APD offers flexibility and quality of life enhancements to a person requiring dialysis. APD can free the patient from the fatigue and inconvenience that the day to day practice of CAPD represents to some individuals. APD can give back to the patient his or her waking and working hours free of the need to conduct dialysis exchanges.

Still, the complexity and size of past machines and associated disposables for various APD modalities have dampened widespread patient acceptance of APD as an alternative to manual peritoneal dialysis methods.

SUMMARY OF INVENTION

Aspects of the invention relate to various components, systems and methods for use in medical applications, including medical infusion operations such as peritoneal dialysis. In some cases, aspects of the invention are limited to applications in peritoneal dialysis, while others to more general dialysis applications (e.g., hemodialysis) or infusion applications, while others to more general methods or processes. Thus, aspects of the invention are not necessarily limited to APD systems and methods, although many of the illustrative embodiments described relate to APD.

In one aspect, there is provided an identification system for one or more fluid lines mounted on a carriage assembly of a peritoneal dialysis device. The system can include: a plurality of slots on the carriage assembly, each configured to accept and hold a fluid line connector of a fluid line; an identification tag mounted on each fluid line connector, the identification tag bearing a code readable by a camera mounted in the peritoneal dialysis device; a slot code located at the base of each slot and readable by the camera in the absence of an installed fluid line connector; and a processor that receives image data from the camera, and that is configured to decode information embedded in the identification tag code and slot code; wherein the processor is programmed to identify empty slots by the detection of the slot code, identify properly mounted or correct fluid lines by the detection of identification tag codes, and identify improperly mounted or incorrect fluid lines if neither a slot code nor an identification tag code is detected in a slot location.

In one aspect of the invention, a tubing state detector may be included with a dialysis system for detecting the presence or absence of a tubing segment, such as a portion of a patient line to be connected to a patient access for delivering dialysate to the peritoneal cavity. The tubing state detector may include a first light emitter having a first optical axis directed toward a space in which a tubing segment is to be positioned, and a second light emitter, adjacent to the first light emitter and having a second optical axis directed toward the space. An optical sensor may be positioned on a side of the space opposite the first and second light emitters and arranged to receive light emitted by the first and second light emitters to determine a presence or absence of a tubing segment in the space.

In one embodiment, the first optical axis may be approximately collinear with a sensor optical axis of the optical sensor, and may pass approximately through a center of a tubing segment when the tubing segment is positioned in the space. In contrast, the second optical axis may be approximately parallel to the first optical axis, and thus, the second optical axis may be offset from the center of the tubing segment and sensor optical axis.

The optical sensor may be arranged to detect a range of light levels when a tubing segment is in the space, e.g., a light level that is higher and/or lower that a light level detected when the tubing segment is absent from the space. However, the optical sensor may detect a lower light level from the second light emitter when a tubing segment is in the space that is detected when the tubing segment it absent from the space. For example, with a tubing

CLAIMS

1. An identification system for one or more fluid lines mounted on a carriage assembly of a peritoneal dialysis device comprising:

a plurality of slots on the carriage assembly, each configured to accept and hold a fluid line connector of a fluid line;

an identification tag mounted on each fluid line connector, the identification tag bearing a code readable by a camera mounted in the peritoneal dialysis device;

a slot code located at the base of each slot and readable by the camera in the absence of an installed fluid line connector; and

a processor that receives image data from the camera, and that is configured to decode information embedded in the identification tag code and slot code;

wherein the processor is programmed to identify empty slots by the detection of the slot code, identify properly mounted or correct fluid lines by the detection of identification tag codes, and identify improperly mounted or incorrect fluid lines if neither a slot code nor an identification tag code is detected in a slot location.

2. The identification system of claim 1, wherein the identification tag code and slot code comprise barcodes or two-dimensional data matrix codes.

3. The identification system of claim 1, wherein the identification tag code of a connector of a fluid line connected to a fluid container includes indicia about the fluid or the fluid container.

4. The identification system of claim 3, wherein the indicia includes the type of fluid, a date of production of the fluid, a volume of the fluid, or other information about such as the date of manufacture or identity of the manufacturer of the fluid or fluid container.

5. The identification system of claim 3 or 4, wherein the processor is configured to identify which of the plurality of slots is occupied by a connector connected to a fluid container having characteristics based on the decoded indicia.

6. The identification system of claim 1, wherein the identification tag is constructed to fold and snap or close around an indicator region of the fluid line connector.