of the medicament inside the drug delivery device may need to be raised prior to injection. While passive warming of the medication is possible, it may be desirable to hasten this process so that the user to not have to wait a significant period of time to deliver the drug. Also, onboard electronics of the drug delivery device may need to be awakened from a low-energy state to a high-energy state prior to drug delivery.

[0006] As set forth in more detail below, the present disclosure sets forth an drug delivery system embodying advantageous alternatives to existing drug delivery devices and that may address one or more of the challenges or needs mentioned above.

Summary

[0007] According to an aspect of the disclosure, a drug delivery system includes a drug delivery device comprising a reservoir, a delivery cannula having a proximal end in fluid communication with the reservoir and a distal end to be received within a patient, a removable sterile barrier disposed about the distal end of the delivery cannula, and a lock. The drug delivery system also includes one or more sensors coupled to the drug delivery device and configured to detect movement of the removable sterile barrier; and a controller coupled to the one or more sensors as well as the lock. The controller may be configured to: use the one or more sensors to determine a condition or an operational state of the drug delivery device, wherein the condition or the operational state of the drug delivery device includes at least whether the removable sterile barrier has been removed from the distal end of the delivery cannula, and activate the lock based on the condition or operational state of the drug delivery device.

[0008] There is disclosed a drug delivery system includes a drug delivery device comprising a reservoir, a delivery cannula having a proximal end in fluid communication with the reservoir and a distal end to be received within a patient, and a controllable element. The drug delivery system also includes a memory configured to store identity information representative of at least one of an identity of the patient, an identity of the drug delivery device, or an identity of a medicament to be stored within the reservoir. Additionally, the drug delivery system includes a controller coupled to the memory and the controllable element. The controller may be configured to control the controllable element based on the identity information.

[0009] According to a further aspect of the disclosure, a method is provided of using a drug delivery device comprising a reservoir, a delivery cannula having a proximal end in fluid communication with the reservoir and a distal end to be received within a patient, a removable sterile barrier disposed about the distal end of the delivery cannula, and a lock.

The method includes determining, with one or more sensors, a condition or an operational state of the drug delivery device, wherein the condition or the operational state of the drug delivery device includes at least whether the removable sterile barrier has been removed from the distal end of the delivery cannula, and activating the lock based on the condition or the operational state of the drug delivery device.

Brief Description of the Drawings

[0010] It is believed that the disclosure will be more fully understood from the following description taken in conjunction with the accompanying drawings. Some of the figures may have been simplified by the omission of selected elements for the purpose of more clearly showing other elements. Such omissions of elements in some figures are not necessarily indicative of the presence or absence of particular elements in any of the exemplary embodiments, except as may be explicitly delineated in the corresponding written description. None of the drawings are necessarily to scale.

[0011] Fig. 1 is a schematic diagram of a drug delivery system according an embodiment of the disclosure in communication with one or more computing devices and one or more networks;

[0012] Fig. 2 is a block diagram of a method of operating the drug delivery system illustrated in Fig. 1 according to an embodiment of the disclosure;

[0013] Figs. 3A-3C is a block diagram of a method of operating the drug delivery system illustrated in Fig. 1 according to another embodiment of the disclosure;

[0014] Fig. 4 is a block diagram of a method of operating a drug delivery system according to another embodiment of the disclosure;

[0015] Fig. 5 is a block diagram of a method of operating a drug delivery system according to a still further embodiment of the disclosure;

[0016] Fig. 6 is a block diagram of a method of operating a computing device according to an embodiment of the disclosure, the computing device in communication with the drug delivery system operating according to the method of Fig. 5, for example;

[0017] Fig. 7 is a block diagram of a method carried out by a drug delivery system according to another embodiment of the disclosure;

[0018] Fig. 8 is a partial cross-sectional view illustrating an embodiment of a system used to carry out, for example, the method of Fig. 7;

What is claimed is:

1. A drug delivery system comprising:

a drug delivery device comprising a reservoir, a delivery cannula having a proximal end in fluid communication with the reservoir and a distal end to be received within a patient, a removable sterile barrier disposed about the distal end of the delivery cannula, and a lock;

one or more sensors coupled to the drug delivery device and configured to detect movement of the removable sterile barrier; and

a controller coupled to the one or more sensors and the lock, the controller being configured to:

use the one or more sensors to determine a condition or an operational state of the drug delivery device, wherein the condition or the operational state of the drug delivery device includes at least whether the removable sterile barrier has been removed from the distal end of the delivery cannula, and

activate the lock based on the condition or the operational state of the drug delivery device.

2. The drug delivery system of claim 1, wherein:

determine if a time period has elapsed since removal of the removable sterile barrier; and

activate the lock if the removable sterile barrier has been removed from the distal end of the delivery cannula and the time period has elapsed.

3. The drug delivery system of claim 1, comprising a circuit having a low-energy state and a high-energy state.

4. The drug delivery system of claim 3, wherein:

the controller is configured to:

use the sensor to determine if the removable sterile barrier has been removed from the distal end of the delivery cannula; and

switch the circuit from the low-energy state to the high-energy state if the removable sterile barrier has been removed from the distal end of the delivery cannula.

5. The drug delivery system of claim 1, comprising a heating element configured to heat a medicament in the reservoir or the delivery cannula when activated.

6. The drug delivery system of claim 5, wherein:

the controller is configured to:

use the sensor to determine if the removable sterile barrier has been removed from the distal end of the delivery cannula; and

activate the heating element if the removable sterile barrier has been removed from the distal end of the delivery cannula.

7. The drug delivery system of any one of claims 1 to 6, the drug delivery device comprising:

a housing containing the reservoir and the delivery cannula; and

the removable sterile barrier being disposed about a distal end of the housing, the removable sterile barrier having at least one roll inhibiting exterior side surface.

8. The drug delivery system of claim 7, the removable sterile barrier having a triangular cross section.

9. The drug delivery system of claim 7 or 8, the removable sterile barrier having a planar distal end surface, the at least one roll inhibiting exterior side surface being perpendicular to the planar distal end surface.

10. The drug delivery system of any one of claims 7 to 9, the removable sterile barrier including a cover member and a tubular member, the cover member covering an open

end of the tubular member, the tubular member including a plurality of outwardly protruding ribs to be gripped by the patient when removing the removable sterile barrier from the housing.

11. The drug delivery system of any one of claims 7 to 10, at least one of the controller or the sensor being housed within the removable sterile barrier.

12. A method for use with a drug delivery device comprising a reservoir, a delivery cannula having a proximal end in fluid communication with the reservoir and a distal end to be received within a patient, a removable sterile barrier disposed about the distal end of the delivery cannula, and a lock, the method comprising:

determining, with one or more sensors, a condition or an operational state of the drug delivery device, wherein the condition or the operational state of the drug delivery device includes at least whether the removable sterile barrier has been removed from the distal end of the delivery cannula; and

activating the lock based on the condition or the operational state of the drug delivery device.

13. The method of claim 12, comprising:

determining if a time period has elapsed since removal of the removable sterile barrier; and

activating the lock if the removable sterile barrier has been removed from the distal end of the delivery cannula and the time period has elapsed.

14. The method of claim 13, comprising:

switching a circuit from a low-energy state to a high-energy state if the removable sterile barrier has been removed from the distal end of the delivery cannula.

15. The method of claim 14, comprising:

activating a heating element if the removable sterile barrier has been removed from the distal end of the delivery cannula.