How Fast Is Too Fast for Delivering IV Push Medications?

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**Problem:** Errors in administering intravenous (IV) therapy can cause serious harm to patients. In fact, with few exceptions, high-alert medications that are known to harm patients are administered via the IV route. One aspect of potentially harmful IV errors that may go unnoticed, however, is the injection of an IV medication too quickly.

At the Institute for Safe Medication Practices (ISMP), we have received several reports of such errors. Sometimes the error is minor, such as the rapid administration of IV ampicillin. In other cases, however, the results have been more serious, such as the rapid administration of IV vancomycin, which can lead to severe hypotension and flushing of the upper body (“red man syndrome”).

Other examples include the rapid administration of potassium chloride solution, especially when prescribers use the term “bolus,” or the rapid administration of IV midazolam (Versed, Roche), which should be given slowly while the drug’s effects on the patient are carefully monitored.Fatalities have been reported when the concentrated form of a drug, such as epinephrine 1:1,000, has been given by a direct “IV push” injection.

Our organization has also received a report of a patient who died after receiving an injection too quickly. A physician in the emergency department had prescribed labetalol HCl 20 mg, by IV push, for a patient experiencing a hypertensive crisis. A nurse retrieved the drug quickly, but the patient was in the process of being transported to the radiology center. On the way, the nurse administered the medication in a matter of seconds. The patient immediately went into cardiac arrest and was unable to be resuscitated. Later, the staff discovered several other cases in which rapid IV push of labetalol might have contributed to patient harm.

According to a study in the United Kingdom, the overly rapid administration of IV medications occurs frequently. The authors uncovered errors in 49% of all IV medications administered. Of these mistakes, 73% occurred when IV push doses were given. In 95% of these cases, the dose was given more quickly than recommended. More than half of these errors were of potentially moderate severity.

**Safe Practice Recommendation:** Here are some suggestions for preventing errors during IV administration:

- To reduce patient harm from a rapid injection, practitioners need ready access to information about the maximum rate of administration (i.e., in milligrams per minute) for agents that pose a high risk of adverse effects when given too quickly. This information should be provided as an alert on pharmacy-applied product labels and as a special notation on computer-generated medication administration records.
- Warnings of any risks should also appear on automated dispensing cabinet screens if applicable.
- A list of these drugs and administration guidelines should be posted in areas of medication use.
- Some hospitals provide data in their internal electronic system (Intranet); on personal digital assistants (PDAs); and in small pocket guides.
- Using a less concentrated solution might help prevent delivery of the drug too rapidly. For example, when the 1-mg/ml strength of midazolam is used instead of the 5-mg/ml strength, the staff can slowly titrate the dose during administration.
- Medications that carry a risk of adverse effects if given too quickly should be diluted and given as a “piggyback” infusion or given via an infusion pump.
- A syringe pump should be used to deliver small-volume IV medications.
- Staff members should avoid using terms such as “IV push,” “IVP,” or “bolus” with drugs that must be administered over a period of one minute or longer. More descriptive terms, such as “IV over five minutes” should be used.
- Drug manufacturers could design a syringe that would allow only slow IV administration (e.g., no faster than 5 to 15 minutes, depending on volume).
- Standardizing the way in which labels are placed on syringes can reduce errors resulting from IV push medications. The patient’s name, the drug name, and the amount of medication should appear parallel to the long axis of the syringe and from the needle end of the syringe to the plunger so that the printing will be “right side up” for practitioners who are right-handed (80%) and who usually hold a syringe by its plunger in their right hand.
- Because the staff members who administer the drug must often observe the syringe’s volume scale, they should make sure that the top of the label is placed flush against the scale. This method provides an important layer of safety by allowing practitioners an additional opportunity to see the patient’s name and the drug name without having to turn the syringe.

**Reference**