nurse. For the period between placing the used needle on a tray or a work station to the time it is discarded, the used needle is a potential source for disease transmissions for those that work near or around the needle. Accordingly, all needles should be covered upon withdraw of the needle from the patient to ensure greater worker safety. Ideally, the procedure for covering the needle tip should be passive, self-activating, or at least simple to perform. In addition, the device for covering the needle should be reliable and robust.

IV catheter assemblies are also known to have an in-line valve located in the catheter hub to stop or slow down the flow of blood back flash following successful venipuncture. However, the location or position of the valve relative to the catheter hub makes wiping or cleaning the valve nearly impossible. Additionally, the location of the valve within the catheter hub makes it difficult to incorporate a tip protector or needle guard in addition to having a catheter with a valve that can be wiped.

Safety IV catheters have been described in the prior art:

EP 1 785 159 A1 relates to a catheter device comprising a needle that passes through the catheter device and a septum that is housed within a housing, which septum is designed to seal the housing. D1 further discloses a catheter device comprising a needle shield to retain the needle upon withdrawal of the needle from the housing. If the needle is withdrawn from the housing, the needle shield disengages from the septum so that the needle shield may be separated.

DE 44 34 569 A1 relates to a catheter device comprising a needle with a needle tip protector slidably arranged on the needle shaft. The needle tip protector or needle guard has a hollow body and a seal, which is received in a connecting part of the needle tip protector. The tip protector including the seal is releasably attached to the catheter hub so as to temporarily limit blood flow from the catheter hub.

SUMMARY

Aspects of the present disclosure include a safety IV catheter (IVC) comprising a catheter hub attached to a catheter tube and a needle attached to a needle hub. Said safety IVC further comprising a valve attached to the catheter hub, said valve comprising an interior cavity, a proximal end wall exposed externally of the catheter hub, and a slit formed in the proximal end wall of the valve. The needle extends through the catheter tube and a tip protector comprising a distal end portion, a proximal wall comprising an opening, and a small profile located between the distal end portion and the proximal wall having the needle passing through the opening on the proximal wall. Wherein the distal end portion of the tip protector is located inside the interior cavity of the valve and the proximal wall located externally of the valve.

The safety IVC wherein the small profile can optionally be located at the slit.

The safety IVC wherein the tip protector optionally comprises one substantially flat or two substantially flat arms that cross one another when viewed along a side view and wherein the small profile is located on the on arm or where the two arms cross.

The safety IVC wherein the needle optionally comprises a crimp.

The safety IVC wherein the crimp, if incorporated, is sized larger than the opening on the proximal wall.

The safety IVC wherein the valve extends proximally of the catheter hub.

Claims

1. A safety IV catheter (100) comprising:
a catheter hub (102) attached to a catheter tube (104),
a valve (124) attached to the catheter hub (102) comprising an interior cavity (154), a needle hub (106) attached to a needle (108) and the needle (108) extending through the catheter tube (104);
a tip protector (156, 212, 213) comprising a distal end portion (276, 292), a proximal wall (186, 214) comprising an opening (272, 216), and a small profile (166) located between the distal end portion (276, 292) and the proximal wall (186, 214);
wherein the distal end portion (276, 292) of the tip protector (156, 212, 213) is located inside the interior cavity (154) of the valve (124), and the proximal wall (186, 214) of the tip protector (156, 212, 213) is located externally of the valve (124);
characterized in that
said valve (124) further comprises a distal end section (142) comprising a front slit (170) and a proximal end wall (130) comprising a slit (168), and that
the proximal end wall (130) is exposed externally of the catheter hub (102).

2. The safety IV catheter (100) of claim 1, wherein the small profile (166) is located at the slit (168) of the proximal end wall (130) of the valve (124).

3. The safety IV catheter (100) of claim 1, wherein the tip protector (156) comprises two arms (90a, 90b) that cross one another and wherein the small profile (166) is located where the two arms (90a, 90b) cross.

4. The safety IV catheter (100) of claim 1, wherein the needle (108) comprises a crimp (94).

5. The safety IV catheter (100) of claim 1, wherein the crimp (94) is sized larger than the opening (272, 216) on the proximal wall (186, 214) of the tip protector (156, 212, 213).

6. The safety IV catheter (100) of claim 1, wherein the valve (124) extends proximally of the catheter hub (102) and has at least a portion that is wider than the catheter hub (102).

7. The safety IV catheter (100) of claim 1, further comprising an installation tool (182, 242) for mounting the distal portion of the tip protector (156, 212, 213) through the slit (168).

8. A method for manufacturing a safety IV catheter (100) of claim 1 comprising:
forming a catheter hub (102) and attaching the catheter hub (102) to a catheter tube (104),
attaching a valve (124) having an interior cavity (154) to the catheter hub (102), said valve (124) comprising a slit (168);
forming a needle hub (106) and attaching the needle hub (106) to a needle (108) and extending the needle (108) through the catheter tube (104);
placing the tip protector (156, 212, 213), at least in part, inside the interior cavity (154) of the valve (124), said tip protector (156, 212, 213) comprising a distal end portion (276, 292), a proximal wall (186, 214) comprising an opening (272, 216), and a small profile (166) located between the distal end portion (276, 292) and the proximal wall (186, 214);
characterized in that
said valve (124) further comprises a distal end section (142) comprising a front slit (170) and a proximal end wall (130) comprising a slit (168), and that
the proximal end wall (130) is exposed externally of the catheter hub (102).

9. The method of claim 8, further comprising aligning the small profile (166) to sit at the slit (168) of the valve (124).

10. The method of claim 8, further comprising placing a tool (182, 242) comprising a slit around the needle (108) before placing the tip protector (156, 212, 213) inside the interior cavity (154) of the valve (124).

11. The method of claim 10, further comprising placing a distal end of the tool (182, 242) in through the slit (168) before placing the tip protector (156, 212, 213) inside the interior cavity (154) of the valve (124).

12. The method of claim 8, wherein the tip protector (212, 213) has a single arm (218, 218a) passing through the slit (168) at the proximal end wall (130) of the valve (124).

13. The method of claim 8, wherein the tip protector (156) comprises two arms (90a, 90b) that cross one another and wherein the small profile (166) is located where the two arms (90a, 90b) cross.

14. The method of claim 10, further comprising pushing the distal end portion (276, 292) of the tip protector (156, 212, 213) through a bore of the tool.

15. The method of claim 8, wherein the needle hub (106) comprises a Luer taper.

16. The method of claim 8, further comprising removing the needle (108) from the catheter hub (102) and the needle hub (106).

17. The method of claim 16, further wiping the proximal end wall (130) of the valve (124) with an antiseptic solution.

18. The method of claim 8, wherein the slit (168) comprises at least three slit sections forming at least two movable slabs.

19. The method of claim 8,characterized in that a tool (182, 242) is placed over the needle (108) and at least partially through the slit; said tool (182, 242) comprising a hollow interior;
that said tip protector (156, 212, 213) is placed, at least in part, inside the interior cavity (154) of the valve (124), by sliding the tip protector (156, 212, 213) at least partially through the hollow interior of the tool (182, 242).

20. The method of claim 19, wherein the tool (182) comprises a lengthwise slit (246) having a dimension larger than a diameter of the needle (108).

21. A safety IV catheter (100) comprising:
a catheter hub (102) attached to a catheter tube (104),
a valve (124) comprising an interior cavity (154) attached to the catheter hub (102),
a needle hub (106) attached to a needle (108) and the needle (108) extending through the catheter tube (104); and
a tip protector (156, 212, 213) comprising a distal end portion (276, 292) of a first dimension, a proximal wall (186, 214) of a second dimension comprising an opening (272, 216) having an opening dimension, and a center section (166) of a third dimension located between the distal end portion (276, 292) and the proximal wall (186, 214), the third dimension is smaller than both the first and the second dimension; wherein
the distal end portion (276, 292) of the tip protector (156, 212, 213) is located inside the interior cavity of the valve (124) and the proximal wall (186, 214) of the tip protector (156, 212, 213) is located externally of the valve (124).
characterized in that
said valve (124) further comprises a distal end section (142) comprising a front slit (170) and a proximal end wall (130) comprising a slit (168) located at a proximal end of the catheter hub (102).