Device For Demonstrating A Medical Procedure

Field of Invention

[001] The present invention relates to a device for demonstrating medical procedures on people, especially young children, to prepare one before undergoing a treatment or as part of general education. This device is also a useful tool for teaching medical caregivers.

Background

[002] Children are often affected by anxiety, fear or a sense of self-reproach before undergoing a medical treatment or procedure. Such medical treatment or procedure often entails infusing a substance into or withdrawing a fluid from a patient's body, or connecting a tube from a medical device into a patient's body. Helping these children allay their anxiety and fear or correcting any self-reproach is a very important step. Conventionally, play specialists use toys to explain the medical treatment or procedure to the children. Others engage the children with games. In one approach, US Patent No. 6,004,136, issued to Ehrenpreis, discloses a toy bear where connectors on the bear are hidden by furs. These connectors allow toy tubes, such as, intravenous or feeding tubes, to be removably attached to the connectors. These connectors also allow replica medical devices to be connected to the toy bear.

[003] In another approach, US Publication No. 2009053971, by Man, discloses an interactive doll, where the doll is in a healthy mode after turning on a power switch. After elapse of a time, the doll changes into a sick mode. The doll interacts by emitting a laughing or crying sound, or turning the cheeks red or green.

[004] It can thus be seen that there exists a need to use a new toy to psychologically prepare young patients for medical treatments or procedures which involve infusing a fluid into, extracting a fluid from or connecting a tube into the toy.

Summary

[005] The following presents a simplified summary to provide a basic understanding of the present invention. This summary is not an extensive overview of the invention, and is not intended to identify key features of the invention. Rather, it is to present some of the inventive concepts of this invention in a generalised form as a prelude to the detailed description that is to follow.

[006] The present invention seeks to provide a toy resembling a life-form for demonstrating a medical treatment or procedure. The medical treatment or procedure involves infusing a fluid into or withdrawing a fluid from a patient, or connecting a tube into the toy. The toy is used with actual medical components and this allows a patient to touch and manipulate the medical components on the toy. Such hands-on play with the medical components and toy helps to prepare the patient, for example, a young child, before undergoing a treatment or performing a procedure.

[007] In one embodiment, the present invention provides an educational toy comprising: an article made up of a front, sculptured member to resemble a life-form or an organ and a rear member, so that the front and rear members are shaped and dimensioned to match each other and to form a 3-dimensional toy with a hollow interior; a cylinder-plunger assembly disposed in the hollow interior of the toy; a connector having a first end and a second end, with the connector disposed in the toy such that the first end is exposed to an exterior; and a tube connecting a cylinder end of the cylinder-plunger assembly with the second end of the connector for leak-proof fluid communication; wherein, when a medical component is connected to the first end of the connector, a fluid contained in the medical component, tube and cylinder-plunger assembly is confined in a leak-proof chamber and is operated to simulate infusing the liquid or withdrawing the liquid in a medical treatment or procedure.

[008] Preferably, the medical component comprises: a syringe, an intravenous catheter, an intravenous cannular, a collection tube or container, a T-connector, an adapter or a self-sealing plug. The medical components may be fitted on an interior face of the front member or rear member, or in a tray disposed inside the toy.

[009] In another embodiment, the present invention provides a kit for configuring an educational toy for demonstrating a medical treatment or procedure.

[0010] In another embodiment, the toy of the present invention provides methods for simulating blood sample by dripping, infusing/ withdrawing/ a fluid, intravenous injection, hyperdermal injection, infusing or feeding from a drip bag, assisted breathing, supplying gas for respiratory treatment, and so on.

Brief Description of the Drawings

[0011] This invention will be described by way of non-limiting embodiments of the present invention, with reference to the accompanying drawings, in which:

[0012] FIG. 1A illustrates a front view of a toy for demonstrating a medical treatment or procedure according to an embodiment of the present invention; FIG. 1B illustrates a rear, interior view of the toy shown in FIG. 1A with a tray holding some medical components, and FIG. 1C illustrates the inside view of a rear cover with an assembly of medical components;

[0013] FIG. 2 illustrates a rear, interior view of the toy according to an embodiment of the present invention;

[0014] FIG. 3A illustrates the use of a syringe, while FIG. 3B illustrates infusing a fluid using the syringe;

[0015] FIG. 4 illustrates withdrawing blood by dripping into a collection tube;

[0016] FIG. 5A illustrates the use of an intravenous catheter and syringe, and FIG. 5B illustrates injecting a vaccine with the IV catheter;

[0017] FIG. 6 illustrates the use of an intravenous plug;

[0018] FIG. 7A illustrates the use of a T-connector, and FIG. 7B illustrates infusing a fluid from an intravenous drip bag through the T-connector;

[0019] FIG. 8A illustrates examples of positions of other intravenous injection sites; and FIGs. 8B and 8C illustrate positions of other hypodermal injection sites;

[0020] FIG. 9A illustrates an implanted Port-A-Cath disposed underneath the skin of the anterior chest wall; and FIG. 9B illustrates an Ommaya port disposed underneath the skin of the scalp; and

[0021] FIGs. 10A and 10B illustrate connecting a breathing tube through a nasal opening.

Detailed Description

[0022] One or more specific and alternative embodiments of the present invention will now be described with reference to the attached drawings. It shall be apparent to one skilled in the art, however, that this invention may be practised without such specific details. Some of the details may not be described at length so as not to obscure the invention. For ease of reference, common reference numerals or series of numerals will be used throughout the figures when referring to the same or similar features common to the figures.

[0023] FIG. 1A shows a front view of a toy **100** for use to demonstrate applying a medical treatment or performing a medical procedure; the medical treatment or procedure involves infusing into or withdrawing a fluid from a patient or connecting a tube into the toy **100**. As shown, the toy **100** has a rabbit-like face and has a head **110**, a torso **112**, a pair of forelimbs **114** and a pair of hind-limbs **116**. The toy **100** is 3-dimensional and of a height of substantially 20 cm long. The toy **100** is made up of a sculptured front member **101** and a rear member **102**. The rear member **102** (shown in FIG. 8C) is shaped and dimensioned to snap fit with a rim at a rear of the front member **101** to form the 3-D toy **100** with a hollow interior. Preferably, the front member **101** is formed by two-colour injection molding, where the front features, such as, the eyes, nose, mouth or belly has a different colour from the rest of the body; the two-colour injection molding is to give a part of the

toy a different colour from another part. The ears **111** are formed as separate parts but are removably attached onto the head **110**; an advantage is to reduce the size of the toy **100** for purposes of packaging. The rear member **102** has simple features and may then be transfer molded rather than injection molded. In one embodiment, the rear hollow of the front member **101** is formed with compartments **103**. In each compartment **103**, an actual medical component is fitted therein for use with the toy, as seen in FIG. 1B. In another embodiment, a tray **105** is fitted onto the rear of front member **101**, that is, the tray 105 is disposed in between the front and rear members when the toy is assembled. The tray **105** is also formed with compartments **103** to store various medical components for use with the toy. More than one type of trays **105** may be provided depending on the types of the medical components. Being molded, the toy **100** can be cleaned by wiping or washing with a cleaning and disinfecting agent.

[0024] FIG. 1B shows a rear view of the toy **100** without the rear member **102**. The medical components that may be accommodated in the respective compartments **103** include a connector **150**, an adapter 160, cylinder-plunger assembly **170**, a connecting tube **180**, a syringe **202**, an intravenous catheter **204**, an intravenous cannular **206**, a fluid collection container **208**, a T-connector **210** and a self-sealing plug. The compartments **103** may be formed directly on the inside face of the front member **101** or rear member **102**or on the tray **105**.

[0025] FIG. 2 shows the rear view of toy **100** according to an embodiment of the present invention. As seen in FIG. 2, the toy **100** is assembled with the connector **150** and the cylinder-plunger assembly **170** in fluid communication through the connecting tube **180**. The interior cavities of the connector **150**, cylinder-plunger assembly **170** and connecting tube **180** define a leak-proof chamber. The connector **150** has a first end **152**, a second end **154** and a bore for fluid communication between the first and second ends. In one embodiment, each of the first and second ends is a female luer connection; in another embodiment, each of the first and second ends is a male luer connection; in yet another embodiment, the first end is a female luer connection and the second end is a male luer connection, or vice versa. In addition or alternatively, these luer connections are of a lock type. It is possible that the first and second ends are made of other types of connections,

such as quick couplings, without affecting the principle of the present invention. Again, as seen in FIG. 1B, a cylinder-plunger assembly **170** is fitted to the rear or inside face of the front member **101** or on the inside face of the rear member **102** with a longitudinal axis of the cylinder-plunger assembly **170** substantially along a median line of the toy **100** and the plunger end is disposed near the head **110**. The cylinder end of the cylinder-plunger assembly **170** has a nozzle **172**, preferably formed as a male luer connection. In one embodiment, the cylinder-plunger assembly **170** is a syringe of substantially 20 cc capacity.

[0026] FIG. 3A shows a correct procedure of using a syringe **202** to vertically draw out a liquid, such as a vaccine, from a vial or container **220**; the filled syringe is then inverted and the plunger is pushed up to remove any air bubbles before use. FIG. 3B shows the syringe **202** is used on the toy **100** to demonstrate infusing the fluid. For demonstration, the liquid may be a dye. The nozzle of the syringe **202** is connected into the first end **152** of the connector **150**. By pushing the plunger of the syringe **202**, a clear liquid is injected into the interior of the tube **180** and cylinder-plunger **170** to simulate an injection procedure. To demonstrate another procedure, the interior of the tube **180** and cylinder-plunger **170** is filled with a red liquid; the plunger of the syringe **202** is retracted to draw the red liquid into the syringe **202** to simulate withdrawing of blood.

[0027] The embodiment shown in FIG. 3B allows a patient to play with an actual syringe used by a doctor or nurse. This helps to allay fear in the patient before conducting a treatment. This embodiment may also be useful to train a care-giver in infusing, withdrawing or draining a fluid from a patient.

[0028] The above manner of withdrawing blood with a syringe from a small child may not be possible. Instead, blood may be collected from a small child by puncturing the tip of a finger or inserting an IV catheter into a vein and allow blood to drip into a container or vacutainer. FIG. 4 shows the use of the toy **100** for collecting blood by dripping into a collection tube or container **208** or bag. The cylinder-plunger **170** is partially filled with the red liquid; by pushing of the plunger, the red liquid is pushed out, flowed along the tube **180** and drip out of the first end **152** of the connector **150**. This embodiment allows a patient first-hand experience to handle a blood-like liquid; this may be useful for educating a young child or psychologically preparing a child for collecting a blood sample.

[0029] FIG. 5A shows a procedure of attaching the IV catheter **204** to a syringe **202**, inverting the syringe and extending the plunger to fill the syringe with a vaccine, and removing air inside the syringe **202** and IV catheter **204** before use. FIG. 5B shows the filled syringe and IV catheter is used to demonstrate an IV injection. The tube of the IV catheter **204** is inserted into the connector **150** and the plunger of the syringe is pushed in so that the content of the syringe is transferred into the cylinder of the cylinder-plunger assembly **170** via the connecting tube **180**.

[0030] FIG. 6 shows another embodiment of the toy **100** where an intravenous cannular **206** is connected to the first end **152** of the connector **150**. As an example, the intravenous cannular **206** has a female luer end that matches with the male luer end **152**. This embodiment is useful for demonstrating intravenous injection (such as, in vaccination), withdrawal, say of blood, or for connection via an extension set to a medical device or for connection with other catheter **240**, **242** as shown in FIG. 8A.

[0031] FIG. 7A shows another embodiment of the toy **100** where a T-connector **210** is connected to the first end **152** of the connector **150**. As shown, the T-connector **210** has a male luer end that matches with the female luer end **152** of the connector **150**, whilst a second end of the T-connector is threaded and is connected to an extension tube **212**. The extension tube **212** terminates with a female luer end **214**. The female luer end **214** is connectable with a matching adapter **160** for supplying a fluid from a drip bag **230**, as seen in FIG. 7B.

[0032] In the above figures, the connector **150** is shown located on a tip the right upper limb for ease of description. The connector **150** can be located on any part of the toy **100** to demonstrate intravenous infusion or injection or hypodermal injection. For example, the end **152** of the connector is shown to be located **300** at a mid-section of the upper limb and the end **152** is connected to a Peripherally Inserted Central Catheter (PICC) **240**, as shown in FIG. 8A. In addition, FIG. 8A shows the end **152** is located **302** at the upper chest and is connected to a catheter **242** to represent a Hickman Line.

[0033] FIG. 9A shows the end **152** is located on an anterior chest wall; this represents a Port-A-Cath that is implanted under the skin of the anterior chest wall and is used to demonstrate repeated insertion of needles, for example, during chemotherapy treatment. In FIG. 9B, the end **152** is located on a scalp and this is used to represent an Ommaya device that allows direct access to the cerebrospinal fluid.

[0034] FIGs. 10B and 10C show multiple sites for hypodermal injection, for example with insulin. Hypodermal injection includes intra-muscular and subcutaneous injection. The end **152** of the connector **150** may be located at the upper limbs **114**, torso **112**, lower limbs **116** or buttock to represent sites **400**, **401**, **402**, **403**, **404**, **405** for hypodermal injection. Multiple injection or intervention sites allow site rotation. The end 152 of the connector may be covered by the self-sealing plug to allow repeated insertion of needles or catheter during treatment.

[0035] In FIGs. 9A and 9B, the end **152** of the connector **150** is located in the nose. A tube can be connected to the end **152** and supplied with air/gas to demonstrate assisted breathing, asthma treatment, anesthetic procedure and so on. In addition, air bags **500** may be connected in parallel to the cylinder-plunger assembly **170** to demonstrate breathing in and out. An elastic band **510** can also be attached to the plunger of the cylinder-plunger assembly **170** to demonstrate functioning of a diaphragm during breathing. This embodiment can be modified to demonstrate the use of a feeding tube.

[0036] With the present invention, the above toy **100** allows children to touch and play with medical components; hands-on experience and role-play tend to have deeper impressions on children, thus are able to help children overcome fear of a medical treatment or procedure. The toy **100** also helps to bridge communication between a patient and the guardian/care-giver and/or medical personnel, for example, when a patient is pre-verbal. The toy can be used in schools for general education or in health-care institutions; in this respect, the toy is helpful when the schools or health-care institutions are located in a country which uses a different language or has a different culture. In addition, the toy allows children to be engaged in waiting rooms or during traveling.

[0037] The above toy **100** is molded with rabbit features. It is possible that the toy **100** is formed to represent another type of animal. It is also possible to mold the toys **100** as anatomically accurate life forms, organs or a set of organs. After use, the toys **100** can be dismantled, the medical components removed and cleaned of any liquid, and all the parts can be cleaned and sanitized.

[0038] While specific embodiments have been described and illustrated, it is understood that many changes, modifications, variations and combinations thereof could be made to the present invention without departing from the scope of the invention. For example, the connector **150** may be located in the torso area and can be used to demonstrate drainage of fluid from the respiratory system, such as the lungs.