

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.

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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.

[0009] 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 catheter / cannular;

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

[0019] FIG. 8A illustrates examples of positions of other intravenous infusion 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 (shown in FIG. 8C). The rear member 102 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 (shown in FIG. 6), 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, 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 tip in syringe 202. This embodiment is useful for demonstrating intravenous injection (such as, in drug transfusion), 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] FIGs. 8B and 8C 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.

[0034] 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.

[0035] In FIGs. 10A and 10B, 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.