



# e-Network Forum

## CALIFORNIA BLOOD BANK SOCIETY

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### ***Infusing drugs or IV solutions along with blood***

**A blood banker in Texas** reports that an anesthesiologist at her hospital is re-infusing intra-operatively **salvaged blood** through the same intravenous line as he infuses a **morphine drip** with 5% dextrose in half-normal saline solution. This practice is occurring during Total Knee and Total Hip Replacements. Several operating room nurses are concerned with this practice, since the nurses are aware of the AABB Standards which state that 'with the exception of 0.9% sodium chloride, USP, drugs or medications shall not be added to blood or components unless 1) They have been approved for this use by the FDA or 2) There is documentation available to show that the addition is safe and does not adversely affect the blood or component'.

**Editor's note:** See previous discussions on [solutions other than isotonic saline that are approved for addition to blood](#) and components, and [adding medications to blood](#). The Anesthesiologist has been asked to reconsider his practice, but he insists that it is ok to re-infuse the blood through the same line as the drug with 5% dextrose in half-normal saline solution. In fact, the anesthesiologist provided a [reference](#) that he believes supports his practice of running morphine with blood.

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The inquiring blood banker is not convinced and is looking for guidance. The following replies have been received in response to the inquiring blood banker's query.

1. **A practicing anesthesiologist in a tertiary care facility in Canada** reported that he, and almost all of his colleagues that he is aware of, have administered drugs through blood lines for the same reasons outlined by the e-network discussions (see above, including the links to related discussions). In the anesthesiologist's opinion, **the practice of ensuring that blood and a drug are compatible is impractical for all of the drugs that are used routinely**. The volume of a given drug administered to a flowing i.v line seems, by common sense, to be minute (one to 10 mL slowly injected into a flowing line). The responding anesthesiologist **asks the following questions:** What happens to the drug when it is administered via a separate line where it gets into the circulation and the patient's own blood? What evidence exists for the guidelines that have created the restricted list of drugs that can be administered? With the large number of cases of drug and fluids administered through lines with transfused blood, what reports, published or anecdotal, is anyone familiar with where a bad outcome has occurred? The inquiring anesthesiologist is interested in comments, particularly those that are evidence-based. He concludes by saying that there appears to be little evidence to support the position to limit the drugs that can be administered with blood. On the other hand, many people do administer drugs along with blood in practice routinely, and have no problems of clinical significance.

**ADDENDA** May 17, 2002

2. **A Texas blood bank physician** (different than the inquiring Texas blood banker) comments that the article on which the anesthesiologist is depending to defend his practice of infusing drugs in 5% dextrose with red blood cells describes practices in New Zealand and relates **solely** to addition of morphine, ketamine and pethidine directly to packed red blood cells. There is no mention of the concomitant use of **5% dextrose solution (which is more troublesome than the drugs themselves)**. This responding Texan is of the opinion that the anesthesiologist is subject to U.S. FDA requirements which specifically prohibit his practice, and she suggests that someone needs to give him a copy of 21 CFR 600 et seq and the current version of AABB Standards.

**(Editor's query:** It would be interesting if an **FDA** e-Network correspondent provided more details on the U.S. FDA requirements alluded to in this reply).

3. **A blood banker from St. Louis** reports that a response to the Texas blood banker's question about anesthesiologists adding drugs and solutions to the blood transfusion line is addressed in the **March, 2002, Standards Source** (Standard number 5.18.9). The answer to the question in the Standards Source outlines the **rationale for not mixing drugs and/or solutions with blood**. It also lists several journal references that may be of interest. Copies of the Standards Source can be obtained via the [AABB](#).

**ADDENDUM** May 20, 2002

4. **An anesthesiologist and Director of an Intraoperative Autotransfusion Service at a highly prestigious institution in the Midwest** comments that regarding the addition of morphine into a line while infusing salvaged blood, in general, this is a routine practice amongst anesthesiologists. Often, IV access is limited and the ability to give drugs through other lines is not feasible. Despite this standard of care, it doesn't necessarily make it right. The [article](#) referenced by the anesthesiologist from Texas discusses morphine in a 1 mg/ml concentration, which typically is in an isotonic saline base and the study showed compatibility. If the anesthesiologist has changed the formulation to incorporate **dextrose** and 1/2 normal saline, the osmolarity of the solution has now become hypotonic and will lead to some red cell hemolysis; however, at the rate of infusion of the morphine (5 ml/hr) combined with the rate of the red cell readministration (as fast as possible), the responding anesthesiologist thinks that the red cell hemolysis would be negligible. Ideally, the infusion should go into another IV but sometimes this is just not possible. Additionally, in the midst of a major blood loss case, worrying about something that is of little clinical significance, detracts from the big picture. So, the responding Midwesterner's feeling is to educate the Texas anesthesiologist as to the concerns surrounding his practice and to suggest that the best quality of care would be to use separate IV lines, but accept the fact that his practice is something that probably has negligible clinical significance, and that anesthesiologists may not be able to always comply.

**ADDENDA** May 21, 2002

5. Recently, **a Southern California hospital discovered** that its anesthesiologists were adding medication directly into the blood bag during surgery. The Department of Anesthesiology was informed that this practice was prohibited by AABB Standards. However, the hospital anesthesiologists are not accepting AABB Standards at face value, and their department has formally requested the Transfusion Committee to educate them as to how adding medications directly into the blood product bag affects the blood product. Members of the e-Network who have information about the effects of specific drugs on blood products are encouraged to share that information by contacting us.

**ADDENDA** May 22, 2002

6. The blood banker who responded in [#3](#) above made reference to the March, 2002, Standards Source (Standard number 5.18.9), but did not provide the content of that reference. What follows summarizes the **March, 2002, Standards Source** (Standard number 5.18.9) According to the AABB Standards, with the exception of 0.9% sodium chloride, USP, drugs or medications shall not be added to blood or components unless one of the following conditions are met:

1. They have been approved for this use by the FDA.
2. There is documentation available to show that the addition is safe and does not adversely affect the blood or component.

Standard 5.18.9 limits the drug or medications that can be administered with blood. It is desirable that blood be the only fluid administered through a catheter at one time. Hypotonicity of some solutions may result in hemolysis, and the presence of excess calcium in others may result in clotting. Further, red cells stored for some weeks in CPDA-1 acquire a storage lesion and lose some of the buffering capacity of fresh human blood, and are theoretically less able to cope with the injurious effects of some high or low-level pH drug solutions. In addition, when a solution is infused simultaneously with blood and there is an adverse event, it becomes difficult to distinguish whether the blood or the solution is the cause. In this case, the transfusion has to be interrupted and the unit potentially discarded. The use of another unit increases the cost of the therapy and exposure to multiple donors when another unit is selected. There may be circumstances, however, when infusing separately is not practical. If simultaneous infusion is practiced within an institution, procedures should describe the circumstances under which infusing blood and solution simultaneously is acceptable and which solutions can be used in these circumstances. For example, Amphotericin B and IL-2 are medications that frequently yield adverse reactions. In addition, the package labeling of medications and solutions should be examined for any contraindications regarding administration with blood components. Review of the package insert for this type of information can reveal that the solution is acceptable for simultaneous infusion. For example, the package insert of Normosol-R states that "the solution can be used for starting blood transfusions." Additionally, the package insert for Plasmalyte-A injection pH 7.4 can be used as a priming solution for blood components, and may be added to or used with blood components through the same line, and may be used as a diluent for blood components. Typically, the multi-lumen catheters have the exit holes for each lumen physically separated by a distance of approximately 2.5 cm and exit on different sides of the catheter. This design allows for dilution in the vessel and minimization of mixing of infusing solutions. Thus, at slow rates of infusion, it is unlikely that the blood component exiting the catheter would be affected. Even under these circumstances, however, an adverse effect on the blood component cannot be excluded with all solutions. The risk of an adverse reaction should be weighed against the benefit of giving both fluids simultaneously. Solutions that are not approved for simultaneous infusion include lactated Ringer's solution, 5% dextrose in water, and

hypotonic sodium chloride solutions. Acceptable solutions for this practice include calcium-free isotonic electrolyte solutions that meet the requirements of the FDA and the Circular of Information for the Use of Human Blood and Blood Components. All solutions are to be administered with the approval of the patient's physician. For more information, see these issues of TRANSFUSION: Ryden SE, Oberman HA. Compatibility of common intravenous solutions with CPD blood. Transfusion 1975; 15:250-5 (Abstract); Lo G, Herring Pk, Moldenhauer C. Administration of drugs in a patient controlled analgesic device (PCA) during blood transfusion. Transfusion 1993; 33(suppl.):27S; and Van den Bas AG. Compatibility of blood and intravenous drug solutions. Transfusion 1997; 37(Suppl.):333S.

**ADDENDA** May 23, 2002

7. **A blood bank physician from Detroit, Michigan** points out that in transfusion medicine, the precautionary principle is usually applied when a risk is unknown but presumed to exist. This principle essentially states that anything that can be done to minimize risk is done, even if the risk cannot be measured or is hypothetical. While the application of this principle is controversial in donor deferrals for possible vCJD exposure, she thinks that in the case of avoiding directly adding drugs to blood, it would be a wise principle to abide by, for several reasons.
- It is not known with certainty the effect of medication when interacting with the blood component, anticoagulant, preservatives, senescent RBCs, platelets, etc, that may be in the blood bag.
  - The federal government has weighed in on this issue in the [Circular of Information](#) (PDF file), by approval of the wording of the Circular, which serves as a product insert. This is not just the AABB talking.
  - While adding drugs to the blood component itself may be standard practice at this hospital, it is NOT standard practice at any of 12 or so facilities at which the responding blood banker has practiced, and colleagues in anesthesia that she has queried make a distinction between adding meds to the bag and infusing meds in the same line as blood - i.e., **never add medications to the bag**; medication infusion in the same line may sometimes be necessary.
  - Another concern is that of potential harm to another patient, such as the scenario that the medication is added to the blood bag, the blood is not transfused to the surgical patient, but is returned to the blood bank and reissued for another patient. (Would the blood bank be made aware that the bag had been entered to inject medication?) Now, the bag is an open system, and is technically an adulterated product, as the labeling on the bag does not correspond with the contents of the bag. So there is the potential risk to another patient of an unsterile unit, as well as any possible reaction to medication in the blood component.

**ADDENDA** Dec. 30, 2005

8. **Editor's note:** The following article is germane to this discussion:

van den Bos A, Wissink WM, Schattenberg AV, Werre JM, de Pauw BE. [Feasibility of a new in vitro approach to evaluate cellular damage following co-infusion of red blood cell concentrates and intravenous drug solutions](#). Clin Lab Haematol. 2003 Jun;25(3):173-8.

**ADDENDA** June 4, 2006

9. **Editor's note:** The following article is germane to this discussion:

Yousef HM, Padmore RF, Neurath DD, Rock GA. [The effect of patient-controlled analgesia on coadministered red blood cells](#). Transfusion. 2006 Mar;46(3):372-6.

Please submit comments to the [e-Network Forum](#).



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**Posted:** May 16, 2002

**Addenda:** May 17, 20, 21, 22 & 23, 2002; Dec. 30, 2005; June 4, 2006

**Link Updated:** Mar. 3, 2006