Claims

1. A system for providing dialysate to a patient, the system comprising:

a dialysis cycler fluidly connectable to a source of a dialysate and to a patient line;

a water source device fluidly connected to the dialysis cycler; and

a drain line fluidly connected to the dialysis cycler, the drain line comprising:

one or more sensors for detecting properties of fluid flowing through the one or more sensors; and

a sensor bypass line,

wherein:

the dialysis cycler comprises at least one fluid inlet and at least one fluid outlet that are connectable to the source of a dialysate, such that when in use, fluid is circulated from the fluid outlet of the dialysis cycler to the source of a dialysate and back to the fluid inlet of the dialysis cycler;

the system comprises a plurality of fluid connections and valves, and the dialysis cycler is configured together with the plurality of fluid connections and valves to selectively control flow along:

a first fluid flow path from the water source device, through one or more sterilisers, to the dialysis cycler;

a second fluid flow path from the dialysis cycler through the drain line and the one or more sensors; and

a third fluid flow path from the dialysis cycler through the drain line and the sensor bypass line, thereby bypassing the one or more sensors.

2. The system according to claim 1, wherein the one or more sterilisers is configured to sterilise fluid flowing between the water source device and the dialysis cycler, optionally wherein the one or more sterilisers comprises one or more of a ultraviolet (UV) steriliser, a filter, and an ultrafiltration system.

3. The system according to claim 1 or 2, wherein when the dialysis cycler is connected to the source of a dialysate comprising a dialysate concentrate, the dialysis

cycler is configured together with the plurality of fluid connections and valves to selectively control flow along a fluid flow path from the dialysate source through the dialysis cycler, the drain line, and the one or more sensors.

4. The system according to any one of claims 1 to 3, wherein when the dialysis cycler is connected to the source of a dialysate comprising a dialysate concentrate and to the patient line, the dialysis cycler is configured together with the plurality of fluid connections and valves to selectively control flow along a fluid flow path from the dialysate source through the dialysis cycler and the patient line.

5. The system according to any one of claims 1 to 4, wherein when the dialysis cycler is connected to the patient line, the dialysis cycler is configured together with the plurality of fluid connections and valves to selectively control flow along a fluid flow path from the patient line through the dialysis cycler and the drain line, optionally additionally though the sensor bypass line.

6. The system according to any one of claims 1 to 5, wherein the dialysis cycler is configured together with the plurality of fluid connections and valves to selectively control flow along: a fourth fluid flow path from the water source device to the drain line, and not through the dialysis cycler.

7. The system according to any one of claims 1 to 6, further comprising a heater configured to disinfect fluid flowing through the water source device and/or the one or more sensors.

8. The system according to any one of claims 1 to 7, further comprising a source of disinfectant fluidly connectable to the water source device, such that when in use, fluid flows through the source of disinfectant and the water source device, thereby providing disinfectant to the system, optionally wherein the disinfectant comprises a compound comprising a peroxy group.

9. The system according to any one claims 1 to 8, wherein the one or more sensors comprises one or more of:

a chlorine sensor configured to detect a concentration of an active chlorine compound in fluid flowing through the chlorine sensor;

a peroxide sensor configured to detect a concentration of peroxide in fluid flowing through the peroxide sensor;

an urea sensor configured to detect a concentration of urea flowing through the urea sensor;

a creatinine sensor configured to detect a concentration of creatinine flowing through the urea sensor; and

a glucose sensor configured to detect a concentration of glucose flowing through, around or over the glucose sensor.

10. The system according to any one claims 1 to 9, wherein the one or more sensors comprises a conductivity sensor configured to detect a conductivity of fluid flowing through the conductivity sensor.

11. The system according to any one of claims 1 to 10, wherein the one or more sensors comprises a refractive index sensor configured to detect a refractive index of fluid flowing through the refractive index sensor.

12. The system according to any one of claims 1 to 11, wherein the dialysate source comprises one or more bags each comprising one or more dialysate concentrates.

13. The system according to any one of claims 1 to 12, further comprising an air source fluidly connected to the dialysis cycler, and when the dialysis cycler is connected to the source of a dialysate comprising a dialysate concentrate, the dialysis cycler is configured to provide air into the dialysate concentrate, optionally wherein the air source comprises a pump and a hydrophobic filter.

14. The system according to any one of claims 1 to 13, wherein the water source device comprises a reverse osmosis membrane for purifying water.

15. The system according to any one of claims 1 to 14, wherein the water source device comprises a pretreatment module comprising one or more of:

a filter having a pore size of from 1 to 8 μm;

an activated carbon column; and

a water softener.

16. The system according to any one of claims 1 to 15, wherein the second and/or third fluid flow paths comprise one or more valves, a contactless flow sensor and an optical sensor, the optical sensor configured to detect fibrin, wherein the one or more valves have an inner diameter that is sufficiently large to prevent clogging by fibrin, optionally wherein the second and/or third fluid flow paths comprise a fibrin filter or are fitted downstream from a fibrin filter.

17. The system according to claim 1, wherein the water source device comprises a device for providing sterile purified water, the device comprising:

a water inlet for providing water to the device;

one or more pumps for providing flow of water through the device;

one or more conductivity sensors configured to detect a conductivity of water flowing through the device;

a reverse osmosis module configured to provide a purified water stream to downstream components of the device, the reverse osmosis module configured to provide a waste stream to a drain outlet;

one or more sterilisation systems selected from a filter, a UV steriliser and an ultrafiltration device for sterilising the purified water stream;

a water outlet configured to provide a sterilised purified water stream;

a heater configured to heat water flowing through the heater;

a chlorine sensor configured to detect a concentration of chlorine in water flowing through the chlorine sensor;

one or more peroxide sensors configured to detect a concentration of peroxide in water flowing through the peroxide sensor; and

a chemical disinfectant source and chemical pump for supplying chemical disinfectant to the device.

18. The system according to claim 17, comprising a controller and a plurality of fluid connections and valves, which controller and plurality of fluid connections and valves are configured to selectively provide fluid flow through:

a first fluid flow path comprising one or more of the conductivity sensors, one or more of the peroxide sensors, the reverse osmosis module, the water outlet and, and one or more of the filter, the UV steriliser, and the ultrafiltration device;

a second fluid flow path comprising one or more of the conductivity sensors, one or more of the peroxide sensors, the reverse osmosis module, the filter, the UV steriliser, and the heater;

a third fluid flow path comprising one or more of the conductivity sensors, one or more of the peroxide sensors, the reverse osmosis module, the filter, the UV steriliser, the heater, and the chlorine sensor,

a fourth fluid flow path comprising one or more of the conductivity sensors, one or more of the peroxide sensors, the reverse osmosis module, the filter, the UV steriliser, and the chlorine sensor;

a fifth fluid flow path comprising the chemical pump, one or more of the conductivity sensors, the chlorine sensor, and the drain outlet;

wherein:

each of the first to fifth fluid flow paths optionally comprises components for fluidly connecting the device to a system for performing dialysis; and

each of the second to fourth fluid flow paths is optionally configured as recirculating fluid flow paths or optionally terminates at the drain outlet.

19. The system according to claim 18, wherein each of the first to fifth fluid flow paths optionally comprises components for fluidly connecting the device to a system for performing dialysis; and wherein each of the second to fourth fluid flow paths is optionally configured as recirculating fluid flow paths or optionally terminates at the drain outlet.

20. The system according to claim 18 or 19, wherein each of the first to fifth fluid flow paths further comprise one or more of a urea sensor, a creatinine sensor, and a glucose sensor.