CLAIMS

We claim:

1. A patient monitoring device, comprising:

a housing comprising:

a holder configured to releasably receive a portion of a fluid conduit;

at least one illumination source configured to illuminate the received portion of the fluid conduit, the at least one illumination source comprising a first set of illumination sources arranged on a first sidewall of the holder; and

at least one optical sensor arranged on a second sidewall of the holder orthogonal to the first sidewall of the holder and configured to generate a signal; and

a controller configured to predict an infection rate based on the signal,

wherein the holder comprises one or more engagement features configured to orient the received portion of the fluid conduit in a predetermined rotational and vertical orientation relative to the at least one illumination source and the at least one optical sensor, wherein the one or more engagement features defines an open slot arranged between the first sidewall and the second sidewall, and the open slot extending along a longitudinal axis of the holder.

2. The device of claim 1, wherein the housing comprises a light seal.

3. The device of claim 1, wherein the one or more engagement features is configured to orient the received portion of the fluid conduit by mating with an alignment feature of the received portion of the fluid conduit.

4. The device of claim 1, wherein the at least one illumination source comprises a plurality of illumination sources.

5. The device of claim 4, wherein the illumination sources are configured to illuminate in a first illumination direction and a second illumination direction orthogonal to the first illumination direction.

6. The device of claim 4, wherein the illumination sources are configured to illuminate in a first illumination direction and a second illumination direction opposite the first direction.

7. The device of claim 4, wherein at least two of the illumination sources are configured to illuminate along a first plane at a first wavelength band.

8. The device of claim 4, wherein at least another two of the illumination sources are configured to illuminate along a second plane substantially parallel to the first plane.

9. The device of claim 4, wherein the illumination sources comprise a first illumination source configured to emit light at a first centered wavelength band between about 800 nm and about 900 nm.

10. The device of claim 4, wherein the illumination sources comprise a second illumination source configured to emit light at a second centered wavelength band between about 400 nm and about 450 nm.

11. The device of claim 4, wherein the illumination sources comprise a third illumination source configured to emit light at a third centered wavelength band between about 500 nm and about 550 nm.

12. The device of claim 4, wherein the illumination sources comprise a fourth illumination source configured to emit light at a fourth centered wavelength band between about 230 nm and about 290 nm.

13. The device of claim 1, wherein the at least one optical sensor comprises a plurality of optical sensors.

14. The device of claim 1, wherein the housing comprises one or more collimators comprising an anti-reflective coating.

15. The device of claim 1, wherein the housing comprises a peritoneal dialysis cycler.

16. The device of claim 1, wherein the housing comprises a hemodialysis device.

17. The device of claim 1, wherein the housing comprises a peritoneal dialysis device fluid path.

18. The device of claim 1, wherein the fluid conduit is coupled to a peritoneal dialysis tubing set.

19. The device of claim 1, wherein the fluid conduit is coupled to a peritoneal dialysis cycler tubing set.

20. The device of claim 1, wherein the fluid conduit is coupled to a peritoneal dialysis drain bag connector.

21. The device of claim 1, wherein the fluid conduit comprises:

an inlet portion;

an outlet portion; and

an optically transparent measurement portion between the inlet portion and the outlet portion, wherein the measurement portion comprises at least two substantially planar surfaces, a rotational alignment feature, and a depth alignment feature.

22. The device of claim 21, wherein at least one of the rotational alignment feature and the depth alignment feature is configured to mate with the one or more engagement features of the holder.

23. The device of claim 1, wherein the controller is further configured to generate patient data based at least in part on the signal.

24. The device of claim 23, wherein the controller is located remote from the housing, and wherein the device further comprises a communication device configured to transmit data representative of the signal to the controller.

25. The device of claim 24, wherein the controller is configured to predict an infection score of a patient based at least in part on the signal.

26. The device of claim 24, wherein the controller is configured to predict an infection state of a patient in response to any one or more of the following: the infection score exceeding a predetermined threshold during each of one or more successive measurement time periods, the infection score increasing from a patient baseline over time, and the infection score having an increasing rate of change over time.

27. The device of claim 26, wherein the infection state comprises a probability of infection.

28. The device of claim 24, wherein the fluid conduit is configured to receive a patient fluid and the controller is configured to estimate turbidity of the patient fluid based at least in part on the signal, wherein the infection score is based at least in part on the estimated turbidity.

29. The device of claim 24, wherein the controller is configured to monitor a trend in infection score predicting infection resolution of the patient.

30. The device of claim 24, wherein the controller is configured to monitor a trend in infection score predicting infection resolution of the patient by predicting infection resolution in response to any one or more of the following: the infection score falling below a predetermined threshold during each of one or more successive measurement time periods, the infection score decreasing from a patient baseline over time, and the infection score having a decreasing rate of change over time.

31. The device of claim 29, wherein the controller is configured to estimate fluid flow rate in the fluid conduit based at least in part on the measured optical characteristic, wherein illuminating the fluid conduit comprises activating illumination in response to the estimated fluid flow rate.