Patient Safety
ISMP Canada

Interruption of Epoprostenol (Flolan) Infusion Leads to Patient's Death

Recently, the Institute for Safe Medication Practices (ISMP) Canada shared information learned from review of an incident that led to the death of a patient with severe pulmonary arterial hypertension.

The death occurred after interruption of a continuous intravenous (IV) infusion of the short-acting drug epoprostenol (Flolan). Epoprostenol is administered as a continuous IV infusion via an ambulatory infusion pump and a long-term central venous access device, such as a Hickman catheter. Because epoprostenol has a very short half-life (2.7 minutes), the medication must be administered continuously at a specified rate. Problems in the

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delivery system resulting in an abrupt interruption in administration of the drug or inadvertent administration of a bolus have been associated with serious consequences, including death.

A patient with severe pulmonary arterial hypertension was being treated with a continuous infusion of epoprostenol delivered via an infusion pump through a Hickman catheter.

The treatment was initiated by a specialist while the patient was in hospital. Both the patient and family were taught how to manage the ambulatory infusion pump, including how to change the cassettes containing the drug. In addition, at the time of discharge, the patient and family were given the telephone number of the hospital's pulmonary arterial hypertension "hotline," in case they experienced any problems.

A few weeks after discharge, the patient was unwell, an ambulance was called. Because of the urgency of the situation, the patient was taken to another hospital, the one closest to the patient's home.

While in the emergency department, the patient initiated a scheduled change of the drug cassette in the infusion pump.

At some point during this procedure, blockage of the Hickman catheter was noted. The staff in the hospital's emergency department attempted numerous times to reach the hotline, without success. During this time, staff withdrew the medication from another cassette and attempted to inject it through the peripheral line. The patient experienced rapid atrial fibrillation, for which treatment was required. Although the atrial fibrillation resolved, the patient's oxygenation rapidly deteriorated, and cardiopulmonary arrest occurred. During resuscitation, the Hickman catheter was unblocked, and the epoprostenol drip was restarted with a new cassette. The patient's oxygenation improved, and cardiac rhythm was restored. The patient was transferred to the intensive care unit but died the following day.

Review the critical points of potential failure from multiple perspectives

During follow-up of this case, the cause of death was determined to be a complication of primary pulmonary arterial hypertension subsequent to blockage of the Hickman catheter (for epoprostenol administration).

Recommendations

The following recommendations are provided for consideration by facilities that administer epoprostenol by IV infusion and also facilities and emergency services that may provide care to patients who are receiving this drug by infusion.

Discharging Patients Home on Epoprostenol Infusion

- Review the critical points of potential failure from multiple perspectives, including patient, family, health-care professionals, equipment and supplies.
- Ensure that written instructions provided to the patient include emergency and alternate contact numbers.

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For example, the hospital where the patient was initiated on the epoprostenol infusion now uses a single-service pager, which is carried by the pulmonary hypertension physician on call, and includes the number of the pager in the patient's emergency instructions. A back-up plan, with alternate contacts, is also now in place.

- Because calls may be routed through a switchboard or "locating" service, ensure that all locating staff know how to manage these high-priority calls, including a back-up plan if a pager goes unanswered.
- Conduct tests to ensure that the emergency processes work as expected and to identify any failures that need to be addressed.
- Identify the supplies and instructions that the patient needs to have readily accessible at all times. Advise patients to carry supplies whenever they leave home. Consider giving the patient a travel bag with a checklist of items for this purpose.
- Provide clear, concise, and understandable instructions to accompany the ambulatory infusion pump. Remember that these instructions may be needed by individuals (including health-care professionals) who are unfamiliar with the medication and/or the infusion device.
- Consider working with a human factors engineer to assist with the design of instructions for patients and their families, and health-care professionals who do not have experience with this medication or the ambulatory infusion pump.

Providing Care to Patients Who Are Receiving Epoprostenol

- Ensure that staff are aware that maintaining the continuous infusion rate for epoprostenol is critical because of the drug's short half-life (2.7 minutes).
- Ensure close monitoring of patients who are receiving epoprostenol. Encourage staff to call the contact number to enhance understanding of steps needed to assist with provision of care and to ensure they are prepared in case difficulties arise.
- In the event that the central access device for the epoprostenol infusion becomes blocked, transfer the ambulatory pump to another IV site immediately.
- Connect the tubing so that the drug reaches the patient in a timely manner (e.g., avoid attaching the tubing at a Y site).
- Do not mix epoprostenol with any other parenteral medications or solutions before or during administration.
- Avoid bolus injections of epoprostenol, as this can also lead to severe harm or even death. (Refer to product monograph for additional information including technical requirements of infusion devices for an epoprostenol drip.) MD