During dialysis for kidney disease or renal failure, a patient is exposed to enough water to fill a standard-size bathtub more than 329 times.¹ That equates to nearly 29,952 liters or over 7,912 gallons of water per year. This is according to DaVita Hospital Services, which provides inpatient dialysis services in over 900 hospitals in the United States and has more than 700 sites located in Joint Commission–accredited hospitals across the country.²

The water, which is used to cleanse a patient’s blood supply via special dialysis equipment, usually comes from public water supply sources. But while tap water may be safe enough to drink, it’s not clean enough to come in close contact with patients’ blood. It has to be specially treated and purified of contaminants, including bacteria, metals, and chemicals that can sicken or even kill patients.

Consequently, dialysis treatment providers must ensure that their procedures, equipment, and staff are up to par, especially when it comes to testing, treating, decontaminating, and distributing water during dialysis procedures. Those responsibilities can be particularly difficult when administering treatment within a hospital environment that’s removed from your familiar domain and not entirely within your control.

Such are the unique challenges faced by DaVita Hospital Services. Parent company DaVita HealthCare Partners, Inc., operates more than 2,000 outpatient dialysis centers across the

(continued)
country, each of which contains dedicated areas for the preparation and storing of purified water. But unlike these outpatient centers, DaVita Hospital Services runs inpatient dialysis units set up within a hospital—which presents complications and demands that can range from properly connecting to the facility’s water supply, to complying with hospital protocol, to training and coordinating staff to work effectively in a remote setting.

However, DaVita Hospital Services has proved its competence, as it became the first inpatient kidney care provider to earn ambulatory health care accreditation from The Joint Commission last April. DaVita Hospital Services was awarded this designation after a thorough vetting process that involved two-and-a-half months of surveys at more than 175 DaVita inpatient dialysis sites.

**Grade A aqua**

“When a hospital contracts with us, we provide turnkey services. Our teammates [staff] perform the dialysis, and we provide and maintain all the equipment,” says Miki Smith, national director of operations for DaVita Hospital Services in Denver.

Approximately 25 gallons of water are used per treatment. To supply the needed water to inpatients, DaVita taps into the municipal water supply provided to the hospital by connecting its equipment to sinks, showers, or pre-plumbed water sources within the facility. This process can be complicated, so careful interfacing with hospital engineers and biomedical technicians is required so that water connections can be made safely and effectively.

Next, to create and distribute dialysis-pure water, three steps are required, according to Smith:

- **Step 1—Pretreatment.** DaVita’s reverse osmosis (RO) machines employ:
  - A 5-micron filter that removes fine carbon particles, resin beads, and other debris
  - A blending valve that mixes hot and cold water to allow the equipment to function at the most efficient temperature (77ºF for conventional systems)
  - Two carbon tanks that eliminate various organics—including chlorine and chloramines, which are harmful to dialysis patients—from the municipal water supply

- **Step 2—Purification.** The RO technology employed involves using a booster pump to direct high-pressure water against a special filter with semi-permeable membranes. The filter enables clean water to pass through but blocks out solutes and contaminants, including bacteria, viruses, endotoxins, salts, and particles.

- **Step 3—Distribution to the patient.** To bring the water to the patients, DaVita relies on either of the following:
  - An indirect feed system when stationery equipment is used, whereby product water from the RO machine is stored in a holding tank
  - A direct feed system (which enables unused product water to flow back to the machine without the need for a holding tank) when portable equipment is needed. Because portable dialysis machines can be conveniently wheeled into a bedridden patient’s room, they are commonly used.

**Passing the test**

“Quality water is vital to patient safety,” Smith says. “DaVita has developed a rigorous set of policies, procedures, and internal standards that it consistently follows to ensure quality control and provide safe and effective care to patients. Additionally, we follow standards established by the Association for the Advancement of Medical Instrumentation (AAMI) and The Joint Commission.” See the sidebar on page 4 for details.

To verify that its water meets safe standards, DaVita tests water quality before each treatment and every four hours during long treatments, using a variety of meters, testing solutions, and strips. Also, samples are taken monthly for bacterial culture and endotoxin testing and processed by DaVita laboratories. These processes are performed while adhering stringently to laboratory quality verification and disinfection protocols.

DaVita’s acute care nurses, stationed within hospital inpatient dialysis units, are not alone in testing and documenting these verifications; also involved are DaVita biomedical technicians and hospital personnel, including infection control officers, nurses, and nephrologists. To ensure that safeguards are met, maintained, and properly documented, quality measures and test results are shared between the hospital and the DaVita team. This team is supervised by
an assigned facility administrator who manages inpatient services for several hospitals. He or she meets monthly, and as needed, with a hospital liaison.

Focus on training and maintaining

Smith says DaVita is able to maintain a consistently high level of quality control across hundreds of hospitals thanks to the extensive training every one of its acute care teammates (employees) receives.

This training begins at the hiring stage. A standard course on water quality and purification and an examination are required for new employees and annually for all acute care clinical and biomedical staff. Nurses complete from 4 to 12 weeks of intensive orientation, depending on their experience. Biomedical teammates conduct a water course review and skills checklist of all acute clinical staff every year.

“DaVita successfully maintains high water quality through teammate training and policy and procedure compliance, which is further verified by monthly internal auditing and files review of our teammates,” Smith says.

Every employee must also complete various annual competencies that involve additional courses, exams, and drills required by DaVita and its hospital partners.

Why accreditation matters

Michael Kulczycki, The Joint Commission’s executive director of ambulatory health care accreditation, says DaVita’s accreditation achievement is impressive, especially considering the multiple hurdles the company’s staff must clear every day in providing care technically as outsiders stationed in a non-native setting they don’t have jurisdiction over.

“I heard very good things about how successful DaVita’s biomedical team was at partnering with hospitals to solve common challenges. These include making sure that the integrity of the water is appropriate and checked at the frequencies expected,” says Kulczycki.

DaVita’s ambulatory accreditation will also aid its hospital partners in risk management and reduction as well as survey readiness. In addition, it complements any hospital with Joint Commission hospital accreditation.

“When [DaVita’s] hospital partners go through their own hospital surveys, it’s not uncommon that environment of care issues unique to dialysis get evaluated, and occasionally there are areas of non-compliance identified,” Kulczycki says. “The fact that DaVita can work so well with their hospital partners to make environment of care improvements results in safer, better care for the 150,000-plus patients whom DaVita cares for every day.”

Meeting Ambulatory Standards

DaVita Hospital Services uses The Joint Commission’s ambulatory standards as a framework to systematically monitor and determine the quality and safety of kidney care therapies. Regular compliance with these accreditation standards enhances the quality and safety of the inpatient dialysis environment within hospital settings. In addition, DaVita closely follows Environment of Care Standard EC.02.04.03—“The organization inspects, tests, and maintains medical equipment”—particularly its Element of Performance 5: “The organization performs equipment maintenance and chemical and biological testing of water used in hemodialysis. These activities are documented.”

“We also comply with industry benchmark standards from AAMI and have incorporated their culture guidelines in our policies and procedures,” says Miki Smith, national director of operations for DaVita Hospital Services. According to AAMI standards, contamination levels in dialysis-quality water and the dialysate used for patient treatments are reported in three categories—acceptable, action, and unacceptable:

- **Bacterial contamination:**
  - Acceptable level: Below 50 cfu/mL
  - Action level: 50–199 cfu/mL
  - Unacceptable level: 200 cfu/mL or greater

- **Endotoxin contamination:**
  - Acceptable level: Below 1 EU/mL
  - Action level: 1 EU/mL or greater but less than 2 EU/mL
  - Unacceptable level: 2 EU/mL or greater

DaVita policies and procedures reflect these standards and outline specific actions for appropriate follow-up to ensure quality water and safety of inpatient dialysis patients.

References