







The Global Medical Office opens up promising new opportunities to transform health care. LEN USVYAT and his team are eager to use them.



28

SIRKKA-LIISA ALÉN feels in good hands at her clinic in Helsinki. A result and gratifying recognition of the team effort during the last ten years.

I get the very best care?"

ensures

"How do I ask someone to help save



Clinical manager BARBARA MILLER knows how challenging the search for a transplant is for her patients. Eventually, she became a kidney donor herself. "How do we gain greater recognition for nursing care?"



Every day, OUR NURSES make a significant contribution to the well-being of our patients. We are very proud of these achievements and regularly show our appreciation on "International Nurses Day".



HorOUT Patients

We always put our patients first. We develop high-quality dialysis products and services for one single purpose: to continuously improve treatment for people with kidney disease and enhance their quality of life.

An important prerequisite for this is listening. Because we want to be able to give considered responses to all the important questions our patients ask us. Together we focus on **WHAT REALLY MATTERS.**

04

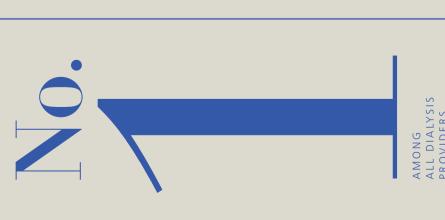
WHAT REALLY

THE COMES FIRST

Fresenius Medical Care is the world's leading provider of dialysis products and services. We care for people with chronic kidney failure, of whom around 3.5 million worldwide depend on dialysis treatment. Thanks to our decades of experience in dialysis, our innovative research and our value-based care approach, we can help them to enjoy the very best quality of life.

We care for more than 345,000 dialysis patients. Their well-being always comes first. Our top priority is to offer them the best possible treatment. To this end, our portfolio encompasses a comprehensive range of high-quality health care products and services as well as various dialysis treatment options for both in-center and home dialysis that are individually tailored to our patients' needs.





HONG KONG, CN BAD HOMBURG, DE RIO DE JANEIRO, BR WALTHAM, U.S.



in charge

to pursue a full and busy life that revolves

around his personal schedule, and not around

still active and mobile. He runs his own com-

the boards of several community organizations.

indeed be good if you are determined to stay

treatment. The 63-year-old entrepreneur is

pany, travels to conferences, and serves on

His aim is to spread the word that life can

in charge.

Home dialysis allows Anvil Nelson Jr.

Nelson lives in Nashville, Tennessee, and commutes about two-and-a-half-hours to his company in Chattanooga.

Anvil Nelson Jr. is a man in perpetual motion. The 63-year-old runs his own chemical manufacturing company in the city of Chattanooga, a two-and-a-half-hour commute from his hometown of Nashville, Tennessee. He is a member of the board of the local Nashville rescue mission, which provides food, lodging, and training for people in need. He also sits on the board of the Tennessee Kidney Foundation that offers screenings, education, and help with transportation for patients with renal disease.

What is more, Nelson has held a leader-ship role at his local church for more than two decades. He also officiates at track and field competitions for state tournaments and at college meets. Last but not least, Nelson wants to spend quality time with his wife and two grown children who live nearby. After ticking off that comprehensive list, he concludes with a chuckle: "I have a pretty busy life. My family actually thinks I'm too busy."



Always by his side: Nelson could not live a full life and run his own business without his wife Deneice as his dedicated care partner. Nelson is very committed locally and is a member of several boards in his hometown Nashville.

So busy, in fact, that Nelson admits he almost left out one crucial detail that has

So busy, in fact, that Nelson admits he almost left out one crucial detail that has become part of his weekly routine. Since losing both kidneys to tumors, he has to undergo dialysis and uses a portable home hemodialysis machine by NxStage from Fresenius Medical Care, to filter his blood. "Dialysis has changed my life, for sure, but not my outlook on life and my ability to stay mobile. I wouldn't even know I was ill if I didn't have to take a pause, sit down and do dialysis several times a week," he says.

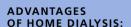
It is this message of optimism and empowerment that Nelson wants to spread far and wide to encourage and motivate other dialysis patients to research their best treatment options, so they can stay as independent and active as possible. "Some people feel like their life is over when they start dialysis, but not me!" he says. "I've found that it's really just a matter of making a mental adjustment to be able to keep on living your life and stay mobile. That's a blessing."

TECHNOLOGY IS KEY.

NXSTAGE ACQUISITION GIVES OUR PATIENTS MORE TREATMENT OPTIONS

NxStage Medical is one of the newest members of the Fresenius Medical Care family; the acquisition was closed in February 2019. Founded in 1998, NxStage is based in the Boston, Massachusetts area. It develops, produces, and markets a portfolio of medical devices for use in home dialysis and critical care settings.

The acquisition gives renal patients more options to keep their independence and enjoy a better quality of life through home dialysis. As such, NxStage joining forces with Fresenius Medical Care is an important milestone in enhancing patients' choice of their preferred dialysis treatment options. It also enables Fresenius Medical Care to leverage its manufacturing, supply chain, and marketing competencies across the dialysis products, services and Care Coordination businesses in a less labor- and capital-intensive care

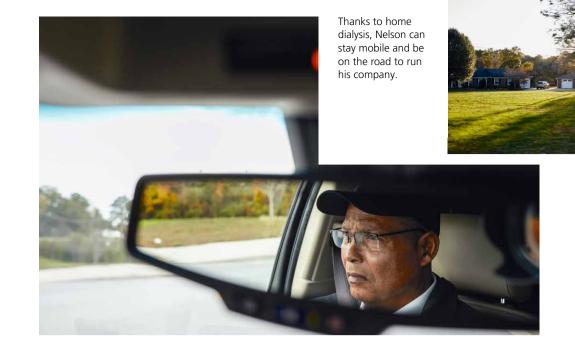


Therapy in a familiar environment

High flexibility due to freely selectable treatment times

Time savings by avoiding trips to and from a dialysis center

Dialysis is easier to integrate into everyday life



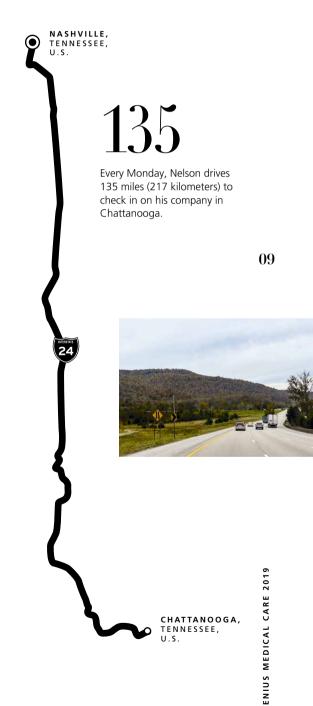
This can-do attitude has been a hallmark of Nelson's journey as a dialysis patient for the last two decades. Back in 2003, he was diagnosed with a non-malignant tumor on his right kidney and had it removed. During his regular follow-up visits with his nephrologist, it became apparent that the function of his remaining left kidney was gradually decreasing. It reached a critical point in the summer of 2017, prompting Nelson to put his name on the national kidney transplant waiting list to find a donor organ.

During a check-up in the summer of 2017 his physician discovered two malignant tumors on his left kidney. "Over the past 14 years, I had kept my appointments with the doctor four times a year, but I hadn't faced any major changes to my lifestyle. Even when I got the news that the cancer had got hold of my other kidney, it just made me want to get proactive," Nelson recalls. "I told the doctor right there and then, 'Let's rip the cancer out as quickly as possible.' Dialysis would change my life, but beating cancer was the bigger challenge."

LOOKING FOR THE BEST OPTION

While he was still recovering from surgery, Nelson was already devising a plan to get his life back on track. Initially, he had to travel to a dialysis center three times a week for his treatment. "It was very rigorous, because you had to schedule it and stay there for a few hours. I booked my treatments for 5 a.m. on Mondays, Wednesdays and Fridays, so I could use the rest of the day, but that meant getting up around 4 o'clock in the morning to drive there." In spite of his original expectations, Nelson found that the treatment schedule interfered too much with his many other obligations. "After getting treatment, you need time to recover. Often, I couldn't even manage to drive to work in Chattanooga on Mondays after dialysis because I had to rest."

So, Nelson told his doctor he needed to explore his options. "I wanted to keep on living my life and not be tied to a center. That's why I initially considered peritoneal dialysis as it was the only way I could continue working as usual."



With peritoneal dialysis, the body's abdominal lining, or peritoneum, is used to filter the blood inside the body. The treatment is administered by patients themselves at home or at work several times a day or automatically during the night. That treatment method appealed to Nelson, he recalls, because it promised him maximum independence and freedom of movement, even though it meant undergoing dialysis seven days a week. "But then," he adds, "I heard about home hemodialysis!"

Nelson found the System One home dialysis machine made by NxStage from Fresenius Medical Care and watched tutorials showing how it worked. "It was an amazing discovery, and I wanted to find out even more." Shortly afterwards, he was sitting in his treatment chair at the local center, when his phone rang. It was an expert from the NxStage team, and Nelson ended up talking to her for an hour and peppering her with detailed guestions. "I decided to go for it and asked my doctor to sign me up for the required training sessions right away."

JOURNEY

ANVIL'S

2003

Right kidney removed hecause of

SUMMER OF 2017 Remaining kidney removed due to kidney

SUMMER

OF 2017 dialysis clinic three times a week

FALL OF 2017

FALL OF 2017

Home dialysis with the System One home nemodialysis machine made by NxStage from Fresenius Medical Care at home or on the road

2019 Training for solo home **O** dialysis

Within a week and because his wife provided him with ongoing and passionate support, Nelson was able to start his training on how to use the System One. This involved instruction by experts at a dialysis center, followed by supervised use. Very quickly, he felt comfortable enough to prepare and connect the machine by himself.

"I told the nurse to watch and only to step in if I messed up. I'm a take-charge kind of guy, so if somebody has to stick needles in me, I might as well do it myself."

Shortly after starting the new treatment, Nelson was able to plan his dialysis treatment schedule by himself. "It gives me a lot of flexibility. I usually choose to do treatment in the afternoon or early evening after work. That means I don't have to dress up and leave the house."

DIALYSIS HAS CHANGED MY LIFE, FOR SURE, BUT NOT MY OUTLOOK ON LIFE AND MY ABILITY TO STAY MOBILE."

Always active,

with social and

professional engagements.

always on the go:

Nelson keeps busy

Home hemodialysis patient



REALLY

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Nelson's wife Deneice or one of his children always try to make time to be available as his care partner – a routine the family has maintained even as Nelson has continued tending to affairs at his company in Chattanooga. On Mondays, he drives to Chattanooga to be on-site at his company and is joined by his wife the next day at the apartment he rents there. "She is always there for me, gets the machine ready and makes us something to eat while I finish up work." As a result of the home dialysis training, his wife has also adjusted her schedule to make time as his care partner. That means preparing the machine on Thursdays and Fridays when he is back at home in Nashville. "I don't want to make it sound too rosy," Nelson says, "but home dialysis is a great opportunity. I can really get on with my life, run my business, and even travel."

When Nelson is on the road, he sometimes has the supplies shipped to the hotel where he is staying and just brings the machine with him. "It makes me feel like I'm in charge of things and gives me back some precious time with my family." Like spending Thanksgiving with his brother who lives six hours away in Illinois.

> Resting at home for treatment means spending time with his dog or reading up on emails.





SYSTEM ONE

System One by NxStage from Fresenius Medical Care is the first portable hemodialysis system cleared for home use in the U.S., including solo home dialysis during waking hours, and nocturnal hemodialysis while both the patient and care partner sleep. It has been specifically designed for patients to use in their homes, and is small enough to allow patients to travel and bring their treatment supplies with them.



Anvil Nelson Jr.

Tennessee, u.s.



A strong family is the best support network: Nelson at home in Nashville with his wife and two grown children.

In the fall of 2017, not long after his surgery, Nelson drove up to his brother's home on a Wednesday and almost had to leave the next day, right after the traditional turkey dinner, in order to be home in time for his 5 am appointment on Friday morning. But fortunately, he was able to complete his training with the System One device shortly beforehand and could stay as long as he wanted. "Now I can just go and see him whenever I want," he says with palpable joy in his voice.

HOME DIALYSIS IN THE LONG TERM

Many experts agree that home dialysis can provide better outcomes for patients and therefore could be the best treatment option for many patients. In reality, however, only about 12 percent of patients worldwide currently receive home dialysis. Fresenius Medical Care has pledged to significantly increase the percentage of patients choosing home therapies and announced in North America a record growth in home dialysis in the six months since the acquisition of NxStage. The shift is part of a larger transformation in care for chronically ill people.

YOUR FAMILY'S SUPPORT IS THE MOST IMPORTANT THING YOU CAN HAVE AS A PATIENT."

Anvil Nelson Jr. Home hemodialysis patient Tennessee, u.s.

Nelson has already planned his next move. He wants to receive additional training so that he can perform his home dialysis all by himself. There will still be safeguards in place, of course. The machine offers remote monitoring and the option to call a hotline with any questions. It also comes with an app and troubleshoot error codes to look up on a smartphone or tablet.

Yet in the end, Nelson admits, he cherishes the time he can spend with his children or his wife by his side while the portable device does its work. It is a welcome breather in his busy schedule. "Your family's support is the most important thing you can have as a patient. But I don't see why they should put their life on hold for me just in case I need them."





4.3 mg/dl 64 How can we offer our patients

the best possible
treatment?"

> Medical Care established the Global Medical Office to enhance the Company's activities in the area of patient-focused care. This milestone on the path to transforming health care worldwide based on our vertically integrated business model.

In March 2019, Fresenius global function marks an important Len Usvyat

Applied Advanced Analytics Fresenius Medical Care



Whenever Len Usvyat visits a dialysis

clinic staff, he also sees data. The

can positively impact," says Usvyat.

clinic, he does not just see patients and

Usvyat heads a diverse team of epidemiologists, computer scientists, engineers, and pharmacologists at Fresenius Medical Care. "The role of my team is to introduce innovative, for patterns in our data that we can translate into useful and practicable insights for medical staff." Big data describe and predict the course of for the better. The experts describe these three different approaches as

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5.3 ml/min

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677 na/ml

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- 701

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4.3 mg/dl

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- 701

88 ml

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STRENGTH BASED

ON GLOBAL EXPERTISE.

INNOVATIVE

data-based solutions to every corner of our organization," he says. "We search specialists use computer algorithms to kidney disease and change its direction descriptive, predictive and prescriptive analyses.

4.3 ma

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Usvyat's team can draw on a vast pool of data: Fresenius Medical Care has access to data worldwide from more than 1.9 million dialysis patients, 1.7 billion laboratory tests and 500 million completed dialysis treatments. However, the data scientists analyze not only traditional health care data, but also plenty of other information, such as weather forecasts, demographic data and traffic data. "It may not seem so at first, but all of this data can be valuable for us," says Usvyat. The computers scour the sprawling data sets for recurring patterns, striking discrepancies or previously

BETTER THERAPEUTIC OUT-**COMES FOR PATIENTS**

unknown correlations.

450 ml/min

Usvyat becomes almost elated when he talks about the many ways these medical data can be applied: "In the future, we will be able to treat kidney disease even more efficiently, individually, and precisely," he says with confidence.

500

9.3%

88 ml

"We will see the emergence of smart treatments tailored to patients' indivi-"It will be possible to develop customized treatments using not only existing data from clinical examinations, but also valuable real-time information from fitness trackers, dialysis machines,

Even today, Usvyat's team routinely analyzes hundreds of data points to predict which patients are likely to need hospital treatment and which have a heightened risk of infection. Avoiding these events leads to an improvement in therapeutic outcomes and quality of life for patients, which is also beneficial for health care systems. But the data are not only useful for clinical forecasts, they also help in organizational matters: For example, traffic data can be used to improve route planning for clinic or home visits to patients, and the data analysts can use weather data to identify patients who are unlikely to attend their next dialysis appointment on account of adverse weather conditions in their area. Data on a patient's living situation can also be used to establish whether home dialysis might be a reasonable treatment option for them.

WE SEARCH FOR PATTERNS IN OUR DATA THAT WE CAN AND PRACTI-CABLE INSIGHTS FOR MEDICAL STAFF."

Len Usvyat Vice President Applied Advanced Analytics

Fresenius Medical Care

dual needs and characteristics," he adds. as well as other devices."

GLOBAL MEDICAL **OFFICE**

Fresenius Medical Care established the Global Medical Office in March 2019 to enhance cooperation and exchange medical knowledge throughout the Company and thus achieve high-quality outcomes for patients worldwide. By adding the Global Chief Medical Officer to the Management Board, Fresenius Medical Care is underlining its commitment to applying clinical science at an ever-higher

NEW OPPORTUNITIES THROUGH CLOSER **COLLABORATION**

So far, Usvyat's team has primarily worked with data from North America. But similar approaches are used in other regions, too, including Asia-Pacific and Europe, as well as other Fresenius Medical Care functions such as Global Research and Development and Global Manufacturing, Quality and Supply.

The Global Medical Office (дмо) was established to connect specialists and research projects around the world, with the aim of allowing experts to collaborate more closely across national borders, learn from each other, and in this way jointly drive clinical innovation and translate it into real practical applications. "This opens up promising new opportunities for us," Usvyat is convinced. His team is part of the GMO.

The GMO is headed by Franklin W. Maddux, MD, who has been Chief Medical Officer at Fresenius Medical Care North America for many years. He was appointed to the Management Board as Global Chief Medical Officer as of the beginning of 2020. The inclusion of this position in the Management Board highlights Fresenius Medical Care's understanding of medical science at a global level as a key factor for success. The gmo's field of activity goes far beyond the use of advanced analytics and big data in dialysis – for example, the experts also look at the healing potential of regenerative medicine and the clinical development of effective drugs for kidney patients. They intend to use the knowledge and experience gained from clinical research around the world more effectively. Ultimately, the aim is to achieve the best possible treatment outcome for the patient.

Fresenius Medical Care operates more than 3,990 dialysis clinics in around 50 countries. As the market leader, the Company manufactures one in every two dialysis machines worldwide. "Kidney disease is a global epidemic that is placing a burden on health care systems around the world," explains Maddux. "As a vertically integrated, globally active health care company, Fresenius Medical Care is ideally positioned to

HOW FRESENIUS MEDICAL CARE TRANSFORMS PATIENT CARE WORLDWIDE

Learn how scientific innovations driven by Fresenius Medical Care have transformed care for chronic kidney disease and other chronic diseases around the world, leading to better health outcomes and providing patients with a future worth living.

> In the early 1970s. dialysis took around twelve hours to perform and was very expensive due to the high outlays for materials and treatment itself. As a result, not all kidney patients had access to this life-saving therapy.



In 1983, the Company started producing synthetic polysulfone fiber membranes for blood purification. These membranes set the quality standard for dialyzers today.

The challenges of hemodiafiltration have encouraged us to continuously develop nnovative products that support the HighVolumeHDF therapy approach. This is currently considered one of the most efficient dialysis methods. HighVolumeHDF improves outcomes, leading to fewer cardiovascular complications and a reduced mortality risk. Thanks to our commitment to making HighVolumeHDF available to all patients, we now have an advanced and highly synergetic portfolio.





Through its acquisition of NxStage, O Fresenius Medical Care expanded its product portfolio for home hemodialysis with System One. Featuring innovative technology for home dialysis, it offers patients greater flexibility and more individual treatment. The acquisition underlines our efforts to promote home dialysis as the preferred treatment modality. In the past year, we already reported record growth in the number of patients receiving home dialysis in the u.s.

 In 2018, Fresenius Medical Care secured exclusive global rights to market the manufactured blood vessel Humacyl. In the future, these blood vessels, which are grown in a bioreactor from donated smooth muscle cells, could potentially offer hemodialysis natients a safe and more durable vascular



We made a major strategic investment in RightelliSense a u.s.-based company that is developing a medical grade data services platform for continuous health monitoring, predictive analytics and algorithmic clinical insights. The investment supports our goal to improve monitoring. interventions and outcomes for patients living with kidney disease and other chronic illnesses



Fresenius Medical Care continued to improve clinical quality as measured by the u.s. government's Five-Star Rating System in 2019: More than 94 percent of our dialysis centers were rated three stars and above for quality of patient care. In addition, the Company has the highest percentage and number of clinics rated with four and five stars to date



The U.S. Food and Drug Administration has granted breakthrough device designation to a new hemodialysis system, currently in development, that aims to prevent blood clotting without the use of blood thinning medication in most natients. As blood thinners can have dangerous side effects, an antithrombogenic additive. Endexo, is being incorporated into the manufacturing process of dialyzers and bloodlines.

The trend towards coordinated and holistic patient care is gaining traction in more and more countries around the world: Over 500 pilot programs have already been launched globally aimed at evaluating the potential of integrated health care models. This confirms our strategy of systematically optimizing our range of products and services in the area of value-based care.

leverage and further develop the opportunities offered by interconnected data and innovative solutions worldwide."

The GMO team regularly publishes its key findings. In 2019, it also developed the first global framework that sets priorities for improving the quality and safety of patient care across regions. This constitutes a further step towards harmonizing and enhancing the quality of care worldwide for people with kidney disease in the long term.

However, global cooperation in the form of the GMO also presents challenges. "We have to work with widely diverse health care systems around the world," says Usvyat. "In terms of big data, this means above all a highly complex situation with regard to the availability of data," he adds. Health care data and demographic information are collected, structured, and organized differently in every region. Moreover, the team has to consider various legal requirements when working on cross-border projects.

BUT ONE THING IS **CERTAIN: IF** WE USE THE NEW TOOLS JUDICIOUSLY, WE CAN IM-PROVE OUR PATIENTS³ QUALITY OF LIFE WITH LASTING EFFECT."

Len Usvvat

Vice President Applied Advanced Analytics Fresenius Medical Care

ALGORITHMS AS A NATURAL PART OF HEALTH CARE

In addition, Usvyat is repeatedly confronted with controversial issues in the course of his work – such as the guestion whether computers will ever replace physicians and nurses. "Certainly not," asserts the data specialist. "We will always need human expertise to ensure that the computer's calculations make sense and are interpreted correctly." Even back when his team was developing its mathematical models, they worked in close cooperation with physicians and clinic staff in order to better understand their needs. "We want to help them and give them a tool that allows them to do their job even better than before," says Usvyat.

Usvyat believes that algorithms will become an increasingly natural part of health care in the future, and that we will gradually get used to that. But even he sees limits when it comes to the use of computer forecasts in everyday clinic life – like mortality calculations or correlations relating to gender or skin color, for example. "We need to be extremely cautious and sensitive when dealing with ethically relevant issues like these," says Usvyat. "But one thing is certain: If we use the new tools judiciously, we can improve our patients' quality of life with lasting effect."

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EALL





A miniature "kidney

(above).

artwork" for Ramos (left).

Satisfied patients regularly

stick post-its with thank-

you messages on the wall

Terrassa, just outside Barcelona, is a major industrial city with a population of more than 200,000, making it one of the biggest cities in Catalonia, Spain. Since 2014, it has also been home to a modern Fresenius Medical Care dialysis clinic with a focus on sustainability. The facility is partially solar-powered, and residual water is collected for watering the gardens. Bright rooms with names like "Sala Modernisme" play host to state-of-the-art dialysis technology and let patients enjoy a visually pleasing environment during their treatment.

Sala Modernisme

Getting information

Doctor App to view

a patient's current

values wherever

they are in the

clinic.

faster: Physicians

can use the new

Some of the walls are decorated in bright blue feature hand-painted scenes of the region and the city, giving the rooms a friendly, almost private atmosphere. Other walls are covered in heartshaped post-its with thank-you messages and selfies of patients and dialysis nurses. But probably the most interesting detail at the "Centro de Diálisis de Terrassa" right now is the object Dr. Yamilet Ramos is holding in her hand: a silver-colored tablet computer.

MAKING TREATMENT EASIER

The physician, who is originally from Cuba, is rarely seen without this particular accessory when she is out and about in the clinic. The tablet runs a piece of software that Ramos can no longer imagine being without: the "Doctor App", developed by Fresenius Medical Care. The app can make it considerably easier for physicians to treat dialysis patients.

HOW DO YOU SUPPORT THE TREATMENT OF **DIALYSIS PATIENTS AS** A PHYSICIAN?

DR. RAMOS: Dialysis treatment is a special time for patients, and they often feel a strong need to talk to a physician about it. When patients first arrive at the clinic, I find out how they are feeling before treatment them again. Another important aspect is that I need to be on the spot immediately in the event of any problems with dialysis.

DR. RAMOS: When a lem during treatment, like times have only very little time in which to make a decision that could be a matter of life or death.

HOW DOES THE APP HELP YOU TO MAKE THE RIGHT DECISION IN A **SITUATION LIKE THIS?**

DR. RAMOS: I used to have to go to my office to check the patient's values on a computer before coming back again. Obviously, that all takes time. The tablet and the app mean I have all of the necessary parameters at hand and can act immediately.

HAS THE APP CHANGED YOUR DAY-TO-DAY WORK A GREAT DEAL?

DR. RAMOS: Yes, the app is fantastic. As much as anything, it changes the way I can deal with individual patients. It means I have more time for them when doing my rounds. I can go into their cases in greater detail and answer their questions right away. All in all, the app gives me more scope for adjusting patients' treatment to reflect their individual needs. In my view, technology makes the physician-patient relationship more personal.

"The app gives me more time for patients and is a great help in my work," says Ramos. Digital specialists from Fresenius Medical Care have spent the last two years developing it and have put it to the test at 30 dialysis clinics in Spain. It allows physicians at the clinic to access the data and current values of each and every patient in real time. This alone is a great bonus for Ramos, as it allows her to give patients advice and information, and tailor their treatment individually from any location. "Otherwise I would have to go to my office or use the nursing staff's computer to take a look at the current values."

for Fresenius Medical Care since 2009, has all of the information at her fingertips. As well as saving time and effort, this can be vital when it comes to acute complications. "If I already have all of the latest data at my disposal when I am at a patient's bedside, this means I can make guicker and better decisions to deal with acute problems

or, in extreme circumstances, even save their life," explains

ALGORITHMS HELP PHYSICIANS

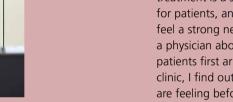
Ramos.

The Doctor App also has a second, even more far-reaching purpose: It is equipped with artificial intelligence (AI) that assists physicians in making important decisions. For decades, AI was something that belonged more in the realm of science fiction.

But there has been huge progress in this area in the past decade or so. Data specialists have succeeded in developing self-learning systems, i.e., systems that learn new skills autonomously providing they are fed sufficient quantities of corresponding data.



REALLY



begins. After dialysis, I check their values and try to talk to

HOW MUCH TIME DO YOU HAVE TO MAKE A DECISION IN SUCH CASES?

patient has an acute proban allergic reaction, I some-

24

Known as machine learning, this technology has triggered a revolution in research and has long become part of everyday life. Whenever your navigation software suggests the quickest route or your smartphone tries to understand a voice command, this is thanks to AI.

One example of the possibilities offered by AI is the so-called anemia algorithm, which can be used to treat renal anemia during hemodialysis. It is not always easy for physicians to determine whether patients in this case should be given iron alone, or with erythropoietin – i.e., stimulating substances that boost the production of red blood cells – and what the exact dosage should be. The algorithm can support this decision. Niklas Best, Director Digital Ecosystem at Fresenius Medical Care, explains the importance of these digital decision aids: "We are talking about algorithms that can evaluate a number of parameters that a human would find almost impossible to juggle in their head."

A WEALTH OF AVAILABLE DATA

Best was involved in the development of the Doctor App right from the start. "Our original aim was to make the anemia algorithm available to physicians in a usable form," the digital expert says. But during the development process, his team realized there were many more things the app could offer in terms of making life easier for

> nephrologists. And so the Doctor App became a comprehensive application that uses all of the important parameters to help physicians make the right treatment decisions at the patient's bedside.

The data for the Doctor App is supplied by the EuCliD system, a technical database used by Fresenius Medical Care to help nephrology institutions continuously ensure and improve the quality of their treatment. The system – which is consequently a technological requirement for the app – collects and evaluates defined indicators. "A long

time ago, Fresenius Medical Care took the strategic decision to build this system within the Care Value e-services department. The result is an incredible wealth of data that we can use to our benefit," Best explains. The Fresenius Medical Care AI Group in the EMEA region uses the EuCliD data to train algorithms. "You could even say that we are among the world leaders when it comes to the use of AI in dialysis. We can certainly compare with software groups in Silicon Valley," Best adds.

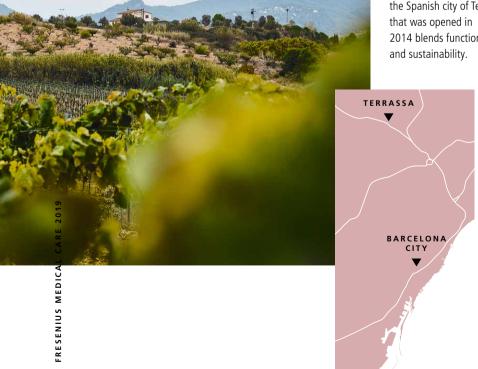
spectives for treating patients. The innovations associated with it help to improve the effectiveness of medical treatment, giving physicians better information for making decisions, and patients more information about their treatment.

Digitization opens up entirely new per-



CENTRO DĪÁLISIS **TĒRRASSA**

It generates solar energy, recycles the gray water that accrues and boasts 30 state-of-the-art dialysis units: The dialysis center in the Spanish city of Terrassa that was opened in 2014 blends functionality and sustainability.



A CLOSER

LOOK AT OUR DIGITAL **INNOVATIONS:** TAILORED TO OUR RANGE

OF TREATMENT **OPTIONS**



"MY COMPANION" PATIENT APP

The app gives patients at Fresenius Medical Care clinics an overview of their treatment as well as the drugs prescribed to them and their lab results.



"THEHUR" CONNECTED HEALTH **PLATFORM**

The platform allows patients, care teams and physicians to better collaborate and monitor patient treatments. This supports our efforts to accelerate the introduction of home treatments while ensuring that our patients remain in close contact with their care teams.



"DOCTOR APP" FOR NEPHROLOGISTS

The app integrates all of the important parameters for dialysis treatment, allowing our physicians to adjust treatment individually and giving them more time for their patients.

The Doctor App on a tablet makes existing data portable. Clinicians can immediately see all the important parameters and answer questions or solve problems at the patient's bedside, giving them more time for their patients.



WE ARE IN THE PROCESS OF DEVELOPING TOOLS AND **SERVICES TO** PATIENT GROUPS WITH CHRONIC KIDNEY FAILURE."

Niklas Best

Director Digital Ecosystem Fresenius Medical Care

DOCTOR APP

The application developed by Fresenius Medical Care runs on a tablet computer that physicians can carry with them on their rounds in the clinic. The app contains all ongoing treatments at any point in time and a list of patients. All of a dialysis patient's important parameters are clearly visible so that physicians can assess them quickly and make adjustments to medication at the patient's bedside. Critical values are also displayed. At helps physicians when making difficult treatment decisions.



"The Doctor App is a core element of our digital strategy," Best continues, "but many other kinds of other digital applications are conceivable or already available. For example, we are in the process of developing tools and services to support all patient groups with chronic kidney failure, whether they receive dialysis at home or in a clinic." The "My Companion" smartphone app allows dialysis patients at Fresenius Medical Care clinics to access their current treatment data, such as lab results or drug information. It also helps patients with their treatment and with adapting their lifestyle.

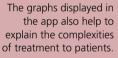
Another area for future developments is support for home dialysis patients. Telemonitoring is the keyword: The connected health platform "TheHub" by Fresenius Medical Care North America offers physicians real-time access to medical records from their device of choice and enables home therapy nurses to better care for their patients. Through daily monitoring and clinical decision support, the care team can catch potential issues earlier and intervene, giving home patients more confidence and personalized support.

INITIAL SKEPTICISM QUICKLY DISSIPATED

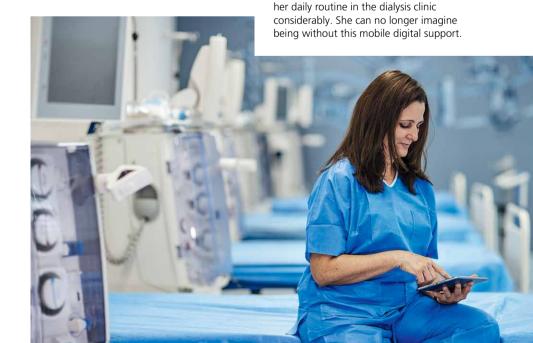
The use of digital technologies will alter the interactions between technology, physicians and patients in some areas. Physicians will have more time to spend on patient contact. And patients will be given more information and be more involved in their own treatment. Of course, new technologies are always eved with suspicion at first. "But the initial skepticism toward the Doctor App quickly dissipated during the test phase. By the end, we were even getting exuberant responses when we turned up at the clinic," Best reports.

Most physicians involved in the roll-out in Spain are now just as enthusiastic about the app as Ramos. Best has no doubt that the app has made work a lot easier for physicians: "Many have noticed that they can finally do what made them want to become a physician in the first place – namely treating patients." He believes that digitization will continue to find its way into medical technology. "In the future, almost every medical decision will be taken with the aid of algorithms, simply because the risk is too great otherwise," Best is convinced. "This is just the beginning," he predicts.









Ramos claims that the new app has changed



Artificial intelligence allows machines to perform certain cognitive tasks just as well as a human being. Machine learning based on large amounts of data has made enormous progress in the past ten years.

PITÄJÄNMÄKI

NEW DIALYSIS CENTERS



Mo ensures I get the ibest care?

Sirkka-Liisa Alén

Dialysis patient from Helsinki,

Fresenius Medical Care opened two dialysis centers in the Helsinki hospital district in the Finnish capital in 2019. It is a rare occurrence in the Nordic country's health care system for a private company to run a center. This is a big step forward for our small Finnish branch. A triumph of teamwork and patience.

around 2,000 need regular dialysis treatment



bed 31 – it is always the same one – and waits for a nurse to connect her to the dialysis machine. A tablet computer is attached to a little table in front of her. "I always watch the morning show on TV," says Alén. "They broadcast reports from all over the country." Having lived and worked in many towns in Finland, she takes an active interest in what is happening everywhere. Having reached old age, however, Alén

dialysis clinic.

decided to move back to her home city of Helsinki. At 92, she is one of the oldest patients at the Pitäjänmäki dialysis center, which opened just recently in spring 2019. "The treatment here is good, but afterwards, I feel exhausted," she admits. Does she find that dialysis puts a big strain on her? She has to think for a while before answering, clearly not wanting to simply say yes. "Well, I'm the eldest of three sisters, and compared to the other two I'm still in the best health," is her eventual reply.

Sirkka-Liisa Alén has experienced a lot in her life. After a teaching career, she went on to hold several positions in the health care sector. But that was a long

time ago. The 92-year-old has been retired for over three decades now. For the past two and a half years, she has

relied on dialysis treatment. That is why she makes the journey herself by taxi to the Pitäjänmäki dialysis center in Helsinki several times a week, says hello to the dialysis nurses, and sets about getting

Then she makes herself comfortable on

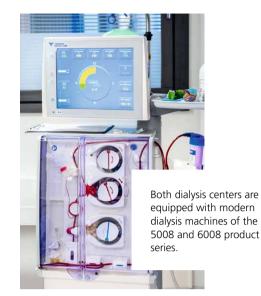
her own treatment ready.

I'M THE ELDEST OF THREE SISTERS, AND COMPARED TO THE OTHER TWO I'M STILL IN THE BEST HEALTH."

Sirkka-Liisa Alén

Dialysis patient from Helsinki, Finland





FINLAND'S DIALYSIS MARKET

9.2%

percentage of gross domestic product

Dialysis market

RESENIUS MEDICAL CARE 2019

A HEALTH CARE SYSTEM FACING NEW CHALLENGES

Alén is not one to complain. She still lives alone and leads an independent life. Her family is a very important part of it. One of her sisters lives a stone's throw away from her home. "On the days when I go to the center for my dialysis session, she cooks for me and we meet up for lunch." Until a few years ago, she was a passionate traveler. One of her two granddaughters lives in Melbourne, Australia. "I've been to Australia four times, and to New Zealand once," she recalls. Even now, she loves being outdoors in nature and going on walks in the forest.

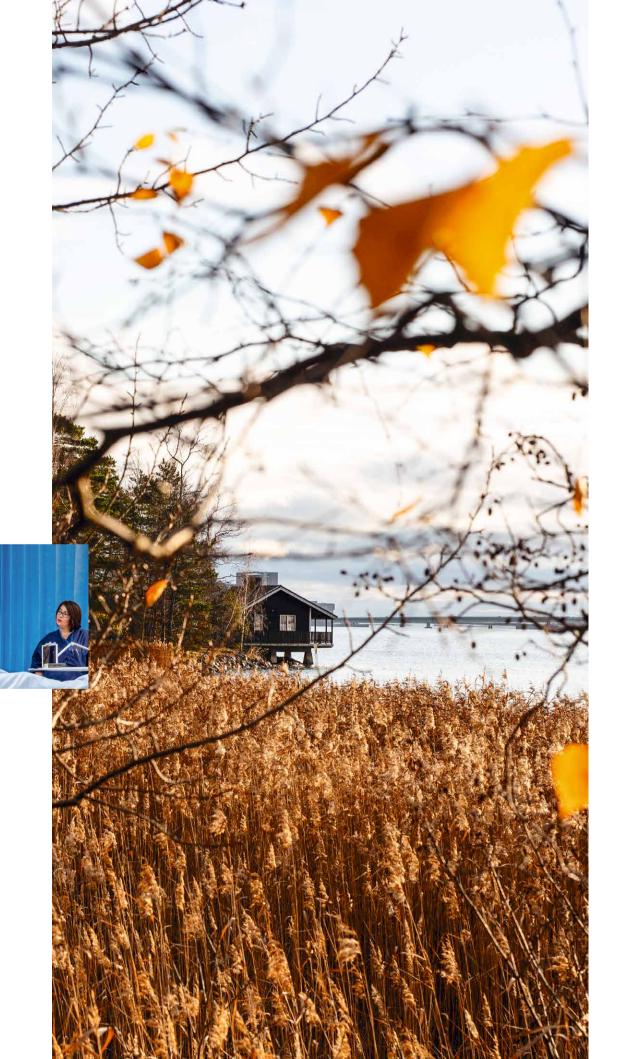
Today, Alén has to spend around four hours at the center. A dialysis nurse stays in the room throughout, and is on hand for patients if they want anything or need help. Whenever the 92-year-old is there, Sirkku Sayeed-Väisänen comes to her bedside to see her. They both look forward to having the chance to talk to each other for a while. However, Sayeed-Väisänen does not have time to stay for long. As Head Nurse, she has responsibility for the whole center.

Anyone who lives in a vast country almost all of which is very sparsely populated and has to put up with long, dark winters is probably likely to develop a completely distinct way of life that focuses above all on independence, responsibility and discipline. These characteristics are also the cornerstones of Finland's health care system. Nurses here are generally entrusted with more responsibility than is common in other countries. But access to health care services is also much more strictly regulated. The result is a relatively efficient health care system with a sound cost structure.



In her work as Head Nurse, Sirkku Sayeed-Väisänen fosters the personal relationship with her patients as often as possible.

Finland is regarded as a role model within Europe in many areas of society. One example is education, where the country has attracted attention due to its excellent results in performance comparisons such as the PISA test. The Finnish health care system is held in similarly high esteem. For many years, European health care experts headed northwards to find out why it is so efficient. They, too, returned with the message that the country on the northeastern edge of the European Union is a prosperous country, a role model, a modern society that also stands out due to the fact that it embraces technological advances.



For some time, however, it has become apparent that the future is not as rosy as it would at first seem: Finland is the fastest-aging society in Europe. The birth rate is in constant decline, while people are getting ever older – the demographic gap is widening here as it is in many industrialized nations. Yet this development threatens to hit the nation of 5.5 million people in northeast Europe especially hard.

Dark clouds are gathering over the Finnish health care system and its hitherto impeccable cost structure. Only around 9.2 percent of gross domestic product was channeled into the health care system in 2018 – too little to be able to cope with the many challenges ahead. By way of comparison, the figure for Germany is around 12 percent.

Finland is divided into 20 hospital districts. The Hospital District of Helsinki and Uusimaa covers a population of about 1.7 million inhabitants.



REALL

Nearly all services are performed in Finland by government institutions that are concentrated in health centers and clinics. Privately run facilities such as the Fresenius Medical Care centers are very much the exception. "Our two dialysis centers in Helsinki are actually the only private facilities of their kind in Finland," says Minna Väänänen, Sales Director of Fresenius Medical Care Finland.

FROM PRODUCT SUPPLIER TO INNOVATION DRIVER

The 24-strong team at the Finnish branch was therefore all the more proud to be awarded the contract for the two dialysis centers in 2018 by the Hospital District of Helsinki and Uusimaa (Hus), one of the largest administrative entities in the Finnish health care system.

OURTWO DIALYSIS CLINICS IN HELSINKI ARE ACTUALLY THE ONLY PRIVATE FACILITIES OF THEIR KIND IN FINLAND."

Minna Väänänen Sales Director Fresenius Medical Care



Minna Väänänen is also the responsible pharmacist at Fresenius Medical Care Finland. She started her career in her family's own pharmacy.

"This success story goes back ten years," Väänänen explains. "At the time, we had built up a totally new, multidisciplinary team," recalls the Sales Director. She is practically a living embodiment of the new culture of diversity at Fresenius Medical Care Finland, having studied several subjects including pharmacy and health economics.

Maria Stenborg also came on board back then as part of the medical management team. The nephrologist contributes her medical expertise to turn employees in both product sales and patient care into experts in their field by teaching them specialist medical knowledge. "Our employees are often the first to bring the latest findings and innovative products into hospitals," says Stenborg.

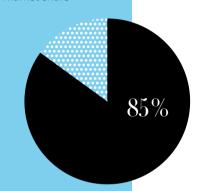
This has helped to gradually shape the Company's image as an innovation driver in Finland. In the meantime, Fresenius Medical Care is no longer regarded as just a supplier of machines and materials, but is considered a partner when it comes to improving dialysis care in Finland. "I would say that our joint efforts in the last ten years were instrumental in winning the contract for the two centers," says Stenborg. "The Hus even counted on us opening the two facilities within just six months," adds Väänänen. "We have no benchmark in Finland for how long it usually takes to complete a job of this kind, but we managed it – thanks to the exceptional performance of the entire team."

There is a great emphasis on teamwork at Fresenius Medical Care in Helsinki. Finding suitable premises in a specified area, converting them, and fitting out the resulting center with clinical equipment, all in an extremely short timeframe, requires total commitment. Between winning the contract in September 2018 and opening the centers in April 2019, the team worked flat out to complete the project. One of the biggest challenges was finding sufficient clinic staff, because there is a significant lack of nurses in Finland. Yet this target was achieved, too.

FRESENIUS **MEDICAL CARE** FINLAND IN FIGURES:

Established: 1995 Employees: 24

Acute product market share



product market share

PD product 42% market share

Fresenius Medical Care Finland provides hemodialysis treatment for nearly 200 patients.



The inauguration of both centers demonstrates that Fresenius Medical Care has gained a reputation as a highly reliable player in the Finnish health care system. "We are the only private center operator," Väänänen explains. "We currently stand at more than 60 percent in hemodialysis in the product sector, and at around 80 percent in the acute sector." This means that the Company has successfully made the leap from product to service business.

HOME DIALYSIS TO CONTINUE TO GROW

This provides us with a solid foundation for the future – one in which the Finnish health care system will have to be reformed in order to meet its challenges. The two centers are also a showcase in this respect, "As a way of demonstrating just what we can do," says Stenborg. "We share new information, and train nurses and physicians." One of the main goals is to help patients take more responsibility for their health. "This is an important issue here in Finland," acknowledges the nephrologist. "Medical services should be used only when it is absolutely necessary."

Fresenius Medical Care's efforts in Finland are intended to show that private health care services do not necessarily have to be more expensive than stateprovided ones, and that they can be even better in terms of quality and performance.

This could be a real prospect for the future of Finnish health care. As growing numbers of people are moving from the countryside to urban agglomerations, and the aging population is taking its toll on the health care system, there is also an urgent need to find new kinds of treatment, also in the area of dialysis. The proportion of home dialysis patients in Finland is already at around 30 percent today, and could grow even further in the future, especially if patients are given even better information and advice about their options.

Such a step is presumably not an option for Alén, who prefers coming to the center where she can find support and has the chance for a conversation with the dialysis nurses. Väänänen, Stenborg, and the other specialists at Fresenius Medical Care Finland are keeping a very close eye on developments in their home market. They believe they are well-equipped for the future. And they also know already how they plan to tackle further growth: with teamwork, of course.



EMPOWER-MENT PAVES THE WAY.

When her grandson Danny was born with kidney disease in January 2010, Barbara Miller's work offering professional, yet compassionate care as a nurse for renal patients at her dialysis clinic suddenly took on a deeply personal meaning. Her grandson required around-the-clock-care and spent the first five months of his life in a hospital before finally being allowed home.

The newborn's ordeal inspired Miller, clinical manager at the Fresenius Medical Care dialysis center in Parsippany, New Jersey, to volunteer to be a living donor for her newest family member. "Watching Danny struggle was definitely the catalyst," she remembers. After initial tests, it turned out that Miller's sister, who is ten years younger, was better suited to give a kidney to the infant.

Danny had to wait until September 2012 when he was almost three to receive the transplant. "The kidney worked immediately. He did really well, started crawling and talking - things he hadn't done before," the 63-year-old nurse recalls, still visibly moved. She composes herself and adds: "I still get choked up thinking about how incredible it was to watch this little guy, who had gone through so much, get better."

This experience and her almost two decades of working daily with renal patients inspired Miller to help others and become an altruistic donor for a stranger. In December 2013, she underwent surgery to donate a kidney to a mother of four she had never met



was born with kidney disease and required around-the-clock nursing care gave Barbara Miller a new perspective on the challenges of renal patients. After receiving a kidney transplant at age two, Danny has grown up to

be her pride and joy.

ney to a stranger in need.



before. "I wanted to give something back and share the good karma. People with dialysis struggle every day," she says. "It's not an easy life for them, even though they may not complain." Miller also knew from her work that most renal patients silently wish for a transplant but are often too shy or even embarrassed to ask family members or friends, for fear of being turned down. THE WAITING LIST KEEPS

GROWING

Miller's story shines a spotlight on the uncertainty and psychological burden that comes with waiting for a lifesaving transplant. There are close to 100,000 patients in the u.s. who need a kidney transplant, and every ten minutes another person is added to the waiting list. While an estimated 20,000 people received a kidney transplant in 2018, only about 6,400 of them came from a living donor. And, depending on where someone lives, they could be on the waiting list for an average of three to nine years. These statistics could be greatly improved if more patients were empowered and trained on how to ask, and more people were educated and inspired to donate.

WATCHING DANNY **STRUGGLE DEFINITELY** CATALYST."

Barbara Miller Clinical Manager Fresenius Medical Care



Passionate and committed: Barbara Miller has worked as a nurse for renal patients for two decades. She is currently clinical manager at the dialysis center in Parsippany, New Jersey.

The Fresenius Medical Care Foundation was created to help the patients, families, and communities most greatly impacted by kidney disease. Today, it is focused on raising awareness of kidney disease and transplantation as a life-saving solution. The Foundation has embarked on two partnerships to inform, educate, and attract potential kidney donors, and help patients to find a donor who can save their lives.

FASIER TESTING FOR POTENTIAL DONORS

The first grant provided by the Foundation went to Donate Life America (DLA), a U.S. nonprofit organization committed to increasing organ donation, to build the first national, universal living donor registry, which is scheduled to go live in the u.s. in 2020. The reqistry is intended to be a hub for anyone interested in becoming a living donor. As such, it would augment the procedure currently used by transplant centers and hospital networks around the country, which require potential donors to take the time to drive to a chosen location for initial consulta-

tion and tests.

With the Foundation's financial support, DLA will also create an easy-to-use home testing kit for potential living donors, which is expected to be released at the same time as the registry. Using a saliva sample similar to those already offered by ancestry research companies, the kit is designed to provide fast, consumer-friendly screening that will be distributed to patients for use by friends and family members. Once the test has been sent in, the results can be converted to a possible match efficiently and safely. The kit stands to greatly expand the pool of potential matches and cut the average wait time to receive a kidney. The kit and registry combined have the potential to double the number of living donors within a year, estimates Jessie Newman, Fresenius Medical Care North America's

Director of Community Relations.

DID YÖU KNOW:

100,000

in the u.s. are actively waiting for a kidney transplant and 4.600 die before a match is found

IWANTED TO GIVE SOMETHING **BACK AND**

SHARE THE GOOD KARMA."

Barbara Miller

Clinical Manager Fresenius Medical Care

> Of these. 6.400 are living donations. HUMAN ORGAN



YEARS

Depending on where you live, the average waiting time for a kidney in the u.s. is between three and nine years.

20,000

Every year, around 20,000 people in the u.s. get a transplant.

6,400

THE COURAGE TO ASK

But to really make an impact, a second approach is also needed: empowering patients and families by giving them the right tools, information, and a healthy dose of self-confidence so they can share their story and find an organ donor. "I didn't fully understand the barriers that patients faced when it comes to talking about their need for a kidney – even to a close friend," says Newman. To ease that psychological burden, the Foundation has partnered with the National Kidney Foundation to significantly expand its "THE BIG ASK -THE BIG GIVE" in-person training around the country.

Miller thinks this educational push for both patients and potential donors is long overdue. "A lot of people would give a kidney if they only knew about the need. Even my patients are often reluctant to discuss the topic with their own family members," she says, as she plays around in her yard with grandson Danny, who turned ten in 2020.

Better outreach and

double the number

education could

of living kidney

within a year.

donors in the u.s.



A proud grandmother: Miller poses with ten-yearold grandson Danny in the garden outside her home in New Jersey.

One regular dialysis patient at her clinic in New Jersey finally mustered the courage to ask his son for a kidney. "He said yes, and they are both doing amazingly well. These are the stories more people need to hear so they can decide to do good."

A LOT OF PEOPLE WOULD GIVE A KIDNEY IF THEY ONLY KNEW ABOUT THE NEED."

Barbara Miller Clinical Manager Fresenius Medical Care

FRESENIUS MEDICAL CARE



"THE BIG ASK – THE BIG GIVE" (BABG) is the National Kidney Foundation's free platform of programs, resources and support for kidney patients and their families. It helps them overcome their inhibitions to share their need with family, friends, and members of their community to find a living donor. BABG includes a fourhour, in-person training that teaches patients through seven strategies to tell their story and let people know how they can help. The National Kidney Foundation launched the BABG in-person training in 2018. Thanks to support from the Fresenius Medical Care Foundation, it was expanded to an additional 15 locations in the u.s. in 2019 and 2020.

Murses may not be angles, but they are the next best thing

非常感謝在這裡 幫我的姑娘

Every day starts with some experiences

But every day ends with some

Experience. Dur life south are

the carried loving very polite

the carried loving for what they

nurse. All the best for what are doing

"How do we gain

greater recognition for nursing care?"

you are so helpful, cariny and professional always. I feet secure and safe with you around. Thank you. Happy Newses Day From: Lan Woei anny

God search here and there to And the strongest women & Anally make them become nurses. All Staff good luck.
and nice people 多謝你悉心的 名四心 明 Your kirelness, attitude, look, touch and kinnery that TIETS 122 43 I ceep up the Good work

Every day, many thousands of nurses on all continents make a significant contribution to the well-being of patients being treated in Fresenius Medical Care clinics. On May 12, the birthday of Florence Nightingale, the founder of modern nursing care, nurses' commitment to society is honored around the world. Fresenius Medical Care organizes special activities on this International Nurses Day, for example in the Asia-Pacific region.

"They help me live my life to the fullest. If you think angel ore a myth, look again, there are among of us. - SAI -



Family Healthcare Hospital





Hong Kong NephroCare Tuen Mun REALLY



J. Llorente, MP Yap and Mendero

Fresenius Kidney Care

Guli Center

China

Hejiang K<mark>angchen</mark>g

getting involved with people outside of the daily routine, listening to them and responding to their problems and desires. While dialysis machines ensure patients' physical well-being, the contact with their trusted caregivers in the clinic is what gives them new strength on a psychological level. Nurses do all they can every day to make our vision become reality: Their knowledge, their experience and above all their commitment help to make a better life possible for people with kidney disease all over the world. Fresenius Medical Care is proud of these achievements and regularly shows its appreciation on International Nurses Day. A special highlight last year were the many messages of thanks from patients to their nurses, which were collected on posters in the clinics.

Being a nurse does not only mean preparing

and carrying out treatments. It also means





Malaysia Asia Renal Care

Petaling Jaya



Remininescene Simamora

Mardi Waluyo Dialysis Unit, Fresenius Medical Care Indonesia







We would like to thank our patients and

We would like to thank our patients and partners for their confidence in us and all employees for their dedication and commitment.

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