Nine Recommendations To Prevent Multiple Line Infusion Medication Errors

From Mitigating the Risks Associated With Multiple IV Infusions. Recommendations from an interim report, Multiple Intravenous Infusions Phase 1b: Practice and Training Scan.
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About the Healthcare Technology Safety Institute (HTSI)
Founded within the AAMI Foundation, the 501(c)(3) charitable arm of AAMI, the HTSI is a community of leaders throughout the healthcare system that are dedicated to one common vision, “No patient will be harmed by healthcare technology.”
HTSI's mission is “To engage the entire healthcare community in multi-disciplinary safety initiatives that strengthen the development, management, and use of healthcare technology for improved patient outcomes.” HTSI engages the healthcare community in research, education, consensus, and partnerships related to the challenges facing healthcare technology industries, regulatory and accrediting bodies, clinicians, caregivers, and patients.

About The Health Technology Safety Research Team (HTSRT)
HTSRT solves healthcare issues in a new way. HTSRT strives to improve health systems. Rather than focusing on incremental improvements to technology, processes or environments in isolation, the team investigates these elements holistically as a socio-technical system. Central to HTSRT's systems approach is a focus on the needs of people—not technology—first. This unique strategy requires a detailed understanding of cultural and contextual factors. HTSRT is thus able to identify a wide range of issues and contributing factors and to create innovative solutions that span the socio-technical system, from device and environmental design, to training programs and government policy recommendations. These solutions are developed and refined through the active engagement of the end-user community, often through the use of an iterative design process. This approach distinguishes HTSRT in the health systems quality and safety community, and positions the team to continue to yield impactful, sustained, health system improvements.

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Introduction

The study, *Mitigating the Risks Associated With Multiple IV Infusions*, is being conducted by the Health Technology Safety Research Team at the University Health Network in Toronto, Canada in collaboration with ISMP-Canada. The nine recommendations on the following pages are from an interim report, *Multiple Intravenous Infusions Phase 1b: Practice and Training Scan* and is available on the HQO website at www.hqontario.ca/en/mas/mas_ohtas_tech_mii_20120530.html.

The initial report, *Multiple Intravenous Infusions Phase 1a: Situation Scan Summary Report*, summarizes the interim findings based on a literature review, an incident database review, and a technology scan. It can be found on HTSRT’s website at: www.ehealthinnovation.org/files/Multiple%20IV%20Infusions_Phase1a_SummaryReport.pdf.

The Study is part of a larger effort by the healthcare community to improve the safety of infusions, the subject of roughly 56,000 reported problems to the U.S. Food and Drug Administration between 2005 and 2009. AAMI and the FDA held a summit on the issue in 2010, and one of its conclusions was the need for more research on infusion safety issues.

The AAMI/FDA 2011 Summit publication is available at the HTSI web site: www.aami.org/htsi/infusion/summit/AAMI_FDA_Summit_Report.pdf.

The following pages include nine recommendations and their associated rationales according to the following safety-related themes:

- Secondary infusions
- Line identification
- Line set-up and removal
- IV bolus administration

If not managed properly, multiple intravenous (IV) infusions have the potential to harm or even kill patients because of line and bag mix-ups.
Secondary Infusions

1. When initiating a secondary medication infusion (often referred to as a piggy-back infusion), nurses should verify that the secondary infusion is active—and that the primary infusion is not active—by viewing the activity in both drip chambers. Full drip chambers should be partially emptied to restore visibility.

Continuous high-alert medications should be administered as primary infusions. Continuous high-alert medications should not be administered as secondary infusions. No secondary medications should be connected to high-alert primary continuous infusions.

Secondary infusions should be attached to primary infusion sets that have a back check valve. If infusion sets without back check valves are also available, multiple strategies should be employed to ensure that the types of tubing are easily differentiated, and that the likelihood of a mix-up is minimized.

Line Identification

4. Hospitals should work towards the use of gowns that have snaps, ties, or Velcro on the shoulders and sleeves to facilitate line tracing and gown changes. Metal fasteners (e.g., metal snaps) should be avoided to prevent patient burns if a gown with metal fasteners goes into the magnet room of a magnetic resonance imaging (MRI) suite.

5. If an “emergency medication line” controlled by an infusion pump is set up, it is strongly suggested that the associated primary IV tubing be labeled as the emergency medication line at the injection port closest to the patient. The label should be prominent and visually distinct from all other labels in the environment.

Line Set-Up and Removal

6. When setting up multiple IV infusions at the same time (e.g., a new patient requires many ordered infusions immediately, routine line changes), infusions should be set up one at a time, as completely as possible, before setting up the next infusion. Set-up tasks required for each infusion vary and may include:

- labeling (e.g., IV tubing, pump)
- spiking and hanging the IV bag
- connecting the IV tubing to the pump
- programming the IV pump
- connecting the IV tubing to the appropriate location (e.g., patient access, manifold)
- starting the pump (unless a secondary infusion must be set up prior to starting the pump, or other infusions need to be connected to a multi-port connector before flushing).

Minor modifications to this recommendation are required for routine line changes.
Multiple three-way stopcocks joined together in a series to connect multiple IV infusions into a single line are prone to leaks, which may often be undetectable. Hospitals should provide multiport or multi-lead connectors, and nurses should use these connectors to join multiple IV infusions into a single line as required.

**IV Bolus Administration**

Hospitals should develop a policy to limit the practice of manually increasing the infusion rate to administer a medication bolus of a primary continuous infusion. If a separate medication bolus cannot be prepared, and the bolus is administered using the primary continuous infusion pump/pump channel, then the nurse should program the bolus dose parameters (i.e., total amount of medication to be given over a defined duration) into the pump without changing any of the primary infusion parameters. Some examples of how to specify the bolus dose parameters include the following:

- programming a bolus using a dedicated bolus feature in the pump (preferred, if available)
- programming a bolus using the pump’s secondary feature but without connecting a secondary IV bag (pump will draw the bolus from the primary IV bag)

Hospitals should ensure that their smart pump drug libraries include hard upper limits for as many high-alert medications as are appropriate for each clinical area, in order to prevent the administration of a bolus by manually increasing the primary flow rate.

**Contact Us**

Has your healthcare organization implemented any of the strategies discussed in this publication?

Do you know of a healthcare facility that has dealt with a technology-related issue and has a story to share?

If so, we would love to hear from you!
Please email slombardi@aami.org.

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