Health problem addressed
These devices perform extracorporeal dialysis to replace the main activity of the kidneys in patients with impaired renal function, such as those with end-stage renal disease.

Product description
Single-patient hemodialysis systems can be divided into three major components: the dialysate delivery system, the extracorporeal blood-delivery circuit, and the dialyzer.

Principles of operation
Single-patient hemodialysis systems can be divided into three major components: the dialysate delivery system, the extracorporeal blood-delivery circuit, and the dialyzer. Blood is taken via the extracorporeal circuit, passed through a dialyzer for solute and fluid removal, and returned to the patient. Each system has its own monitoring and control circuits. The delivery system prepares dialysate—a solution of purified water with an electrolyte composition similar to that of blood—and delivers it to the dialyzer. The external blood-delivery system (extracorporeal blood circuit) circulates a portion of the patient's blood through the dialyzer and returns it to the patient. The dialyzer is a disposable component in which solute exchange, or clearance, takes place.

Operating steps
Blood is taken via the extracorporeal circuit, passed through a dialyzer for solute and fluid removal, and returned to the patient.

Reported problems
Infections are a leading cause of morbidity and mortality in chronic hemodialysis patients. For example, HBsAg (an indicator for the presence of hepatitis B virus) has been detected on various surfaces in hemodialysis centers. Strict, specific policies and procedures designed to reduce infection risks should be implemented. These policies should address issues such as sterilization and disinfection, housekeeping, laundry, maintenance, waste disposal, isolation precautions, and universal precautions.

Use and maintenance
User(s): Nurse; dialysis technician
Maintenance: Medical staff; technician; biomedical or clinical engineer
Training: Initial training by manufacturer and manuals

Environment of use
Settings of use: Dialysis department at hospitals; dialysis clinics
Requirements: Stable power source; water treatment capability (e.g., reverse osmosis, deionization)

Product specifications
Approx. dimensions (mm): 1680 x 510 x 640
Approx. weight (kg): 85
Consumables: Dialysate and administration sets
Price range (USD): 37,000
Typical product life time (years): 5 to 7
Shelf life (consumables): variable and single use

Types and variations
Single patient; multiple patient