Institute for Safe Medication Practices An ECRI Affiliate	
High-Alert Medications Heparin, Concentrated Electrolytes and Magnesium: Practical Strategies in Pursuit of Safety	
Christina Michalek, BS, RPh, FASHP Medication Safety Specialist	
Susan Paparella, MSN, RN Vice President	
Michelle Mandrack, MSN, RN	
Director of Consulting Services	









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

 Define
 • Define hogh-alert medications and their impact on patient safety

 Descrive
 • Oscible hogh scoring assessment items for hegarin, concentrated electrolytes and magnesium from the ISMP Medication Safety Self Assessment® for Hogh alert Medications

 Urget
 • Oscible hogh scoring assessment items for hegarin, concentrated electrolytes and magnesium from the ISMP Medication Safety Self Assessment® for Hogh alert Medications

 Urget
 • Oscible hogh scoring assessment items for hegarin, concentrated electrolytes and magnesium

 Urget
 • Oscible hogh scoring assessment items for hegarin, concentrated electrolytes and magnesium

 Urget
 • Oscible hogh scoring assessment items for hegarin, concentrated electrolytes and magnesium

 Urget
 • Oscible hogh scoring assessment items for hegarin, concentrated electrolytes and magnesium











New Best Practice Ensure that the strategies address system vulnerabilities in each stage of the medication use process (i.e., prescribing, dispensing, administering, and monitoring) and apply to prescribers, pharmacists, nurses, and other practitioners involved with medication use. Avoid reliance on low-leverage risk-reduction strategies (e.g., applying high-alert medication labels on pharmacy storage bins, providing education) to prevent errors, and instead bundle these with mid- and high-leverage strategies. Limit the use of independent double checks to solve thigh alert medications with the groatest rick for

Limit the use of independent double checks to select high-alert medications with the greatest risk for error in the organization. (e.g., chemotherapy, opioid infusions, IV insulin, heparin infusions).

Regularly **assess for risk** in the systems and practices used to support the safe use of medications by using information from internal and external sources (e.g., Joint Commission, ISMP).

Establish outcome and process **measures to monitor safety** and routinely collect data to determine the effectiveness of risk-reduction strategies.



©2022 ISMP | www.ismp.org | 12

















Item #	Self Assessment Item	Mean	None	Partial	Full
16	When orders for antithrombotic agents are entered, the computer order entry system alerts practitioners if the patient has received an antithrombotic (including anticoagulants), even a one-time dose, within the prior 24 hours in any location in the organization (e.g., emergency department, cardiac catheterization laboratory, interventional radiology), to ensure that adequate time has elapsed between doses of the same or different antithrombotic agent	47%	40%	31%	28%
	different antitrirombotic agent				

21

Low Scoring Items

πem π	Self Assessment Item	Mean	None	Partial	Full
7	Protocols and order sets identify the specific drugs, interventions, and treatments (e.g., neuraxial procedures, certain vascular access procedures) that should be avoided in patients receiving anticoagulants	58%	26%	40%	34%
8	Protocols or guidelines exist to facilitate the transition between different anticoagulants	58%	30%	32%	38%

Case Example

- Eighty-six-year-old woman prescribed enoxaparin
- Warfarin was added to the regimen
- A few days later, warfarin was stopped for a procedure and a heparin infusion was initiated; enoxaparin continued



ISMP

ltem #	Self Assessment Item	Mean	None	Partial	Full
3	The most recent laboratory value is automatically displayed on order entry system screens when placing/verifying an order for an anticoagulant that is dose adjusted based on laboratory results	60%	32%	21%	47%
13	A standard, reliable process is in place for screening patients for recent anticoagulant use before invasive procedures; if therapy must be discontinued, protocols/guidelines define when anticoagulants should be stopped and restarted, and when alternative agents to bridge should be considered	64%	20%	42%	38%
36	Prior to ordering unfractionated heparin or using heparin-coated catheters/instruments, a history of heparin-induced thrombocytopenia (HIT) and/or allergy to heparin is determined and documented to generate an electronic alert	66%	13%	30%	57%

©2022 ISMP | www.ismp.org | 23

ltem #	Self Assessment Item	Mean	None	Partial	Full
37a	If HIT is suspected or diagnosed during current therapy, there is a mechanism in place to ensure the following: All sources of unfractionated heparin and low molecular weight heparin (including use for arterial lines or catheter flushes) are discontinued	78%	14%	20%	66%
37b	If HIT is suspected or diagnosed during current therapy, there is a mechanism in place to ensure the following: A prominent entry is placed in the patient's medical record to alert staff to avoid the administration of, or exposure to, heparin in any form (including use for arterial lines or catheter flushes, heparin-coated catheters or instruments)	76%	15%	22%	63%

Case Example



High Scoring Items

Item #	Self Assessment Item	Mean
30	The variety of different unfractionated heparin (UFH) vial concentrations and sizes is limited to only those needed in the facility	97%
33	UFH Infusions are standardized to no more than two concentrations for neonates based on weight (e.g., less than 1 kg and 1 kg and greater)	95%
31	Only commercially prepared, premixed IV solutions of UFH are used (unless unavailable)	95%
32	UFH infusions are a standard concentration for adults and pediatrics	95%
29	Weight based standard order sets / protocols are used for UFH	93%
27	After start or change of UFH infusion, aPTT level taken no sooner than 6 hours and every 24 hours once stable	92%
34	Adults – commercially prepared unit-dose syringes of flush, or lock, or single-use vials are stocked in correct clinical areas	92%







High-Alert Self Assessment: General Electrolyte Replacement Therapy Lowest Scoring Items

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
9	System to proactively convert from IV to PO	55%	23%	22%
3	Standard order sets exist to prescribe electrolyte replacement including monitoring	22%	52%	27%
2b	Standard protocols exist for electrolyte replacement therapy that include the type and frequency of patient monitoring required\during IV administration and following therapy to evaluate the patient's response	13%	50%	37%
2a	Standard protocols exist for electrolyte replacement therapy that include MAXIMUM concentration and rate IV solutions including concentrations requirement for central line access	9%	34%	57%
SMF	ISMP Medication Safety Self Assessment ^{an} for High-Alert Medicat https://www.ismp.org/assessments/high-alert-medicativ	tions- 2018 ons		©2022 ISMP wv







35

High-Alert Self Assessment: Potassium Lowest Scoring

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
12	For maintenance infusions only manufactured, premixed potassium chloride solutions are used	13%	43%	44%
13	For single/intermittent infusions for IV hypokalemia only, manufactured, premixed potassium chloride solutions, marked "highly concentrated" are used	11%	27%	61%
15	In surgical locations, concentrated potassium chloride vials are sequestered in sealed kits and only obtained just before use	6%	18%	76%
MF	ISMP Medication Safety Self Assessment# for High-Alert Medication https://www.ismp.org/assessments/high-alert-medication	ons- 2018 1 <u>5</u>	đ	D2022 ISMP www.is

Co	ncentrated Electrolytes
Iniect	table Potassium Chloride Recommendations
— L	imit access
— L	imit compounding; Use prediluted standardized solutions
— U	Jse automation/workflow systems for compounded electrolytes
— S d	egregate/sequester in storage; Avoid open access in ADCs matrix lrawers or towers
— F	MEA to identify risk
— A	ssess knowledge of risk
An ECRI Affiliate	ISMP Medication Safety Self Assessment® for High-Alert Medications- 2018 https://www.ismp.org/assessments/high-alert-medications © 02022 ISMP www.ismp.org 37
37	







High-Alert Self Assessment: Sodium Chloride Lowest Scoring Items

#	Self-Assessment Item	None (A+B)	Partial (C+D)	Full (E)
18	Protocol/order set exists for each INDICATION for use of hypertonic saline	43%	27%	31%
19	Protocol/order set exists for specific ADMINISTRATION and MONITORING for hypertonic saline	38%	25%	36%
22	IV push doses of 23.4% sodium chloride are prepared in the pharmacy, labeled, and hand-delivered to urgent/critical care administrating provider	17%	28%	55%
20	3% sodium chloride infusions are restricted to pharmacy and/or approved areas in limited quantities	3%	22%	75%
MF	ISMP Medication Safety Self Assessmen ^{ee} for High-Alert Medica https://www.ismp.org/assessments/high-alert-medicat	ations- 2018 ions		©2022 ISMP wv









45

High-Alert Self Assessment: Potassium and Sodium Phosphate Lowest Scoring

	Self-Assessment Item	(A+B)	(C+D)	
When IV automate concomit 24 each dos other sou replacem	Potassium Phosphate is prescribed, there is an ed or manual process in place to calculate the ant amount of potassium patients are to receive with considering the patient's potassium level and all rces of electrolytes)maintenance fluids, PN or other ent doses)	36%	28%	36%
When po 25 hypopho	ssible, sodium phosphate is used to treat sphatemia (rather than potassium phosphate)	35%	24%	41%









© ISMP 2022

ltem #	Self-Assessment Item	None (A+B)	Partial (C+D)	Full E	Mean (%)
8	To respond to emergencies caused by magnesium sulfate overdoses, a standard protocol has been established that guides the administration of a rescue agent (i.e., calcium gluconate) after prescriber notification; and the rescue agent is easily accessible, along with directions for use, in all clinical areas where high-dose magnesium sulfate is administered.	43%	29%	27%	45%
11	During administration of intermittent doses of IV magnesium sulfate, the patient is assessed for signs of toxicity (e.g., hypotension; respiratory depression; signs of pulmonary edema; bradycardia; cardiac arrhythmia; loss of deep tendon reflexes; progressive muscle weakness; decreased urine output; headache; clonus) at defined intervals (e.g., every 15 minutes for the first hour, every 30 minutes for the second hour, then hourly).	35%	38%	28%	51%

51

Low Scoring Items

	Self-Assessment Item	None (A+B)	Partial (C+D)	Full E	Mean (%)
9	Magnesium sulfate electrolyte replacement protocols have been established and are used to prevent and treat hypomagnesemia.	27%	34%	40%	62%
10	Standard order sets have been established and are used to prescribe magnesium sulfate to treat hypomagnesemia.	26%	32%	42%	64%
2	Parenteral magnesium sulfate protocols and order sets require periodic monitoring of magnesium blood levels, serum creatinine, and clinical patient assessments at defined intervals to determine the effectiveness of treatment and detect signs of toxicity.	19%	45%	36%	65%

ltem #	Self-Assessment Item	None (A+B)	Partial (C+D)	Full E	Mean (%)
22	Upon temporary stoppage of magnesium sulfate infusions, the solution is immediately disconnected from the patient. Exception: Short stoppages caused by conditions such as changing a gown.	20%	26%	54%	78%
16	Only 20 g/500 mL bags (not 40 g/1,000 mL bags) of magnesium sulfate are used for maintenance solutions to limit the amount of drug the patient could receive if an error occurs and to differentiate magnesium sulfate from other infusions in 1,000 mL bags (e.g., oxytocin, Lactated Ringer's).	29%	4%	68%	79%



















	Magnesiu	ım Sulfate Safety
	Protocols and Order Sets	Establish and implement separate protocols and order sets per indication Use standard dosing units (e.g., g vs. mEq; mg or mg/kg vs. mEq or mEq/kg)
	Emergency Preparedness	Establish a standard protocol for administration of the rescue agent calcium gluconate Ensure calcium gluconate is readily available with directions for use
	Products	Use commercially available premixed bags or pharmacy-prepared infusions Standardize to the use of 20 g/500 mL bags (not 40 g/1,000 mL bags) for pre-eclampsia
An Ed	SMP.	©2022 ISMP www.ismp.org 63







Institute for Safe Medication Practices An ECRI Affiliate	
Questions?	
This activity is funded by Payter	

67

©2022 ISMP | www.ismp.org | 67