What is claimed is:

1. A flush syringe assembly comprising:

a barrel including a side wall having an inside surface defining a chamber for retaining fluid, and outside surface, an open proximal end, a distal end including a distal wall having an aperture therethrough in fluid communication with the chamber;

an elongate plunger rod disposed within the barrel, the plunger rod comprising a distal end including a stopper slidably positioned in fluid-tight contact with the inside surface of the barrel so that distal movement of the stopper relative to the barrel pushes fluid out of the barrel;

a cap comprising a passageway therethrough in fluid communication with the chamber, the cap including a Luer connector on a distal end and being releasably connectable to a vascular access device (VAD) and a proximal end releasably attachable to the barrel; and

a valve positioned adjacent the distal end of the barrel and the proximal end of the cap, the valve being movable between an open position to permit fluid flow between the chamber and the VAD and a closed position to prevent fluid flow from a blood vessel to the VAD

2. The flush syringe assembly of claim 1, wherein the valve comprises a plug having a proximal face and a sidewall extending distally therefrom, the sidewall including a plurality of openings that allow fluid communication between the chamber and the VAD.

3. The flush syringe assembly of claim 2, wherein when the plug is in the open position there is fluid communication between the chamber and the cap through the plurality of openings and when the plug is moved distally to the closed position, the chamber is isolated from the VAD.

4. The flush syringe assembly of claim 2, wherein the plug is flexible.

5. The flush syringe assembly of claim 4, wherein the plug is made from an elastomeric material.

6. The flush syringe assembly of claim 2, wherein the valve comprises a valve stem extending distally from a center of the valve, the valve stem having a proximal diameter and a distal diameter greater than the proximal diameter and the cap further comprises a valve seat that forms a fluid-tight seal when the valve stem is in complete contact therewith.

7. The flush syringe assembly of claim 6, wherein, when distally directed force is applied to the stopper, the valve stem is not in complete contact with the valve seat and when a proximally directed force or no-force is applied to the stopper, the valve stem is in complete contact with the valve seat to form a fluid-tight seal isolating the chamber from the VAD.

8. The flush syringe assembly of claim 1, wherein the valve comprises a proximal face and a sidewall extending distally therefrom, the proximal face comprising a plurality of openings allowing fluid communication between the chamber and the cap, and a valve stem extending distally from a center of the valve, the valve stem having a proximal diameter and a distal diameter greater than the proximal diameter and the cap further comprises a valve seat that forms a fluid-tight seal when the valve stem is in complete contact therewith.

9. The flush syringe assembly of claim 8, wherein, when distally directed force is applied to the stopper, the valve stem is not in complete contact with the valve seat and when a proximally directed force or no-force is applied to the stopper, the valve stem is in complete contact with the valve seat to form a fluid-tight seal isolating the chamber from the VAD.

10. The flush syringe assembly of claim 8, wherein the sidewall of the valve includes a plurality of openings that allow fluid communication between the chamber and the cap.

11. The flush syringe assembly of claim 1, wherein:

the valve comprises a proximal face and a sidewall extending distally therefrom, a plurality of openings in one or more of the proximal face and the sidewall allowing fluid communication between the chamber and the cap and a valve stem extending distally from a center of the valve, the valve stem having a proximal end with a proximal diameter and a distal end with a distal diameter greater than the proximal diameter; and

the cap further comprises a valve seat within the passageway biased radially inwardly, the valve seat having a proximal face and a distal face and the distal end of the valve stem is in an initial position in contact with the proximal face of the valve seat forming a seal against distal fluid movement and the plurality of openings in the valve are unobstructed.

12. The flush syringe assembly of claim 11, wherein when the valve is in the initial position, proximally directed force on the plunger causes the stopper causes the distal end of the valve stem to move proximally from the proximal face of the valve seat allowing fluid to flow from a blood vessel towards the cap, and then into the chamber.

13. The flush syringe assembly of claim 12, wherein subsequent distally directed force on the plunger causes the distal end of the valve stem to pass from a proximal side of the valve seat to a distal side of the valve seat moving the valve to the open position allowing fluid communication between the cap and the chamber through the plurality of openings in the valve.

14. The flush syringe assembly of claim 13, wherein, when distally directed force is applied to the stopper, the valve stem is not in complete contact with the valve seat and when a proximally directed force or no-force is applied to the stopper, the proximal side of valve stem is in complete contact with the distal end of valve seat to form a fluid-tight seal isolating the chamber from the IV line.

15. The flush syringe assembly of any of the preceding claims, further comprising:

a sleeve coaxial with the barrel and having a distal end and a proximal end, and an inside surface and an outside surface, wherein the sleeve slides from a distal position to a proximal position relative to the barrel; and

a disinfecting system comprising a disinfectant contained in a hub wherein the disinfectant system is released upon proximal motion of the sleeve.

16. The flush syringe assembly of claim 15, wherein the sleeve further comprises one or more cutouts to provide visibility to the contents of the barrel.

17. The flush syringe assembly of claim 15 or 16, wherein the outside surface of the barrel further comprises two annular positioning ridges, a distal annular positioning ridge and a proximal annular positioning ridge.

18. The flush syringe assembly of claim 17, wherein the inside surface of the sleeve further comprises two annular positioning grooves for controlling the position of the sleeve relative to the barrel by engaging with the annular positioning ridges on the outside surface of the barrel.

19. The flush syringe assembly of any of claims 15 to 18, wherein the distal end of the sleeve connected to the disinfectant system by an interference fit.

20. The flush syringe assembly of any of claims 15 to 19, wherein the disinfecting system further comprises a removable cover for protecting the disinfectant system prior to use and a disinfectant-carrying medium.

21. The flush syringe assembly of any of the preceding claims, wherein the stopper is made of material selected from the list consisting of thermoplastic elastomers, natural rubber, synthetic rubber, thermoplastic materials and combinations thereof.

22. The flush syringe assembly of any of the preceding claims, wherein the cap engages with the VAD by one or more of threads that engage with complementary threads on the VAD or an interference fit.

CLAIMS

1. A flush syringe assembly comprising: a barrel including a side wall having an inside surface defining a chamber for retaining fluid, and outside surface, an open proximal end, a distal end including a distal wall having an aperture therethrough in fluid communication with the chamber; an elongate plunger rod disposed within the barrel, the plunger rod comprising a distal end including a stopper slidably positioned in fluid-tight contact with the inside surface of the barrel so that distal movement of the stopper relative to the barrel pushes fluid out of the barrel; a cap comprising a passageway therethrough in fluid communication with the chamber, the cap including a Luer connector on a distal end and being releasably connectable to a vascular access device (VAD) and a proximal end releasably attachable to the barrel; and a valve comprising a plug positioned adjacent to the distal end of the barrel and in contact with the proximal end of the cap, the plug having a proximal face and a sidewall extending distally therefrom, the sidewall including a plurality of openings that allow fluid communication between the chamber and the VAD, the entire valve being movable by distally directed force applied by the stopper from a proximal open position that permits fluid flow between the chamber and the VAD through the plurality of openings and a distal closed position that prevents fluid communication between a blood vessel and the VAD, wherein the valve comprises a valve stem extending distally from a center of the valve, the valve stem having a proximal diameter and a distal diameter greater than the proximal diameter and the cap further comprises a valve seat that forms a fluid-tight seal when the valve stem is in complete contact therewith.

2. The flush syringe assembly of claim 1, wherein the plug is flexible.

3. The flush syringe assembly of claim 2, wherein the plug is made from an elastomeric material.

4. The flush syringe assembly of claim 1, wherein, when distally directed force is applied to the stopper, the valve stem is not in complete contact with the valve seat and when a proximally directed force or no-force is applied to the stopper, the valve stem is in complete contact with the valve seat to form a fluid-tight seal isolating the

chamber from the VAD.

5. The flush syringe assembly of claim 1, wherein the proximal face of the valve comprises a plurality of openings allowing fluid communication between the chamber and the cap, and a valve stem extends distally from a center of the valve, the valve stem having a proximal diameter and a distal diameter greater than the proximal diameter and the cap further comprises a valve seat that forms a fluid-tight seal when the valve stem is in complete contact therewith.

6. The flush syringe assembly of claim 5, wherein, when distally directed force is applied to the stopper, the valve stem is not in complete contact with the valve seat and when a proximally directed force or no-force is applied to the stopper, the valve stem is in complete contact with the valve seat to form a fluid-tight seal isolating the chamber from the VAD.

7. The flush syringe assembly of claim 1, further comprising: a valve stem extending distally from a center of the valve, the valve stem having a proximal end with a proximal diameter and a distal end with a distal diameter greater than the proximal diameter; and the cap further comprises a valve seat within the passageway biased radially inwardly, the valve seat having a proximal face and a distal face and the distal end of the valve stem is in an initial position in contact with the proximal face of the valve seat forming a seal against distal fluid movement and the plurality of openings in the valve are unobstructed.

8. The flush syringe assembly of claim 7, wherein when the valve is in the initial position, proximally directed force on the plunger causes the distal end of the valve stem to move proximally from the proximal face of the valve seat allowing fluid to flow from a blood vessel towards the cap, and then into the chamber.

9. The flush syringe assembly of claim 8, wherein subsequent distally directed force on the plunger causes the distal end of the valve stem to pass from a proximal side of the valve seat to a distal side of the valve seat moving the valve to the open position allowing fluid communication between the cap and the chamber through the plurality of openings in the valve.

10. The flush syringe assembly of claim 9, wherein, when distally directed force is applied to the stopper, the valve stem is not in complete contact with the valve seat and when a proximally directed force or no-force is applied to the stopper, the proximal side of valve stem is in complete contact with the distal end of valve seat to form a fluid-tight seal isolating the chamber from the IV line.

11. The flush syringe assembly of claim 1, further comprising: a sleeve coaxial with the barrel and having a distal end and a proximal end, and an inside surface and an outside surface a hub connected to the distal end of the sleeve and having a distal face and a proximal face adjacent to the distal end of the cap; and a disinfecting system comprising a disinfectant in contact with the distal face of the hub, wherein the sleeve slides from a distal position in which the proximal face of the hub conceals the distal end of the cap to a proximal position which the disinfectant system is released by contact with the distal end of the cap upon proximal motion of the sleeve.

12. The flush syringe assembly of claim 11, wherein the sleeve further comprises one or more cutouts to provide visibility to the contents of the barrel.

13. The flush syringe assembly of claim 11, wherein the outside surface of the barrel further comprises two annular positioning ridges, a distal annular positioning ridge and a proximal annular positioning ridge.

14. The flush syringe assembly of claim 13, wherein the inside surface of the sleeve further comprises two annular positioning grooves for controlling the position of the sleeve relative to the barrel by engaging with the annular positioning ridges on the outside surface of the barrel.

15. The flush syringe assembly of claim 11, wherein the distal end of the sleeve is connected to the disinfectant system by an interference fit.

16. The flush syringe assembly of claim 11, wherein the disinfecting system further comprises a removable cover for protecting the disinfectant system prior to use and

a disinfectant-carrying medium.

17. The flush syringe assembly of claim 1, wherein the stopper is made of material selected from the list consisting of thermoplastic elastomers, natural rubber, synthetic rubber, thermoplastic materials and combinations thereof.

18. The flush syringe assembly of claim 1, wherein the cap engages with the VAD by one or more of threads that engage with complementary threads on the VAD or an interference fit.

19. The flush syringe assembly of claim 11, wherein when the valve is in the initial position, proximally directed force on the plunger causes the distal end of the valve stem to move proximally from the proximal face of the valve seat allowing fluid to flow from a blood vessel towards the cap, and then into the chamber.

20. The flush syringe assembly of claim 19, wherein subsequent distally directed force on the plunger causes the distal end of the valve stem to pass from a proximal side of the valve seat to a distal side of the valve seat moving the valve to the open position allowing fluid communication between the cap and the chamber through the plurality of openings in the valve.

21. The flush syringe assembly of claim 20, wherein, when distally directed force is applied to the stopper, the valve stem is not in complete contact with the valve seat and when a proximally directed force or no-force is applied to the stopper, the proximal side of valve stem is in complete contact with the distal end of valve seat to form a fluid-tight seal isolating the chamber from the IV line.

22. A flush syringe assembly comprising: a barrel including a side wall having an inside surface defining a chamber for retaining fluid, and outside surface, an open proximal end, a distal end including a distal wall having an aperture therethrough in fluid communication with the chamber; an elongate plunger rod disposed within the barrel, the plunger rod comprising a distal end including a stopper slidably positioned in fluid-tight contact with the inside surface of the barrel so that distal movement of the stopper relative to the barrel pushes fluid out of the barrel; a cap comprising a

passageway therethrough in fluid communication with the chamber, the cap including a Luer connector on a distal end and being releasably connectable to a vascular access device (VAD) and a proximal end releasably attachable to the barrel; and a valve comprising a plug positioned adjacent to the distal end of the barrel and in contact with the proximal end of the cap, the plug having a proximal face and a sidewall extending distally therefrom, the sidewall including a plurality of openings that allow fluid communication between the chamber and the VAD, the entire valve being movable by distally directed force applied by the stopper from a proximal open position that permits fluid flow between the chamber and the VAD through the plurality of openings and a distal closed position that prevents fluid communication between a blood vessel and the VAD, wherein the proximal face of the valve comprises a plurality of openings allowing fluid communication between the chamber and the cap, and a valve stem extends distally from a center of the valve, the valve stem having a proximal diameter and a distal diameter greater than the proximal diameter and the cap further comprises a valve seat that forms a fluid-tight seal when the valve stem is in complete contact therewith.

23. The flush syringe assembly of claim 22, wherein, when distally directed force is applied to the stopper, the valve stem is not in complete contact with the valve seat and when a proximally directed force or no-force is applied to the stopper, the valve stem is in complete contact with the valve seat to form a fluid-tight seal isolating the chamber from the VAD.

24. A flush syringe assembly comprising: a barrel including a side wall having an inside surface defining a chamber for retaining fluid, and outside surface, an open proximal end, a distal end including a distal wall having an aperture therethrough in fluid communication with the chamber; an elongate plunger rod disposed within the barrel, the plunger rod comprising a distal end including a stopper slidably positioned in fluid-tight contact with the inside surface of the barrel so that distal movement of the stopper relative to the barrel pushes fluid out of the barrel; a cap comprising a passageway therethrough in fluid communication with the chamber, the cap including a Luer connector on a distal end and being releasably connectable to a vascular access device (VAD) and a proximal end releasably attachable to the barrel; a valve comprising a plug positioned adjacent to the distal end of the barrel

and in contact with the proximal end of the cap, the plug having a proximal face and a sidewall extending distally therefrom, the sidewall including a plurality of openings that allow fluid communication between the chamber and the VAD, the entire valve being movable by distally directed force applied by the stopper from a proximal open position that permits fluid flow between the chamber and the VAD through the plurality of openings and a distal closed position that prevents fluid communication between a blood vessel and the VAD; a valve stem extending distally from a center of the valve, the valve stem having a proximal end with a proximal diameter and a distal end with a distal diameter greater than the proximal diameter; and the cap further comprises a valve seat within the passageway biased radially inwardly, the valve seat having a proximal face and a distal face and the distal end of the valve stem is in an initial position in contact with the proximal face of the valve seat forming a seal against distal fluid movement and the plurality of openings in the valve are unobstructed.