf of, these patients. These clinicians have access to a clinical library of best practice interventions, which includes current FMCNA procedures or programs, such as Thrive Social Work Intensive Program, and accepted nephrology resources such as the Fistula First Initiative. The FMCNA ePilot Management System is used to gather data on clinical areas of focus for interventions and track high-risk patients as they improve toward "graduation" from the high-risk list.

High-risk patients who are enrolled in the DHR project benefit from focused communication and interdisciplinary team attention to the complex social and clinical issues that make them prone to hospitalization. Clinic staff receive quarterly data to help them monitor interventions and hospitalization outcomes.

The DHR program, which started in 2013 with only five Fresenius Medical Care dialysis clinics, resulted in significant reduction in hospital admissions and hospital days for patients. After initial pilot feedback, the tools and training were refined for efficiency. As of early 2016, the DHR pilot program had expanded to over 150 FMCNA clinics nationwide; the pilot phase concludes later this year.

### Why DHR works





**"See" high-risk patients**

- Predictive model list
- Clinical judgment
- Patients "on the list"

**"Support" for clinical work**

- Accountable team
- Intervention priorities
- Shared best practices

**"Success"**

- Track outcomes
- See improvements
- Graduations!

"The Dialysis Hospitalization Reduction project helps clinical staff identify patients at risk for hospitalization. With these project tools, the clinical teams have proactively solved complex problems, resulting in improved patient outcomes and quality of life."

– Dr. Dugan Maddux



## Timely Catheter Removal

The transition from an incident HD catheter to a more permanent vascular access is a complicated process, and the clinical pathway has traditionally not been outlined and measured in its component parts against time targets. Timely Catheter Removal (TCR) is a project focused on achieving a usable permanent access for patients who dialyze with a central venous catheter (CVC). The TCR project has five components:

- “Seeing” every CVC patient every treatment
- Avoiding CVC-related infections
- Creating structured partnerships with local vascular access experts (VAEs)
- Creating enhanced dialysis facility communications and coordination of care processes
- Using “time to” metrics to benchmark actionable steps to achieve a usable permanent access in 90 days or less

Clinic teams developed multiple ways to identify or “see” CVC patients during treatment. Some used an educational or brightly colored laminated placard on the dialysis machine, or they

clustered all CVC patients in one section of the clinic. Recognizing a CVC patient at the time of treatment highlights the need for strict adherence to proper CVC policies and procedures to avoid CVC-related infections.

As part of the TCR project, clinics identified all VAE partners, including surgeons and interventional endovascular specialists. Clinic teams established service level expectations and communication processes with each VAE partner.

Vascular access data creates “time to” metrics for each actionable step along the process of creating a permanent access. These metrics enable each clinic to focus on solving local barriers to access creation. The combination of care coordination with process metrics helps identify the steps in the clinical pathway that lead to more timely removal of CVCs. Early results show an impact on reducing CVC exposure time.

Total catheter exposure time: 90 days (12-13 weeks)



Associations in implementation of the TCR project and the time to permanent vascular access placement metrics			
“Time to” metric	Pilot month 1 (median days)	Pilot month 2 (median days)	Pilot month 3 (median days)
Time from first HD with CVC to VAE appointment	49	3	28
Time from VAE appointment to surgeon consult	85	67	67
Time from surgeon consult to surgery	41	29	29
Time from surgery to maturation	79	79	79
Time from maturation to cannulation	7	7	7
Total clinic CVC exposure time	221	204	195

# Clinical Health Information Technology

## Making technology that enhances usability and insight

Clinical Health Information Technology (CHIT) is a part of Fresenius Kidney Care and functions as a bridge between clinicians and the Information Technology Group (ITG). The CHIT team translates clinical policy and procedures into workflow-centric technology solutions. It also helps the ITG teams gather requirements and provides subject matter expertise in the design of technology solutions. The CHIT team optimizes and prioritizes clinical system enhancement requests. With input from pertinent stakeholders, CHIT assists with prioritizing initiatives for clinical applications development. In addition, the CHIT team leads the Provider Advisory Council on Technology (PACT), which advises FMCNA and ITG on various aspects of clinical technology including design, adoption, optimization, and training.

### My eCube Rounder™

My eCube Rounder iPad application provides an efficient process for our physicians to round in the clinic. It complements the nephrologist's workflow via seamless access to critical patient information directly from the dialysis facility's eCube® Clinicals electronic health record.

Using My eCube Rounder, nephrologists report spending more time caring for their patients and less time collecting, accessing, and assimilating relevant patient data. This technology features:

- Efficient design to allow easy toggling between different report views in the patient's treatment history and lab report

- Customized alerts for critical data such as new lab data, missed treatment information, and deviations from treatment history to enable better clinical decision making

- User-customizable screen layout

The intuitive design and user-centric interface of My eCube Rounder enable the nephrologist to create and annotate basic rounding notes with detailed data, and to access patient information from any location at any time to support patient care.

New features currently in development include dialysis order management and medication reconciliation.



### Leadership profile



#### Ahmad Sharif, MD

Vice President  
Clinical Health Information Technology

Dr. Ahmad Sharif completed his master's degree in public health policy and management at the University of North Texas and was awarded a full scholarship to attend courses at Harvard University. He also holds an Advanced Project Management Certification from Stanford University. Prior to joining Fresenius Kidney Care in 2015, Dr. Sharif was the chief medical information officer for a Tenet Health market. His extensive experience in health information technology includes consulting nationally and internationally to implement and optimize electronic health record systems.

## Nephro-Logix™

Fresenius Kidney Care launched Nephro-Logix, a nephrology practice analytics platform, in 2015 as part its ongoing collaboration with our affiliated nephrology practices to promote a healthier renal patient population.

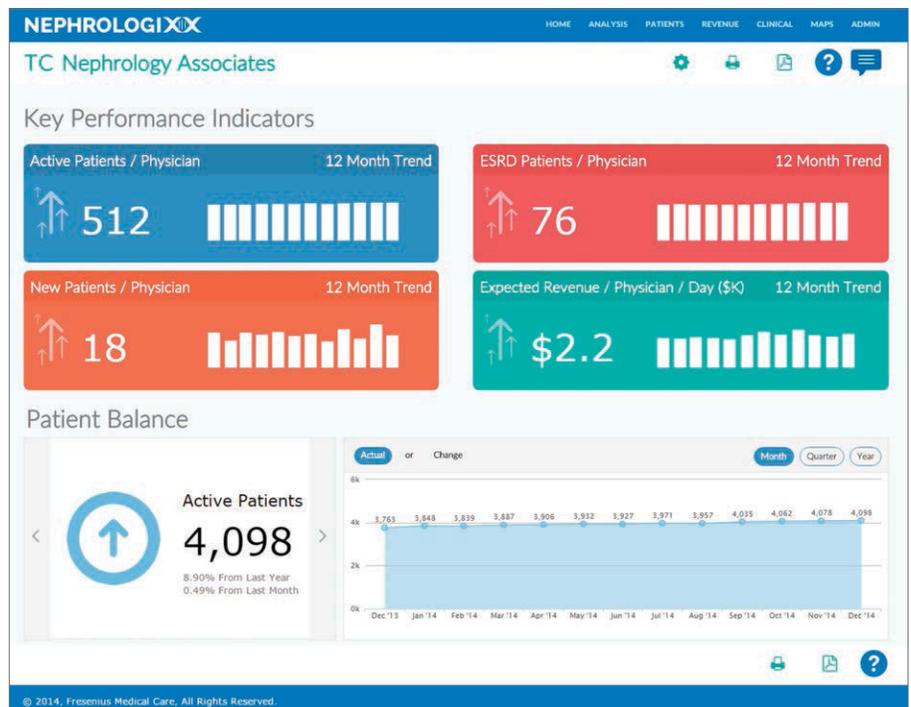
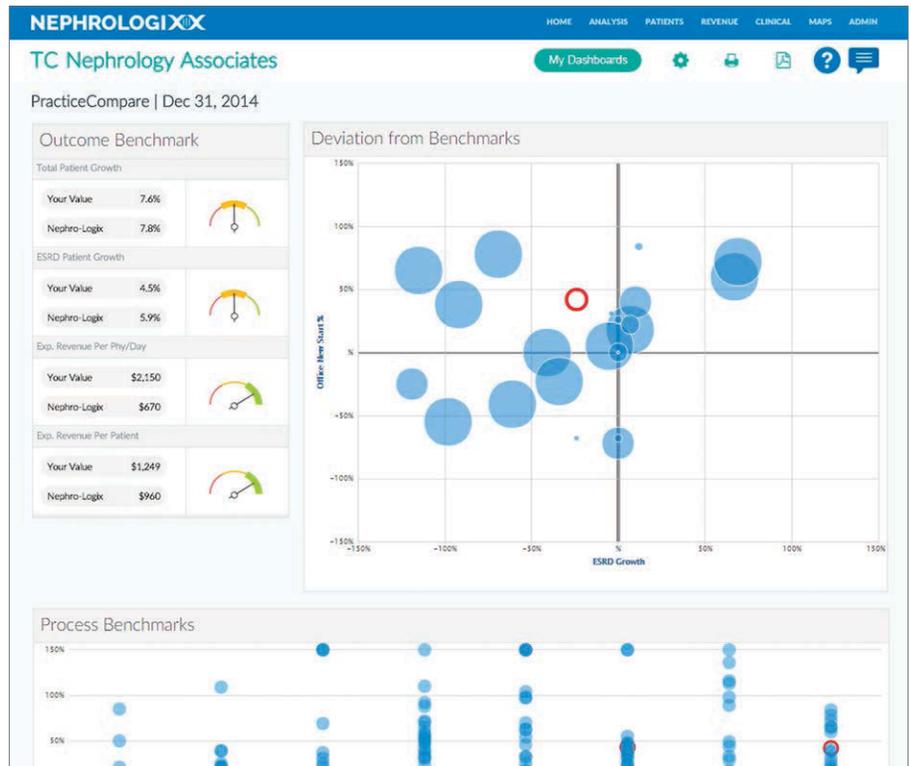
Nephro-Logix provides clinical and business intelligence that nephrology practices need to identify the strengths and weaknesses of their local care delivery.

Through benchmarking, aggregated comparative analytics, and the collaboration with the Fresenius Kidney Care team, practices can hone in on the greatest opportunities for practice performance improvement.

The Nephro-Logix platform and team work together with the practice to:

- Analyze practice business and clinical performance data
- Set and work toward practice outcome targets
- Monitor performance improvement initiatives
- Provide a physician metrics scorecard
- Provide interactive mapping of patient patterns
- Enable user-defined reporting modules

Throughout 2016, Nephro-Logix will implement new features, including linking to the practice's electronic health record and practice management data systems. The addition of this data combined with the analytics powered by the Nephro-Logix platform will empower practices in their efforts to provide optimal patient care and prepare for the move to value-based health care.



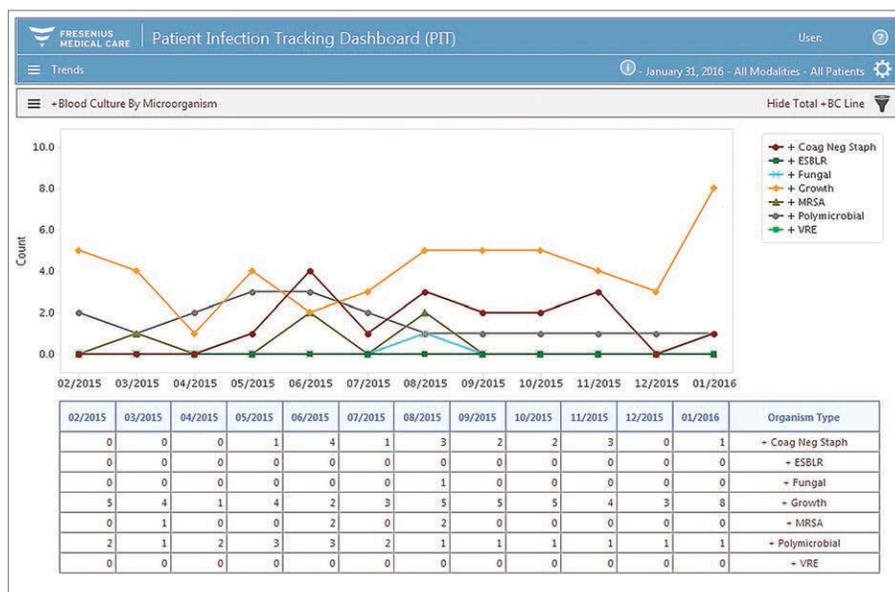
## Patient Infection Tracking Dashboard (PIT)

The Patient Infection Tracking Dashboard (PIT) is a visual, analytical tool for clinicians to track, trend, and analyze specific infections in eCube Clinicals. The dashboard synthesizes a variety of data from Spectra, Dialysis Access Management Application (DAMA), and eCube Clinicals systems to identify infections correlated with a start date, end date, and related antimicrobial therapy.

The PIT offers flexible features including a 12-month trend showing the total number of infections as well as a six-month trend for each infection type. There are active data points on the trend line to drill down to a list of each infection that started in the month, patient name, infection type, culture organism (if available), and infection origin (such as access or hospital stay related). The PIT includes trending for infection types and bloodstream infection organisms for easy monitoring.

The Infections and Treatments module features a timeline for all currently active infections in the clinic for the selected month. The data is broken down into a timeline view for each infection and includes any related antimicrobials with administered doses, along with start and stop dates.

Several PIT dashboard enhancements are planned for 2016, including calculation of peritonitis rates consistent with the Quality Status Report and the addition of more infection types.



Specific infection types included on the dashboard

Bloodstream infections

Access-related infections

Peritonitis

Pneumonia

Sepsis requiring hospitalization

IV/IVP/IP antimicrobial administration

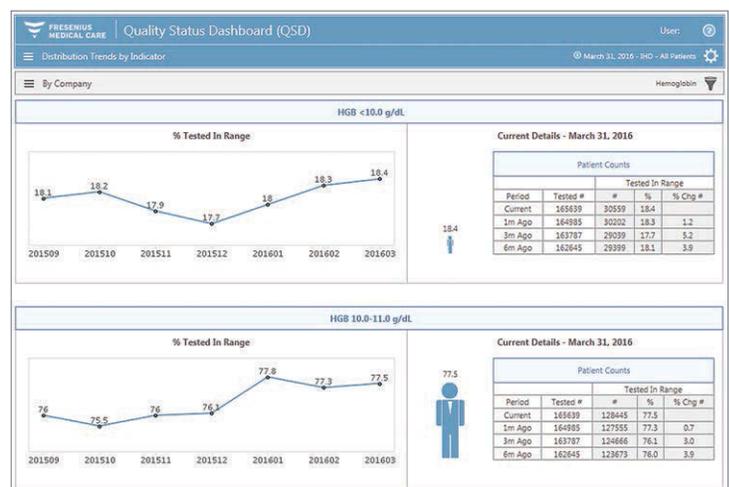
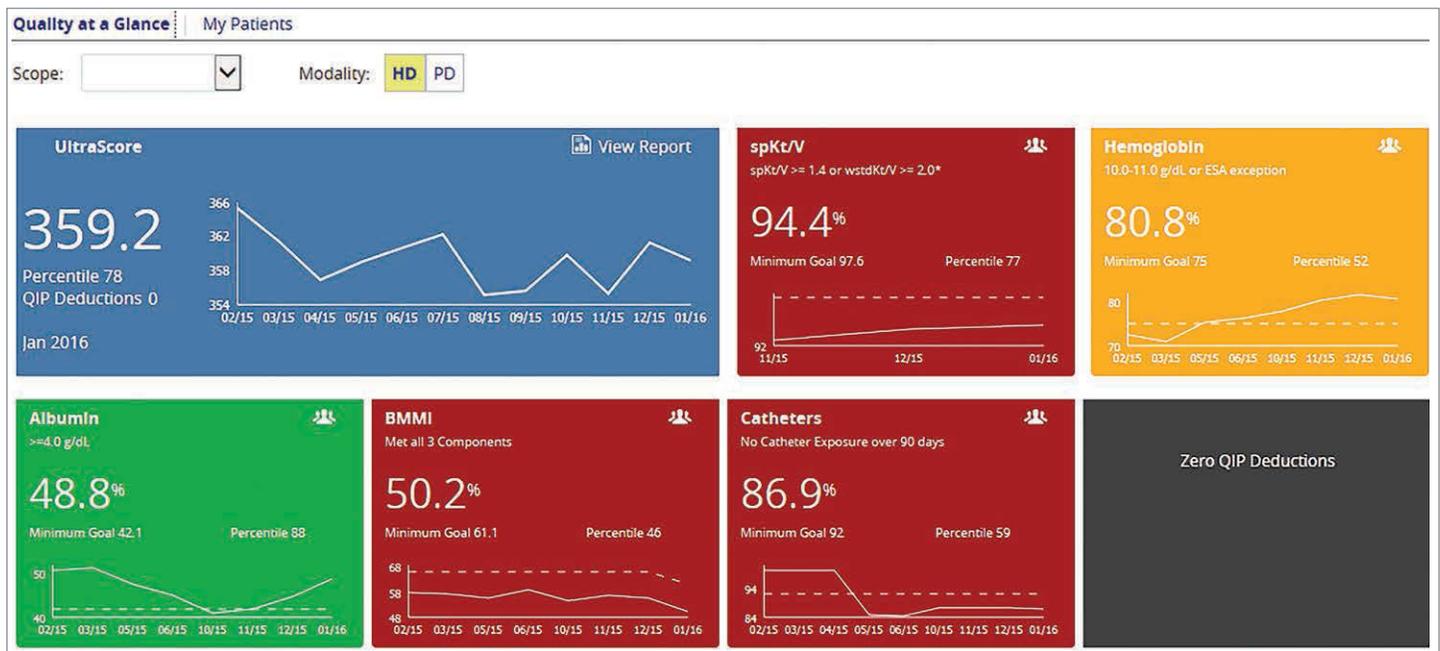
## Quality Status Dashboard

The Quality Status Dashboard (QSD), available to medical directors on Doctors Corner, is designed to report current clinical quality metrics at each facility. The data is selectable by company, division, operating group, region, and area. The dashboard graphically presents the clinical outcomes for patients at multiple levels of detail. The data visuals provide graphic representation of current, as well as trended, key values in the UltraScore calculation: dialysis

adequacy, anemia treatment, bone and mineral metabolism management, catheter rate, and mortality.

Exception reports are available with "drill down" capability to specific patients as well as by the attending physician.

New QSD functionality and reports are scheduled to be published throughout 2016.



# Fresenius Vascular Care

## Coordinating endovascular care within the FMCNA network

Fresenius Vascular Care (FVC) is dedicated to exceptional patient experience. The path to achieving this goal relies on collaboration and communication between staff members at all levels of the organization. This all begins with the physician leadership of FVC, whose Medical Advisory Board (MAB) is made up of 10 members, two consultant physicians, and the FVC chief medical officer. In addition to serving on the MAB, the physician members all serve on at least one of five subcommittees: Quality, EMR, and Research; Peer Review; Products; Physician Training and Education; and Procedure Diversification and FMCNA Integration.

Each subcommittee also has a nonphysician member who is part of the FVC senior management team. The purpose of the MAB and its subcommittees is to review and analyze clinical quality, define areas for improvement, and integrate the best clinical practices for the organization.

Information that needs to be shared throughout the organization is communicated through two primary methods. The first is at quarterly regional forums, attended by physicians from each center in the region, as well as through representatives from the Regional Operations team and by regional medical officers. Ultimately, the physician-led Operations team assures that the shared information is provided to the staff at each FVC center. The other method is at the FVC Medical Office's Annual Physician Symposium to which all FVC physicians are invited to attend. This meeting provides the opportunity to share information and learn about topics such as advanced clinical techniques or practice development.

Externally, FVC places a top priority on strong communication with referring physicians and patients. As an organization, we provide follow-up reports to referring physicians within 24 to 48 hours post-procedure. Market research has confirmed that referring physicians and patients choose FVC for treatment because of our excellent clinical outcomes, prompt and timely care, collaborative communications, and exceptional patient experiences.

### Maintaining quality through 2015 expansion activities

- Regional Medical Officers (RMO)
- Quarterly Physician Forums
- Partner Physician Vetting and Training Program
- Interventional Nephrology Fellowship Program
- Initiated Physician Mentoring Program
- Vascular Access Consultant (VAC) Program

## Leadership profile



### **Murat Sor, MD**

Chief Medical Officer  
Fresenius Vascular Care

Dr. Murat Sor graduated from the University of Pennsylvania and completed his residency and fellowship training at the George Washington University School of Medicine. He is board certified by the American Board of Radiology, with subspecialty certification in interventional radiology, and is a member of the Society of Interventional Radiology (SIR) and the Radiological Society of North America (RSNA). Dr. Sor serves as an assistant professor in the Georgetown University Hospital Interventional Radiology Fellowship program and as an adjunct instructor at the George Washington University School of Medicine.

## Vascular and clinical network integration

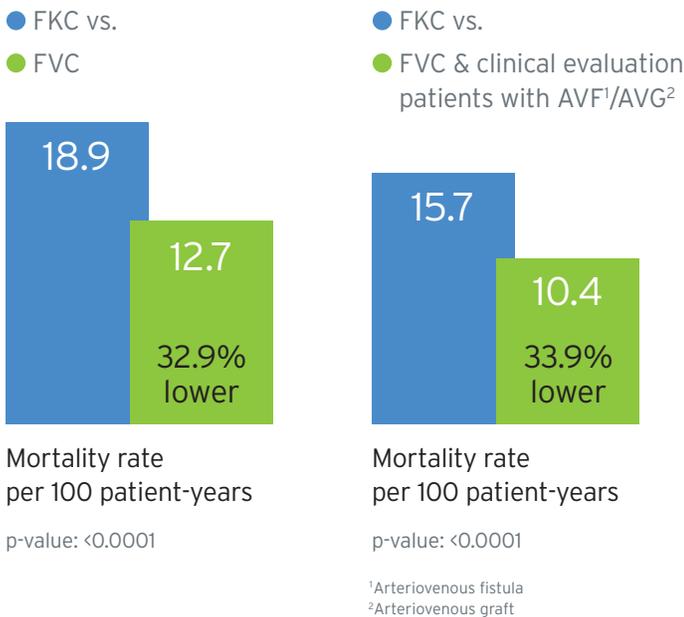
FVC partnered with the Fresenius Medical Care Integrated Care Analytics (ICA) group in a retrospective data analysis comparing Fresenius Kidney Care (FKC) hemodialysis (HD) patients who received arteriovenous access interventions in an FVC center to a matched set of Fresenius Kidney Care HD patients whose arteriovenous accesses were not managed in an FVC center during 2014.

FVC provided a list of those Fresenius Kidney Care HD patients who visited an FVC center and the reason for the visits, including "clinically timed evaluations" (CTE). The ICA group used the clinical data warehouse to match the 4,376 FVC patients with an arteriovenous access and the 2,183 FVC and CTE patients with clinically similar Fresenius Kidney Care patients who were not managed by FVC.

The research goal was to compare patient death, hospitalization, and access longevity outcomes between those who participated in the innovative FVC/Fresenius Kidney Care synergetic relationship and those who were not included in this model. The data analysis supported the following conclusions:

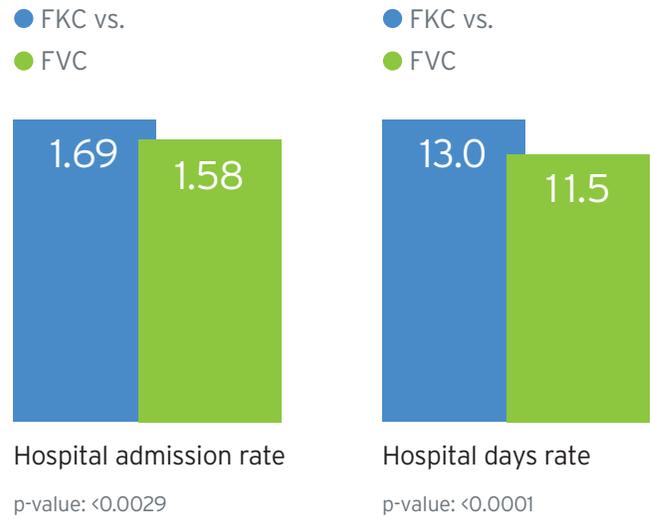
- FMCNA patients under the care of FVC have lower death and hospitalization rates, compared to other FMCNA patients.
- FMCNA patients cared for by FVC with an indication for CTE have even lower death and hospitalization rates and longer arteriovenous access lives compared to other FMCNA patients.

### 6-month mortality outcomes



Source: 2015 FMCNA data

### 6-month hospitalization outcomes



Source: 2015 FMCNA data

## Timely Catheter Removal pilot

The Clinical Innovation Initiatives (CII) team from the FMCNA Medical Office collaborated with FVC physician Dr. Walead Latif to conduct a Timely Catheter Removal pilot. Dr. Latif, an interventional nephrologist, had designed and implemented a novel time-based process metric governing catheter removal in his practice. The metrics were used to identify rate limiting steps in the process from catheter insertion to catheter removal. Retrospective analysis concluded that Dr. Latif's practice yielded a median catheter exposure time of 108 days with an 87 percent successful fistula creation rate.

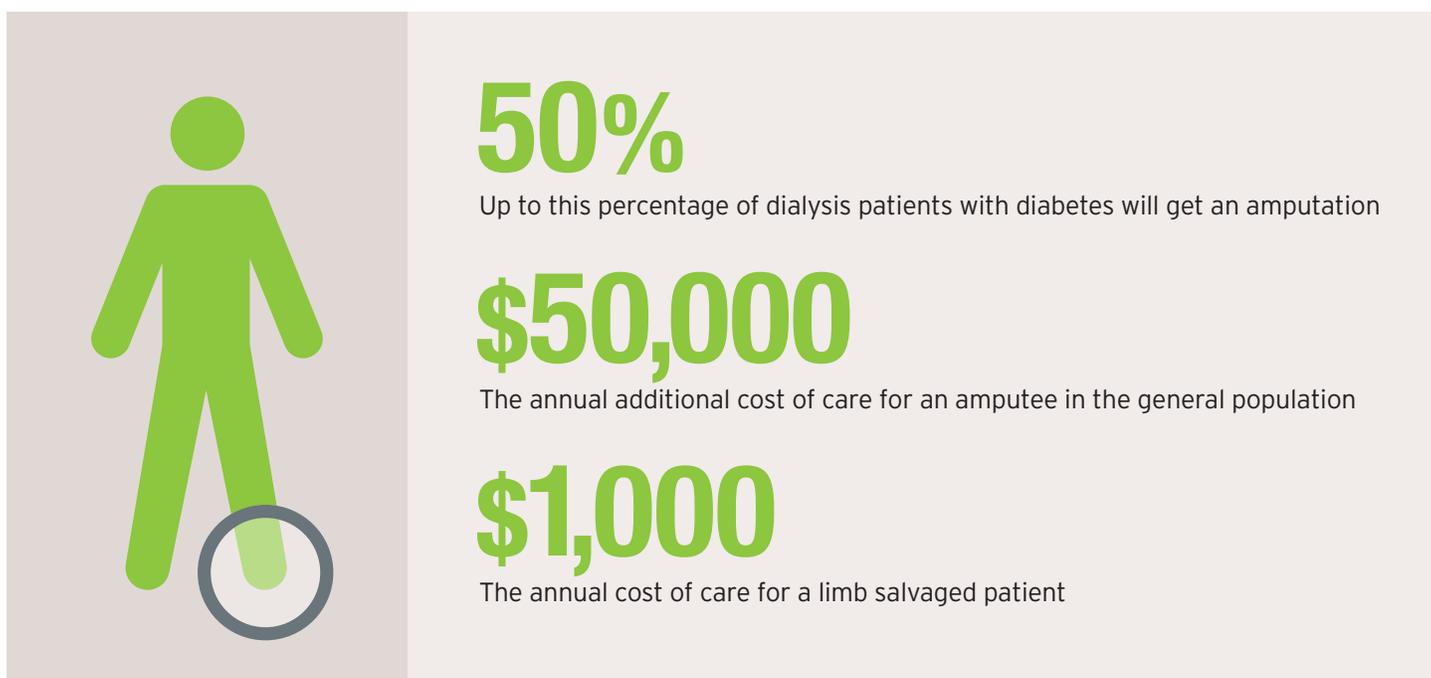
This helped provide the background and foundation for the launch of the Timely Catheter Removal pilot and fosters enhanced achievement for ever shorter catheter exposure time.

A by-product of the Timely Catheter Removal pilot is that FVC has begun to mine data and track total catheter exposure times across the FVC organization. This will hopefully provide the substrate for improved care coordination with Fresenius Kidney Care as both divisions look to better organize their respective processes of care around catheter reduction.

**108 days**  
Median catheter exposure time

**87%**  
Successful fistula creation rate





Source: Allie DE, Hebert CJ, Ingraldi A, Patlola RR, Walker CM. 24-carat gold, 14-carat gold, or platinum standards in the treatment of critical limb ischemia: Bypass surgery or endovascular intervention? *J Endovasc Ther.* 2009;16 Suppl 1:134-146. doi:10.1583/08-2599.1.

## Limb Salvage Center

A 2012 review of Medicare patients who underwent a major amputation for critical limb ischemia (n=20,464) showed that 71 percent had no revascularization attempts and 46 percent had no diagnostic angiogram prior to a major amputation.<sup>1</sup>

It is well known that diabetes is the leading cause of end-stage renal disease (ESRD) in the US dialysis population and that the combination of diabetes and ESRD results in significantly more foot ulcers, amputations, and foot-related hospitalizations. However, a 2013 study illustrated that these amputations and foot-related hospitalizations disproportionately affect dialysis patients. Up to 50 percent of dialysis patients with diabetes will get an amputation.<sup>2</sup> The annual cost of care for an amputee is \$50,000, compared to \$1,000 for a limb salvaged patient.<sup>3</sup> FVC and the FMCNA Corporate Medical Advisory Board committed to a Limb Salvage Pilot in FMCNA dialysis centers.

The pilot is a multidisciplinary collaboration between the dialysis center, nephrology, podiatry, wound care, and peripheral vascular specialists. The care pathway for this program has three key components:

- When a foot or leg ulcer is found during a monthly foot check at the dialysis center, a standard algorithm for evaluation by a vascular specialist and podiatrist/wound care specialist is initiated.
- The vascular specialist would determine if the need for noninvasive studies (ABI, Doppler, venous insufficiency), and/or an endovascular intervention is required.
- A podiatrist would perform wound care and evaluate the foot or leg for mechanical issues that may lead to ulcer formation.

<sup>1</sup> Goodney PP, Travis LL, Nallamothu BK, et al. Variation in the use of lower extremity vascular procedures for critical limb ischemia. *Circ Cardiovasc Qual Outcomes.* 2012;5(1):94-102.

<sup>2</sup> Lavery L a., Lavery DC, Hunt N a., La Fontaine J, Ndip A, Boulton AJ. Amputations and foot-related hospitalisations disproportionately affect dialysis patients. *Int Wound J.* 2013;10-13.

<sup>3</sup> Allie DE, Hebert CJ, Ingraldi A, Patlola RR, Walker CM. 24-carat gold, 14-carat gold, or platinum standards in the treatment of critical limb ischemia: Bypass surgery or endovascular intervention? *J Endovasc Ther.* 2009;16 Suppl 1:134-146.

# Fresenius Medical Care Renal Therapies Group

## Delivering innovative products and therapeutic solutions

The Medical Department within the Fresenius Medical Care Renal Therapies Group, led by Dr. Robert J. Kossmann, consists of the Clinical Research, Medical Affairs, and Medical Information Groups. With the broad range of expertise and skill sets of physicians, pharmacists, and scientists, the Medical Department performs thorough scientific and medical evaluation of technologies and innovations in the nephrology field that can advance the overall growth, reputation, and repertoire of the Fresenius Medical Care Renal Therapies Group through clinical study, evidence-based medicine, and in-depth global literature analysis. The Medical Department is also instrumental in educating health care providers nationwide, reviewing promotional material, and ensuring that information disseminated to the public is fair, balanced, and accurate.

### Medical Affairs

The primary mission of the Renal Therapy Group's Medical Affairs team is to enhance the lives of patients through the exchange of medical and scientific information with the health care community. Medical Affairs includes the Medical Science Liaisons and Evidence Based Medicine (EBM) team.

In order to investigate new device or medication benefits, the EBM team conducts rigorous analysis of product life cycle data correlated with patient data. Results are thoroughly examined to document scientific and medical evidence of differentiated product values and associated patient outcomes. Over the last four years, the EBM team has produced approximately 35 publications, including 17 on fluid management and Crit-Line®.

#### Real-world experience of sucroferric oxyhydroxide (SO) in hemodialysis patients—changes in serum phosphorus control and phosphate binder (PB) pill burden

In collaboration with Fresenius Kidney Care, the FMCNA Clinical Data Analytics team, and Frenova Renal Research, a retrospective database analysis was performed on 3,151 HD patients (averaging 54 years old and 4.3 years HD) with baseline phosphate binder therapy including sevelamer (47 percent), calcium acetate (26 percent), calcium carbonate (6 percent), lanthanum carbonate (7 percent), combination therapy (7 percent), and no PB specified (7 percent) who were prescribed SO as part of routine clinical care.

### Leadership profile

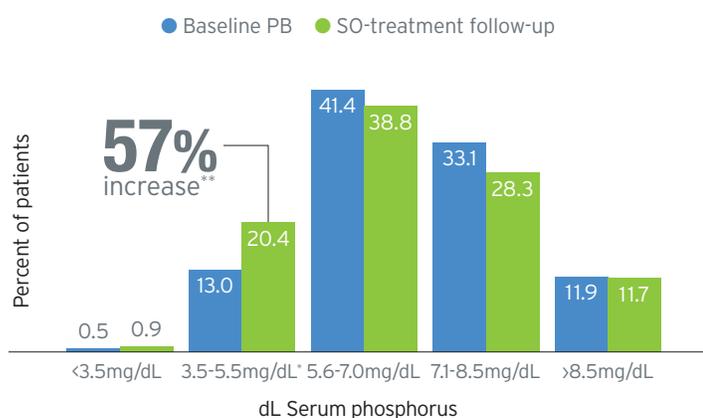


#### Robert J. Kossmann, MD

Senior Vice President, Chief Medical Officer  
Fresenius Medical Care  
Renal Therapies Group (RTG)

Dr. Robert "Rob" Kossmann practiced as a nephrologist in Santa Fe, New Mexico, for 20 years prior to joining Fresenius Medical Care in 2014. He served as president of the Renal Physicians Association (RPA) and was a founding member of its Nephrology Coverage Advocacy Program. Dr. Kossmann was a member of the volunteer clinical faculty in the University of New Mexico's Department of Medicine. He served as nephrology advisor to the American Medical Association's Relative Value Scale Update Committee and founded the New Mexico Renal Disease Collaborative Group.

## Distribution of serum phosphorus at baseline and SO-treatment follow-up (N=3151)



\* Recommended K/DOQI range of calcium x phosphorus product in HD patients

\*\*Change in % of pts with sPhos between baseline PB and SO-Tx follow-up, p<0.001

Source: 2015 FMCNA RTG data

Comparing baseline phosphate binders versus three months of SO, the following data points were observed by the project team:

- SO patients were prescribed an average of 3.7 pills per day versus 8.4 pills per day at baseline, p<0.001.
- The number of patients achieving in-range serum phosphorus (3.5-5.5 mg/dL) increased by 57 percent (p<0.001) and the number of patients achieving in-range calcium x phosphorus product (<55 mg<sup>2</sup>/dL<sup>2</sup>) increased by 32 percent (p<0.001).
- Patients' mean serum phosphorus decreased from 6.94 to 6.73 mg/dL (p<0.001).

### Medical Science Liaisons

Medical Science Liaisons develop peer relationships with key opinion leaders, health care professionals, and clinical managed market key decision makers with a unique mission:

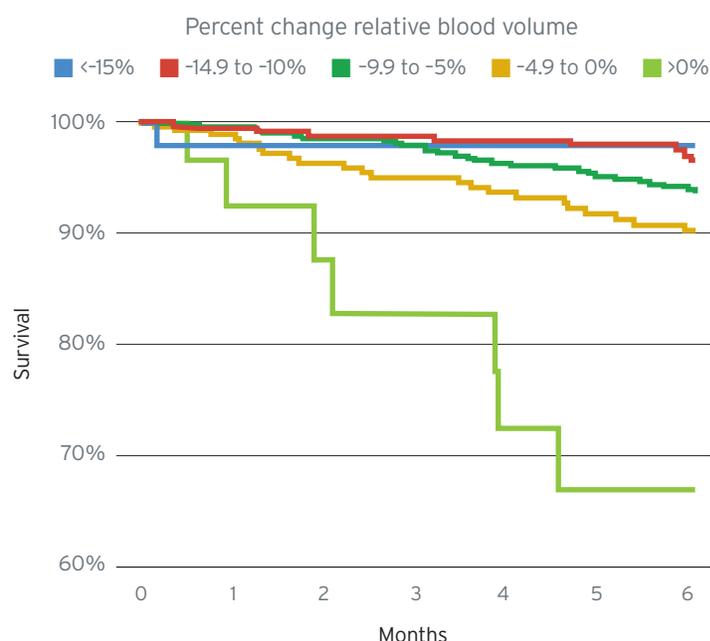
- Presentation of late-breaking data in response to requests from physicians
- Support of clinical studies site identification
- Contacts for investigator initiated research studies
- Review continuing medical education CE grants
- Conduct speaker training for speaker bureau
- Conduct Medical Advisory Boards and gain health care provider insights

### Retrospective data analysis on real-world experience of fluid management with the Crit-Line monitor in HD patients

In collaboration with the Renal Research Institute, patient data from 22,579 hemodialysis (HD) treatments (1,099 patients) over a six-month period were analyzed for percent changes (reductions) in relative blood volume (RBV), as measured by the RTG Crit-Line monitor. RBV is commonly used as a surrogate measure for fluid or volume status in dialysis patients. Patient deaths were also routinely recorded. Patient data were divided into groups according to the percent change in relative blood volume (decrease) by the end of treatment: >0 percent, 0 to -4.9 percent, -5 to -9.9 percent, -10 to -14.9 percent and ≤-15 percent, and the risk of death for each group was calculated during the six-month period. Based on the analysis, there was an increasing risk of death in those who had less reduction in RBV. Compared to patients with the greatest reduction in RBV (≤-15 percent), patients with the least reduction in RBV had a 16-fold greater risk of death. Statistical analyses found that there was a 15 percent increase in the risk of death for each 1 percent increase (lesser reduction) in relative blood volume at the end of treatment (unadjusted; p<0.0001). Similar results were obtained after controlling for age, gender, and race (11 percent increased risk, p=0.002). These results underscore the importance of fluid management programs.



### Kaplan-Meier survival estimates



Log rank p-value <0.0001

Source: 2015 FMCNA RTG data



### New peritoneal dialysis cyclor project

The RTG Medical Department is a member of a cross-functional core team that is tasked with bringing a new peritoneal dialysis cyclor to the US market. The medical team is responsible for providing clinical input based on needs of the customer identified via conference calls, web, and face-to-face meetings. The new cyclor is a lightweight device that will use single-use disposables and is equipped with safety features, in-line heating, touch screen graphics, and wireless or wired communication systems.

### Ongoing Clinical Research

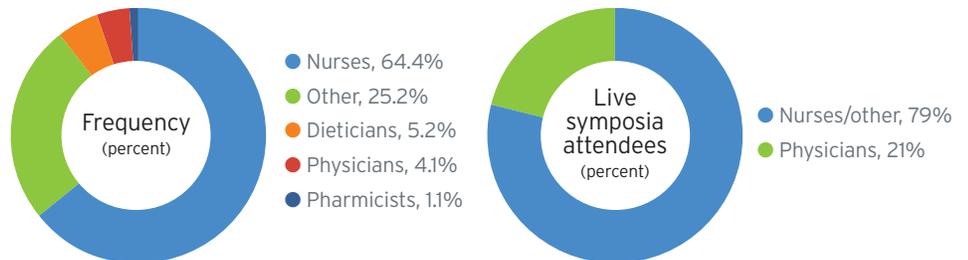
The RTG Medical Department’s Clinical Research team is responsible for testing investigational drugs, biologics, and medical devices in humans and for conducting trials to support timely regulatory approval of the investigational product with an optimal label. It is governed by the International Council for Harmonization Good Clinical Practice ethical and scientific standards, which are designed to protect both the rights and welfare of research participants and the integrity of the data produced by clinical trials.

Ongoing clinical research programs include development of a portable dialysis platform and improved dialyzer technology. The new portable dialysis device utilizes refinements in sorbent materials (e.g., activated carbon and zirconium salts) in cartridge technology. The goal is to reduce water volume usage compared to conventional, single-pass dialysis (9 liters versus 140 liters) through regeneration of dialysate, while permitting a full hemodialysis treatment. The system is the Portable Artificial Kidney. Also ongoing is the production of a dialyzer with an anti-clotting material spun into its fibers and not simply attached as a surface coating. The aim of this is to enable substantial reduction in the use of anticoagulants such as heparin during dialysis while concomitantly improving sustained flow through the hollow dialysis fibers.

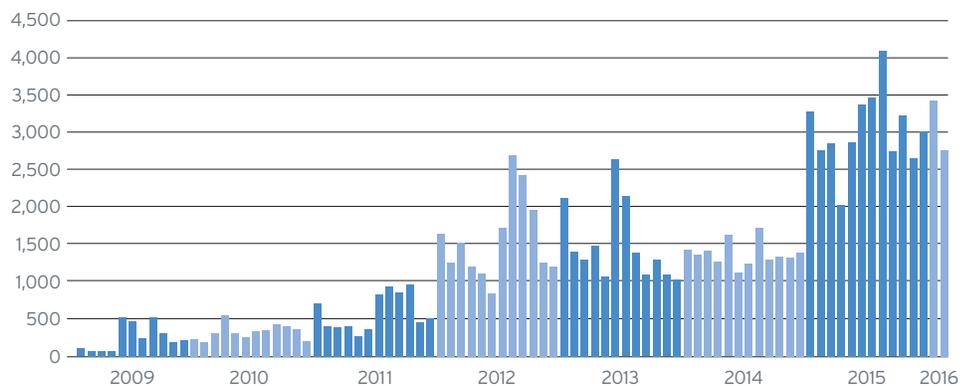
### Medical Information Support

The Medical Department of RTG has developed the Medical Information Support Center, an online service intended to provide the US health care provider with medical information regarding our pharmaceutical products and medical devices.

To ensure easy access, RTG Medical has established numerous support programs including the Advanced Renal Education Program (AREP)<sup>®</sup>—designed as a comprehensive medical education program covering a variety of kidney disease topics—and the Medical Education Web Series, which covers education topics related to dialysis and products.



### AREP e-learning by month



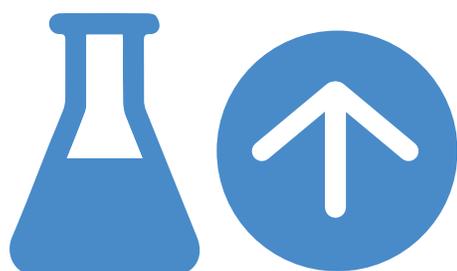
Source: 2015 FMCNA RTG data

# FreseniusRx

## Pharmacy intervention results in improved patient outcomes

As a renal specialty pharmacy, FreseniusRx helps Fresenius Kidney Care clinics drive better patient outcomes in a value-based health care environment. Our renal pharmacists are organized to serve as coordinated care partners by assisting physicians with medication plans, integrating with clinic care teams to administer the plan, and supporting patients in adhering to a medical regimen designed for optimal outcomes.

### Better lab values<sup>1</sup>



	FreseniusRx	Control
Patients	28,810	28,810
Calcium	93.6%	92.7%
Phosphorus	54.5%	51.6%
iPTH	70.9%	67.9%
ALL	39%	35%
	9% overall improvement	

Within nine months after enrollment, more patients were on target for calcium, phosphorus, and iPTH levels, a 9% overall improvement in the number of patients on target for all lab values.

Source: 2015 FMCNA data

The patient support that FreseniusRx offers and the data provided to clinic staff help improve the likelihood that patients will take and refill their prescribed medications. In partnership with physicians and clinic staff, patients enrolled in FreseniusRx have demonstrated improved health outcomes. In late 2015, a study of more than 75,000 Fresenius Kidney Care patients, half of whom were enrolled in FreseniusRx and half of whom received medications from another pharmacy, revealed that the patients enrolled in FreseniusRx for at least three months experienced a 13 percent

improvement in their target ranges for blood calcium, phosphorus, and intact parathyroid hormone (iPTH) goals, compared to patients who were not using FreseniusRx<sup>1</sup>.

Several initiatives over the past year have contributed to FreseniusRx's influence on such positive patient outcomes, including a deeper expertise in renal medication management, monitoring, and proactive medication adherence programs.

<sup>1</sup> Rosen S, Larkin J, Thekkumkattil J, Brownlee N, Roberts S, Usvyat L, Hymes J, Ketchersid T, Maddux FW. A renal pharmacy coordinated care program is associated with improvements in bone mineral metabolism outcomes in hemodialysis patients [NKF poster abstract submission #100]. *Am J Kidney Dis.* 2016 (in press).



The typical dialysis patient is prescribed **10 to 12 medications** to manage a variety of diseases.

## One-on-one medication interventions drive adherence and uncover potential complications

On average, the typical dialysis patient is prescribed 10 to 12 medications to manage a variety of diseases<sup>2</sup>, and medication adherence issues contribute to approximately one-half of hospitalizations for dialysis patients<sup>3</sup>. A recent study by the Albany College of Pharmacy and Health Sciences reinforced the need to provide dialysis patients with medication therapy management services and identified pharmacists as the ideal provider of these services, particularly to deliver medication reconciliation and patient education<sup>4</sup>.

More than a year ago, FreseniusRx began a medication adherence pilot with a group of Medicare Advantage members from a major general health insurer who are receiving care at FMCNA clinics.

Each of the patients opted to engage with a pharmacist, who spent dedicated time reviewing their medications.

As part of the pilot program, FreseniusRx pharmacists also reviewed medications for 140 patients, focusing on drugs prescribed for nonrenal disease comorbidities. The analysis identified 370 drug-related interactions, duplicated therapies, improper drug selection, and improper dosing. Pharmacists provided recommendations to prescribing physicians to help them adjust their medication management and doses to avoid adverse effects. As part of the overall care team, FreseniusRx is dedicated to enhancing support to physicians, clinic staff, and patients.

## Leadership profile



### **Savannah Roberts, PharmD**

Senior Manager, Clinical Pharmacy Services  
FreseniusRx

Savannah Roberts earned her doctor of pharmacy degree and certificate in health care informatics at Lipscomb University College of Pharmacy after completing pre-pharmacy coursework at the University of Kentucky. She holds pharmacist licenses in Tennessee, Kentucky, Maryland, and West Virginia and earned several certifications from the American Pharmacists Association, including Delivering Medication Therapy Management Services and Pharmacist & Patient-Centered Diabetes Care.

Since joining the organization in 2013, Dr. Roberts coordinated the launch of FreseniusRx's renal pharmacotherapy certification program with the National Kidney Foundation and the Albany College of Pharmacy and Health Sciences, a first in the industry.



Bessie Vaughn Francis, ESRD-Certified Pharmacist with FreseniusRx

## ESRD-certified pharmacists provide specialized patient care

FreseniusRx pharmacists recently completed a proprietary, 26-module end-stage renal disease (ESRD) curriculum, developed in partnership with the National Kidney Foundation and the Albany College of Pharmacy and Health Sciences. The curriculum certifies our pharmacists as renal specialists, which means they understand the many nuances of this complex disease and are better equipped to provide specialized support.

Because ESRD patients face numerous comorbid conditions, including diabetes, heart disease, and anemia, our pharmacists are trained in appropriate renal dosing to avoid adverse reactions and interactions with other medications. They also critically review patients' medications prescribed for other disease states, and work with physicians to optimize medication regimens according to current guidelines and FMCNA coordinated care algorithms.

## FreseniusRx leads the FMCNA challenge to eradicate hepatitis C

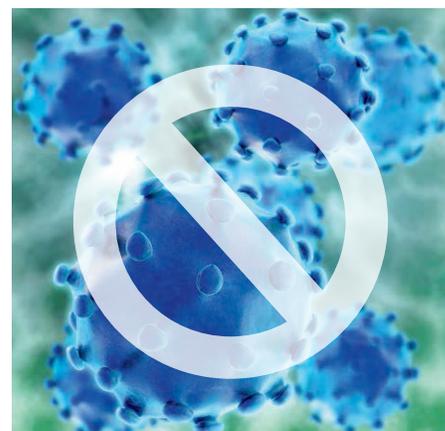
Throughout 2016, FreseniusRx will focus heavily on collaborating with Fresenius Kidney Care to eradicate the hepatitis C virus (HCV) from our patient population. Liver dysfunction, increased mortality, hospitalization, and cardiovascular disease associated with HCV creates added complications for patients who are already challenged from ESRD, but FreseniusRx is positioned to offer a coordinated care management approach that helps patients achieve a cure and live healthier, better lives.

Fresenius Kidney Care will assess all dialysis patients and identify those who have chronic HCV that can be effectively treated by new direct acting antiviral drug therapy. It is estimated that our dialysis patients with HCV will benefit from newly developed

oral medication regimens and medication management provided by FreseniusRx. Our pharmacists will increase a patient's likelihood of adherence and sustained viral response by working closely with each patient, their nephrologist, specialists, and other clinic care team members. The goal of a sustained viral response represents an essential cure of HCV. Patients who once faced lifelong complications associated with HCV and limited treatment options will now have an organized option to rid them of the health risks from HCV.

Deepening the impact of FreseniusRx's renal expertise and finding ways to be proactive about medication adherence are some of the ways FreseniusRx is working to be a strong partner with FMCNA

physicians, clinics, and care teams. Our goal is to continue to introduce innovative programs and expert medication support that drives quality and ultimately improves patient care.



<sup>2</sup> Cardone KE, Bacchus S, Assimon MM, et al. Medication-related problems in CKD. *Adv Chronic Kidney Dis.* 2010;17(5):404-412.

<sup>3</sup> United States renal data systems, USRDS 2013 annual data report; atlas of chronic kidney disease and end-stage renal disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2013.

<sup>4</sup> Parker WM, Jang SM, Muzzy JD, Cardone KE. Multidisciplinary views toward pharmacists-delivered medication therapy management services in dialysis facilities. *J Am Pharm Assoc.* 2015;55:390-397.

# FMCNA Analytics

## Insight from information

From every angle, health care in 2016 is a data-intensive operation, particularly for patients with chronic conditions on whom vast amounts of data are collected. Fresenius Medical Care North America uses data analytics in almost every aspect of its business, including direct patient care, quality improvement programs, coordinated care delivery, clinical research, financial and operational analyses, employee incentive programs, and evaluations of patient, physician, and employee satisfaction. While there are a number of analytical teams within FMCNA, below are examples of how clinical data analytics provide an innovation engine for the clinical care services provided by FMCNA.

### Custom Reporting and Data Analytics

The Custom Reporting and Data Analytics (CRDA) team is responsible for producing the daily "CRUSER" reports. A number of custom reports are sent directly to the dialysis facilities, such as:

- Electronic anemia algorithms
- Dietitian report
- Social worker report

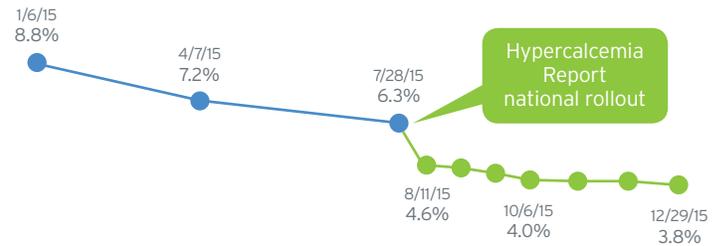
When a new report is developed, the CRDA team conducts pilots to generate feedback to improve the report design. If the piloted report proves to be successful, it is published for all facilities via the eCube electronic health record or on the FMC4Me corporate intranet.

In 2015, CRDA developed the Hypercalcemia Report to help facilities identify patients with high calcium results and gather information about the factors that might be contributing to the high calcium.

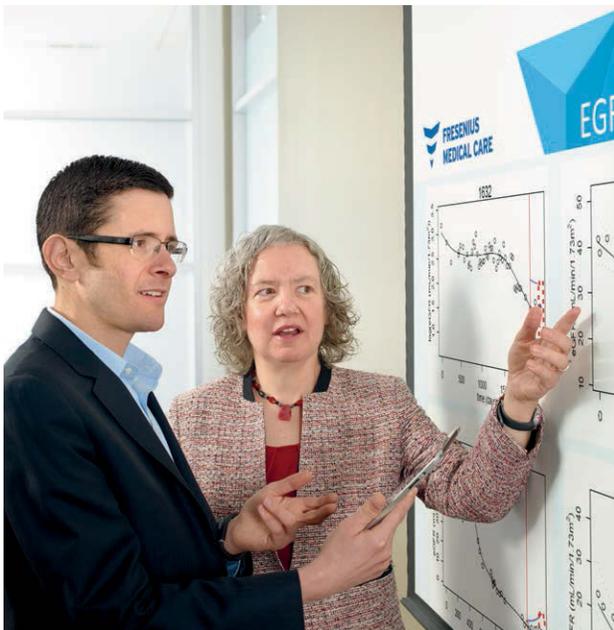
As the chart indicates, the percent of patients with hypercalcemia improved substantially through highlighting those in need of addressing their calcium levels when compared to the prior three months.

#### Impact of the Hypercalcemia Report

(percent of patients with latest Ca>10.0 mg/dL or three-month average Ca>10.2 mg/dL)



### Leadership profiles



#### Len Usvyat, PhD

Vice President  
Integrated Care Analytics

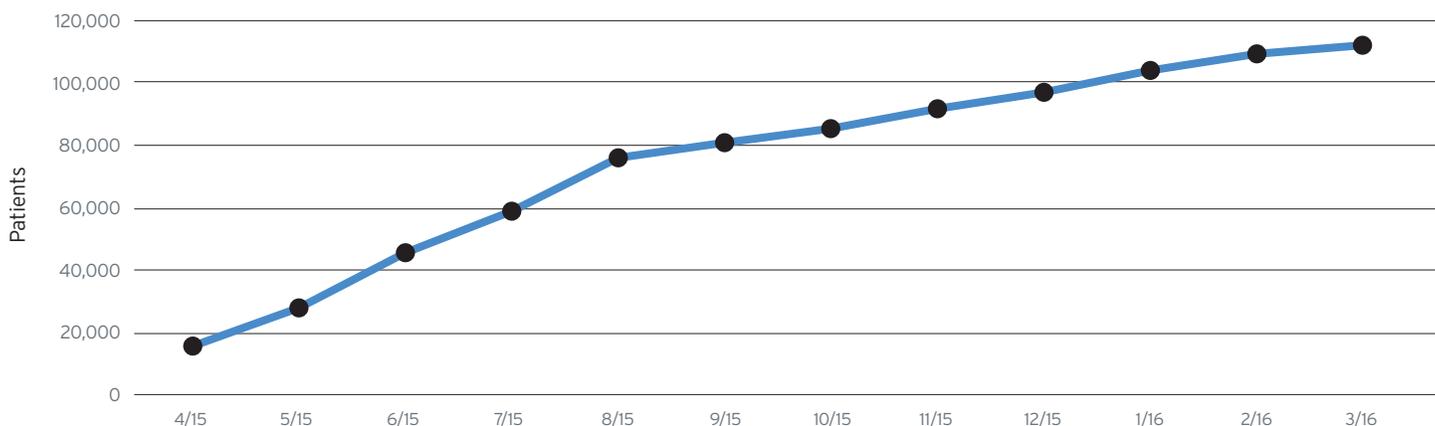
Len Usvyat holds a PhD from the University of Maastricht in the Netherlands. Prior to joining FMCNA, he worked with the Renal Research Institute on patient outcome and quality research projects. Len chairs FMCNA's Predictive Analytics Steering Committee and works closely with the MONitoring Dialysis Outcomes (MONDO) initiative, an international consortium of dialysis providers. His team's areas of focus include liaison analytical support to FMCNA's pharmacy, vascular care centers, urgent care facilities, hospitalist group, Medical Office research, and its health plan.

#### Norma Ofsthun, PhD

Vice President  
Data Analytics

Norma Ofsthun completed a PhD in chemical engineering at the Massachusetts Institute of Technology. Prior to joining the organization in 1998, she worked in membrane-related research and development at Baxter Healthcare. In her role with FMCNA, she leads the organization's longest-standing clinical data analytics team and chairs the FMCNA Data Governance Program. Norma's team is focused on custom reporting, data analysis, and data modeling.

### In-center Mircera dose trend/MIR patients



Source: 2015 FMCNA data

## FKC algorithms for anemia management

Currently, more than 80 percent of FMCNA patients receive anemia medications based on automated reports that eliminate the need for nurses to calculate dose changes as new anemia lab results become available. There have been multiple evolved versions of algorithms for a short-acting erythropoiesis-stimulating agent (ESA) as well as separate algorithms for intravenous iron and three long-acting ESAs.

With the advent of new long-lasting ESAs, the availability of reports to assist in converting from one drug to another, dosing the drugs, as well as comparing outcomes has been critical to nurses, physicians, and the FMCNA Medical Office.

The graph above, taken from data in the weekly executive summary, shows the growth in the patients using the long-lasting ESA,

Mircera. The same report also summarizes drug utilization and hemoglobin outcomes.

The CRDA is also responsible for a number of recurring reports and ad hoc analyses. The team produces facility-level bone and mineral reports shared with physicians and facility staff as well as the reports on phosphate binders. The team has also developed and delivered the pilot version of the Missed and Shortened Treatment (MOST) Report deployed in January 2016 as part of a coordinated fluid management program. That report has patient-friendly graphics to help clinicians explain the importance of attending their treatments and staying for the full prescribed time.

## Data Governance Program

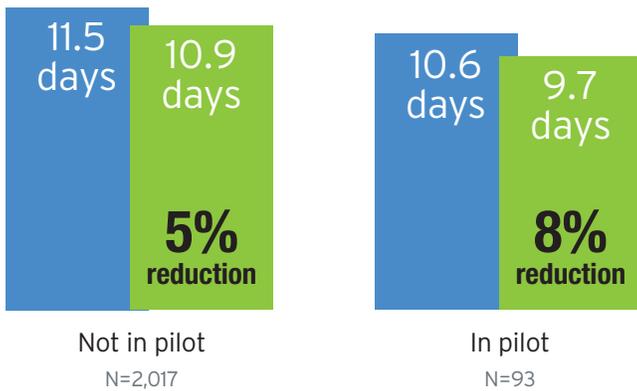
In February 2015, the Data Governance Program, a cross-functional team, launched with the mission of organizing the framework to establish objectives, policies, and strategies to collect, utilize, and manage information captured in the corporate data systems.

Data governance ensures data definitions are complete, accurate, up-to-date, clear, and unambiguous. Achieving data governance requires properly functioning data systems, alignment of business processes, and training of users throughout the organization.

The screenshot displays the Collibra Data Governance Center interface. The breadcrumb trail shows: Browser > FMC-NA Community > FKC - Fresenius Kidney Care Community > FKC Clinical Term Dictionary. The main content area shows the definition for 'Erythropoiesis Stimulating Agent' (Type: Business Term, Status: Accepted). The definition is: 'A medication which induces the human body to create blood cells'. A descriptive example is provided: 'Epogen, Mircera, Aranesp'. The Clin Definition Category is 'Anemia' and 'Medications'. The Has Acronym section shows 'ESA' with the domain 'FKC Clinical Term Dictionary'.

### Dialysis Hospitalization Reduction (DHR) pilot

- 12 months ending March 2015
- 12 months ending December 2015



Source: 2015 FMCNA data

In a hospitalization reduction pilot, high hospitalization risk patients with interventions saw a 23 percent reduction in hospital admission rates three months after the implementation of the initiative. On an overall basis, clinics enrolled in the pilot have seen a larger drop in the hospital days per patient-year than clinics not enrolled in the pilot: 8 percent versus 5 percent ( $p < 0.001$ ), with intervention clinics having a much lower hospital days rate at the end (9.7 versus 10.9 in the non-intervention clinics).

The Right TraC pilot was a test of the High Risk Hospitalization Model in order to reduce hospital readmissions. In this pilot, through an automated process using data from the FMCNA Knowledge Center, patients transitioned out of a hospital received additional interventions based on whether they were classified as high risk per the High Risk Predictive Model. From this effort, additional patient interventions were provided, resulting in an associated lower readmission rate.

As predictive analytics efforts are further utilized within FMCNA, its use promises improved identification of at-risk patients by merging our clinical knowledge, our data, and our analytical and statistical expertise.

### Predictive Analytics

In recent years, data analytics and predictive modeling have received a lot of attention in the media. FMCNA has been involved in predictive modeling efforts for several years. Generally, predictions require access to large and diverse data sets containing many elements; ideally these sets contain frequently captured information on our patients. FMCNA occupies a unique position because we see patients on a regular basis for many successive years, unlike most other segments of the health care delivery system.

Fresenius Medical Care North America established the Predictive Analytics Steering Committee (PASC) to assess the predictive modeling demand in the organization, to prioritize the requests, and to build and pilot these models. By early 2016, there were 26 predictive model requests evaluated by the PASC. High- and low-risk hospitalizations and unexcused no-show predictive models have been widely adopted throughout the organization, among other models.

The High Risk Hospitalization Model for dialysis patients assigns a likelihood that each patient will have more than five hospital admissions in the following 12 months. This model is:

- Based on >40 predictors using a Generalized Additive Model approach
- Built in collaboration with Renal Research Institute and academic collaborators
- Currently used in the Dialysis Hospitalization Reduction (DHR) pilot and other initiatives where patients have particular admission and readmission risks

### 30 days readmission rate for high risk of hospitalization patients



**One follow-up call**

**55%**  
Hospital readmission rate

**Multiple follow-up calls**

**32%**  
Hospital readmission rate

Source: 2015 FMCNA data

# Renal Research Institute

Applying research, advanced math, and basic science to improve renal disease care

The Renal Research Institute (RRI), a division of Fresenius Medical Care Renal Therapies Group, was created in 1997 to explore innovative technologies and new clinical paradigms to improve patient outcomes and quality of life. RRI research has published more than 350 peer-reviewed papers in more than 30 journals to share findings with the renal care community.

RRI's Research team includes physicians and scientists from diverse backgrounds such as nephrology, biochemistry, epidemiology, biostatistics, applied mathematics, biology, and electrical and chemical engineering. RRI research leverages core competencies of creative innovation, computational biomedicine, data analytics, and exploratory biomedical research, as well as strategically forged research relationships with top universities in the Americas, Asia, and Europe.

## Intradialytic oxygen saturation: A novel predictor of patient outcomes

Dialysis patients are at risk for fluid overload, which can cause pulmonary edema, pleural effusions, and upper airway obstruction. Renal failure is also associated with impaired respiratory function, such as sleep apnea and chronic obstructive pulmonary disease. Hence, respiratory and renal diseases frequently coexist.

Notwithstanding the various causes, low arterial blood oxygen saturation and poor tissue oxygen levels are associated with short- and long-term effects on multiple organ systems, including the cardiovascular system and inflammation pathways.

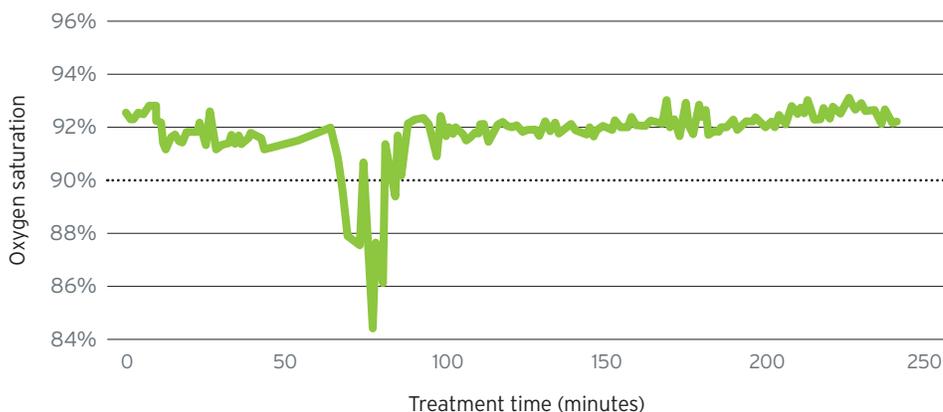
Starting in 2015, RRI has focused on research into arterial oxygen saturation as measured by RTG's Crit-Line monitor during the dialysis treatment. We followed almost 1,000 chronic hemodialysis (HD) patients over a period of 18 months and found that 10 percent of the patients had intradialytic arterial oxygen saturation below

90 percent for, on average, more than one-third of their treatment time. This prolonged intradialytic hypoxemia (PIH) was associated with inflammation, as indicated by lower serum albumin levels and elevated inflammatory markers. Moreover, patients with PIH were more frequently hospitalized and their mortality rate was doubled.<sup>1</sup>

We are currently working with FMCNA's medical leadership to develop care pathways for patients with PIH. Given the numerous pathologies that result in hypoxemia, a multidisciplinary approach will be critical to translate these findings into improved patient care.

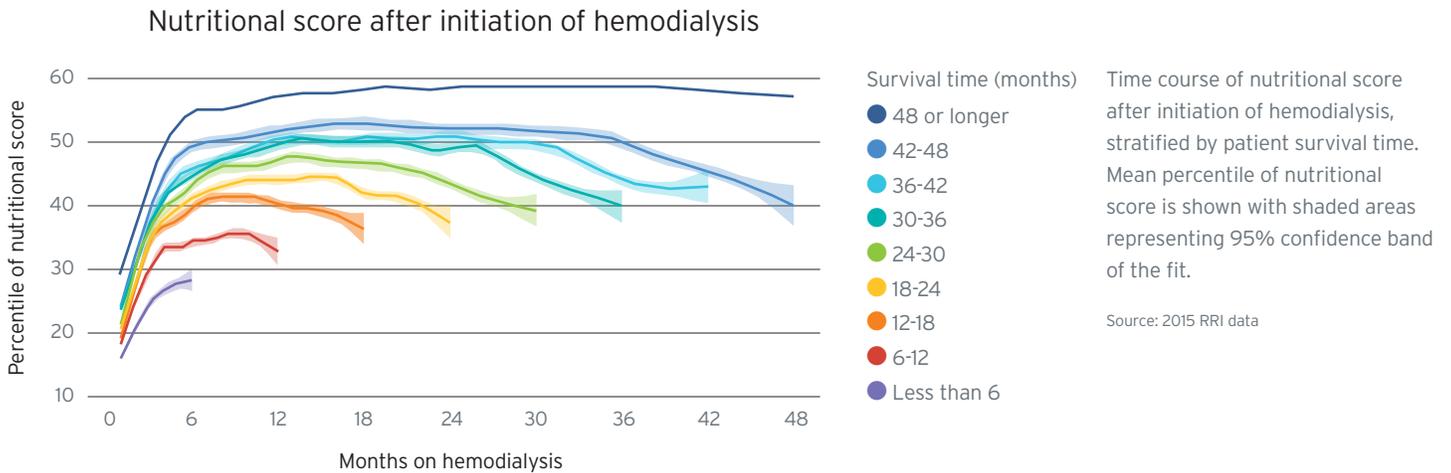
<sup>1</sup> Meyring-Wösten A, Zhang H, Ye X, Fuertinger DH, Chan L, Kappel F, Artemyev M, Ginsberg N, Wang Y, Thijssen S, Kotanko P. Intradialytic hypoxemia and clinical outcomes in patients on hemodialysis. Clin J Am Soc Nephrol. 2016 Mar 2. pii: CJN.08510815.

### Arterial oxygen saturation



Source: 2015 RRI data

This figure shows continuous arterial oxygen saturation (SatO<sub>2</sub>) recordings by Crit-Line over the course of six treatments in a chronic hemodialysis patient. While SatO<sub>2</sub> is normoxic (above 90 percent) for most of the time, repeated intermittent drops below 90 percent SatO<sub>2</sub> occur, possibly related to sleep apnea, a condition with high prevalence in renal patients.



## Improving nutritional competence in hemodialysis patients

Hemodialysis (HD) patients have a high risk for inadequate nutrition, which is a major contributor to the high morbidity and mortality in this vulnerable population. Their nutritional status is particularly susceptible to deterioration when faced with hospitalization. To enable care providers to detect nutritional deterioration and take therapeutic or preventive action (e.g., administration of oral nutritional supplements), it is critical to assess nutritional status in dialysis patients over time.

Fresenius Medical Care's allocation of oral nutritional supplements within its clinics is currently based on monthly measurements of serum albumin concentration, a protein in the patients' bloodstream. This traditional approach is reactive, mainly because it is a one-dimensional approach relying solely on one marker, albumin,

which is influenced by both nutrition and inflammation, as well as fluid status. Also, this reactive approach only helps once nutritional status has already deteriorated.

RRI and FMCNA have developed an easy-to-calculate multidimensional nutritional score that draws on five routine parameters in HD patients on a monthly basis (serum albumin, phosphorus, creatinine, equilibrated normalized protein-catabolic rate, and interdialytic weight gain). Together they provide a nutritional score that represents the nutritional competence of the patient.

Examining data on nearly 130,000 chronic HD patients, researchers were able to show rapid improvement in nutritional status as assessed by this score in the first few months after initiation of dialysis therapy. They further demonstrated that nutritional scores

## Leadership profile

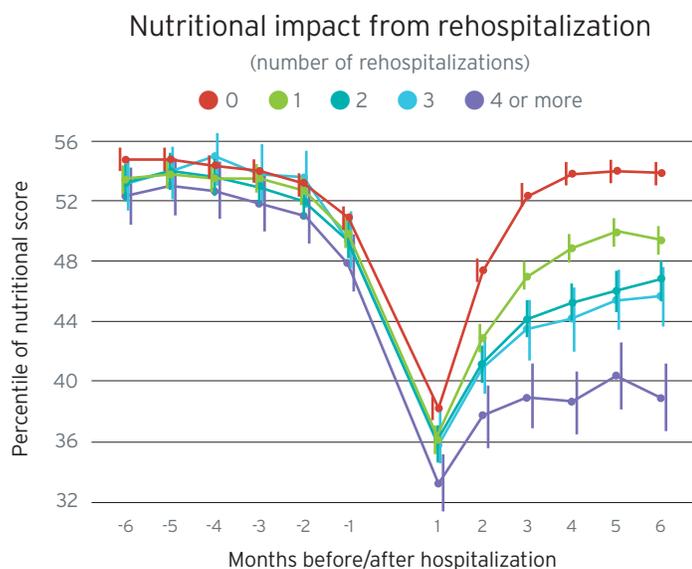


### **Peter Kotanko, MD**

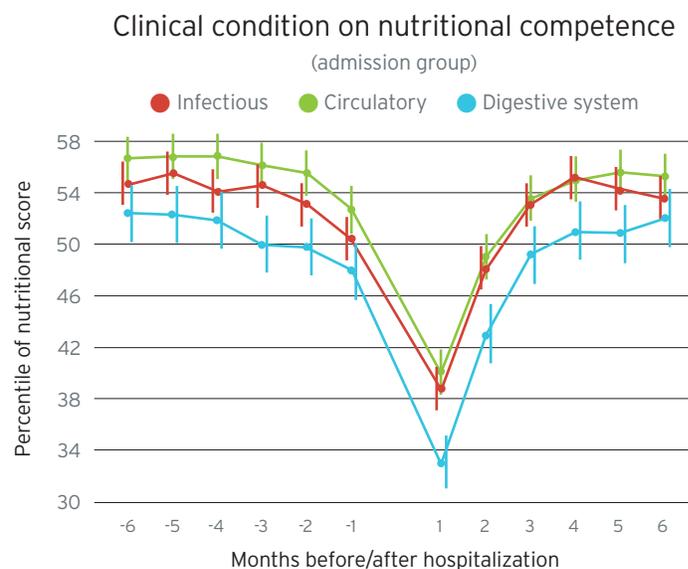
Research Director  
Renal Research Institute

Prior to joining RRI in 2010, Dr. Peter Kotanko served as vice chair of the Department of Internal Medicine at the Hospital Barmherzige Brüder, an academic teaching hospital in Graz, Austria, from 1997 to 2007. He worked at the Department of Physiology and the University Clinic of Internal Medicine, Innsbruck, Austria, from 1982 through 1989 and then trained to specialize in nephrology at the Hammersmith Hospital in London.

Dr. Kotanko is currently an adjunct professor of medicine and nephrology at the Icahn School of Medicine at Mount Sinai in New York and holds a teaching appointment at the Medical University in Innsbruck. He has authored and co-authored more than 200 research papers and book chapters.



Source: 2015 RRI data



Source: 2015 RRI data

increased more rapidly and reached higher values in patients who survived longer on dialysis (see “Nutritional score after initiation of hemodialysis” graph on the previous page).

Looking at approximately 14,000 HD patients who were hospitalized, RRI researchers saw that on average the nutritional score started to decline one to two months before hospitalization, reached its lowest level in the month after hospitalization, and then partially recovered in the subsequent five months. It is worth noting that, patients without any re-hospitalizations fully recovered in the six months after the initial hospitalization, while those with rehospitalizations showed deeper declines and poorer recovery (see “Nutritional impact from rehospitalization” graph). Also, those hospitalized for gastrointestinal reasons had lower nutritional scores than those hospitalized for other reasons (see

“Clinical condition on nutritional competence” graph).<sup>2</sup> While these findings represent the average response in the overall HD population, individual patients may behave differently. This research is defining a patient’s nutritional resilience, which refers to patients’ susceptibility to nutritional deterioration in the face of a challenge to their nutritional competence. This can be due to inter-current illness and can differ substantially between patients.

RRI is currently investigating how the above nutritional scoring model can be utilized in Fresenius Medical Care North America clinics to yield a more targeted, specific, and proactive allocation of nutritional interventions, ensuring that oral nutritional supplements reach the patients who need them most.

<sup>2</sup> Thijsen S, Wong MM, Usvyat LA, Xiao Q, Kotanko P, Maddux FW. Nutritional competence and resilience among hemodialysis patients in the setting of dialysis initiation and hospitalization. *Clin J Am Soc Nephrol*. 2015 Sep 4;10(9):1593-601.

## The impact of the FMCNA foot check program on major lower limb amputations

Diabetic patients are at increased risk of foot ulcers, which may result in limb amputations, reduced quality of life, and increased morbidity and mortality. While in diabetic patients not on dialysis, foot care prevents ulcerations and amputation, evidence in hemodialysis patients was elucidated when RRI collaborated with the FMCNA Medical Office to investigate the relationship between the implementation of the routine foot check program in diabetic incident hemodialysis patients and major lower limb amputations.

This epidemiological research into the FKC standard monthly foot check program showed that patients in the program experienced a 17 percent decrease in amputation rate, from 1.30 to 1.07 per 100 patient-years. This is currently the largest study on this topic.<sup>3</sup>

<sup>3</sup> Marn Perna A, Peršič V, Usvyat L, Saunders L, Rogus J, Maddux FW, Lacson E Jr, Kotanko P. Implementation of routine foot check in patients with diabetes on hemodialysis: associations with outcomes. *BMJ Open Diabetes Res Care*. 2016 Mar 3;4(1):e000158.



# 17%

Decrease in amputation rate for patients in the FMS monthly foot check program

Source: 2015 RRI data

# Frenova Renal Research

## Advancing the state of the science of renal disease care

Frenova Renal Research, the contract clinical research team of FMCNA, has been dedicated to improving the lives of kidney disease patients for almost two decades. Through our research partnerships, Frenova participates in all phases of clinical trial development for both drugs and medical devices. Our focus and experience extend beyond ESRD and covers the spectrum of CKD patients, as well as all disease areas and conditions associated with renal impairment. We strive to advance the medical community's understanding of renal disease and bring new therapies to patients so they can live longer, healthier, and happier lives.

### Advancing the science of care: Through renal therapies

The Frenova team is advancing the science of caring for kidney patients by partnering with researchers in a variety of disciplines. Our partners include physician investigators, pharmaceutical companies, and medical device firms. Under the guidance of the FMCNA Medical Office, we provide strategic resources and support for our expanding research community.

#### Renal disease type

21% Pre-dialysis 79% Dialysis

#### Disciplines

- Anemia
- Bone and mineral metabolism
- Biosimilars
- Vascular access
- Cardio-renal investigations
- Dialysis-dependent care
- Non-dialysis dependent CKD

ADPKD Alport Syndrome Device  
 Cardio-renal Anemia  
 Diabetes, Type II Gout  
 Diabetic kidney disease Uremic Pruritis  
 Hyperphosphatemia  
 Diabetic nephrology Vascular Access  
 ESRD Infection SHPT  
 Hyperkalemia Malnutrition/wasting

### Leadership profile



#### Kurt Mussina, MBA

General Manager  
 Frenova Renal Research

Kurt Mussina joined Fresenius Medical Care North America in 2013, bringing extensive experience leading the development and profitable growth of international contract research organizations (CROs). In the past, he has built de novo and restructured both large and small CROs. His experience spans the research, development, and approval continuum for drugs and medical devices. Kurt is also an accomplished entrepreneur with experience launching novel business models in highly complex and competitive international markets. He received a chemistry degree from Montclair State University followed by an MBA from Duke University's Fuqua School of Business.

## Advancing the science of care: Through building and growing relationships

As a unique research partner, Frenova serves several key functions:

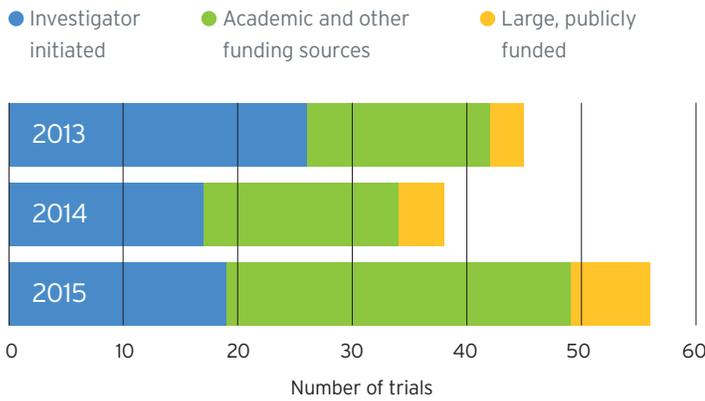
- Contract research organization (CRO)—providing conventional clinical trial management.
- Site management organization (SMO)—providing on-site research coordinators skilled at working alongside physician investigators, as well as managing the research partner’s business.
- Investigative site network (ISN)—providing centralized management and orchestration of clinical research activities conducted within FMCNA and affiliated dialysis facilities.

Frenova is advancing the science of caring for kidney patients by working with both large and small organizations conducting clinical studies. From administering small, short-term single investigator-led studies to participating in large, long-term publicly funded or academic institution-initiated research programs, we are on the cutting edge of conducting better informed, faster, and more efficient clinical research into new and more effective care for our patients. We always work with patients’ health and well-being in mind.

**Data-driven intelligence**

- Leverage FMCNA data assets
- Design study protocols
- Validate patient enrollment curves
- Conduct focused patient recruiting

### Frenova’s support of research in non-industry-sponsored trials



Source: 2015 FMCNA data

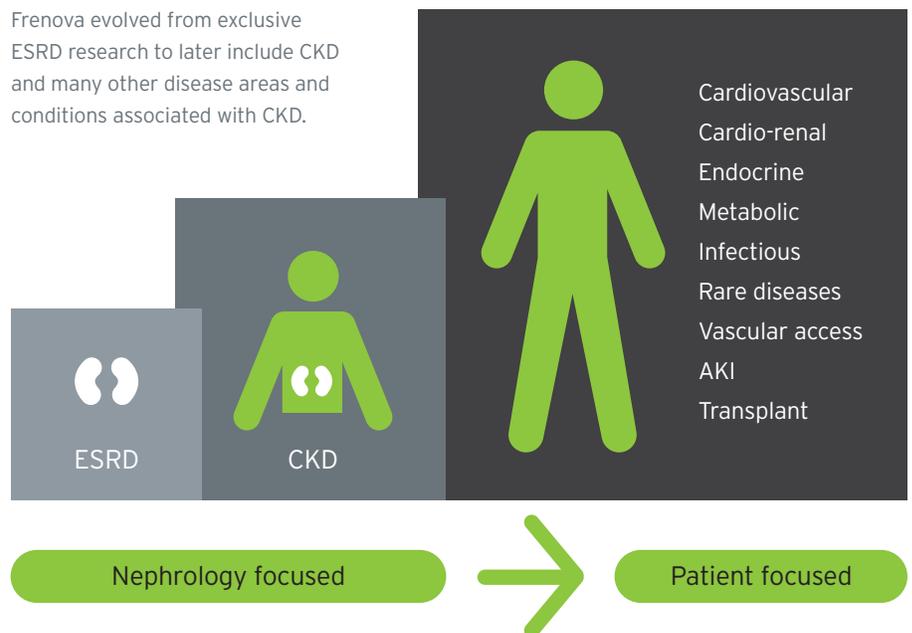
As a core member of the research team, Frenova orchestrates FMCNA resources to design study protocols, provide datamining and analyses, assist with patient recruiting, and manage clinical trials up to, and including, manuscript writing.

Frenova is an active member of the patient community at both the national and local levels. We provide support to the American Society of Nephrology, the Kidney Health Initiative, the National Kidney Foundation, and the American Association of Kidney Patients, among other organizations.

## Advancing the science of care: Through focus on the patient

Frenova’s mission is no longer categorically confined to nephrology, the renal disease process, or treatment options for ESRD and in-center hemodialysis. And Frenova’s clinical research services focus on more than just ESRD. By adopting a more holistic view of our patients, we go beyond ESRD. Through our partnerships with a growing community of diverse researchers, we have expanded our clinical studies to include chronic kidney disease, medical devices, infectious diseases, rare diseases, gene therapies, vascular access technologies, vascular care processes, peripheral vascular disease, and cardio-renal studies.

Frenova evolved from exclusive ESRD research to later include CKD and many other disease areas and conditions associated with CKD.



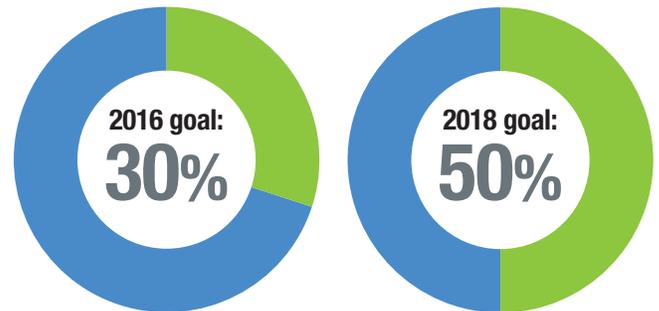
# Fresenius Health Partners

## Leading an evolution toward value-based health delivery

The Secretary of Health and Human Services recently established a 2016 goal to have 30 percent of all Medicare provider payments in alternative payment models tied to how well providers care for their patients, instead of how much care they provide. This was achieved by the end of the second month of 2016. The target in 2018 increases to 50 percent of all Medicare provider payments. The secretary went on to say: "In alternative payment models, providers are accountable for the quality and cost of care for the people and populations they serve, moving away from the old way of doing things, which had amounted to, 'the more you do, the more you get paid.'"

In the fall of 2015, as part of the Comprehensive ESRD Care Model, the Center for Medicare and Medicaid Innovation (CMMI) launched 13 ESRD Seamless Care Organizations (ESCOs). As the largest participant in this program with six of the 13 ESCOs in operation, Fresenius Health Partners (FHP) is now coordinating care for over 8,000 ESRD-attributed Medicare beneficiaries. Each ESCO is accountable for the quality and cost of the care delivered to the attributed beneficiaries. The ESCOs are accountable for 26 specific quality metrics, ranging from familiar QIP metrics to measures that resemble the physician-facing Physician Quality Reporting System measures.

Fresenius Health Partners leverages risk by coordinating financial management, care navigation, and medical management. The Care Navigation Unit (CNU) is a team of dedicated clinical professionals that provide 24/7 coordination of care support to patients for clinics, hospitals, and nephrology practices, as well as to patients directly.



Medicare provider payment models tied to how well providers care for their patients rather than how much care they provide

Source: 2015 FHP data

## Leadership profile



### **Terry Ketchersid, MD, MBA**

Senior Vice President, Chief Medical Officer  
FMCNA Integrated Care Group

Dr. Terry Ketchersid received a BA in chemistry from Austin College and an MD degree from the University of Texas Southwestern Medical School in Dallas. After completing an internal medicine residency in Dallas and a nephrology fellowship at the University of Missouri, he practiced nephrology for 15 years. In 2007, Dr. Ketchersid completed the executive MBA program at Duke University's Fuqua School of Business, earning the Fuqua Scholar honor. In 2008, he joined the Acumen Electronic Health Record Senior Management team where he served as the company's chief medical officer from 2009 through 2013. He joined Fresenius Medical Care North America in 2009 with FMCNA's acquisition of Health Information Technology Services Group.



Tuesday Thompkins, RN, BSN  
Care Navigation Nurse Coordinator

## Highlighting the Care Navigation Unit

From centralized locations, the Care Navigation Unit (CNU) supports nursing case management, service coordination, and social work services across the United States. The team is empowered to take extraordinary measures to safely coordinate care, with an intense focus on:

- Creative solutions
- Problem solving
- Teamwork
- Real-time support

Historically, when using this approach, we have recognized a 20 percent reduction in the hospitalization rate for a similar cohort of ESRD beneficiaries.

## Active monitoring/Active engagement

Fresenius Kidney Care patients who participate in an ESCO are flagged in our systems, to facilitate active monitoring and alerting within the CNU. Through proactive surveillance as well as electronic system notification, exception reporting, and open lines of communication with the clinicians at the clinics, the CNU monitors for conditions and is notified when issues occur.



The CNU is staffed with experienced nurses, social workers, and patient care service coordinators. Working as a cohesive team, they address unexpected events quickly and creatively. In the event a patient is hospitalized, the CNU works with the hospital discharge planner to monitor status, maintain open communication with the hospital and the dialysis clinic, update records, and follow up with the patient or their caregiver post-discharge. The post-hospital processes involve medication reconciliation with a licensed FreseniusRx pharmacist.

low up with the patient or their caregiver post-discharge. The post-hospital processes involve medication reconciliation with a licensed FreseniusRx pharmacist.

## Coordinating aspects of care

In addition to dialysis-related care coordination, the CNU assists the patient with nondialysis concerns such as the acquisition of durable medical equipment (DME), identifying available community resources, conducting benefit reviews, and arranging transportation to medically necessary appointments.

### Case 1: Monitoring treatment start time

An ESCO patient treatment identified on the CNU work list failed to start on time. The CNU contacted the clinic and discovered the patient was in the emergency room for altered mental status. The CNU team immediately contacted the local ER

to inform the medical staff that the CNU was available to help coordinate an out-patient dialysis treatment in the event the patient was not admitted to the hospital. The team began the process of determining treatment options at the patient's home clinic as well as other clinics in the area for the same day and the following day.

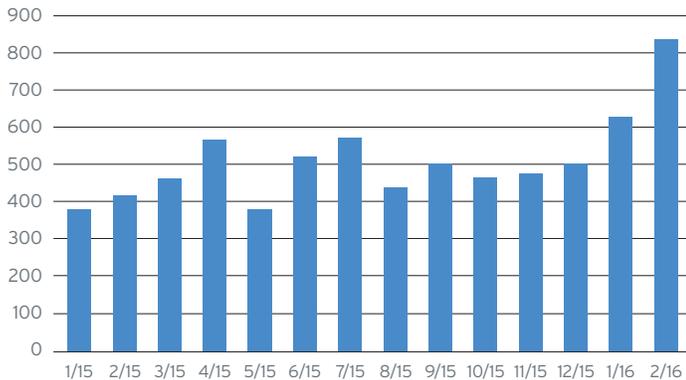
When the hospital ER informed the CNU that the patient was not being admitted, the CNU contacted the patient's nephrologist to ascertain treatment day preference. The nephrologist informed the CNU that treatment the following day was acceptable. The CNU confirmed with the patient's home clinic that they would arrive the following day. A CNU team member contacted the patient regarding the treatment schedule change and confirmed the patient had transportation for the following day. The attention to detail and CNU teamwork ensured the patient's needs were accommodated without delay.



### Case 2: Coordinating nondialysis care

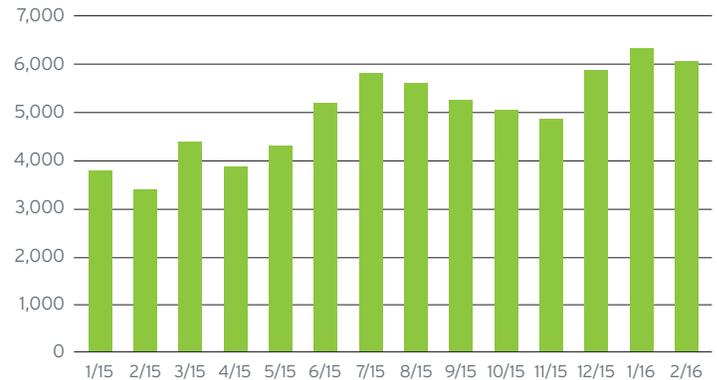
Through routine review of the Daily Incident Patient Treatment Report, the CNU identified a new patient recently transferred into a Fresenius Medical Care clinic with consistently shortened treatment times. By conducting an investigation into the situation, the CNU discovered the patient was transported to the dialysis clinic via ambulance and experienced high levels of anxiety during the dialysis treatment.

### Care Navigation Unit inbound calls



Source: 2015 FHP data

### Care Navigation Unit outbound calls



Source: 2015 FHP data

To ensure a thorough understanding of the patient's case, the CNU initiated a medication review with the FreseniusRx pharmacy and conducted a benefits review to determine options for transportation to non-dialysis medical appointments. Although additional transportation coverage was denied by the patient's insurer, the CNU opted to intervene with coverage for other medically necessary appointments.

When the patient's condition continued to deteriorate with shortened treatment and access issues, the patient's nephrologist sent the individual to the hospital. During

a hospital stay, the CNU coordinated a psychology consultation in the hospital setting with the patient and family. Post-discharge, the patient continued to shorten treatments, and the family initiated a conversation with the CNU regarding hospice care. In turn, the CNU notified the social worker and nephrologist of the family's inquiry. Upon receiving the order from the patient's physician, the CNU coordinated daily communication and care with hospice, the nephrologist, and the family and provided comfort-oriented dialysis as needed.

### Case 3: Transportation for a new patient

A new ESRD patient was scheduled for an initial treatment as noted on the CNU's Daily Incident Patient Treatment Report. A CNU team member contacted the patient, introduced the team, and explained available services. Following a brief hospitalization, the patient contacted the CNU and indicated she would need help with transportation to and from her scheduled treatments for a few days until she could arrange a permanent transportation solution for herself. The CNU contacted a local taxi service every morning for the patient's first week of treatments.

### Leadership profile



#### Jodi Conti, RN

Director, Care Navigation Unit  
Fresenius Health Partners

Jodi Conti graduated from Creighton University in Omaha, Nebraska, with a bachelor's degree in nursing. After training in peritoneal dialysis care at the University of Nebraska Medical Center, she continued her nursing career in dialysis. She has served as in-center charge nurse, clinic manager, and nephrology practice manager. Jodi joined Fresenius Medical Care North America in 2010 as an award-winning clinic manager in Austin, Texas. In 2014, she was asked to develop and lead the Care Navigation Unit to manage ESRD Seamless Care Organizations participants at Fresenius Medical Care North America.

# Sound Physicians

## Performance management of the acute episode of care

Sound Physicians, a majority-owned subsidiary of Fresenius Medical Care North America, is a national health care organization with the largest staff of hospitalists caring for patients in need of acute hospital-based care, post-acute, and transitional care services. Sound also provides intensive care, emergency medicine, and physician advisory services at well over 200 facilities in nearly 40 states.

### Partner of choice: Delivering collaborative care

Sound Physicians is firmly committed to being the provider of choice for patients and also the partner of choice for the hospitals and care teams that care for those patients. Annually, Sound conducts a satisfaction survey to ask our partner care teams how we are doing. These teams are comprised of hospital nursing teams, case managers, and other ancillary services (e.g., therapies).

In 2015, 74.2 percent of care team members agreed or strongly agreed with the statement, "I would recommend Sound hospitalists to provide care for a member of my family." Even as hospital-based care teams experience ever-changing challenges year after year, Sound's performance continues to be strong and improved, demonstrating our commitment to and success in providing collaborative care.

### Care team patient satisfaction improvement

(care team average score, percent of 4/5 ratings)



The percent of care team members who agree or strongly agree with the following statement:

"I would recommend Sound hospitalists to provide care for a member of my family."

Source: 2015 Sound Physicians data

### Leadership profile



**Scott Sears, MD**  
Chief Clinical Officer  
Sound Physicians

Dr. Scott Sears is the chief clinical officer for Sound Physicians. Prior to this role, he served as the organization's northwest regional medical officer. He has been named a fellow of both the American College of Physicians and the Society of Hospital Medicine. He is a Certified Physician Executive and received his MBA from the University of Massachusetts. Dr. Sears previously served as national faculty for the American College of Physicians Quality Improvement Project and for many years on the Governor's Advisory Council for Montana Chapter of the American College of Physicians.

## Committed to every patient, every visit

Sound Physicians' quality program measures performance based on the parameters defined by the Centers for Medicare and Medicaid Services and The Joint Commission. The target for these combined measures is 100 percent performance. During 2015, twelve inpatient measures were directly, and specifically, impacted by hospitalists. While 100 percent is an extremely high performance expectation, it represents Sound's commitment to every patient receiving quality care every time. For the most recent quarter, 41 percent of Sound sites met this 100 percent target.

Sound's quarterly performance for Q3 2015, averaged 98.9 percent. Eleven percent of Sound sites have achieved 100 percent performance across the most recent four quarters. This represents zero achievement fallouts for a single patient on the 12 quality measures over an entire year.

Sound has continually improved quality performance year-over-year due to focused education, best practice interventions, and hospitalist team engagement.

## Quality performance year-over-year trend

(average yearly quality performance score)

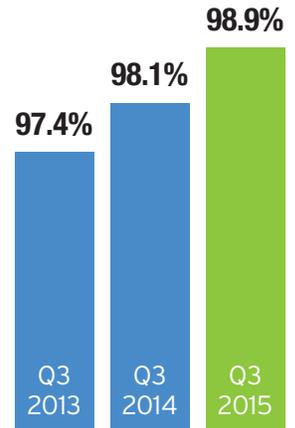
Sound Physicians quality measures:

2013:

- Acute myocardial infarction
- Heart failure
- Pneumonia
- Prevention: global immunization measures
- Stroke
- Venous thromboembolism

2014 and 2015:

- Stroke
- Venous thromboembolism



Source: 2015 Sound Physicians data

## Surpassing benchmarks

The Case Mix Index (CMI) and Length of Stay (LOS) metrics for hospital partners correlates the severity of illness of patients and the success of the care team in getting our patients home as safely and as quickly as possible.

Sound uses the Healthcare Cost and Utilization Project (HCUP) data created by the Agency for Healthcare Research and Quality (AHRQ) to compare our LOS and CMI performance to national averages. A stratification methodology is applied to adjust for specific factors in order to make a consistent comparison to HCUP, with 100 percent representing average performance relative to performance at more than 1,400 US hospitals. Sound's targeted performance is to rank significantly better than these averages. Applying best practices, Sound uses standardized tool kits and interventions that improve hospital throughput and efficiency, which is demonstrated by a decreased LOS across time.

Our targets are:

- LOS: 95 percent or lower
- CMI: 102 percent or higher

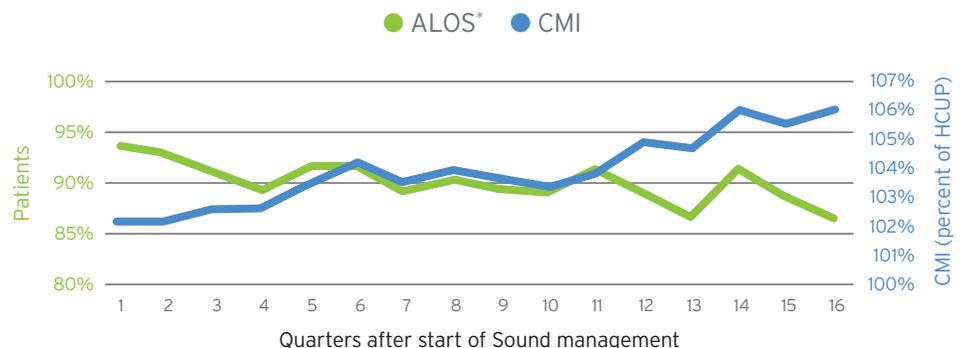
Additionally, Sound provides disciplined education for physicians to improve clinical documentation. We regularly partner with our hospitals' Clinical Documentation Improvement programs to identify opportunities for improvement and provide team or physician-specific education.

This focus results in an improvement in clinical documentation demonstrated by CMI, even as LOS holds steady or declines.

The graph below shows that improvement begins with the first quarter of Sound performance and continues to improve consistently over time, evidence of the power of the *Sound Way of Management* through people, process, and technology.

## LOS declines and CMI increases across time

(CMI/LOS trend post-implementation, % of HCUP; all sites after January 2110)



\*Refers to the overall average length of stay with outliers included

Source: 2015 Sound Physicians data

# Nephrology and Cardiology Subspecialty Services

## Providing clinical services in nephrology and outpatient interventional cardiology

Provider services are a critical arm of the coordination of care services for patients with high-cost chronic conditions. Patients with advanced renal disease often suffer from cardiovascular disease, so FMCNA is evolving our competency in cardio-renal medicine. Having the ability to move cardiology into an outpatient venue of care offers a chance to define a novel and productive approach to caring more intensively for the cardiac conditions that either lead to or result from advanced renal disease.

**FMCNA Physician Practice Services** is dedicated to helping develop our network of affiliated physicians and is interested in embracing alternative payment models of care for chronically ill renal disease patients. In this regard, we have evolved our relationships with nephrologists to include practice support and management while developing a spectrum of relationships with nephrologists to align interests, management services, and develop new or existing practices.

### Physician quality metrics

The Physician Practice Services team develops physician practice quality performance metrics for ESRD and CKD care to assess both process and patient outcomes. Performance measures include a comparison of the provider's performance against national benchmarks, as well as year over year performance improvement. The list of measures will evolve as metrics "top out" and new quality targets are developed. Within the context of value-based purchasing, a percentage of the provider's compensation is linked

to their quality score. In year one, performance will be measured by successful reporting, establishing a baseline for the year over year improvement comparison.

For Q1 2016, three compensation metrics are in a pilot phase. The metrics include year over year improvement in incident ESRD catheter rates, incident home therapy starts, and incident 120-day ESRD mortality.

### Leadership profile



#### **Joseph A. (Skip) Kuhn, MD, FACP**

Senior Consultant  
FMCNA, Office of the Chief Medical Officer

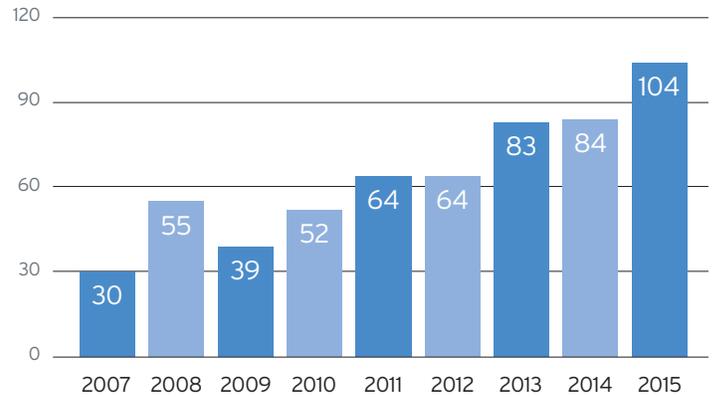
Dr. Joseph Kuhn graduated from Jefferson Medical College. He completed a nephrology fellowship at Georgetown University in 1978 and practiced nephrology in Wilmington, Delaware, for 34 years. He is the former head of the Renal and Hypertension Section of Christiana Care Health System and held multiple dialysis center medical directorships until his retirement in 2012. A former chair of the Fresenius Medical Advisory Board, he now acts as a senior consultant to the chief medical officer of FMCNA.

## Medical director training program

To continuously improve care and safety for our dialysis patients, the FMCNA Medical Office, in conjunction with the leadership training team, conducts quarterly training programs for all new Fresenius Kidney Care medical directors. This two-day program is required for all new medical directors to ensure full understanding of the scope of responsibility and importance of their new role.

Experienced Fresenius Kidney Care medical directors can also participate in ongoing education programs to keep abreast of the ever-changing demands of their role. Attendance every five years is highly suggested for existing medical directors.

Participation in quarterly training program



Source: 2015 FMCNA data

**National Cardiovascular Partners (NCP)** was founded in 2004 to partner with leading physicians and hospital systems to develop outpatient cardiac and vascular interventional labs within a convenient and cost-effective setting. Working closely with our physician partners, NCP manages the business portion of the labs, allowing the doctors and nurses to fully concentrate on what they do best: provide high-quality patient care. As of the end of 2015, NCP owns and operates 23 facilities located in Texas, Florida, Arizona, California, Kansas, and Louisiana. NCP has been a part of the Fresenius Medical Care North America team since October 2014.

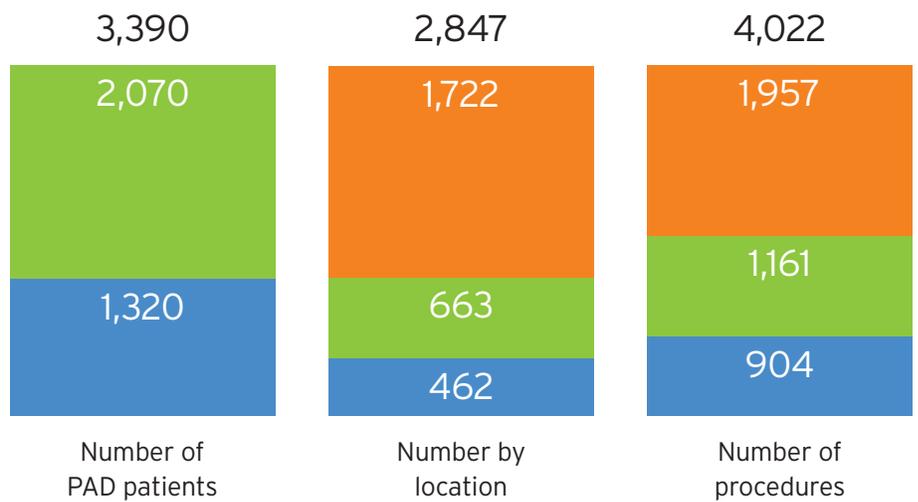
## Peripheral Artery Disease

NCP launched its Peripheral Artery Disease (PAD) initiative in January 2015 with the introduction of a data collection tool to evaluate every PAD patient at the time of procedure. Closely tracking all PAD procedures enables NCP to track appropriateness of PAD care, procedure success rates, patterns of complications, and adverse event rates.

The Physician Executive Council closely monitors the PAD initiative. The PAD patient outcomes are stratified based on procedure location, number and type of interventions, and success and adverse event rates.

Peripheral Artery Disease (PAD) initiative

(2015 results)



● Total interventions  
● Total diagnostics

● Hip to knee  
● Above the hip  
● Below the knee

● Total balloon  
● Total atherectomy  
● Total stent

Source: 2015 NCP data

## Physician Executive Council

The Physician Executive Council (PEC) is a five-physician committee selected by NCP senior leadership to provide oversight and guidance to NCP labs. The council's mission is to ensure an ongoing focus on improvement of care. The group works with local governing boards on overall quality and appropriateness of care and clinical procedures. The council meets quarterly to review current data and discuss trends.

By monitoring and trending performance data from all NCP locations, the PEC is able to identify best practices and address negatively trending concerns in a timely manner. Data from all NCP labs

is compared to the NCP corporate average as well as Ambulatory Surgery Center (ASC) industry averages for the purpose of improving patient care. The PEC monitors all clinical and operational variances such as transfers, falls, infections, serious adverse clinical (sentinel) events, and procedure complications. In the case of left heart catheterization procedures on NCP patients with coronary artery disease, the PEC monitors activities focusing on the appropriate use, rates of procedures with normal results, and medication management practices.

### Clinical and operational variances reporting—NCP cath labs and Ambulatory Surgery Centers

	NCP cath labs				NCP multispecialty ASCs			
	2014 Cath labs	2014 Results	2015 Cath labs	2015 Results	2014 ASC	2014 Results	2015 ASC	2015 Results
Sentinel events <sup>1</sup>	10	0.09%	8	0.07%	0	0%	3	0.03%
Transfers	31	0.21%	36	0.32%	6	0.10%	17	0.19%
Falls	2	0.02%	3	0.03%	1	0.02%	1	0.01%
Infections	9	0.08%	5	0.04%	0	0%	0	0%
Complications <sup>2</sup>	66	0.61%	68	0.60%	5	0.08%	13	0.14%

<sup>1</sup> Death, wrong procedure site, loss of limb, loss of function, retained foreign body

<sup>2</sup> Return to surgery/lab, hematoma, MI, stroke, other

Source: 2015 NCP data

## Leadership profile



### Randy Lombardo, MD

Medical Director  
National Cardiovascular Partners

Dr. Randy Lombardo is the medical director of National Cardiovascular Partners and practices with Advanced Cardiovascular Group in Beaumont, Texas. He is board certified in internal medicine, general cardiology, and interventional cardiology. Dr. Lombardo is a graduate of the University of Texas, Southwestern Medical School in Dallas, and he completed his residency in internal medicine at Parkland Hospital in Dallas and Memorial Hermann in Houston, where he also completed his cardiology fellowship.

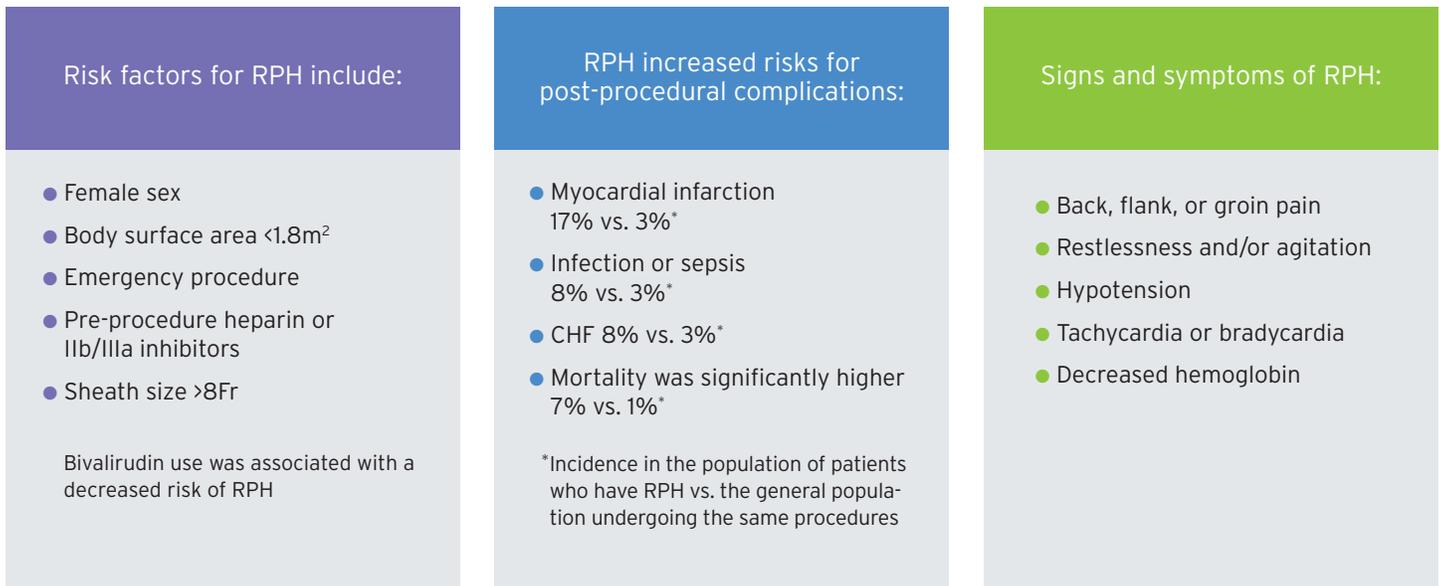
## Retroperitoneal Hematomas initiative

Based on trends from 2014 to early 2015, NCP identified retroperitoneal hematomas (RPH) as the most frequently reported complication for patients receiving interventional procedures.

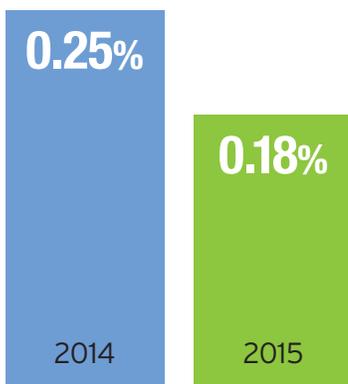
The PEC recommends treatment for hypotension such as fluid resuscitation, atropine for bradycardia, and increased vagal activity, as well as type and cross match for transfusion. In addition, as part of the initiative to reduce or eliminate RPH, the PEC identified procedural recommendations such as pressure at the access. Physicians were encouraged to consider early intervention with access on the contralateral side and balloon tamponade of the bleeding area with covered stent, when appropriate.

In an effort to further minimize these bleeding complications, the initiative also includes guidance on ultrasound, micro-puncture, and radial artery access. In addition, it offers a protocol for local labs to consider when making decisions about transferring these complex patients to the hospital after invasive procedures have failed.

The initiative resulted in an overall reduction in RPH from 0.25 percent to 0.18 percent by the end of 2015.



### RPH reduction



The **cost effectiveness** of moving stable elective interventional procedures into the outpatient venue of care offers the opportunity to enhance the value of these services to address patients with **advanced vascular disease**.

# MedSpring Urgent Care

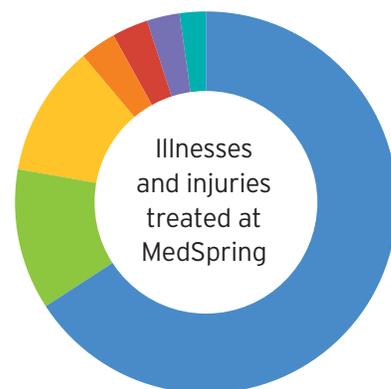
## Delivering an exceptional patient experience of care

MedSpring Urgent Care centers are located in four metropolitan areas: Austin, Houston, Dallas, and Chicago. We are also located in Boston where we operate under the brand name Partners Urgent Care in a joint venture with Partners HealthCare. In 2015 alone, MedSpring had more than 260,000 patient visits. Our centers evaluate and treat a wide array of illness and injuries, with illnesses being the predominant reason for most visits. Compared to the emergency room, patients enjoy significant cost and time savings while having their health care needs effectively addressed.

Access to timely and convenient health care is important, and demand will continue to increase as more individuals across the country acquire health insurance. In an effort to serve communities as effectively as possible, MedSpring intensively studies local demographics to identify locations that will best serve our patient population. In 2015, our patients traveled 5.1 miles, on average, to reach one of our centers. In some cases, patients traveled more than 30 miles to a MedSpring center.

In 2016, MedSpring continues to analyze the characteristics of repeat patients, including why patients choose to return to MedSpring. Our goal is to understand how we can provide better service and better care to our patients as efficiently as possible.

Occasionally, a patient's condition warrants transfer to an emergency room. In 2015, approximately 2 percent of our patients were referred for more intensive care in an ER. Although MedSpring recognizes the cost and time commitment of emergency room visits, when it is deemed to be in the patient's best interest to receive ER care, MedSpring staff efficiently arranges for it. Patients' documents are typically prepared in advance of the transfer, and MedSpring's referring physician attempts to contact the ER staff directly to ensure a smooth and seamless transition for the patient.

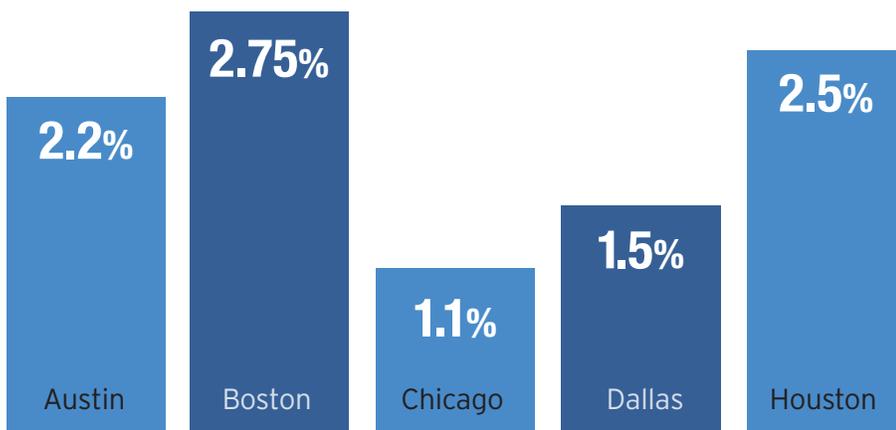


- Urgent Care—illness, 66%
- Urgent Care—injury, 12%
- Occupational health—UDS<sup>1</sup> or BAT<sup>2</sup>, 11%
- Occupational health—injury, 3%
- Occupational health—other, 3%
- Urgent Care—vaccination and other, 3%
- Urgent Care—physical, 2%

<sup>1</sup>Urine drug screen  
<sup>2</sup>Breath alcohol test

Source: 2015 MedSpring Urgent Care data

### Percent of ER referrals



Source: 2015 MedSpring Urgent Care data

# 5.1 miles

Average distance patients travel to reach a MedSpring Urgent Care center

Source: 2015 MedSpring Urgent Care data

## Virtual Care

MedSpring continues to expand our Virtual Care services pilot in Illinois. Offering patients the convenience of seeing a provider remotely, Virtual Care increases access to timely and effective care and helps drive down lost work days and visits to the emergency room. In 2016, MedSpring plans to expand its Virtual Care hours and services, such as introducing virtual pediatric care.

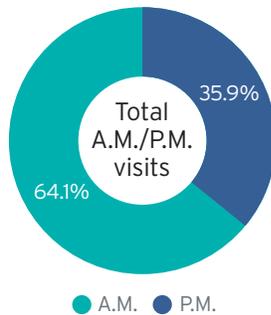
Virtual Care was introduced in the Boston market in partnership with Partners HealthCare in May 2016.



## Extended hours

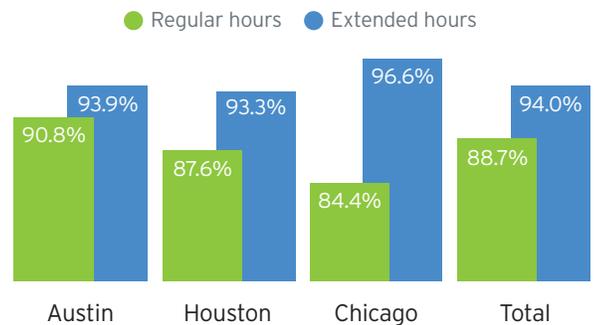
Typically, MedSpring's hours of operation are 9:00 a.m. to 9:00 p.m. At select centers, MedSpring has introduced extended hours from 7:00 a.m. to 11:00 p.m. to better accommodate patients' needs.

We are also observing increased demand for early morning visits, as compared to those in the late evening.



Source: 2015 MedSpring Urgent Care data

## Percent of illness/injury patient visits requiring a provider



Source: 2015 MedSpring Urgent Care data

## Leadership profile



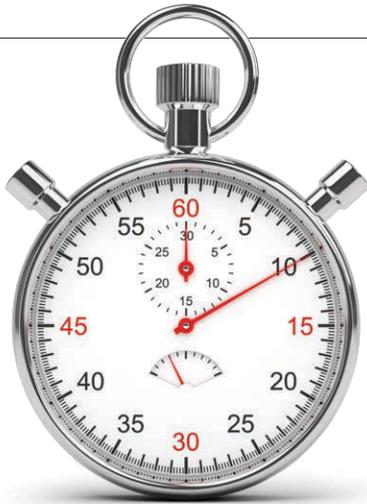
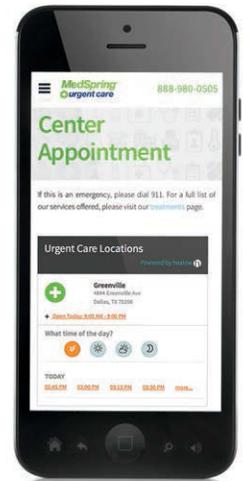
**Jon L. Belsher, MD**  
 Chief Medical Officer  
 MedSpring Urgent Care

Dr. Jon Belsher attended Amherst College and the University of Arizona and received his doctor of medicine from UT Southwestern Medical School. He completed residencies in family medicine and internal medicine at the Mayo Clinic Scottsdale as well as a fellowship in critical care medicine at the Mayo Clinic in Rochester. Dr. Belsher served as the chief of aerospace medicine for the Arizona Air National Guard's 162nd Fighter Wing. As a lieutenant colonel, he was second-in-command of the largest Air National Guard Medical Group in the country.

## Online appointments

Every day, across many sectors of the service industry, consumers are presented with more opportunities to schedule appointments with the simplicity of a keystroke. MedSpring has joined this revolution by implementing Healow, an electronic medical record (EMR)-integrated online appointment scheduling platform. Patients can access the program from their desktop, tablet, or smartphone. Available appointments within each of our centers are displayed for the current and following day.

Once patients have selected a desired date and time, they proceed to a preregistration section, which ultimately saves time when they arrive in center. All preregistration information is automatically downloaded to MedSpring's EMR. As a final step in the process, the patient receives an email confirming the appointment date, time, and center location. Full implementation of the Healow platform occurred across all five markets during the first quarter of 2016.



# 99%

The number of prescriptions that were appropriately ePrescribed within 10 minutes of a patient's checkout

Source: 2015 MedSpring Urgent Care data

## Prescriptions

When patients feel under the weather, MedSpring recognizes the importance of providing what they need to recover as quickly and easily as possible. This includes ensuring the timely transmission of prescriptions from our centers to the pharmacy. Internal audits of our EMR and by our center support team provide oversight to the program, and when we fall short, we coach our staff on how to prevent missed opportunities moving forward. As of the first quarter of 2016, 99 percent of our prescriptions were appropriately ePrescribed within 10 minutes of a patient's checkout.

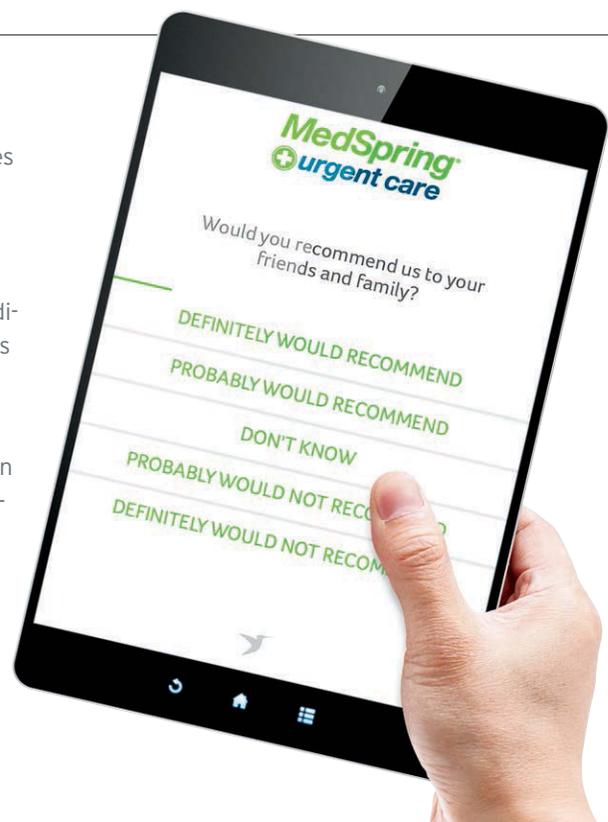
## Reputation management

MedSpring, like all responsible service-oriented organizations, recognizes the importance and value of real-time feedback in the retail health care setting. In 2015, 98 percent of post-visit reviews from our patients were positive.

In a continued effort to better understand in-center performance immediately and boost in-center reviews on third-party websites, MedSpring has implemented Humm®, an on-site real-time feedback platform.

By asking patients about their service and care on-site with Humm, MedSpring is seeing a decrease in perceived visit time, richer feedback in terms of character length, additional comments, and an increase in positive third-party reviews.

Humm allows our organization to quickly address shortfalls in service standards. Patients receive a timely call from our market leadership teams for details regarding an unsatisfactory visit.



# FMCNA Government Affairs

## Advocating for health delivery reform that helps patients with renal disease

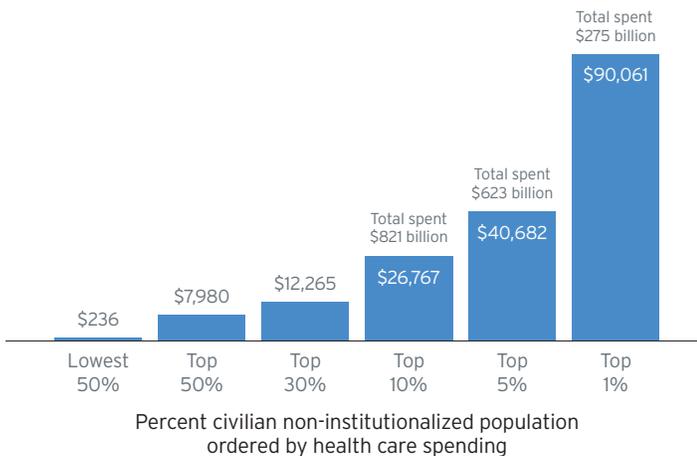
It is no secret that the American health care system is rapidly evolving. For years, policymakers and practitioners alike have been experimenting with ways in which we can move beyond fee-for-service to a system that holds clinicians accountable for both the cost and quality of that service.

But while there is widespread agreement on the need to move from volume-based care to value-based care, there remains great debate as to what the destination will actually look like. Will it involve shared savings of reduced costs or full responsibility through capitation? Open provider networks or closed? Voluntary patient enrollment or assignment?

Given the high health care delivery cost of our patients and other chronically ill Americans, it is not hard to understand why the system needs to change. We believe changes will help patients with advanced kidney disease gain access to care and services that will help them thrive despite their illness.

### US health care spending

(mean annual expenditure per person in dollars)



Source: NIHCM Foundation analysis of data from the 2009 Medical Expenditure Panel Survey

# 86%

The amount of US health care spending that goes to chronic care

# 50%

The amount of health care spending on inpatient and post-acute care

Over the past eight years, the US health care system has made significant progress in reorganizing. Today, over 30,000 clinicians work in more than 6,000 practices certified as patient-centered medical homes. There are more than 500 Medicare accountable care organizations, or ACOs. As a result, roughly two-thirds of the US population lives in an area serviced by an ACO and 40 percent live in an area with two or more ACOs.

But for small populations with high, unmet needs—those with chronic conditions—these kinds of successes are too often the exception rather than the rule. The sad truth is that the unique needs and cadence of care that chronically ill patients require are not being met, and the impact is simply staggering. According to the Centers for Disease Control and Prevention, chronic diseases

are responsible for seven out of 10 deaths in the United States each year. And while 20 percent of the population has a chronic condition, treating these conditions accounts for \$2.9 trillion, or 86 percent of our nation's health care costs. In the last few years, the US health care system has placed a great deal of attention on primary care—and understandably so. But by failing to address gaps in care for the chronically ill, we appear to be on the wrong side of the 80-20 rule.

At Fresenius Medical Care North America, we've been following this trend closely. But we wanted to know more. So we recently conducted a survey of 250 physicians and 1,000 members of the US population and uncovered some interesting findings.

## Patients want organized support for managing care

The health care system needs specialized integrated networks to better meet the needs of the chronically ill.

# 90%

of patients say that they are prepared to take care of their needs arising from their disease.

# 86%

of the general population says that a coordinated treatment experience is important.

# 66%

of physicians say they would treat patients more effectively if they had more access to integrated care networks.

# 66%

of patients are non-compliant, which is a significant obstacle for two-thirds of physicians.

Source: FMCNA Survey Results 2015

First, the health care system lacks coordination. Physicians don't always talk to each other, treatments are not aligned, and patient information and data is not made available to all professionals treating the patient. Simply put, the current system was not built to respond to the needs of chronically ill patients. Interestingly, both patients and physicians know this. They are the ones crying out for change.

At Fresenius Medical Care North America, we are proud to have been a part of the evolution from volume to value from the outset. For example, more than a decade ago, back when bundling was not

yet part of the health care lexicon, we were the first to advocate to Congress for the creation of a bundled payment system for dialysis. Rather than separately bill the government for every aspect of the dialysis treatment—the treatment itself, lab tests, pharmaceuticals, and the like—we thought it made far more sense to include all inputs of the treatment into a single payment. Patients would be better off because we could more effectively manage all aspects of their treatment, and the system as a whole would benefit by incentivizing providers to control costs. In short, bundling would improve outcomes and reduce costs.

## Leadership profile



### Robert Sepucha

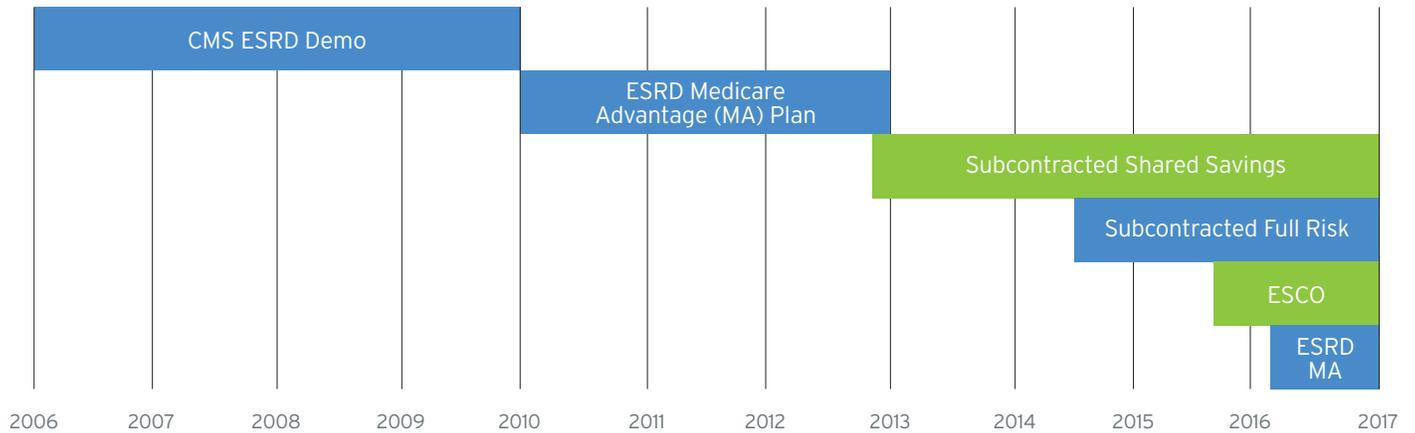
Senior Vice President, Corporate Affairs  
Fresenius Medical Care North America

Robert Sepucha received a JD from the University of Michigan and a BA in government with a concentration in economics from Dartmouth College. Prior to joining Fresenius Medical Care North America, he served as general counsel for the Massachusetts Life Science Center, as well as chief of staff and senior policy advisor to US Rep. Harold Ford Jr. (D-TN), where he was the congressman's primary advisor on legislative strategy, political activities, media strategy, and legal issues. Robert is also a member of the board of ALS Therapy Development Institute, a nonprofit biotechnology organization dedicated to developing effective treatments for amyotrophic lateral sclerosis (ALS).

## FMCNA participation in alternative payment models

A long history of experience in value-based models

● Capitation model ● Shared savings model



That promise has been borne out by reality. Since 2006, Fresenius Medical Care has reduced mortality among our ESRD patients by more than 6.1 percent. Similarly, Medicare expenditures for the entire industry have declined. According to the United States Renal Data Service 2015 Annual Data Report, the growth in total end-stage renal disease (ESRD) spending is no longer due to higher per patient costs. Rather, it is almost entirely attributable to growth in the number of covered patients.

But our advocacy for moving to a value-based system is not limited to dialysis. The chronic care survey we conducted validated what we have long believed: that value-based models are necessary to attack the unique needs—and high costs—of treating the chronically ill. That is why we have been part of value-based models focused on the total cost of care for ESRD patients since 2006—with our participation in a demonstration project with the Centers for Medicare and Medicaid Services (CMS) that saw us reduce mortality by 24 percent and reduce all-cause hospitalizations by 20 percent.<sup>1</sup>

And that commitment has only increased. We began advocating for a shared savings model for ESRD over five years ago, which led to the creation of ESRD Seamless Care Organizations, or ESCOs, in October 2015. We have operated six of the inaugural 13 ESCOs across the country, more than any other provider. We have also continued to operate Medicare Advantage chronic special needs plans (C-SNPs), which is a capitated model focused solely on the unique needs of dialysis patients.

Indeed, for more than a decade, we have been at the forefront of designing alternative payment models for the renal population, models that promote integrated and coordinated care to improve outcomes and reduce costs.

And we won't stop here, which is why we are members of the Health Care Transformation Task Force, an industry consortium of patients, payers, providers, and purchasers that seeks to advise policymakers on ways to transform the US health care system. As part of that enterprise, we have committed to having 75 percent of our business operating under value-based payment arrangements by 2020.

By nearly any measure, the US health care system is undergoing radical transformation. By breaking down historical barriers among physicians, and encouraging all providers to be more accountable for the quality and cost of their care, the emerging landscape holds the promise for a better quality of life for patients and a more sustainable spending trajectory for society.

At Fresenius Medical Care, we are committed to supporting this transformation. It is why we have advocates in Washington and in state capitols across the country explaining how we can chart a new path for the treatment of the chronically ill.

<sup>1</sup> Arbor Research, ESRD Demonstration Disease Management Demonstration Evaluation from 2006-2008, the First Three Years of a Five-Year Demonstration, December 8, 2010.

# Patient experience

## The next step in our commitment to patients

At Fresenius Kidney Care, we're passionately committed to helping people living with kidney disease lead fuller, more active, and vibrant lives. Our goal is to take the very best of what each of our clinics do every day and unify those best practices into a consistent experience for our patients. In 2015, we took this commitment to a new level. We built, developed, and cemented it through a dedicated customer service program to ensure that every single treatment that every single person receives is an optimal experience.

### Focusing on people living with kidney disease

Most health care organizations consider their customers as patients. Other service industries give the people they serve a title of empowerment—"customer," "client," or "guest." In some ways health care operates as though it is exempt from customer experience. Many health care professionals often say we are in the business of doing the right thing, not necessarily the nice thing. As we have learned, the right thing and the nice thing may be the same thing.

### Giving our patients a voice

As we embarked on this journey, our first step was to really understand our patients' needs. Improving patient experience is almost impossible without a data-driven understanding of what is most critical and important to the people we care for, so we started there. We dug in by talking and, more importantly, listening to over 50,000 patients. This is an enormous feat for any organization, but we knew this was the only way we could truly understand our patients and give them a voice.

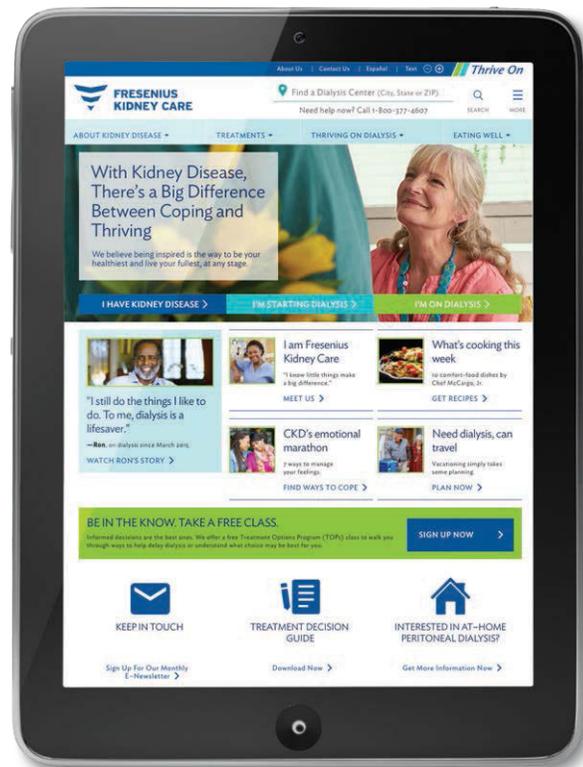
### We learned what matters most

While we continue to deliver the best clinical care and outcomes, our patients also shared that they need us to be a partner with them in the clinical journey and emotional journey. We learned through our surveys:

- Being inspired is just as important as people being their healthiest.
- People are striving for goals they previously thought were beyond their grasp.
- Living with chronic kidney disease is about more than just surviving—it's about thriving.

### The next phase of this journey

We are in the process of integrating what we learned from the data into our overall strategy and interactions with patients. In 2016, we are building training and educational programs, and have launched a new website that speaks to the experience our patients are asking us to create for them. It is an exciting start to a multiyear journey, which has only just begun.



Please visit us at [www.freseniuskidneycare.com](http://www.freseniuskidneycare.com)

# 50,000

Number of patients we talked with to better understand their needs

# 5 million

Number of data points analyzed

"The staff is extremely caring, and all of them have become more like friends than just caregivers. They are all interested in what is going on in the patient's life away from the center."

# Publications and research

## Advancing the science of acute and chronic diseases through research to provide our patients with better outcomes

Fresenius Medical Care North America (FMCNA) and its affiliated companies play an important role in advancing the scientific understanding of renal and chronic disease care. By actively conducting research endeavors at FMCNA and submitting our findings to peer-reviewed publications, we demonstrate our commitment to contribute to advancing the state of the science and continually improving the care we provide to our patients.

In the first four months of 2016, we had 20 journal article publications. Since 2015, our research endeavors included more than 125 abstracts accepted that involved the contributions of more than 1,200 FMCNA staff members. These research efforts fall into eight general categories:

- Using technology and science to improve patient care
- Optimizing CKD, transitional, and incident ESRD dialysis care

- Improving management of cardiovascular diseases
- Dialysis access management and catheter reduction
- Global and local collaborative approaches to providing better kidney care
- Customizing therapies to patients' geographic locations
- Obtaining a holistic view of patients to better their outcomes
- Using innovative approaches to improve hospitalist care paradigms and inpatient outcomes

These initiatives continue to result in improved quality of life, fewer hospitalizations, reduced health care complications, and better patient outcomes—helping to fulfill the FMCNA mission to improve the lives of every patient, every day, and to lead the industry in advancing the care of kidney patients.

### 2016 manuscripts (as of May 2016)

**Effects of renal care coordinator case management on outcomes in incident dialysis patients.** Maddux DW, Usvyat LA, DeFalco D, Kotanko P, Kooman JP, van der Sande FM, Maddux FW. *Clin Nephrol.* 2016 Mar;85(3):152-8. doi: 10.5414/CN108713.

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**Implementation of routine foot check in patients with diabetes on hemodialysis: associations with outcomes.** Marn Pernat A, Peršič V, Usvyat L, Saunders L, Rogus J, Maddux FW, Lacson E Jr, Kotanko P. *BMJ Open Diabetes Research and Care* 2016;4:e000158. doi:10.1136/bmjdr-2015-000158.

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**Hemodialysis outcomes in a global sample of children and young adult hemodialysis patients: the PICCOLO MONDO cohort.** Ferris M, Gibson K, Plattner B, Gipson DS, Kotanko P, Marcelli D, Marelli C, Etter M, Carioni P, von Gersdorff G, Xu X, Kooman JP, Xiao Q, van der Sande FM, Power A, Picoits-Filho R, Sylvestre L, Westreich K, Usvyat L. *Clin Kidney J.* 2016 Apr;9(2):295-302. doi: 10.1093/ckj/sfv157. Epub 2016 Mar 5.

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**Quantifying physical activity levels and sleep in hemodialysis patients using a commercially available activity tracker.** Han M, Williams S, Mendoza M, Ye X, Zhang H, Calice-Silva V, Thijssen S, Kotanko P, Meyring-Wösten A. *Blood Purif.* 2016 Jan 15;41(1-3):194-204.

**Doing more than caring about quality.** Maddux FW. *Semin Dial.* 2016 Mar;29(2):119-24. doi: 10.1111/sdi.12471. Epub 2016 Feb 9.

**Intradialytic hypoxemia and clinical outcomes in patients on hemodialysis.** Meyring-Wösten A, Zhang H, Ye X, Fuertinger DH, Chan L, Kappel F, Artemyev M, Ginsberg N, Wang Y, Thijssen S, Kotanko P. *Clin J Am Soc Nephrol.* 2016 Mar 2. pii: CJN.08510815.

**Uremic toxicity-induced eryptosis and monocyte modulation: the erythrophagocytosis as a novel pathway to renal anemia.** Bonan NB, Steiner TM, Kuntsevich V, Virzi GM, Azevedo M, Nakao LS, Barreto FC, Ronco C, Thijssen S, Kotanko P, Pecoits-Filho R, Moreno-Amaral AN. *Blood Purif.* 2016;41(4):317-23. doi: 10.1159/000443784. Epub 2016 Feb 6.

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**Low-sodium versus standard-sodium peritoneal dialysis solution in hypertensive patients: a randomized controlled trial.** Rutkowski B, Tam P, van der Sande FM, Vychytil A, Schwenger V, Himmele R, Gauly A. *Am J Kidney Dis.* 2016 May;67(5):753-61. doi: 10.1053/ajkd.2015.07.031. Epub 2015 Sep 20.

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**Associations between global population health indicators and dialysis variables in the Monitoring Dialysis Outcomes (MONDO) Consortium.** Calice-Silva V, Hussein R, Yousef D, Zhang H, Usvyat L, Campos LG, von Gersdorff G, Schaller M, Marcelli D, Grassman A, Etter M, Xu X, Kotanko P, Pecoits-Filho R. *Blood Purif.* 2015;39(1-3):125-36. doi: 10.1159/000368980. Epub 2015 Jan 20.

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**Association between pre hemodialysis serum sodium concentration and blood pressure: results from a retrospective analysis of the international monitoring dialysis outcomes (MONDO) initiative.** Raimann JG, Canaud B, Etter M, Kooman JP, Levin NW, Marcelli D, Marelli C, Power A, Duncan N, van der Sande FM, Carioni P, Thijssen S, Xu X, Usvyat LA, Wang Y, Kotanko P. *J Hum Hypertens.* 2015 Jul 30. doi: 10.1038/jhh.2015.79.

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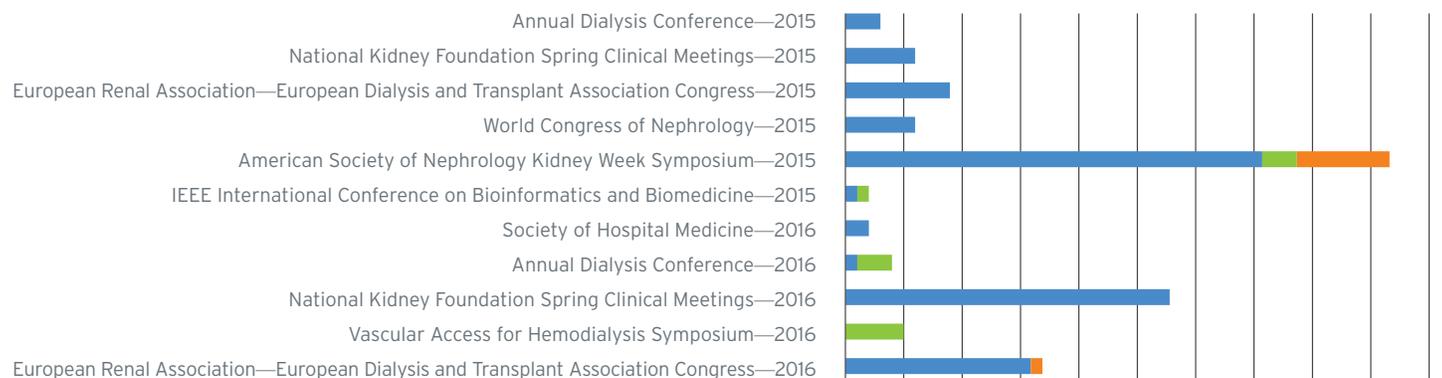
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