CLAIMS

What is claimed is:

1. A rapidly insertable central catheter (“RICC”) insertion system, comprising:

a RICC assembly including:

a RICC including:

a catheter tube;

a catheter hub coupled to a proximal portion of the catheter tube; and

one or more extension legs, each extension leg of the one-or-more extension legs coupled to the catheter hub by a distal portion thereof;

an access guidewire disposed in a primary lumen of the RICC; and

a keeper including a splittable casing over both the catheter tube and a distal portion of the access guidewire extending from a distal end of the RICC forming a longitudinal composite thereof;

a RICC insertion device including:

a frame including:

a longitudinal handle including a wheel well;

a nose extending from a distal portion of the handle distal of the wheel well, the nose including a through channel configured for advancing the catheter tube of the RICC therethrough; and

a curved cradle extending from a proximal portion of the handle;

one or more roller wheels disposed in the wheel well; and

a nose cover over the nose, the nose cover and nose forming a split channel configured for both splitting and passing the splittable casing therethrough, the RICC insertion device configured for advancing the RICC assembly from an initial position in the frame to a final position in the frame by repeatedly pushing the longitudinal composite into the one-or-more roller wheels and rolling the longitudinal composite across the one-or-more roller wheels; and

an introducer.

2. The RICC insertion system of claim 1, wherein the keeper further includes a catheter-hub holder to which a proximal end of the splittable casing is attached, the catheter-

hub holder configured to hold the catheter hub therein and keep the splittable casing in position over the catheter tube and the access guidewire.

3. The RICC insertion system of claim 2, wherein the catheter-hub holder includes a perimetrical wall around at least a portion of a perimeter of the catheter-hub holder, the perimetrical wall defining a recess into which the catheter hub fits with an engineering fit.

4. The RICC insertion system of any claim of claims 1-3, wherein the cradle includes a curved extension over a distal portion of the cradle, the extension substantially following a same curve as the cradle.

5. The RICC insertion system of claim 4, wherein the cradle includes an enclosure over the distal portion of the cradle with the extension extending therefrom, the enclosure configured to enclose therein an otherwise exposed proximal portion of the access guidewire in the initial position of the RICC assembly in the frame.

6. The RICC insertion system of either claim 4 or 5, further comprising a retaining clip configured to clip on to a proximal portion of the RICC, retain the RICC assembly in the RICC insertion device, and keep the catheter tube from prematurely advancing over the access guidewire, the retaining clip including a post configured to engage with a slot in the extension that faces an open face of the cradle.

7. The RICC insertion system of claim 6, wherein the retaining clip is configured to disengage with the slot in the extension when any remaining slack of the longitudinal composite is removed upon advancing the RICC assembly from the initial position to the final position in the frame.

8. The RICC insertion system of any claim of claims 1-7, the frame further including a retaining arch over the cradle proximate the proximal portion of the handle from which the cradle extends, the retaining arch configured to retain the RICC assembly in the RICC insertion device and hold the longitudinal composite over the handle as the RICC assembly transitions over the proximal portion of the handle from which the cradle extends upon advancing the RICC assembly from the initial position to the final position in the frame.

9. The RICC insertion system of any claim of claims 1-8, wherein the nose cover and the nose further form a retaining clamp configured to slidably clamp the longitudinal

composite therein, the nose cover rotatable over the nose, and the nose cover including a longitudinal gap configured to rotatably align with the through channel in the nose for removal of the longitudinal composite, the splittable casing, or the catheter tube therefrom.

10. The RICC insertion system of any claim of claims 1-9, further comprising a retractable nicking blade, the retractable nicking blade disposed in a nicking-blade carriage slidably integrated into the nose, the nicking-blade carriage having a nicking position with the retractable nicking blade extending beyond a distal end of the nose and a safety position with the retractable nicking blade short of the distal end of the nose.

11. The RICC insertion system of any claim of claims 1-10, the introducer including:

an introducer needle including:

a needle shaft including a needle tip in a distal portion of the needle shaft; and

a needle hub coupled to a proximal portion of the needle shaft; and

a splittable introducer sheath configured to accept therein the introducer needle, the introducer sheath including:

a splittable sheath body; and

a splittable sheath hub coupled to a proximal portion of the sheath body, the sheath hub including a pair of outwardly extending wings along a length of the sheath hub having an internal angle of about 90° or less between the wings configured for splitting the sheath hub by pinching the wings together with a single hand.

12. The RICC insertion system of claim 11, wherein the sheath hub includes a single longitudinal fault along a side of the sheath hub opposite a vertex of the internal angle formed by the wings, the sheath hub configured to split along the fault for propagation along a same side of the sheath body when the wings are pinched together.

13. The RICC insertion system of claim 11, wherein the sheath hub includes a pair of longitudinal faults including a primary fault along a primary side of the sheath hub opposite a vertex of the internal angle formed by the wings and a secondary fault along a secondary side of the sheath hub opposite the primary fault, the sheath hub configured to split along the primary fault for propagation along the primary side of the sheath body when the wings are pinched

together, and the sheath hub configured to split along the secondary fault for propagation along the secondary side of the sheath body when the wings are pulled apart.

14. The RICC insertion system of any claim of claims 11-13, the sheath hub further including a valved cap disposed in a proximal portion of the sheath hub, the valved cap including a tapered female valved-cap connector and a septum distal of a proximal opening in the female valved-cap connector, the female valved-cap connector configured to accept therein a tapered male needle-hub connector extending from a distal portion of the needle hub, and the septum configured to accept therethrough the needle shaft.

15. The RICC insertion system of claim 14, wherein the valved cap is partially or fully split such that the valved cap splits with the sheath hub when the wings are pinched together.

16. The RICC insertion system of any claim of claims 11-15, the sheath hub further including:

an overmolded nicking blade distally extending from the sheath hub; and

a hinged nicking-blade cover having an opened state with the nicking-blade cover opened away from the overmolded nicking blade and a closed state with the nicking-blade cover closed over the nicking blade.

17. The RICC insertion system of any claim of claims 11-16, further comprising a syringe including a tapered male syringe tip extending from a distal portion of the syringe, the syringe tip configured to insert into a tapered female needle-hub connector in a proximal portion of the needle hub.

18. A rapidly insertable central catheter ("RICC") insertion assembly, comprising:

a RICC assembly including:

a RICC including:

a catheter tube;

a catheter hub coupled to a proximal portion of the catheter tube; and

one or more extension legs, each extension leg of the one-or-more extension legs coupled to the catheter hub by a distal portion thereof;

an access guidewire disposed in a primary lumen of the RICC; and

a keeper including a splittable casing over both the catheter tube and a distal portion of the access guidewire extending from a distal end of the RICC forming a longitudinal composite thereof; and

a RICC insertion device including:

a frame including:

a longitudinal handle including a wheel well;

a nose extending from a distal portion of the handle distal of the wheel well, the nose including a through channel configured for advancing the catheter tube of the RICC therethrough; and

a curved cradle extending from a proximal portion of the handle;

one or more roller wheels disposed in the wheel well; and

a nose cover over the nose, the nose cover and nose forming a split channel configured for both splitting and passing the splittable casing therethrough, the RICC insertion device is configured for advancing the RICC assembly from an initial position in the frame to a final position in the frame by repeatedly pushing the longitudinal composite into the one-or-more roller wheels and rolling the longitudinal composite across the one-or-more roller wheels.

19. The RICC insertion assembly of claim 18, wherein a distal end of the longitudinal composite, the splittable casing, or the access guidewire is substantially commensurate with a distal end of the frame in the initial position of the RICC assembly in the frame.

20. The RICC insertion assembly of either claim 18 or 19, wherein a slack loop of the longitudinal composite extends away from both the handle and the cradle in the initial position of the RICC assembly in the frame.

21. The RICC insertion assembly of any claim of claims 18-20, wherein the longitudinal composite is substantially split in the final position of the RICC assembly in the frame.

22. The RICC insertion assembly of any claim of claims 18-21, wherein a proximal end of an extension leg or a Luer connector coupled to the extension leg of the one-or-more

extension legs of the RICC is substantially commensurate with a proximal end of the cradle in the initial position of the RICC assembly in the frame.

23. The RICC insertion assembly of claim 22, wherein a proximal end of the access guidewire is coupled to the proximal end of the cradle in the initial position of the RICC assembly in the frame.

24. The RICC insertion assembly of either claim 22 or 23, wherein the one-or-more extension legs of the RICC lie substantially over the handle in the final position of the RICC assembly in the frame.

25. The RICC insertion assembly of any claim of claims 18-24, wherein the catheter hub of the RICC lies over the wheel well in the final position of the RICC assembly in the frame.

~~26. A method for inserting a rapidly insertable central catheter ("RICC") into a blood-vessel lumen of a patient, comprising:~~

~~obtaining a RICC insertion system including an introducer, a RICC insertion device, and a RICC assembly including the RICC, the RICC assembly optionally already disposed in the RICC insertion device in a substantially ready-to-operate state of a RICC insertion assembly;~~

~~establishing a needle tract from an area of skin into the blood-vessel lumen of the patient with an introducer needle of the introducer, the introducer needle disposed in a splittable introducer sheath of the introducer for the establishing of the needle tract;~~

~~removing the introducer needle from the introducer sheath leaving the introducer sheath in the blood-vessel lumen;~~

~~advancing an access guidewire through a nose and nose cover of the RICC insertion device, through a splittable sheath hub of the introducer, through the introducer sheath, and into the blood-vessel lumen by splitting a splittable casing away from a longitudinal composite of the RICC assembly, a distal portion of the access guidewire that extends from a primary-lumen aperture of a catheter tube of the RICC freed from the longitudinal composite with the splitting of the splittable casing for the advancing of the access guidewire;~~

removing the introducer sheath leaving the access guidewire in the blood-vessel lumen; and

advancing the catheter tube over the access guidewire and into the blood-vessel lumen by further splitting the splittable casing away from the longitudinal composite of the RICC assembly, the catheter tube freed from the longitudinal composite with the splitting of the splittable casing and allowed to advance over the access guidewire upon removal of any remaining slack of the longitudinal composite in the RICC insertion assembly.

27. The method of claim 26, wherein establishing the needle tract includes ensuring blood flashes back into a needle hub of the introducer needle for confirmation the needle tract extends into the blood-vessel lumen.

28. The method of either claim 26 or 27, further comprising aspirating blood with a syringe coupled to the introducer needle for confirmation the needle tract extends into the blood-vessel lumen before removing the introducer needle from the introducer sheath.

29. The method of any claim of claims 26-28, further comprising advancing the introducer sheath over the introducer needle and farther into the blood-vessel lumen before removing the introducer needle from the introducer sheath.

30. The method of any claim of claims 26-29, further comprising inserting a male nose connector of the nose of the RICC insertion device into a female valved-cap connector of the sheath hub of the introducer sheath before advancing the access guidewire through the introducer sheath.

31. The method of any claim of claims 26-30, further comprising nicking the area of skin around the needle tract with a nicking blade extending from the sheath hub when the catheter tube is 7 Fr or larger, the nicking of the area of skin around the needle tract performed before advancing the access guidewire through the introducer sheath.

32. The method of claim 31, further comprising

opening a hinged nicking-blade cover away from the nicking blade and into a nicking position away from the nicking blade before nicking the area of skin around the needle tract; and

closing the nicking-blade cover over the nicking blade into a safety position over the nicking blade after nicking the area of skin around the needle tract.

33. The method of any claim of claims 26-30, further comprising nicking the area of skin around the needle tract with a retractable nicking blade integrated into the nose of the RICC insertion device when the catheter tube is 7 Fr or larger, the nicking of the area of skin around the needle tract performed before advancing the catheter tube over the access guidewire.

34. The method of claim 33, further comprising:

distally sliding a nicking-blade carriage including the nicking blade overmolded therein into a nicking position with the nicking blade extending beyond a distal end of the nose of the RICC insertion device; and

proximally sliding the nicking-blade carriage into a safety position with the nicking blade short of the distal end of the nose of the RICC insertion device.

35. The method of any claim of claims 26-34, wherein removing the introducer sheath includes splitting the introducer sheath to form a split along a side of the introducer sheath by pinching together a pair of wings outwardly extending from the sheath hub and propagating the split in a side of the sheath hub along a same side of a sheath body of the introducer.

36. The method of any claim of claims 26-35, wherein advancing the access guidewire or the catheter tube includes repeatedly pushing the longitudinal composite into one or more roller wheels disposed in a wheel well of a longitudinal handle of the RICC insertion device and rolling the longitudinal composite across the one-or-more roller wheels with a single hand to split the splittable casing away from the longitudinal composite.

37. The method of any claim of claims 26-35, wherein advancing the access guidewire or the catheter tube includes pulling the splittable casing of the longitudinal composite out of a split channel formed between the nose of the RICC insertion device and the nose cover thereover to split the splittable casing away from the longitudinal composite.

38. The method of any claim of claims 26-37, wherein a retaining clip clipped on to a proximal portion of the RICC disengages with a curved extension over a cradle of the RICC insertion device upon removal of any remaining slack of the longitudinal composite in

~~the RICC insertion assembly, thereby allowing the catheter tube to advance over the access guidewire.~~

~~39. The method of any claim of claims 26-38, further comprising removing the access guidewire leaving the catheter tube in the blood vessel lumen.~~

~~40. The method of any claim of claims 26-39, further comprising removing a keeper including a proximal end of the splittable casing attached to a catheter-hub holder from the RICC assembly by removing a catheter hub of the RICC from the catheter-hub holder and splitting any remaining splittable casing of the longitudinal composite away from the catheter tube.~~

~~41. The method of any claim of claims 26-40, further comprising freeing the catheter tube of the RICC from a retaining clamp formed of the nose and nose cover of the RICC insertion device by rotating the nose cover over the nose to align a longitudinal gap of the nose cover with a through channel in the nose and pulling the catheter tube away from the RICC insertion device.~~

~~42~~26. A rapidly insertable central catheter ("RICC") insertion system, comprising:

an insertion assembly including a housing having a blood-flash nozzle and a catheter nozzle;

a blood-flash indicator in fluid communication with the blood-flash nozzle;

a RICC disposed within an interior cavity of the housing and slidably engaged with the catheter nozzle; and

an introducer including an introducer needle and an introducer sheath, the introducer releasably engaged with one of the blood-flash nozzle or a catheter nozzle.

~~43~~27. The RICC insertion system of claim ~~42~~26, further comprising a needle-retraction system coupled with the introducer needle, the needle-retraction system configured to withdraw the introducer needle from the introducer sheath proximally through the blood-flash nozzle.

~~44~~28. The RICC insertion system of either claim ~~42~~ 26 or ~~43~~27, wherein the blood-flash indicator is in fluid communication with a needle lumen of the needle.

~~45~~29. The RICC insertion system of any one of claims ~~42-44~~26 to 28, wherein a sheath hub of the introducer sheath is configured to releasably engage the catheter nozzle and longitudinally align a sheath lumen of the introducer sheath with the RICC.

~~46~~30. The RICC insertion system of any one of claims ~~42-45~~26 to 29, further comprising a catheter-advancement assembly configured to slidably engage with the RICC with the catheter nozzle.

~~47~~31. The RICC insertion system of any one of claims ~~42-46~~26 to 30, further comprising an access guidewire coupled to a guidewire-advancement assembly, the guidewire-advancement assembly configured to slidably engage the access guidewire with the catheter nozzle.

~~48. A method of placing a catheter within a vasculature of a patient, comprising:~~

~~accessing a vasculature with an introducer needle of an introducer;~~

~~withdrawing the introducer needle from a sheath lumen of an introducer sheath of the introducer through a blood-flash nozzle of an insertion assembly;~~

~~detaching a sheath hub of the introducer sheath from the blood-flash nozzle and engaging the sheath hub with a catheter nozzle of the insertion assembly;~~

~~advancing an access guidewire through the catheter nozzle and the sheath lumen;~~

~~splitting the introducer sheath longitudinally to disengage the introducer sheath from the access guidewire; and~~

~~advancing the catheter through the catheter nozzle over the access guidewire.~~

~~49. The method of claim 48, further comprising actuating a blood-flash indicator to draw a fluid flow proximally through a needle lumen of the introducer needle and through the blood-flash nozzle.~~

~~50. The method of either claim 48 or 49, further comprising actuating a needle-retraction assembly, disposed within the insertion assembly, to withdraw the introducer needle through the blood-flash nozzle and into an interior cavity of the insertion assembly.~~

~~51. The method of any one of claims 48-50, wherein the catheter includes one of a rapidly insertable central catheter, a central venous catheter, a peripherally inserted central catheter, or a dialysis catheter.~~