



Medical Direction and Practices Board

The Importance of Proper Preparation of Injectable Medications

White Paper

In emergency medical care, the correct preparation and administration of injectable medications is critical to ensuring patient safety and treatment effectiveness. Mixing a drug with the wrong fluid or preparing it improperly can lead to serious complications, such as tissue damage, reduced drug effectiveness, or dangerous interactions. Using the wrong fluid can alter the pH or stability of the drug, potentially rendering it ineffective or harmful. Additionally, some drugs need to be given slowly or in specific concentrations, which makes accurate preparation even more important.

Maine EMS protocols have evolved in recent iterations to include specific mixing and administration instructions to improve safety and effectiveness of medications. The MDPB is working to simplify medication mixing by protocolizing nearly all prehospital medications to be mixed in either normal saline (NS – 0.9% sodium chloride) OR dextrose 5% (D5W), with only a few specific exceptions, with the goal of streamlining decision-making in urgent situations. Unless otherwise specified, all medications in the Maine EMS formulary may be mixed in D5W or NS (at specified volume).

Exceptions include:

- Sodium bicarbonate when diluted for children under 2 years old
- Amiodarone drips that are compounded in the field

In the case of sodium bicarbonate, the standard 8.4% is too concentrated for young patients and needs to be diluted by half to 4.2%. Doing so with normal saline renders the solution too concentrated in sodium and it becomes hypertonic. Mixing with D5W avoids this issue.

Amiodarone is known to precipitate (crystallize) when mixed with normal saline, especially in higher concentrations or during prolonged infusions. This precipitation can clog IV lines or cause embolism if infused into the patient. Mixing with D5W prevents this from happening by maintaining the solubility of the drug in solution.

Diluting Amiodarone in small volumes (under 20 ml's) for immediate administration IVP does not present this harm. In addition, common practices of flushing with normal saline after medication delivery presents no harm.

EMS Clinicians are often the first healthcare providers to administer these medications, sometimes in high-stress situations. This makes it essential to double-check medication labels, reconstitution guidelines, and fluid compatibility charts. Using protocols, checking expiration dates, and verifying the correct diluent can prevent avoidable errors. Accurate preparation helps by protecting the patient and ensuring the best possible outcome.