

A Review of Intravenous Blood-Sparing Systems and Techniques in Use Among NIH Harvard Catalyst Clinical Research Centers (HCCRC): Beth Israel Deaconess Medical Center, Brigham & Women's Hospital, and Massachusetts's General Hospital

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Purpose

- To review blood sparing systems and techniques in use among the HCCRCs as a first step in determining best practices.

Background






- IV blood sparing systems have been standard practice for studies requiring frequent blood sampling for many years.
- Nurses at one center identified practice ambiguities and began to question their blood sparing practices.
- A general consensus developed related to the need for a system evaluation.
- Through the HCCRC Nursing Best Practice Committee a practice question was formulated: is there an IV blood sparing system better suited to improving nursing practice, sample integrity and research participant satisfaction?

Method

- The HCCRC Nursing Best Practice Committee, membership representing BIDMC, BWH, MGH and BCH, discussed pros and cons of their respective blood-sparing systems.
- Metrics were identified: patient safety, comfort, sample integrity, ease of use and cost.
- An extensive literature review was initiated and has continued to date.
- Nurses at each center were interviewed about their thoughts on the pros and cons of their systems and techniques. Quotes from the interviews appear in the table to the bottom right.

Evaluation

- The group discovered that each institution had its own IV blood-sparing system and techniques.
- All nurses expressed comfort with their system and techniques.
- Nurses admitted to the practice of continued use of systems because of habit and familiarity. Most nurses did not know how the blood sparing system came to be used on their unit.
- Through interviews, nurses voiced their concerns.
- Each CRC found areas for improvement and made recommendations.
- None of the institutions had ever initiated system updates to reflect new technology.

Beth Israel Deaconess Medical Center	Brigham & Women's Hospital	Massachusetts's General Hospital
 <p>Open system Open x 2 per blood draw No discard No IV pump No heparin Cost = \$0.84</p>	 <p>Open system Open x 1 per blood draw No discard IV pump Heparinized Cost = \$6.18</p>	 <p>Open system Open x 1 per blood draw No discard IV pump No heparin Cost = \$6-7.00</p>
 <p>Closed system No discard No IV pump No heparin Cost = \$16.99</p>	 <p>Open system Open x 3 per blood draw 0.2mL discard IV pump No heparin Cost = \$0.82</p>	<p>Open or Closed Systems refers to whether in the process of obtaining a blood sample the system is open to air or not.</p> <p>Cost excludes syringes, IV tubing, extension sets, intravenous fluids.</p>

Summary of Staff Interviews

Top Concerns

Fibrin formation-clots

Open System → increased risk of infection

Open System → Blood Exposure → Increased staff risk

Top Recommendations

Change to any system that would ↓fibrin formation
↓risk of blood exposure ↓infection risk

Change to a closed system

Shorten extension tubing length

Sample of Staff Nurse Comments

CONCERNS

- It's not truly a closed system; too many connections needed to put the system together which can result in loose connections – leaks, bacteria, etc.
- I strongly dislike the [open] system because there's too much opening and closing, high risk for infection, high risk for injection of air, etc. I also do not think it is as efficient a system. There is a much smaller volume that is used for the [closed] system.
- [I have concerns about the] length of tubing to patient. Too long and puts too much stress on the vein. System encourages fibrin formation.
- I would prefer that we were able to use claves [needleless connectors] on the ports. I feel like there is a high risk for us to have blood exposure, so I would like the system to be a little tighter...

RECOMMENDATIONS

- [I would recommend a change to] a system that has less connections.
- [I would recommend we] shorten the tubing to the patient and decrease any connections not needed to prevent clot formation.
- Something that alleviates the open system, clotting, and all of the above.
- I think there needs to be more standardization across everyone who uses the systems. As far as, are we vacutaining, syringing, capping, leaving syringes on, etc.
- I would just recommend we eliminate the [open] system and go the [closed] system.
- I think that there are some studies that use a 0.2mL clear of the proximal [sample] port. And I think that should be a universal system for all studies to resolve some of the issues that you asked about earlier.
- I like the [closed] system. If we could change over to the [closed] system, that's what I would do. It is cleaner, self-enclosed, there is less room for error.

Next Steps

- Complete literature review: determine if further investigation is needed
- Continue to research new technologies that will address stated concerns and recommendations
- Report any evidence for practice changes to Best Practice committee
- Best practice committee to determine if a change in practice is recommended and report to their respective sites
- Individual HCCRCs can decide if a change in their practice is warranted or preferred

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