WHAT IS CLAIMED IS:

1. A cap comprising:

a housing comprising:

a top wall;

an essentially cylindrical sidewall forming a first cavity; and

an open bottom formed by the cylindrical sidewall with an opening to the first cavity within the housing for receiving a hub of a medical connector; and

a protrusion extending from the housing and positioned within the first cavity, the protrusion having an inner surface and an outer surface, the inner surface of the protrusion defining a second cavity,

an inner thread on the inner surface of the protrusion, the inner thread being sufficient to interlock with a mating feature of the medical connector comprising a female medical connector, and

an outer thread on the outer surface of the protrusion, the outer thread being sufficient to interlock with a mating feature of the medical connector comprising a male medical connector;

a disinfection sponge configured within the second cavity, the disinfection sponge comprising a slotted end; an essentially cylindrical sponge sidewall defining a hollow and an open end; and a sponge end wall; and

a pressure seal disposed in the hollow of the disinfection sponge, the pressure seal comprising:

an elongate member extending from an interior surface of the top wall of the housing; and

an insert comprising a bottom wall, and an essentially cylindrical insert sidewall, the insert sidewall forming a chamber and a top edge of the insert sidewall defining an aperture; the insert slidably engaging with the elongate member;

wherein upon engagement of the cap with the medical connector, the disinfection sponge contacts a lumen edge of the medical connector and the insert of the pressure seal blocks a lumen of the medical connector thereby inhibiting disinfectant ingress into the lumen.

2. The cap of claim 1, wherein an inside surface of the top edge slidably engages with the elongate member.

3. The cap of claim 1, wherein the elongate member comprises a shoulder section, a slanted section, and one or more sliding sections.

4. The cap of claim 1, wherein the insert sidewall comprises a plurality of prongs defined by portions of the insert sidewall and the top edge separated by slits.

5. The cap of claim 4, wherein faces of the prongs slidably engage with the elongate member.

6. The cap of claim 1, wherein an outside geometry of the insert sidewall comprises a tapered surface effective to compliment an inner surface of a lumen of the medical connector.

7. The cap of claim 1, wherein the insert comprises a polymeric material selected from the group consisting of polyethylene, polypropylene, thermoplastic elastomer (TPE), or combinations thereof.

8. A method of disinfecting a medical connector comprising:

connecting the cap of claim 1 to a medical connector by engaging threads of the medical connector onto the inner thread or the outer thread of the protrusion such that an edge of the medical connector contacts the disinfection sponge and the pressure seal inhibits disinfectant ingress into a lumen of the medical connector.

9. A medical assembly comprising the cap of claim 1 connected to a medical connector.

10. The medical assembly of claim 9, wherein the medical connector is a female medical connector with a male threaded fitting selected from the group consisting of: a needleless connector, a stopcock, a female Luer connector, and a catheter connector.

11. The medical assembly of claim 9, wherein the medical connector is a male medical connector with a female threaded fitting selected from the group consisting of: an intravenous tubing end and a male Luer connector.

12. The cap of claim 1, wherein when the medical connector comprises a septum in the lumen, the pressure seal is positioned to avoid creating a fluid path through the septum.

13. The cap of claim 1, wherein the slotted end of the disinfection sponge comprises a slot that extends into opposing portions of the sponge sidewall.

14. The cap of claim 13, wherein the slot extends along opposing portions of the sponge sidewall to the open end.

15. The cap of claim 1, wherein in an uncompressed state, the pressure seal is disposed entirely in the hollow.