CLAIMS

What is claimed:

1. A catheter assembly, comprising:

a catheter adapter, comprising a distal end, a proximal end, a lumen extending through the distal end of the catheter adapter and the proximal end of the catheter adapter, and a side port disposed between the distal end of the catheter adapter and the proximal end of the catheter adapter;

a catheter extending distally from the distal end of the catheter adapter;

an annular valve disposed within the lumen and configured to seal the side port from the lumen; and

a retainer element configured to secure the annular valve within the lumen, wherein the retainer element is disposed within the lumen proximal to a proximal end of the annular valve or within the proximal end of the annular valve.

2. The catheter assembly of claim 1, wherein the retainer element contacts the annular valve.

3. The catheter assembly of claim 1, wherein the retainer element comprises a ring, wherein the ring is disposed proximal to the annular valve.

4. The catheter assembly of claim 1, wherein the retainer element comprises a C-shape, wherein the retainer element pinches the annular valve between the C-shape and the catheter adapter.

5. The catheter assembly of claim 4, wherein a portion of the annular valve within an open portion of the C-shape is unclamped.

6. The catheter assembly of claim 5, wherein the portion of the annular valve is on a same side of the catheter assembly as the side port.

7. The catheter assembly of claim 1, further comprising an antimicrobial coating disposed on an outer surface of the retainer element.

~~8. A catheter assembly, comprising:~~

~~a catheter adapter, comprising a distal end, a proximal end, and a lumen extending through the distal end of the catheter adapter and the proximal end of the catheter adapter;~~

~~a catheter extending distally from the distal end of the catheter adapter;~~

~~a valve disposed within the lumen; and~~

~~a C-shaped retainer element secured within the lumen proximal to the valve.~~

~~9. The catheter assembly of claim 8, wherein an inner surface of the catheter adapter forms the lumen and comprises a narrowed diameter portion proximal to the valve, wherein the C-shaped retainer element is configured to compress to move distally through the narrowed diameter portion.~~

~~10. The catheter assembly of claim 9, wherein the C-shaped retainer element is proximate the valve.~~

~~11. The catheter assembly of claim 10, wherein after moving distally through the narrowed diameter portion, the C-shaped retainer element is configured to expand within the lumen proximate the valve.~~

~~12. The catheter assembly of claim 9, wherein the lumen comprises a first inner diameter distal to the narrowed diameter portion and proximal to the valve and a second inner diameter at the narrowed diameter portion, wherein the second inner diameter is less than the first inner diameter.~~

13. The catheter assembly of claim 12, wherein the lumen further comprises a third inner diameter proximal to the narrowed diameter portion, wherein the second inner diameter is less than the third inner diameter.

14. The catheter assembly of claim 13, wherein a width of the C-shaped retainer element is greater than a distance from the narrowed diameter portion to the proximal end of the catheter adapter.

15. The catheter assembly of claim 13, wherein the first inner diameter is equal to the second inner diameter.

16. The catheter assembly of claim 12, wherein an outer diameter of the C-shaped retainer element in a natural state is greater than the first inner diameter.

17. The catheter assembly of claim 9, wherein in a natural state, a distal end of the C-shaped retainer element comprises a first outer diameter and a proximal end of the C-shaped retainer element comprises a second outer diameter, wherein the second outer diameter is greater than the first outer diameter, wherein an inner surface of the catheter adapter forms the lumen, wherein the first outer diameter and the second outer diameter contacts the inner surface.

18. A catheter assembly, comprising:

a catheter adapter, comprising a distal end, a proximal end, and a lumen extending through the distal end of the catheter adapter and the proximal end of the catheter adapter;

a catheter extending distally from the distal end of the catheter adapter;

a valve disposed within the lumen; and

~~a retainer element configured to secure the annular valve within the lumen, wherein the retainer element is disposed within the lumen proximal to a proximal end of the annular valve, wherein the retainer element comprises:~~

~~a spring; or~~

~~a metal disc.~~

~~19. The catheter assembly of claim 18, wherein the spring is tapered inwardly in a proximal direction.~~

~~20. The catheter assembly of claim 18, wherein the metal disc comprises a central opening, wherein an outer edge of the metal disc comprises a plurality of proximally extending protrusions configured to press into the inner surface, wherein an edge of the opening comprises a plurality of distally extending teeth.~~