IMPACT ACTIVATED RETENTION FEATURE FOR DRUG DELIVERY DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] Priority is claimed to US Provisional Patent Application No. 63/252,940, filed October 6, 2021, the entire contents of which are hereby incorporated by reference herein.

FIELD OF DISCLOSURE

[0002] The present disclosure generally relates to drug delivery devices, and, more particularly, to impact activated retention features for drug delivery devices.

BACKGROUND

[0003] Drug delivery devices, such as injectors, are used to deliver liquid drugs to a patient. Upon activation, a drug delivery device will expel a drug stored within an internal reservoir through a needle, cannula, or other delivery member into the patient. Some drug delivery devices, such as pen-type autoinjectors, may be positioned adjacent to a patient's skin to deliver a drug via an injection needle or some other means over a period of time. The drug delivery device may be positioned near the tissue of the patient's abdomen, thigh, arm, or some other portion of the patient's body.

[0004] Some devices may have drawbacks. Specifically, users may be frightened by an exposed injection needle or feel they are inherently incapable of performing an injection. Because of aversions to exposed needles, as well as health and safety issues that may be involved, various types of injectors and other devices have been developed for concealing needles from the user and automating the injection task to assist the user in performing the injection, ensure reliable delivery of the medication and ensure patient safety.

[0005] Typically, three tasks may be performed when injecting a drug into a patient with a hypodermic syringe: 1) insertion of the needle into the patient; 2) injection of the drug from the syringe into the patient; and 3) withdrawal of the needle after the injection has been completed. Generally, shield-activated devices use manual needle insertion techniques whereby a user simultaneously inserts a needle and initiates dosing through the action of retracting a shield relative to the rest of the device. In these devices, the needle may automatically insert upon manually activating the device. Button-activated devices typically employ automated needle insertion mechanisms whereby the needle is inserted mechanically and the dosing mechanism release is automatically delayed until the correct device state is achieved. Any or all of these devices may use manual and/or automated withdrawal mechanisms to retract the needle, and typically rely on springs or other power sources to generate forces required to perform the tasks. Occasionally, a user may inadvertently mishandle or drop the device prior to use. In these circumstances, if the device is dropped in certain orientations, inertial forces may cause the internal components to move relative to each other, which may result in inadvertent premature device activation. Such a premature activation may result in some or all of the desired drug from actually being delivered to the user, which may be wasteful and potentially harmful to the user and/or others.

[0006] The present disclosure sets forth drug delivery devices embodying advantageous alternatives to existing drug delivery devices, and that may address one or more of the challenges or needs mentioned herein.

SUMMARY

[0007] In accordance with a first aspect, a drug delivery device includes a housing having proximal and distal ends and a longitudinal axis extending therebetween, an injection assembly at least partially disposed within the housing and including a needle or a cannula, a drive assembly at least partially disposed within the housing and operably coupled with the injection assembly, a shield slidably coupled with the housing and operably coupled with the drive assembly, and a retention mechanism. The drive assembly is engageable to deliver a medicament via the injection assembly. The shield is positionable in an extended position in which at least a proximal end extends a distance beyond the proximal end of the housing and a retracted position where the proximal end of the housing protrudes a distance beyond the proximal end of the shield. Moving the shield to the retracted position engages the drive assembly to deliver the medicament via the injection assembly. The retention mechanism limits movement of the drive assembly

to restrict engagement thereof such that the drive assembly is restricted from delivering the medicament via the injection assembly during unintentional movement of the housing.

[0008] In some examples, the drive assembly may further include a trigger ring engageable by the shield. The trigger ring may be movable between an initial position and a releasing position. In some of these approaches, movement of the shield to the retracted position urges the trigger ring to the releasing position. In these and other examples, the shield may include an activator portion that engages the trigger ring.

[0009] In some approaches, the shield may include an activator portion that engages the trigger ring. Further, the retention mechanism may include at least one arm that is carried by a nut. The at least one arm may engage a portion of the trigger ring to prevent the trigger ring from moving to the releasing position. In some examples, the device may further include a container holder operably coupled with the injection assembly. The container holder may include an arm that engages the at least one arm during inadvertent or unintended movement of the device. In some examples, the container holder may be fixedly coupled with the housing.

[0010] In accordance with a second aspect, a drug delivery device may include a housing having a proximal end, a distal end, and a longitudinal axis extending between the proximal end and the distal end thereof, an injection assembly at least partially disposed within the housing at or near the proximal end thereof, the injection assembly including a needle or a cannula, a drug storage container, and a container holder adapted to at least partially surround the drug storage container, a drive assembly at least partially disposed within the housing and operably coupled with the injection assembly, and a shield slidably coupled with the housing and operably coupled with the drive assembly. The drive assembly may include a trigger ring being movable between an initial position and a releasing position to deliver a medicament via the injection assembly, and further may include a nut at least partially disposed around a periphery of the trigger ring. The shield is positionable in an extended position in which at least a proximal end of the shield extends a distance beyond the proximal end of the housing and a retracted position in which the proximal end of the housing protrudes a distance beyond the proximal end of the shield. Upon moving the shield to the retracted position, a portion of the shield urges the trigger ring to the releasing position to deliver the medicament via the injection assembly. The container holder, the nut, and the trigger ring cooperate to form a retention mechanism to prevent the trigger ring from activating to deliver the medicament via the injection assembly during unintentional movement of the housing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The above needs are at least partially met through provision of the impact activated retention feature for drug delivery devices described in the following detailed description, particularly when studied in conjunction with the drawings, wherein:

[0012] Fig. 1 illustrates a perspective view of an example drug delivery device in accordance with various embodiments;

[0013] Fig. 2 illustrates a cross-sectional view of the example drug delivery device of Fig. 1 in accordance with various embodiments;

[0014] Fig. 3A illustrates a cross-sectional view of an example rear sub-assembly of the example drug delivery device of Figs. 1 & 2 in accordance with various embodiments;

[0015] Fig. 3B illustrates a cross-sectional view of an example drug storage container of the example drug delivery device of Figs. 1-3A in accordance with various embodiments;

[0016] Fig. 3C illustrates a cross-sectional view of an example front sub-assembly of the example drug delivery device of Figs. 1-3B in accordance with various embodiments;

[0017] Fig. 4 illustrates a perspective view of an example drive assembly of the example drug delivery device of Figs. 1-3C in accordance with various embodiments;