METHOD AND APPARATUS FOR DOSE MEASUREMENT

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The present disclosure relates to devices for use in conjunction with a syringe in measuring a dose using the syringe. In certain embodiments, a clip is provided that includes an elongated portion for insertion into a barrel of a syringe and a locking portion that locks onto a feature of the syringe. Once inserted, the clip physically prevents retraction of a plunger of the syringe past a certain point corresponding to a desired dose.

ABSTRACT

15 Claims, 7 Drawing Sheets
FIG. 5
METHOD AND APPARATUS FOR DOSE MEASUREMENT

BACKGROUND

The present disclosure relates generally to methods and devices for measuring a dose, such as of a medication or other liquid, using a syringe.

This section is intended to introduce the reader to various aspects of art that may be related to various aspects of the present disclosure, which are described and/or claimed below. This discussion is believed to be helpful in providing the reader with background information to facilitate a better understanding of the various aspects of the present disclosure. Accordingly, it should be understood that these statements are to be read in this light, and not as admissions of prior art.

Syringes are often used in the oral administration of liquid medications to the pediatric population. In particular, a syringe may be partly filled with a dose of a medication and the syringe may then be inserted into the mouth of the child. The dose may then be dispensed from the syringe into the mouth of the child, where it is swallowed. In this manner, a prescription or over-the-counter medication may be administered to a pediatric patient who might otherwise be difficult to treat.

Syringes for use in administering pediatric medications may be used with over-the-counter medications (where the medication is contained within the syringe as well as prevent­

ment errors are possible in which the incorrect amount of medication is loaded into the syringe. Accordingly, it should be understood that these statements are 15 intended to limit the scope of this disclosure. Indeed, this disclosure may encompass a variety of aspects that may not 55 correspond to different dosages for a given syringe type. The clip corresponding to a given dosage may be attached by a user of the syringe, such as a parent or guardian, or may be attached by a medical professional, such as a pharmacist or physician, prior to being given to the parent or guardian.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

FIG. 1 depicts a plan view of one embodiment of a clip for use with a syringe, in accordance with aspects of the present disclosure;

FIG. 2 depicts an end view of one embodiment of a clip for use with a syringe, in accordance with aspects of the present disclosure;

FIG. 3 depicts a perspective view of one embodiment of a clip for use with a syringe, in accordance with aspects of the present disclosure;

FIG. 4 depicts a plan view of one embodiment of a clip that is scored along an elongated portion to facilitate breakage along the elongated portion, in accordance with aspects of the present disclosure;

FIG. 5 depicts an assortment of clips associated with different respective doses, in accordance with aspects of the present disclosure;

FIG. 6 depicts an assortment of color-coded clips associated with different respective doses, in accordance with aspects of the present disclosure;

FIG. 7 depicts a side view of a syringe in which a clip has been inserted but not secured, in accordance with aspects of the present disclosure;

FIG. 8 is a cross-sectional view of the syringe and clip of FIG. 7 depicting the clip within the barrel of the syringe, in accordance with aspects of the present disclosure;

FIG. 9 depicts a side view of a syringe in which a clip has been inserted and secured, in accordance with aspects of the present disclosure;

FIG. 10 is a cross-sectional view of the syringe and clip of FIG. 9 depicting the clip within the barrel of the syringe, in accordance with aspects of the present disclosure;

FIG. 11 depicts a side view of a syringe in which a clip corresponding to a different dosage has been inserted and secured, in accordance with aspects of the present disclosure; and

FIG. 12 is a cross-sectional view of the syringe and clip of FIG. 11 depicting the clip within the barrel of the syringe, in accordance with aspects of the present disclosure.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

One or more specific embodiments of the present techniques will be described below. In an effort to provide a concise description of these embodiments, not all features of an actual implementation are described in the specification. It should be appreciated that in the development of any such actual implementation, as in any engineering or design project, numerous implementation-specific decisions must be made to achieve the developers’ specific goals, such as compliance with system-related and business-related constraints, which may vary from one implementation to another. Moreover, it should be appreciated that such a development effort might be complex and time consuming, but would neverth
less be a routine undertaking of design, fabrication, and manufacture for those of ordinary skill having the benefit of this disclosure.

The present disclosure relates to approaches for measuring and administering a specified dose using a syringe. In certain implementations, a clip is employed which is inserted at least partially into the barrel of a syringe and secured to the syringe, such as to a flange formed as part of the body of the syringe. When secured, the clip prevents the plunger from being withdrawn beyond a point corresponding to a specified or prescribed dose. In this manner, a person using a syringe with a clip attached may withdraw the plunger to fill the syringe until the clip physically prevents further withdrawal of the plunger. In this manner, the user can fill the syringe with the specified or prescribed dose.

With the foregoing discussion in mind and turning to FIGS. 1-3, one embodiment of a suitable clip 10 is depicted by way of example. In this example, the clip 10 includes an elongated portion 12, which is configured to be inserted into the body of a suitable syringe, and a locking portion 14, which is configured to securely engage with a complementary structure of a syringe. In the depicted example, the locking portion 14 is provided as a C-clamp that may slidably or rotatably engage a feature of a syringe, such as a finger flange of the syringe. In certain embodiments, the locking portion 14 may be shaped or may include a visual indication to indicate the type or brand of syringes with which the clip 10 is to be used.

In certain implementations the clip 10 includes identifying information in the form of imprinted or raised text, such as an indication 16 of the type and/or size of syringe for which the clip 10 is sized and/or an indication 18 of the dose to which the clip 10 corresponds. Other information that may be indicated on the clip 10, such as by type or by other visual indicators (such as color coding) may include information relating to instructions or criteria for use of the respective clip 10. For example, all or a portion of the clip 10 may be color coded red if the clip is intended for use with patients whose weight is less than 25 pounds while corresponding clips that are intended for use with patients whose weight is greater than 25 pounds may have all or a portion of the corresponding clip color coded blue. Similarly, other usage related information that may be indicated on the clip 10 include, but are not limited to, patient factors such as age, gender, or pre-existing medical conditions (such as diseases or genetic predispositions).

In addition, non-usage related information may also be indicated or provided on the clip 10. For example, manufacturing information or point of origin information (such as the country in which the clip 10 was manufactured) may be indicated on the clip 10 by text or color-coding. In this manner, the manufacturer and/or country of origin may be determined for a clip 10. Likewise, other non-usage information that may be of interest may be provided on the clip 10.

The clip 10 may be formed from any suitable material that provides sufficient strength and/or resilience. Examples of suitable materials include, but are not limited to, plastics and metals. In certain embodiments the clip 10 may be formed from polypropylene or from acrylonitrile butadiene styrene (ABS). In general, the material from which the clip 10 is formed may be chosen based on suitability for the intended use (e.g., sufficiently strong to function as a physical stop to plunger withdrawal, sufficiently resilient to withstand repeated engagement and disengagement with a complementary feature of the syringe) and on suitability for the desired method of fabrication. Examples of suitable fabrication methods include, but are not limited to, three-dimensional (3-D) printing, injection molding, stamping, laser cutting with routing, and so forth.

As depicted in FIGS. 2 and 3, the elongated portion 12 may be shaped to conform to structural features typically found in a syringe. For example, in the depicted example, a surface of the elongated portion 12 may have a curved or rounded surface generally corresponding to the inner surface of the barrel of a syringe with which the clip 10 is configured to be used. The curvature and/or extent of the surface 22 may vary depending on the type and/or size of syringe with which the clip 22 is to be used. Likewise, in other embodiments, the surface may be shaped differently (i.e., not rounded or curved), depending on usage or design considerations.

Further, in the depicted embodiment the inward facing surface 24 of the clip 10 is angled so as to generally conform to or fit between perpendicular structural elements that may be present on a plunger of a syringe assembly. That is, to the extent that perpendicular structural elements of a plunger form what is essentially a corner shaped niche, the inward facing surface 24 of the clip 10 may be angled or curved so as to fit within or generally conform to the perpendicular surfaces of the plunger. As will be appreciated, in different embodiments the inward facing surface 24 may be angled, as depicted, or may be rounded, curved, or have other shapes and still achieve a suitable conforming fit within a syringe assembly. In other embodiment, the cross-section of the elongated portion 12 may be generally round, triangular, square, rectangular, pentagonal, hexagonal, and so forth. In general, the elongated portion 12 may have any cross-section that allows the elongated portion to fit between the plunger and inner barrel surface of a syringe assembly and, in certain embodiments, allows rotation of the clip between locked and unlocked configurations within the syringe.

Turning to FIG. 4, an additional embodiment is depicted in which the elongated portion 12 of the clip 10 is scored or otherwise structurally weakened at one or more break points 30. In this embodiment, a single clip 10 may be adapted to provide a specified dose by breaking off the elongated portion at the appropriate location. For example, in an unaltered state the clip 10, when inserted and secured within a syringe assembly, may allow a first dose amount (e.g., 3.0 cc) to be drawn into the syringe assembly. By breaking the elongated portion at a first break point 32, a second dose amount (e.g., 3.5 cc) may be drawn into the syringe assembly. Similarly, breaking the elongated portion at a second break point 34 or at a third break point 36 allows a third dose amount (e.g., 4.0 cc) or a fourth dose amount (e.g., 4.5 cc), respectively, to be drawn into the syringe assembly. In this way, a single clip may be configured to provide different doses when integrated with a syringe assembly. As depicted, some form of visual indication 18 may be provided that corresponds to each break point so that a user can determine what doses are associated with breaking or not breaking the clip 10 at a respective break point 30.

Turning to FIG. 5, a kit 40 of dosing clips 10 is depicted in which different clips 10 correspond to different doses or otherwise different uses (such as based on weight, age, or patient or other patient or usage based criteria, as discussed above). For example, in one such embodiment, the elongated portion 12 of each clip 10 of the kit 40 may differ in length to correspond to the dose associated with the respective clip 10. The locking portion 14 of each clip, however, may be the same size where the clips 10 are configured for use with the same size or type of syringe.

In the depicted kit 40 each clip 10 may include indications or markings, as discussed above, indicating the dose to which
each clip corresponds and/or what type, size, or style of syringe with which the clip is to be used. In practice, such a kit of clips may be provided to a practitioner (e.g., a pharmacist or physician) to provide a range of clip sizes or usages for use by the practitioner. For example, such a kit may include clips for commonly prescribed oral doses administered by a syringe. For example, the clips may correspond to doses in any conventional dosing unit (e.g., cubic centimeters (cc), milliliters (mL), tablespoons, teaspoons) and may include clips corresponding to conventional dosing increments within the respective unit of measurement. For example, in one embodiment, the kit may include clips corresponding to doses between 1.0 mL to 4.5 mL in 0.5 mL increments.

Likewise, FIG. 6 depicts an alternative embodiment of a kit of clips of different sizes and/or for different uses. The clips of the kit are differentiated from one another based on color (represented in FIG. 6 by different types of hatching). In this manner, a practitioner may select a suitable clip from the kit by selecting a clip of a color that corresponds to a desired dose or use.

As will be appreciated, the clips of the respective kits depicted by FIGS. 5 and 6 are described as being distinguished by textual indications or by color to simplify explanation. However, in practice, any number or combination of visual indications may be employed in such a kit such that the indications are not limited to color or text. Likewise, in practice, color, text, and/or other visual indications may be combined and/or employed within the same kit. That is, the clips of a kit may include textual and color indications of a dose to which each clip corresponds and/or the type of syringe with which each clip is to be used and may also be color-coded based on dose or other use considerations. For example, in one implementation the clips of a kit may include textual indications of the dose to which each clip corresponds and the type of syringe with which each clip is to be used while a portion of each clip (such as elongated portion) may also be color-coded to indicate the dose to which each clip corresponds, and a different portion of each clip (such as locking portion) may be color-coded to indicate the weight range of patients with which the clip is to be used. In this manner, different types of use indicators may be utilized to allow clips within a kit to be readily distinguished from one another based on doses or other use criteria.

With the foregoing discussion of clips in mind and turning now to FIGS. 7-12, various examples of the use of a dosing clip in conjunction with a syringe are depicted. Turning to FIGS. 7 and 8, a clip is depicted as being inserted into a syringe assembly that includes a plunger disposed within a barrel of the syringe. In FIG. 7, the clip and syringe assembly are depicted from an external view while in FIG. 8 the syringe assembly is partially cut-away to depict the clip within the barrel of the syringe. In the depicted example, the clip is inserted into the barrel of the syringe but has not yet been secured to the syringe.

Turning to FIGS. 9 and 10, where FIG. 10 depicts a partial cut-away view, the clip is depicted as having been rotated within the barrel of the syringe such that the locking portion of the clip is secured to a flange of the syringe. In certain embodiments the flange or other feature to which the clip is secured may include a divot, notch, indentation, or other structure to facilitate locking of the clip to the syringe. For example, in one such implementation, the flange may include an indent or notch and the locking portion of the clip may be rotated to snap into the indent, locking the clip in place. Once the clip is secured, the elongated portion of the clip physically prevents the plunger from being retracted past a point that corresponds to a desired dose within the syringe. In this manner, a user may operate the syringe by retracting the plunger of the syringe until the clip prevents further retraction. At the point where the clip prevents further retraction of the plunger, the syringe should contain the desired dose. In certain embodiments, when it is no longer needed, the clip may be rotated to disengage the flange and withdrawn from the barrel of the syringe. In other embodiments, the clip may remain secured to the flange (such as in embodiments where the locking portion locks or snaps into an indent or other receiving structure) such that the clip is permanently associated with the syringe for the life of the syringe.

By way of further example, FIGS. 11 and 12, where FIG. 12 depicts a partial view, depict the use of a clip having an elongated portion of a different length than that depicted in FIGS. 7-10. As a result of this different length of the elongated portion, the plunger of the syringe can be retracted a different amount so that at different dose can be drawn into the syringe before the clip prevents further retraction of the plunger. In the depicted example, the clip has a shorter elongated portion than was depicted in FIGS. 7-10, thus allowing the plunger to be retracted further before physically preventing further retraction, and thereby allowing a large dose to be drawn into the syringe.

With the foregoing in mind, it will be appreciated that a clip of the type disclosed may be used in conjunction with a syringe, such as an oral dosing syringe, to prevent inadvertent withdrawal of a dose in excess of what was prescribed. Likewise, greater certainty in general may be obtained in measuring a dose as the clip provides a physical indication of the proper extent to which a syringe plunger should be withdrawn to measure a prescribed dose into a syringe. Though discussed herein as being a separate structure from the syringe body and/or plunger, it should be appreciated that in certain embodiments the clip may be constructed as an integral component of the plunger or syringe. That is, the clip may be part of the syringe body or plunger instead of being a separate component.

In practice, the clip may be used by both medical professionals as well as lay people (e.g., parents or other non-professionals). For example, in certain contexts a clip may be secured to a syringe by a medical professional, such as a pharmacist or physician, at a clinical treatment site or point of distribution for a pharmaceutical (e.g., a doctor’s office, hospital, or pharmacy). In this manner, the doctor or pharmacist pre-configures the syringe for later use by attaching a clip corresponding to the prescribed dose. A parent or layperson using the syringe configured with the clip need only withdraw medication into the syringe up to the point where the clip physically prevents further withdrawal to know that the prescribed dose of medicine is present in the syringe.

In other contexts, such as in the context of over-the-counter medications, a manufacturer may package a medication with a syringe and one or more clips corresponding to the dosage instructions on the package. A person opening the package may then select the appropriate clip (such as a color-coded clip where the color-coding corresponds to colors indicated in the dosage instructions) for use with the provided syringe. In this manner, a user of a syringe assembly equipped with a dose clip as discussed herein may fill a syringe with a prescribed dose of medication.

This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including
The invention claimed is:

1. A clip, comprising:
   an elongated portion configured to fit within the barrel of a syringe between a plunger of the syringe and an internal surface of the syringe; and
   a locking portion configured to secure the clip to a feature of the syringe
   wherein the elongated portion comprises an angular portion extending along a majority of a length of the elongated portion, wherein the angular portion is configured to fit within a complementary open region defined by a plunger when the syringe is secured to the syringe, and wherein the elongated portion is configured to be broken at one or more scored locations to provide a particular length that corresponds to a particular dose of the syringe.

2. The clip of claim 1, wherein the elongated portion of the clip, when the clip is secured to the syringe, limits the movement of the plunger within the barrel.

3. The clip of claim 1, wherein a length of the elongated portion of the clip corresponds to a specific dose that can be measured using the syringe.

4. The clip of claim 1, wherein the locking portion comprises a C-clamp configured to be temporarily secured to the feature of the syringe.

5. The clip of claim 1, wherein the locking portion comprises a C-clamp configured to be rotated so as to engage with or disengage from the feature, the feature comprising a flange portion of the syringe that is complementary to the size and shape of the C-clamp.

6. The clip of claim 1, wherein the elongated portion comprises a rounded portion configured to complement a corresponding shape of the internal surface of the syringe when the clip is secured to the syringe.

7. The clip of claim 1, wherein one or both of the elongated portion and the locking portion comprise metal or plastic.

8. The clip of claim 1, wherein one or both of the elongated portion and the locking portion comprise polypropylene or acrylonitrile butadiene styrene (ABS).

9. The clip of claim 1, comprising a first visual indicator of the dose for which the clip corresponds and a second visual indicator of the specified size or capacity of the syringe with which the clip is configured to be used.

10. A set of dosing devices, comprising:
   a plurality of syringe inserts for a specified size or capacity of a syringe, each syringe insert comprising:
   an elongated portion configured to be inserted into the barrel of the syringe, wherein the elongated portion of each syringe insert is of a different length, and wherein the elongated portion comprises an angular portion extending along a majority of a length of the elongated portion, wherein the angular portion is configured to fit within a complementary open region defined by a plunger when the syringe insert is secured to the syringe;
   a locking portion configured to mate with a corresponding feature of the syringe and to secure the syringe insert to the syringe when so mated; and
   a first visual indicator of the dose for which the respective syringe insert corresponds; and
   a second visual indicator of the specified size or capacity of the syringe with which the plurality of syringe inserts are configured to be used.

11. The set of dosing devices of claim 10, wherein the first visual indicator comprises raised type indicating the dose for which the respective syringe insert corresponds.

12. The set of dosing devices of claim 10, wherein the first visual indicator comprises a respective color used to indicate the dose for which the respective syringe insert corresponds.

13. The set of dosing devices of claim 10, wherein each syringe insert comprises a further visual indicator conveying use information for the respective syringe insert.

14. The set of dosing devices of claim 13, wherein the use information indicates a sex, a weight range, an age, or other non-dosage factors.

15. The set of dosing devices of claim 10, wherein the first visual indicator and the second visual indicator comprise textual markings disposed on the elongated portion, the locking portion, or a combination thereof.