THE FUTURE OF DIALYSIS IS GREEN

Jürgen Kastl develops and coordinates projects dealing with ecologically sustainable dialysis at Fresenius Medical Care in Bad Homburg.

Professor Alfred Jacoby, architect and head of the Dessau Institute of Architecture, developed a concept for a “green” dialysis clinic based on sustainable construction principles.

As her regular occupation, Jitka Pancířová works as a quality manager at a clinic in Prague in the Czech Republic. She supports the “Go Green in Dialysis” initiative as a project manager on a voluntary basis.
Dialysis is a time-consuming and costly therapy. To treat one single patient over a period of several hours three times a week, dialysis clinics require large amounts of energy, water and disposable medical products. As a result, this vital measure for a growing number of patients is increasingly having a negative impact on the environment. Jürgen Kastl, an employee at Fresenius Medical Care in Bad Homburg, has therefore decided to take a new approach. Together with a team of partners, he has initiated a series of projects to open up sustainable and environmental friendly opportunities for dialysis.

Successful dialysis treatment is defined by values that measure the efficiency of treatment for individual patients: a Kt/V value of more than 1.2 points, a hemoglobin count of around twelve grams and phosphate levels of max. 5.5 mg/dL. On the other hand, an average hemodialysis session consumes an estimated 400 to 500 liters of water and ten kilowatt hours of electricity, and it produces up to three kilograms of medical waste. “In line with advances in both medicine and technology and the resulting legal requirements, the resources needed for dialysis have grown steadily over the last few decades,” explains Jürgen Kastl, project manager at NephroCare Coordination, Fresenius Medical Care’s dialysis services division for the EMEA (Europe, Middle East, Africa and Latin America) region. For example, a large part of the equipment used for dialysis, such as the dialysis tubing which carries the blood to the cleansing filter, can only be used once for reasons of safety. Successful dialysis treatment still takes approximately four hours and consumes water and electricity in corresponding amounts. “Nevertheless, the industry will have to consider seriously over the coming years how to guarantee high-quality treatment for patients while making the lowest possible impact on the environment.” As the number of patients with chronic kidney disease grows, so does the impact of treatment on the environment: Whereas in 1980 around 158,000 patients worldwide underwent dialysis treatment, the number had risen to more than two million in 2011. By the year 2020 this figure is expected to almost double again.

CHANGE BEGINS IN THE MIND
Fresenius Medical Care has been concerned with making its products and processes more environmentally friendly for many years. This has resulted in products and materials such as the recyclable and eco-certified Biofine foil and ongoing improvements in production processes aimed at increasing resource efficiency. The Company has also been expanding its environmental management in the clinical sector for a number of years. Not only its largest European production sites, but also more than half of its dialysis centers in Europe have since been awarded ISO 14001 certification, the international environmental management standard. Its clinics in Europe are also gradually introducing eco-controlling to collect environment-related data such as energy and water consumption as well as waste volumes.

However, as Kastl knows, the success of these initiatives depends on more than just the right standards and tools. “It calls for a real mind shift in the everyday running of the clinics. This affects everyone from dialysis specialists to doctors and clinic management.” The dialysis sector still has a long way to go in terms of environmental protection, especially at clinic level, compared with other areas of the healthcare industry. Kastl, who has been with Fresenius Medical Care for almost ten years, explains that this has a lot to do with the nature of dialysis: “It is a highly complex medical treatment process, on which the patient is permanently reliant for survival.” Doctors and nursing staff therefore justifiably give greater priority to safety and the quality of medical care given to the patient, as well as the many values and standards used to measure these two aspects. An additional factor is the decentralized structure of the dialysis clinics: As a rule, each center concentrates on its own business. There is still a general lack of awareness...
regarding the impact of the dialysis process as a whole on the environment and the role played by each individual center. This was confirmed in 2009 at an EDTNA/ERCA (European Dialysis and Transplant Nurses Association/European Renal Care Association) conference. “Back then we carried out a survey among some 900 conference delegates and established two things,” says Jürgen Kastl: “On the one hand, dialysis specialists are unable to adequately assess the actual resource requirements in their field of work. In the case of electricity, which is measured in abstract kilowatt hours, this was hardly surprising. However, one in three of interviewees indicated that they were not aware of the level of water consumption and medical waste per treatment. On the other hand, and this is good news, there is also a high level of interest in environmental protection and in making a personal commitment among clinic employees: Well over 90% of specialist dialysis staff, according to the survey, would support an environmental protection campaign in their clinic; considerably more than half see information campaigns as the best way to convince their colleagues of the need to protect the environment. This motivated us to do something to raise awareness of such an important issue, not just at Fresenius Medical Care but throughout the sector.”

**THE WAY TO “GREEN” DIALYSIS**

Together with EDTNA/ERCA, Kastl launched the “Go Green in Dialysis” campaign. A team of 15 specialists from the association and Fresenius Medical Care, including dialysis care experts, dialysis technicians, as well as quality and environmental management officers, developed a handbook on environmental management systems aimed at clinical staff. The handbook offers background information and practical advice on all aspects of the day-to-day running of a clinic that nursing staff, doctors and clinic management can influence by the way they behave — from purchasing electrical appliances, electronic equipment, auxiliary and cleaning materials and using them consciously to separating waste for recycling and using water more efficiently. For example, the handbook draws attention to new and particularly effective water preparation systems that make it possible to use up to 85% of drinking water fed into the system for dialysis, compared to the usual 40%. It recommends centralized production and clinic-wide distribution of dialysis concentrates with the help of special equipment, instead of using smaller plastic canisters for liquid concentrates, which end up as waste products and need to be transported to clinics, thus boosting CO₂ emissions. It also gives advice on taking small, simple steps, for example, clearly labeling waste containers, employing energy-saving LED lights and using cleaning and disinfectant products exactly according to instructions and therefore more efficiently. “These are all things which each and every employee in a dialysis center can do to protect the environment and which at the same time help to keep costs down — an equally urgent issue in view of the ever dwindling health budgets at present,” Kastl explains.

Another important message contained in the handbook is that, however great their commitment to the environment, staff must always put patients and their needs first. “We always make sure that the advice and suggestions we give comply with the relevant industry legislation and standards relating to quality and safety,” emphasizes Jitka Pancířová, project manager of “Go Green” for EDTNA/ERCA in a voluntary capacity. This can, of course, also lead to a conflict of goals. Take waste management, for example, where the maxim is “prevention before re-use, re-use before recycling and recycling before disposal.” “In dialysis, however, we cannot re-use many products because they come into contact with the patient’s blood, for example, and therefore cannot be recycled either safely from a medical standpoint or cost-effectively,” explains Pancířová, herself a trained dialysis nurse who now works as a quality manager at a clinic in Prague in the Czech Republic. “Nevertheless, it makes a world of difference if everyone acts prudently: For example, we can all ensure that household waste is not thrown away with infectious medical waste, making it necessary to incinerate it, which causes greenhouse gases. This is exactly what still happens regularly in the day-to-day running
The future of dialysis is green

Together with 15 specialists, Jürgen Kastl developed a handbook about environmental management for staff at dialysis centers.

“WE WANTED TO MOVE AWAY FROM A LARGE NUMBER OF GOOD INDIVIDUAL IDEAS TO A MORE HOLISTIC APPROACH.”

Jürgen Kastl
The large windows in the “green” dialysis clinic allow plenty of light and natural warmth into the rooms.

Jürgen Kastl is sure that each and every employee in a dialysis center can contribute to environmental protection and, in so doing, help to save costs.
Granumixplus machine to produce dialysis concentrate in the clinic: The prepared concentrate is transferred directly to the dedicated tank for storage. Thanks to this closed system, the concentrate stays clean and dust-free without spilling.

Solar cells on the roof of the CO₂-neutral dialysis clinic: The combination of renewable energy forms, a smart outer shell design and technologies for efficient energy recovery means that the clinic can cut down on as much carbon dioxide as it produces during dialysis, water preparation and other operations.
“IT IS POSSIBLE TO LOWER A CLINIC’S ENERGY AND WATER CONSUMPTION SIGNIFICANTLY SIMPLY BY RAISING AWARENESS AMONG EMPLOYEES.”

Would you support an environmental protection campaign in your dialysis unit?

a — No, I do not see the need
b — Yes, I would support it if I have time
c — Yes, I consider it mandatory

Jitka Pancířová presents the “Go Green” team’s handbook to dialysis experts from all over Europe at the 40th EDTNA/ERCA conference in Ljubljana in Slovenia.

All staff can contribute to preserving resources in their everyday work at the clinic.
of a clinic. We estimate that by dealing with waste more carefully, we could reduce the generation of infectious waste by up to 50%. It is possible to lower a clinic’s energy and water consumption significantly simply by raising awareness among employees.”

ACHIEVING MORE TOGETHER

In September 2011, Jürgen Kastl and Jitka Pancířová presented the “Go Green” team’s completed handbook to an audience of specialists at the 40th EDTNA/ERCA conference in Ljubljana, Slovenia. “We were allowed 45 minutes to make our presentation – a sign that we are not alone in considering this an important issue,” Kastl says proudly. With their joint project, Fresenius Medical Care and EDTNA/ERCA will be able to spread awareness about environmental protection among a considerable number of dialysis specialists across Europe: Around 1,000 association members read the quarterly EDTNA/ERCA newsletter, which the team regularly used to report on the progress of the “Go Green” project. The excitement it sparked in the “Go Green” team was a particularly fulfilling experience. “Our team was made up of experts from ten countries and a wide range of disciplines,” says Pancířová. “We all wanted to achieve something. This multidisciplinary, multicultural approach and the high level of motivation in the team resulted in a lively exchange of expertise and experience. It also ensured that, despite our day-to-day workload, we all continued to make a joint commitment.” Over the coming years, Fresenius Medical Care and EDTNA/ERCA plan to continue working together, including mounting an information campaign aimed at dialysis specialists to further embed environmental protection issues in their consciousness. By 2015, Fresenius Medical Care intends to establish the environmental management handbook as the standard in all of its clinics in the EMEA (Europe, Middle East and Africa) region.

FROM THE INDIVIDUAL TO THE WHOLE ...

“In dialysis, the human factor is crucial when it comes to protecting the environment. This was the thinking behind ‘Go Green’,” explains Jürgen Kastl. “However, ‘green’ dialysis can and should go further still in our opinion.” The next step for NephroCare was to make those elements of dialysis more environmentally-friendly over which individual staff members have no control, namely the clinic building itself, including the outer shell, the interiors and the building technology. “We wanted to move away from a large number of individual good ideas and solutions for greater energy efficiency as outlined in dialysis literature to a more holistic approach,” explains Kastl. Together with the German Energy Agency (dena), he and a team of members from NephroCare Coordination and Technical Services & Infrastructure developed a model for a CO2-neutral dialysis clinic. The concept is simple: By combining renewable energy forms, a smart outer shell design and technologies for efficient energy recovery, a clinic can cut down on as much CO2 (carbon dioxide) as it produces during dialysis, water preparation and other operations. For example, it can mount solar cells on the roof to produce electricity, recover heat from the waste water produced during dialysis, and install special insulation for the walls and outer shell of buildings. “This model was very important to us,” Kastl emphasizes. “It showed us that a dialysis clinic can in fact be designed as an energy-efficient integrated system. And that its energy consumption can, under ideal conditions, be reduced by half! But the concept was not detailed enough at first to implement it. It was also concerned exclusively with the carbon footprint, and did not take the patient’s perspective and needs sufficiently into account.”

The fact that this perspective carries significant weight can be gleaned from the Company’s comprehensive architectural guidelines for constructing and renovating dialysis clinics at Fresenius Medical Care. “Dialysis patients, who mostly lie on a daybed during their long treatment sessions and are barely able to move, have different needs to healthy people when it comes to comfort,” explains
Kastl. For this reason, along with the many technical and structural requirements set out in the guidelines, they also include statutory thresholds concerning room temperature, humidity, light and noise levels in a clinic. And these can be considerably at odds with what would be considered ideal conditions for energy efficiency in any other building. Take, for example, room temperature: In a dialysis treatment room, the temperature should be between 22 and 24 degrees Celsius, whereas 19 degrees is normally recommended for homes. Or lighting: A light intensity of 500 lux is prescribed for treatment rooms compared to 300 lux recommended for homes. The reason for this is to prevent mistakes in administering the correct drug dosage, a correlation that is corroborated by studies.

... AND FROM THEORY TO PRACTICE
Implementing the concept of a sustainable dialysis clinic should therefore involve combining eco-friendly construction expertise and energy-efficient technologies with an understanding of the specific requirements of dialysis patients. This is precisely what Kastl and his team wanted to achieve with a practical handbook on how to construct sustainable dialysis clinics at NephroCare. The result was a joint project involving specialists in clinic architecture at NephroCare, the Technical Services & Infrastructure department and the Dessau Institute of Architecture, a post-graduate program for architects at Anhalt University of Applied Sciences in Dessau that specializes in eco-friendly construction. "Architecture is often concerned with prestige, resulting in buildings that emphasize form and are therefore mostly self-referential. But a dialysis clinic is an integral part of every patient’s life. It is essential and important that they feel comfortable there. This was a great incentive," says Professor Alfred Jacoby, architect and head of the Dessau Institute of Architecture, describing the team’s reason for taking on the project. But it also presented some challenges, as he recalls. "Initially, there was a clash of different approaches in our workshops. But that made the project even more exciting and constructive. We were continually forced to question the theory behind sustainable construction, to examine its practicality for dialysis based on the data received from NephroCare specialists and then find individual solutions." One discovery was that the required lighting conditions in the clinic could be made more energy efficient by fully exploiting natural light through a special window arrangement and the way certain surface materials and colors in the clinic’s interior interacted. By using ground-coupled heat pumps and heat from the processed water that has to be at a temperature of 37 degrees Celsius for treatment, energy can be recovered and diverted to the building. These and other solutions, taken together, can reduce a clinic’s energy consumption by 20 to 50%.

STEP BY STEP TO SUCCESS
Jürgen Kastl and his team intend to present their new handbook in 2012 at a workshop for Fresenius Medical Care architecture specialists in the various countries in the EMEA region. In the same year, it will be put to practical use for the first time when the Company builds two “green” pilot clinics. According to Kastl, the number of dialysis centers that Fresenius Medical Care can build to this new standard in the future will depend on whether partners can be found to realize the project. In the early stages, the investment is higher because of the costly construction techniques, and the current financial crisis is putting added pressure on healthcare budgets in many countries. Nevertheless, this does not change the Company’s objective to lead the market in terms of environmental protection, too. “The projects we have initiated over the last few years at NephroCare with our partners have set a benchmark in our sector,” Kastl is convinced. “Our goal for the coming years is to continue making dialysis greener step by step.”
“IT IS ESSENTIAL AND IMPORTANT THAT THE PATIENT FEELS COMFORTABLE IN A CLINIC.”

Alfred Jacoby

Elements of CO₂-neutral dialysis

a — Special features of the building shell: reduced energy requirements, optimal insulation, high-quality windows, airtight shell

b — Efficient energy conversion: Energy conversion with efficient heating technology and renewable energy

c — Use of renewable energies: solar energy, geothermal energy, bio energy, wind

Prof. Alfred Jacoby’s work has paid off. Fresenius Medical Care will build two “green” pilot clinics.