

# High-Alert Medications Insulin and Vasopressors: Practical Strategies in Pursuit of Safety



## High-Alert Medications Insulin and Vasopressors: Practical Strategies in Pursuit of Safety

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- [www.ProCE.com](http://www.ProCE.com)
- Login with username and password
- Deadline: **January 14, 2022**



**Attendance Code = ??????**



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# High-Alert Medications Insulin and Vasopressors: Practical Strategies in Pursuit of Safety

## Learning Objectives

### Define

- Define high-alert medications and their impact on patient safety

### Describe

- Describe low scoring assessment items for insulin from the ISMP Medication Safety Self Assessment® for High-Alert Medications

### Cite

- Cite at least two effective strategies each for harm prevention for vasopressors and insulin



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## High-Alert Medications

Medications bearing a **heightened risk of causing significant patient harm when used in error**. While mistakes may or may not be more common, the consequences of an error are more devastating to patients.



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**High-Alert Medications in Long-Term Care (LTC) Settings**

**ISMP List of High-Alert Medications in Long-Term Care (LTC) Settings**

**ISMP List of High-Alert Medications in Acute Care Settings**

**Medications bearing a heightened risk of causing significant patient harm when used in error.** While mistakes may or may not be more common, the consequences of an error are more devastating to patients.

**Table of Medications:**

Medication	Common Abbreviation	Potential for Error
Insulin	Insulin	High
Vasopressors	Vasopressors	High
Sedatives	Sedatives	High
Antipsychotics	Antipsychotics	High
Antidepressants	Antidepressants	High
Antibiotics	Antibiotics	High
Anticoagulants	Anticoagulants	High
Chemotherapy	Chemotherapy	High
Cardiovascular	Cardiovascular	High
Endocrine	Endocrine	High
Genitourinary	Genitourinary	High
Immunosuppressants	Immunosuppressants	High
Neuroleptics	Neuroleptics	High
Respiratory	Respiratory	High
Thrombolytics	Thrombolytics	High
Transfusions	Transfusions	High
Antiepileptics	Antiepileptics	High
Anticancer	Anticancer	High
Antifungals	Antifungals	High
Antivirals	Antivirals	High
Cardiovascular	Cardiovascular	High
Chemotherapy	Chemotherapy	High
Endocrine	Endocrine	High
Genitourinary	Genitourinary	High
Immunosuppressants	Immunosuppressants	High
Neuroleptics	Neuroleptics	High
Respiratory	Respiratory	High
Thrombolytics	Thrombolytics	High
Transfusions	Transfusions	High
Antiepileptics	Antiepileptics	High
Anticancer	Anticancer	High
Antifungals	Antifungals	High
Antivirals	Antivirals	High

**Abbreviations:** H=High, M=Moderate, L=Low

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## Tool and Process

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## Goals

- Assist providers assess the safety of systems and practices associated with 11 categories of high-alert medications
  - Heighten awareness
  - Identify and prioritize
  - Create a national baseline
  - Determine challenges



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## Assessment Items

- 380 critical safe medication systems and practice items
- Selected by ISMP and an Advisory Group based on the types of errors and safety risks identified in these settings
- Evidence-based items and consensus based expert opinions
- Extends beyond minimum standards of practice



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## Items Weighted Based on Impact

### Power (Leverage)

High  
Max: 16

Medium  
Max: 10

Low  
Max: 6

System Reliability

Human Reliability



**Most Effective  
Hardest to Implement**

**Least Effective  
Easiest to Implement**

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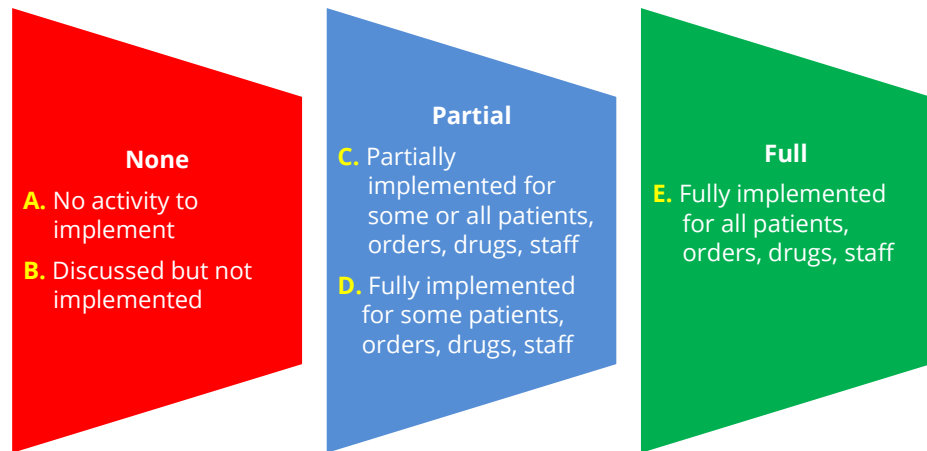


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## Scoring Guidelines



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## General High-Alert Medications/ Vasopressors

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## High-Alert Self Assessment: General: Subcategories Scoring

Items	Self-Assessment Item	Mean %
9-13	Technology Alerts	54%
1-8	Technology	59%
31-33	Learning Culture	75%
1-33	<b>Total</b>	<b>64%</b>



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## High-Alert Self Assessment: General: Top Five

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)	Mean (%)
26	Rapid response team available 24/7	3%	6%	91%	95%
8	Electronic access of current lab values	0%	14%	86%	95%
32	Medication event reports used to identify risks or errors & to demonstrate sustained improved	2%	19%	79%	92%
25	Process and environmental strategies in place to minimize similar/confusing drug names and labels	0%	28%	72%	91%
5	eMAR accessible during drug administration	2%	26%	72%	91%



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## High-Alert Self Assessment: General: Bottom Five

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)	Mean (%)
7	Smart infusion pumps integrated with EHR	86%	8%	6%	20%
4c	Machine-readable coding to remove high-alert medications from ADCs via override or from open matrix drawers	64%	16%	20%	29%
10b	Maximum dose alerts tested at least annually for automated compounders	47%	17%	36%	29%
29	Criteria established to trigger automatic consultation with pharmacist or others for patients taking high-alert meds	42%	47%	11%	39%
13	Active computer surveillance system used to optimize therapy & identify risk of harm	48%	36%	16%	41%



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## Technology: Machine-Readable Coding Used

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)	Mean (%)
4c	To remove high-alert medications from ADCs via override or from open matrix drawers	64%	16%	20%	29%
2	To verify all base solutions and additives when preparing high-alert CSPs	48%	29%	23%	45%
4a	To select high-alert medications for dispensing	46%	31%	23%	42%
4b	To fill ADCs with high-alert medications	28%	29%	43%	57%
4d	Prior to administration	3%	47%	50%	84%



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## Technology Alerts

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)	Mean (%)
10b	Maximum dose alerts tested at least annually for automated compounders	47%	17%	36%	29%
13	Active computer surveillance system used to optimize therapy & identify risk of harm	48%	36%	16%	41%
11	ERH alerts user if patient's weight or height exceeds threshold	41%	22%	37%	50%
12	CPOE interfaced with lab & alert clinicians of abnormal values when placing or verifying orders	29%	45%	26%	54%
10a	CPOE tested at least annually to ensure maximum dose alerts are functional	35%	28%	37%	54%



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NATIONAL ALERT NETWORK (NAN)

March 23, 2015



This alert is based on information from the National Medication Errors Reporting Program operated by the Institute for Safe Medication Practices.

**NAN ALERT**

### Warning! Potentially dangerous confusion between Bloxiverz (neostigmine) injection and Vazculep (phenylephrine) injection



ISMP is alerting hospitals, ambulatory surgical centers, and anesthesia professionals about the potential for dangerous mix-ups between two relatively new presentations of older medications, neostigmine injection and phenylephrine injection.

Eclet Pharmaceuticals is currently manufacturing BLOXIVERZ (neostigmine) and VAZCULEP (phenylephrine). Bloxiverz became the first FDA-approved neostigmine product in 2013. It is a cholinesterase inhibitor indicated for the REVERSAL of non-depolarizing neuromuscular blockade after surgery. Vazculep is a phenylephrine injection product approved in 2014 for treatment

The pharmacy bulk packages are intended for use in the pharmacy during sterile compounding of infusions.

In the past 3 months, ISMP has received 8 practitioner reports expressing concern about look-alike packaging of Bloxiverz 10 mg/10 mL (1 mg/mL) and Vazculep 50 mg/5 mL (10 mg/mL). The vials and outer cartons look similar in size, color, and design (Figure 1). Several hospitals have reported that vials or cartons of the 10 mg Bloxiverz product were found mixed in with Vazculep 50 mg/5 mL (10 mg/mL) vials or cartons. Of the 8 reports, five were close calls in which the wrong product was actually used during sterile compounding. Fortunately, in each reported case,



Figure 1. Mix-ups between Bloxiverz and Vazculep have occurred at hospitals around the US.



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## Errors with Vasopressors

- Look-alike drug names and vials
  - ePHEDrine and EPINEPHrine with purple caps and purple coloring on labels
- Look-alike vials and pharmacy-prepared syringes
  - EPINEPHrine and Pfizer COVID-19 vaccine vials and syringes
- Weight-based vs non-weight-based dosing units
  - Norepinephrine mcg/minute vs mcg/kg/minute
- Wrong concentration
  - Norepinephrine 32 mg/250 mL vs 4 mg/250 mL
- Discontinued infusion restarted in error
  - Norepinephrine
- Contrived drug name
  - “Neostick” vs “neostig”
- Wrong infusion being titrated
  - Norepinephrine vs fentanyl



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## Recommendations

- Strategy to ensure pharmacy bulk packages NEVER leave pharmacy
- Differentiate look-alike drug vials and store them away from each other
- Barcode scanning upon dispensing and administration
- Standardize dosing units and in all technologies
- Standardize and minimize drug concentrations
- Ensure line tracing and labeling
- Strategy for discontinued infusions
- Never use “contrived” drug name



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## Insulin

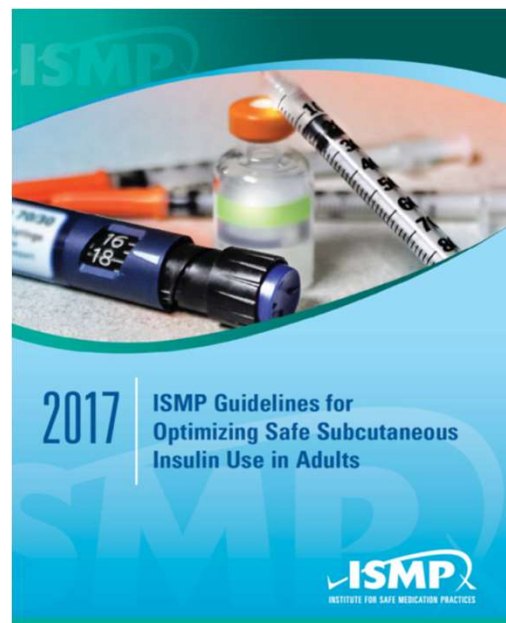
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## Guideline Sections

- Prescribing of Subcutaneous Insulin
- Pharmacy Management and Distribution of Subcutaneous Insulin
- Administration and Monitoring of Subcutaneous Insulin
- Safe Transitions of Care for Patients Receiving Subcutaneous Insulin



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## American Diabetes Association: Standards of Medical Care in Diabetes – 2021

Diabetes Care Volume 44, Supplement 1, January 2021

S211



### 15. Diabetes Care in the Hospital: *Standards of Medical Care in Diabetes—2021*

American Diabetes Association

Diabetes Care 2021;44(Suppl. 1):S211–S220 | <https://doi.org/10.2337/dc21-s015>

The American Diabetes Association (ADA) “Standards of Medical Care in Diabetes” includes the ADA’s current clinical practice recommendations and is intended to provide the components of diabetes care, general treatment goals and guidelines, and tools to evaluate quality of care. Members of the ADA Professional Practice Committee, a multidisciplinary expert committee (<https://doi.org/10.2337/dc21-SPPC>), are responsible for updating the Standards of Care annually, or more frequently as warranted. For a detailed description of ADA standards, statements, and reports, as well as the evidence-grading system for ADA’s clinical practice recommendations, please refer to the Standards of Care Introduction (<https://doi.org/10.2337/dc21-SINT>). Readers who wish to comment on the Standards of Care are invited to do so at [professional.diabetes.org/SOC](https://professional.diabetes.org/SOC).

Among hospitalized patients, hyperglycemia, hypoglycemia, and glucose variability are associated with adverse outcomes, including death (1–3). Therefore, careful

15. DIABETES CARE IN THE HOSPITAL



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## High-Alert Self Assessment: Insulin: Lowest Scoring Subcategories

Items	Self-Assessment Item	Mean %
18-22	Management of Hypoglycemia and Hyperglycemia	48%
1a-l	Protocols and Order Sets	58%
44-45	Insulin Pumps	59%
14-17	Monitoring	64%
23-26	Patient Education	64%



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## Management of Hypoglycemia and Hyperglycemia

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
19	Endocrinologist or practitioner trained in insulin management	23%	33%	44%
20	Single blood glucose value below a facility-established minimum prompts reassessment	50%	25%	25%
21	Pattern of blood glucose values below a facility-established minimum prompts reassessment	54%	25%	21%
22	Upon admission, identify patients who are at high risk for developing hypoglycemia	73%	17%	11%



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## Standard insulin protocols and/or order sets exist/used when.....

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
1k	Monitoring patients via defined laboratory testing / bedside point-of-care glucose monitoring, and communicating critical blood glucose values	2%	12%	85%
1j	Treating clinically significant hypoglycemia	6%	15%	79%
1i	Treating clinically significant hyperglycemia and hyperosmolar hyperglycemic state	14%	23%	64%
1g	Treating hyperkalemia	33%	23%	45%



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Standard insulin protocols and/or order sets exist/used when.....

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
1h	Treating calcium-channel blocker overdoses using high-dose insulin	73%	10%	17%
1f	Managing patients receiving glucocorticoid therapy	70%	16%	14%
1a	Converting from oral agents to insulin	67%	17%	16%
1e	Managing pregnant and postpartum patients with pre-existing diabetes	44%	15%	41%



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## Monitoring

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
14	All patient-specific, diabetes care-related information is in one designated place in the patient's health record	24%	27%	50%
15	Process to promote blood glucose checks and administration of nutritional insulin doses in conjunction with meals	6%	27%	66%
16	Standardized process established to communicate to authorized prescriber any significant changes in a patient's carbohydrate intake	24%	35%	41%
17	Prescriber identifies patient's pre-meal and random target glucose ranges in patient's health record	28%	33%	39%



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## How are bedside point-of-care blood glucose values documented?

How are point-of-care values documented?	N	%
Manually documented on a paper form (e.g., diabetic flow sheet, MAR/eMAR, notes)	19	4%
Manually documented on a paper form which is later entered into the patient's EHR	27	5%
Manually documented directly into the EHR	141	27%
Electronically imported into the EHR via a blood glucose monitor that is docked with a computer	270	51%
Electronically imported into the EHR from a blood glucose monitor via wireless technology	213	40%



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## Patient Assessment: Before Administration

- Prior to the administration of subcutaneous insulin, practitioners (i.e., nurses, nursing assistants) perform an assessment of the following:
  - Bedside POC blood glucose value (finger stick)
  - Symptoms of HYPOglycemia
  - Symptoms of HYPERglycemia
  - Nutritional status (e.g., NPO, receiving enteral or parenteral nutrition, last oral intake)
  - Changes in the patient's condition (e.g., infection)
  - Changes in the patient's medication regimen (e.g., addition or discontinuation of a medication that may impact blood glucose levels [e.g., corticosteroid])



POC = Point of care; NPO = Nil per os/not by mouth.

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## Early Signs of HYPOglycemia

- Assessments may not identify symptoms and may result in falls, transfers to higher levels of care, and increased monitoring
  - Anxiety, irritability, dizziness, diaphoresis, pallor, tachycardia, headache, shakiness, and hunger
- Patients may be given drugs like haloperidol/ lorazepam for symptoms when patient is actually hypoglycemic, and treatment of the BG would have negated the need to sedate/restrain the patients



Metchich LN, et al. Am J Med . 2002;113:317-323.

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## Wrong Dose Errors Due to Wrong Blood Glucose Values

- 12.9% of the wrong-dose events involved breakdowns with obtaining and/or communicating patients' blood glucose values.
- Specific problems include:
  - Reporting an incorrect value,
  - Confusing the patient's weight for his or her blood glucose level,
  - Verbally communicating the wrong patient's value and
  - Documenting the wrong result.



Pa Patient Safety Authority. Medication Errors with the Dosing of Insulin: Problems across the Continuum. Pa Patient Saf Advis 2010 Mar;7[1]:9-17. [http://patientsafety.pa.gov/ADVISORIES/Pages/201003\\_09.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/201003_09.aspx)

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## Wrong Dose Errors When Communicating Blood Glucose Results

- The nurse asked the nursing assistant for the patient's Accucheck results. The nurse was told that the blood glucose was 377. The patient was covered with 10 units of Humalog per sliding scale guidelines. When the nursing assistant wrote the Accuchecks on the bulletin board, the blood glucose of 97 was written for that patient.
- A nurse extern came out of patient's room at the time Accuchecks are performed. The nurse extern stated "211," and RN repeated "211, right?" The nurse extern was referring to the patient's daily weight, which is supposed to be performed at 7:30 a.m. The nurse covered the patient with 4 units of regular insulin then five minutes later the nurse extern informed the RN that the patient's blood glucose level was 130.



Pa Patient Safety Authority. Medication Errors with the Dosing of Insulin: Problems across the Continuum. Pa Patient Saf Advis 2010 Mar;7[1]:9-17  
[http://patientsafety.pa.gov/ADVISORIES/Pages/201003\\_09.aspx](http://patientsafety.pa.gov/ADVISORIES/Pages/201003_09.aspx)

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## Blood Sugar Levels or .....?

- The nurse picked up a piece of scrap paper that listed several patients with a number next to each name. All of the numbers were well above 200.
- Assuming the numbers were blood sugar levels, she gave each patient insulin using a sliding-scale protocol.
- Afterwards, she realized that the numbers were actually patient room numbers!



Institute for Safe Medication Practices. Why it is important to ensure that all information, such as blood glucose values, is communicated properly." *Medication Safety Alert! Acute Care* ed. 2003(Nov 27):8(24).

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## Continuous Subcutaneous Insulin Infusion Devices

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
44a	Criteria to determine which patients are appropriate to manage their own pumps upon hospital admission	26%	14%	60%
44b	Conditions that would necessitate removal of the insulin pump during hospitalization	31%	12%	56%
44c	Process to transition patients from the pump to an alternative means of insulin delivery during hospitalization if the pump is removed	35%	16%	50%



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## If the insulin pump is managed by the patient while in the hospital..

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
45f	Process to measure and track the patient's blood glucose level	20%	11%	70%
45h	Procedure to avoid exposure of the pump to ionizing radiation or magnetic fields during imaging procedures	28%	11%	61%
45j	Procedure to manage the pump when the patient is not able to do so	33%	8%	59%



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If the insulin pump is managed by the patient while in the hospital..

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
45e	Patient access and reviews pump insulin delivery, pump alarms, and glucose monitoring values with nurse at least daily	52%	14%	34%
45i	Pharmacy to dispense all insulin used to refill insulin pump	44%	11%	45%
45c	Criteria for when an endocrinologist/ diabetes management specialist with knowledge of pump must be contacted	43%	13%	44%
45a	Means for obtaining patient consent after reviewing risks and patient responsibilities	40%	8%	52%



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## Insulin Pumps

- Patients with insulin pumps typically have more knowledge and expertise than medical professionals
- Consensus statement from the American Association of Clinical Endocrinologists and the American College of Endocrinology encourage hospitalized patients and their admitting physicians to **not** discontinue an insulin pump
- But continuing the infusion without knowing how to manage the pump may **not** be a clinically appropriate or safe alternative



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## Errors with Insulin Pumps

- Patient self-administered a dose of insulin via insulin pump without telling the nurse, and the nurse administered the same dose via an injection
- If patient's condition changes or they undergo surgery, the pump may need to be managed by clinicians or turned off temporarily



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## Recommendations for the Safe Management of Patients with an External Subcutaneous Insulin Pump During Hospitalization

**Please note:** These recommendations were compiled and vetted by ISMP after reviewing current policies and procedures that have been honed through experience in several large and small US hospitals, a review of the professional literature,<sup>1,17</sup> the results of the 2015 ISMP survey on this topic,<sup>2</sup> and analysis of reports of errors related to insulin pumps submitted to ISMP or published in the literature. Examples of some of the recommended documents mentioned in the recommendations (e.g., patient consent/agreement, insulin pump order set, patient bedside worksheet/log) are provided in several of the references<sup>6,11,12,14,17</sup> listed at the end of the recommendations.

### I. Initial Assessment Process

#### Admission Assessment

- 1) As part of an initial patient admission assessment, nurses should be prompted to specifically ask all patients if they are using an insulin pump.
- 2) If the patient is using an external insulin pump, the nurse conducting the initial patient assessment should notify the patient's admitting physician. This should set into motion a process to determine whether or not the pump can remain in place and be managed by the patient or a responsible adult representative during hospitalization.

#### Patient Selection Criteria

- 3) A standard process should be used to determine if the patient is an appropriate candidate to manage his or her own insulin infusion (per prescriber orders) via the insulin pump during hospitalization. Consideration should be given to the following elements when developing patient selection criteria:
  - a. The patient, or a knowledgeable, responsible adult representative of the patient, may be an appropriate candidate if he or she is alert, physically capable, able to properly work the pump functions, and willing to manage the pump during hospitalization. If an adult representative will be managing the pump, he or she must be on site and immediately available 24 hours/day, 7 days/week.
  - b. At a minimum, the patient or the responsible representative should be assessed for awareness of hypoglycemia symptoms; the ability to calculate and deliver bolus doses; the ability to change the basal rate, set a temporary rate, or suspend insulin delivery; and glucose control



<https://www.ismp.org/resources/safe-management-patients-external-subcutaneous-insulin-pump-during-hospitalization>

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## Patient Education

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
23	For patients discharged on insulin, criteria have been established to trigger automatic consultation with a certified diabetes educator/other diabetes management specialist.	59%	22%	18%
25	Prior to hospital discharge or leaving a treatment facility, patients receive verbal and up-to-date written instructions	4%	42%	55%
26	Prior to hospital discharge or leaving a treatment facility, a process is in place to ensure that patients have or will obtain the medications and supplies	6%	42%	52%



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## Patients are assessed for their understanding of...

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
24b	Proper dose measurement and self-administration technique	5%	51%	45%
24e	Ability to use a blood glucose meter to test blood glucose	6%	48%	46%
24g	Nutritional management of diabetes	3%	51%	46%
24c	Proper use and disposal of needles, syringes, lancets, and pumps	4%	46%	50%



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# High-Alert Medications Insulin and Vasopressors: Practical Strategies in Pursuit of Safety

## Triggers

### Possible ADE

- Hypoglycemia

### Triggers

- Dextrose 50%
- Glucagon
- Blood glucose more than 300 or less than 50
- Rapid response team call



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## Outcome Measures: Insulin

### Measure 1:

**Numerator:** Number of episodes of blood glucose results (bedside and lab testing) less than or equal to 50 mg/dL

**Denominator:** Number of inpatients who are prescribed insulin (peds & adults)

### Measure 2:

**Numerator:** Number of episodes of administering Dextrose 50% to treat hypoglycemia for patients prescribed insulin

**Denominator:** Number of inpatients who are prescribed insulin (peds & adults)



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# High-Alert Medications Insulin and Vasopressors: Practical Strategies in Pursuit of Safety

## Process Measures: Insulin

### Measure 1:

**Numerator:** Patients discharged on insulin provided education

**Denominator:** Patients discharged on insulin



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## Questions?

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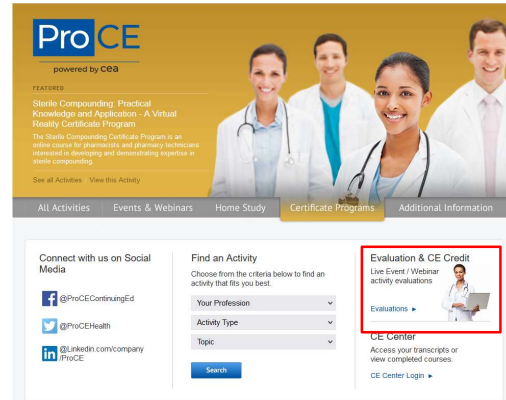
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# High-Alert Medications Insulin and Vasopressors: Practical Strategies in Pursuit of Safety

## Online Evaluation and Statement of Completion

- [www.ProCE.com](http://www.ProCE.com)
- Login with username and password
- Deadline: **January 14, 2022**



**Attendance Code = WR9FMN**



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