

# Nurse AdviseERR®

Educating the Healthcare Community About Safe Medication Practices

## Managing hospitalized patients with ambulatory pumps: Findings from an ISMP survey—Part 1

In our October 2015 newsletter, we invited readers to complete a survey about current practices and concerns associated with patients who arrive at the hospital with an external ambulatory pump, including insulin pumps, elastomeric pumps, and IV pumps (non-elastomeric). Implanted pumps were excluded from the survey. We sincerely thank the 370 readers who participated in the survey—you have provided ISMP with valuable information on this topic along with details we believe cannot be found elsewhere.

Overall, the results exposed significant breaches in safe practices associated with managing patients with external ambulatory pumps. This is a serious risk given that the use of ambulatory pumps is no longer a rare occurrence—more than half a million people with diabetes are using ambulatory insulin pumps, alone. We also found that a large number of respondents did not even know whether certain policies, procedures, guidelines, or practices were in place in their hospitals to safeguard patients with an ambulatory pump. In **Part 1** of our 2-part article, we highlight the key findings from the survey. Full results can be found in **Table 1** on page 2.

### Respondent Demographics

Survey respondents were mostly pharmacists (55%), nurses (31%), and diabetes educators (6%). Forty-one percent of all respondents held staff-level positions and 31% held supervisory, managerial, or administrative positions. Respondents were from organizations of varying sizes, with 16% from hospitals with less than 100 beds, 37% from hospitals with more than 400 beds, and the remaining 47% from hospitals with 100 to 400 beds.

### Insulin Pumps

**Policies, patient selection criteria, and pump removal.** Three-quarters (75%) of survey respondents do not have a policy, procedure, or guideline in place regarding the management of patients who present for care with insulin being delivered via an external pump. Of those who have a policy, procedure, or guideline, almost 1 in 5 respondents do not have a process in place to determine if patients are appropriate candidates to manage their pumps while hospitalized.

It is the policy to halt use of the insulin pump during hospitalization in 16% of respondents' hospitals, which may place patients at risk for ketoacidosis unless the hospital has a robust system for replacing the needed insulin (e.g., IV insulin infusion; not just sliding scale insulin). But only half of respondents' hospitals provide guidance regarding how to manage the patient with subcutaneous or IV insulin if the pump must be halted. Also, if an insulin pump must be temporarily discontinued, just 40% of respondents specify how to do this, where to store the pump, and when to reconnect it.

**Readiness for patient self-management.** If the insulin pump will be used by a hospitalized patient, very few respondents reported that the pump must be inspected to verify functionality. While almost 3 in 4 hospitals specify the content of complete orders when an insulin pump will be used by the patient during hospitalization, just 38%

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## SAFETY wires

**Farewell to ratio expressions on single entity drug labels.** On May 1, 2016, the USP39-NF34 (The United States Pharmacopeia [USP] and The National Formulary [NF]), which becomes official, will no longer allow the use of ratio expressions on single entity drug products. For example, the strength of **EPINEPHrine** 1:1,000 injection will only be displayed as 1 mg/mL, and 1:10,000 will only be displayed as 0.1 mg/mL. Isoproterenol 1:5,000 injection will be expressed as 0.2 mg/mL, and neostigmine 1:1,000 injection will be expressed as 1 mg/mL. The May 1, 2016, date will allow manufacturers and drug information systems time to make these changes. The ratio expression for local anesthetics such as lidocaine 1% and **EPINEPHrine** 1:100,000 injection, and bupivacaine 0.25% and **EPI-NEPHrine** 1:200,000 injection, will retain ratio expressions for the **EPINEPHrine** component because a decimal notation for such a low strength could easily be misread. ISMP had previously petitioned USP to make this change because of an ongoing stream of very serious errors where different ratio expressions were confused with one another ([www.ismp.org/sc?id=1641](http://www.ismp.org/sc?id=1641)).

Please let prescribers and other clinicians who respond to codes know about the upcoming changes, and encourage them to use the new dosing nomenclature when referring to these medications after the changes have been introduced. Once the labels change and they no longer contain the ratio expressions, drug storage labels and orders for these drugs must be communicated using doses expressed in metric weights to avoid confusion. For example, if a prescriber leading a code team calls out for "1:10,000 **EPINEPHrine**" and the product label no longer contains this ratio expression, practitioners could become confused and administer the wrong strength.

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**Table 1.** Use of external insulin, elastomeric, and IV ambulatory pumps during hospitalization

Abbreviated Questions (Full questions can be viewed at: <a href="http://www.ismp.org/sc?id=643">www.ismp.org/sc?id=643</a> )		Insulin Pumps (%)				Elastomeric Pumps (%)				IV Pumps (%) (Non-elastomeric)			
		Y	S/P	N	DK	Y	S/P	N	DK	Y	S/P	N	DK
<b>a</b>	Policy/procedure/guideline on ambulatory pump management?	21	3	75	1	22	6	46	26	25	15	40	20
<b>b</b>	Halt use of ambulatory pumps during hospitalization?	16	41	39	4	20	14	27	39	24	22	24	30
<b>c</b>	Process to determine if patient is an appropriate candidate to manage pump while hospitalized?	64	11	18	7	13	4	47	36	21	9	48	22
<b>d</b>	Would suicidal ideation exclude pump access?	65	9	5	21	35	6	10	49	42	8	10	40
<b>e</b>	If patient needs assistance, a knowledgeable person/staff remains in hospital at all times?	47	10	30	13	14	3	35	48	20	6	35	39
<b>f</b>	Before continued use, must the ambulatory pump be inspected to verify it is functioning properly?	6	2	82	10	6	0	63	31	8	0	63	29
<b>g</b>	Contact the outpatient provider responsible for the patient's ambulatory pump infusion for input as needed?	26	10	57	7	10	3	56	31	12	10	54	24
<b>h</b>	Specify the content of complete orders (e.g., basal rate, bolus doses, infusion rate, related monitoring)?	71	6	17	6	39	4	24	33	44	8	24	24
<b>i</b>	Require prescriber with specialized knowledge to provide orders for pump's continuation?	38	11	42	9	8	3	51	38	13	10	46	31
<b>j</b>	Require patient to sign an agreement/consent specifying the risks and responsibilities of self-management?	50	7	29	14	16	2	42	40	19	3	42	36
<b>k</b>	Provide patients with a flow sheet to document all doses, monitoring results, site changes, rate changes?	27	9	56	8	3	3	55	39	6	4	62	28
<b>l</b>	Device and medications or solutions infusing via the pump listed on the patient's MAR?	68	13	11	8	37	15	13	35	43	17	15	25
<b>m</b>	Require nurse to document medication/product administration at least daily on the MAR/other record?	68	10	12	10	37	11	17	35	43	10	16	31
<b>n</b>	Is medication/solution being administered via pump or used for refill dispensed/verified by the pharmacy?	51	16	24	9	32	9	27	32	40	11	23	26
<b>o</b>	If pump requires refill, have guidelines regarding who can prepare the solution, fill the device, and program it?	54	8	28	10	19	8	37	36	22	11	35	32
<b>p</b>	Refills of pumps carried out by clinicians who have specific competencies?	17	10	57	16	12	7	32	49	9	9	42	40
<b>q</b>	Refills of medications or solutions require an independent double check before restarting pump?	25	6	48	21	10	0	41	49	15	3	41	41
<b>r</b>	If pump/medication is investigational, specify from where the medication will come if a refill is necessary?	28	6	23	43	23	4	15	58	23	7	19	51
<b>s</b>	In-house expert knowledgeable about ambulatory pumps who can be consulted when necessary?	32	16	42	10	11	9	46	34	9	11	48	32
<b>t</b>	Clinicians who might encounter pumps educated about those seen most often in their care settings?	18	20	45	17	8	10	42	40	9	12	41	38
<b>u</b>	Organization maintains resources about pumps being used that clinicians can easily access?	11	7	64	18	3	4	62	31	5	5	60	30
<b>v</b>	Require anesthesia to evaluate patients prior to procedures requiring general anesthesia to determine appropriateness of continuation during procedure?	56	8	12	24	37	4	10	49	36	4	10	50
<b>w</b>	Specify how to communicate that patient is receiving medications/solutions via an ambulatory pump?	49	16	25	10	34	12	27	27	37	11	26	26
<b>x</b>	Specify how to manage pumps during a radiology procedure to avoid exposure to radiation/magnetic fields?	45	3	26	26	18	4	34	44	23	4	31	42
<b>y</b>	Process to ensure that clinical staff know how to turn the pump off in case of an emergency?	35	8	41	16	11	7	44	38	13	7	47	33
<b>z</b>	Ensure patients discharged with pumps understand how to use/monitor the pump and medication/solution?	53	11	20	16	41	6	13	40	44	9	13	34
<b>aa</b>	Provide patients with written information about how to stay safe at home with infusion via a pump?	39	11	23	27	31	0	27	42	32	3	26	39
<b>bb</b>	Specify how to disconnect a pump, where to store it, when to reconnect it if stopped during hospitalization?	40	10	34	16	15	6	38	41	17	7	41	35
<b>cc</b>	Specify how to manage patients whose pumps have been discontinued while hospitalized?	50	15	24	11	14	6	44	36	18	5	43	34

**Key** Y = Yes S/P = Sometimes or Partly N = No DK = Don't Know

> **Survey**—text continued from page 1

require the inpatient prescriber to have specialized knowledge of insulin pumps, and even fewer expect the inpatient prescriber to contact the outpatient prescriber responsible for the patient's insulin pump for input as needed. Only half of respondents require the patient to sign an agreement or consent form specifying the risks and delineating the responsibilities of self-management of their insulin pump during hospitalization.

**Special conditions.** Almost half of respondents with policies, procedures, or guidelines told us they specify how to communicate that the patient is receiving insulin via an ambulatory pump (pumps may be hidden under bedclothes), or how to avoid pump exposure to radiation or magnetic fields during radiology procedures. Prior to a surgical procedure that requires general anesthesia, 56% of respondents expect anesthesia to evaluate the patient to determine the appropriateness of continuation of the insulin pump during the procedure. One worrisome survey finding shows that only 35% of the respondents indicated that their hospital has a process to ensure that clinical staff know how to disconnect an insulin pump in case of an emergency.

**Documenting administration.** About two-thirds of respondents include the insulin pump on the patient's medication administration record (MAR) and expect nurses to document insulin administration at least once daily. However, only 1 in 4 hospitals provide the patient with a flow sheet to document all self-initiated doses, glucose monitoring results, site changes, and rate changes.

**Refills.** Approximately half of respondents told us that any insulin used to refill the pump must be dispensed or verified by pharmacy, and that guidelines exist regarding who can prepare the insulin, fill the device, and program it. However, few respondents reported that refills are carried out by clinicians with demonstrated competencies (17%), or that an independent double check is required for refills before restarting the pump (25%).

**Staff resources, competency, and patient education.** Just 32% of respondents reported that their hospitals have an in-house expert knowledgeable about insulin pumps who can be consulted when necessary. Even fewer told us that their hospitals maintain resources about insulin pumps that can be easily accessed by clinicians, or that staff are educated about the insulin pumps seen most often in their care settings. Just half of the respondents ensure that patients discharged with insulin pumps understand how to use them, and even fewer provide the patient with written information about how to stay safe at home with an insulin pump.

### Elastomeric and IV Ambulatory Pumps

**Policies, patient selection criteria, and pump removal.** Between 22% and 25% of respondents, respectively, have a policy, procedure, or guideline in place for managing patients who present for treatment in a hospital with an ambulatory elastomeric or IV pump. About 1 in 4 respondents reported that they halt the use of an ambulatory elastomeric or IV pump upon hospital admission, but of these, few specify how to disconnect the pump and store it, or how to manage patients whose pumps have been discontinued during hospitalization. Among respondents with a policy, procedure, or guideline for managing ambulatory elastomeric or IV pumps, a specific process to determine if the patient is a candidate to self-manage an elastomeric or IV pump while hospitalized is provided in only 13% (elastomeric) and 21% (IV) of respondents' hospitals; of these, less than half believe patient access to pumps would not be permitted if the patient exhibited suicidal ideation.

**Readiness for patient self-management.** Less than 10% of respondents reported that an ambulatory elastomeric or IV pump must be inspected to verify appropriate function prior to use during hospitalization. Less than half of respondents specify the contents of a complete order associated with an elastomeric or IV ambulatory

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**Foiled by enoxaparin look-alikes.** We have received reports of mix-ups between prefilled syringes of enoxaparin and other drugs in look-alike syringes. An incident was reported to us with **RELISTOR** (methylnaltrexone) injection 12 mg/0.6 mL prefilled syringes, which is indicated for opioid-induced constipation. The Relistor syringe, manufactured by Salix Pharmaceuticals, looks very similar to generic enoxaparin 150 mg/1 mL prefilled syringes manufactured by Amphastar Pharmaceuticals (**Figure 1**). Relistor was about to be dispensed for enoxaparin, but a pharmacist caught the error before dispensing the wrong drug.



**Figure 1.** Similar appearance of Relistor (top) and enoxaparin (bottom) syringes.

Generic manufacturers of enoxaparin use the same dark navy color for the syringe plunger that Sanofi has used to differentiate their 150 mg enoxaparin from other strengths of the drug. Relistor syringe plungers are the same dark navy color, and the syringes also have a similar clear plastic housing. Depending on how the syringe is oriented when held, the drug names may not be easy to read, especially Relistor, which is printed in a dark navy color font without a contrasting background. Although Relistor syringes are available in individual



**Figure 2.** Fondaparinux syringe (left) and enoxaparin syringe (right) look very similar.

cartons, they may be removed for patient labeling. Once Relistor syringes are removed, if the Amphastar generic enoxaparin syringes are near-by, the syringes are in danger of being mistaken for one another unless the syringe label is read correctly.

We also received a report about potential mix-ups with the anticoagulant fondaparinux 2.5 mg/0.5 mL syringes from

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pump, and less than 15% contact the outpatient provider responsible for the patients' ambulatory pump for assistance with the orders. Less than 15% require the prescriber to have specialized knowledge of the pump and medication, and fewer than 1 in 5 respondents require the patient self-managing an elastomeric or IV pump to sign an agreement or consent outlining the risks and responsibilities.

**Special conditions.** Just 1 in 3 respondents have established a process to communicate to clinicians who provide care to the patient that he or she is receiving medications/solutions via an ambulatory elastomeric or IV pump. Approximately one-third of respondents require anesthesia to assess the patient to determine if the ambulatory pump and the solution it delivers should be continued during a procedure requiring general anesthesia. Only about 1 in 10 respondents are confident that clinicians know how to disconnect an ambulatory elastomeric or IV pump in case of an emergency.

**Documenting administration.** Only 37% of respondents said that medications or solutions delivered via an ambulatory elastomeric pump are listed on the patients' MARs or that nurses need to document administration at least once daily; 43% reported the same for ambulatory IV pumps (non-elastomeric). Less than 10% of respondents provide patients with a flow sheet to document all self-managed doses and rate changes.

**Refills.** One in five hospitals provides guidelines for preparing and refilling the ambulatory elastomeric or IV pumps; 1 in 3 hospitals requires the pharmacy to dispense or verify the medication or solution used for refills. Very few require specific competencies for those who can refill the devices.

**Staff resources, competency, and patient education.** Eleven percent or fewer respondents report having an in-house expert on ambulatory elastomeric and IV pumps to consult when needed, and 5% or fewer report that the hospital maintains resources about these pumps that are easily accessible to staff. Less than 10% of respondents' hospitals provide education to staff about ambulatory elastomeric or IV pumps. Yet, 2 in 5 hospitals reported they provide education to patients discharged using an ambulatory elastomeric or IV pump. Only 1 in 3 provides written information to patients utilizing an ambulatory pump.

### Conclusions

Safely managing hospitalized patients who present for treatment with external ambulatory pumps requires extensive planning, widespread clinician education, clearly defined approaches to communication, and a commitment to attend to the myriad details associated with caring for these patients and preparing them for self-management at home. Our survey showed a high degree of variability in assessing and managing these patients in the hospital, with many aspects of patient safety overlooked. Using this survey data and other resources, ISMP plans to develop guidelines to help hospitals establish a safe environment for patients with an ambulatory pump, and to advance the skills, knowledge, and abilities of staff who care for these patients. In **Part 2** of the article, we will highlight strategies to accomplish these goals.

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Dr. Reddy's Laboratories that look like the 30 mg/0.3 mL syringes of enoxaparin from Teva. Again, the similarly colored syringe plungers and plastic housing make the syringes look alike (**Figure 2**, on page 3). A hospital told us they had a situation where fondaparinux was found mixed in a bin with enoxaparin syringes in an automated dispensing cabinet (ADC). A pharmacist identified the mix-up while doing a spot check of ADC stock. Obviously, reading labels is always the primary way of preventing errors with look-alike products, but people don't always do what they're supposed to do.



**Inadequate TIG treatment.** A review of tetanus cases reported to the California Department of Public Health from January 2008 through March 2014 (Yen C, et al. Missed opportunities for tetanus postexposure prophylaxis—California, January 2008–March 2014. *MMWR*. 2015;64:243-6) found that two patients were treated with 250 units of tetanus immune globulin (TIG) following a tetanus diagnosis. Although an optimal therapeutic dose of TIG has not been established, the Centers for Disease Control and Prevention (CDC) recommends 3,000 to 6,000 units for treatment. A 250 unit dose is recommended for postexposure prophylaxis for adults and children 7 years and older. Apparently, some providers have inadvertently prescribed the post-exposure dose instead of the treatment dose. Also, the package insert for **HYPER-TET** ([www.ismp.org/sc?id=1642](http://www.ismp.org/sc?id=1642)) has only one sentence about treatment with no specific dosage: "The dosage should be adjusted according to the severity of the infection." Sporadic cases of tetanus continue to occur in people who are not up-to-date with tetanus vaccinations or have not received appropriate postexposure treatment. The US Food and Drug Administration (FDA) was asked to consider label improvements to include the treatment dose.

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Production of this peer-reviewed newsletter would not be possible without the assistance of a reliable and talented clinical advisory board. As 2015 nears an end, we want to thank each of the following members of the advisory board for their dedication to making this newsletter a valuable medication safety resource for nurses.

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