

# Ambulatory Pump Safety: Managing Home Infusion Patients Admitted to The Emergency Department and Hospital

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Before the 1980s, patients had to be hospitalized to receive various types of infusion therapies to treat diseases unresponsive to oral medications. Since then, the availability of lightweight ambulatory pumps has made infusion therapy possible in alternative settings outside the hospital, including in the home. One market research study suggests that the use of ambulatory pumps is commonplace and will continue to grow at an annual rate of about 9%.<sup>1</sup>

This growth is tied to an increasing geriatric population, the expanding prevalence of chronic diseases such as cancer and diabetes, and positive patient outcomes in a less-expensive home setting. Ongoing technology developments and newer applications of ambulatory pumps in the home are driving an increase in their use. Today, ambulatory pumps are being used to deliver various medications (Table 1) to treat a wide array of diseases and conditions, from diabetes to chronic pain. This mode of delivery typically involves using a needle or catheter under the skin to administer medications, blood products, nutrition, or hydrating solu-

tions via the IV, subcutaneous, epidural/intrathecal, percutaneous, intrawound, intrahepatic, or other parenteral routes.

As with any medication delivery system, patient safety can be jeopardized if the devices are mishandled when filling, programming, attaching, and monitoring the pumps. The ambulatory pump marketplace is diverse, so the devices rarely have standard components. This poses a unique challenge for health care providers when patients who use these devices are admitted to an emergency department (ED) or hospital. Often, health care providers are not familiar with all the ambulatory pumps in use, and most patients who use these devices are ill informed, leading to serious errors—the most dangerous of which is overinfusion. For example, earlier this year in this column, the ISMP described numerous overinfusions of fluorouracil caused by the misprogramming of a CADD ambulatory infusion pump and misusing a rate-specific elastomeric EASYPUMP. In this column in 2017, we published an event in which both a patient and clinicians in the ED mistakenly believed an elastomeric DOSI-FUSER pump had malfunctioned and delivered an overinfusion of fluorouracil when it had not, leading to the omission of a large portion of the prescribed chemotherapy after the infusion was disconnected prematurely.

Insulin pumps provide another example of a unique challenge to clinicians when

patients with these devices present for treatment. Insulin pumps have been used for more than 35 years. There are nearly a dozen different devices available in the U.S. today. In 2007, about 374,000 patients with type-1 diabetes were using insulin pumps.<sup>2</sup> Today, more than half a million patients with type-1 and type-2 diabetes are using them.<sup>3,4</sup> Yet few health care clinicians working in hospitals have a comprehensive understanding of these devices. When patients with insulin pumps are evaluated in the ED or admitted to the hospital, they typically have more knowledge and expertise with using the pump than the medical professionals who are handling their care.<sup>1</sup>

## Don't just turn it off

So, what happens in your hospital when a patient using an ambulatory pump to deliver a medication or solution is admitted to the ED or hospital? What if the patient is unresponsive and cannot help to identify the medical device found at his or her waist? Simply discontinuing the therapy may NOT be the most appropriate or safest solution. Turning off the ambulatory pump without understanding its purpose and contents could lead to serious, even fatal, events.<sup>5</sup> For example, in a 2014 consensus statement, the American Association of Clinical Endocrinologists and the American College of Endocrinology encouraged hospitalized patients and their admitting physicians to not discontinue an insulin pump, but rather to consult the specialist responsible for the patient's insulin pump management if the patient cannot manage his or her own pump.<sup>4</sup> Another example involves the serious consequences of interrupting a continuous infusion of an IV prostacyclin (epoprostenol or treprostinil) used to treat pulmonary hypertension.

But continuing the infusion without knowing how to manage the pump may not be a clinically appropriate or safe alternative either, especially if the patient

**Table 1 Examples of Medications/Medication Classes and Solutions Commonly Administered at Home via Ambulatory Pumps**

<ul style="list-style-type: none"> <li>• Analgesics</li> <li>• Antiemetics</li> <li>• Antimicrobial, antifungal, antiviral agents</li> <li>• Antineoplastic agents</li> <li>• Antispasmodic drugs, including baclofen</li> <li>• Biologic drugs</li> <li>• Blood factors</li> <li>• Corticosteroids</li> <li>• Diuretics</li> <li>• Epoprostenol or treprostinil</li> </ul>	<ul style="list-style-type: none"> <li>• Hematopoietic agents</li> <li>• Heparin</li> <li>• Hormones, including insulin and growth hormones</li> <li>• Hydration</li> <li>• Immunological medications</li> <li>• Inotropic medications</li> <li>• Monoclonal antibodies</li> <li>• Parenteral nutrition</li> <li>• Tocolytics</li> </ul>
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is not well enough to manage the device. Even allowing a very capable patient to manage his or her own ambulatory medication pump can be risky.<sup>5</sup> For example, it may be impossible to determine if the device is working properly or where to find replacement parts or batteries if clinicians don't know how to operate that particular pump. Clinicians may not know how to turn off the pump in an emergency or refill the device when it is empty.<sup>6</sup> With insulin pumps, for example, serious errors have been reported in which a patient self-administered a dose of insulin via an ambulatory pump without telling the nurse, and the nurse administered the same dose via an injection. Also, if the patient's condition changes or if the patient must undergo surgery, the ambulatory pump may need to be managed by clinicians or turned off temporarily.<sup>5</sup>

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*The reports described here were received through ISMP's Medication Errors Reporting Program (MERP). Errors, close*