




## Multi-Site Validation Study, Clinical Pearls, and Prospective Utilization of the High-Alert Medication Stratification Tool-Revised (HAMST-R)

Joel Daniel, PharmD, MS, CPPS  
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## Learning Objectives

- Describe gaps between current safety standards and available published tools for high-alert medications
- Apply the HAMST-R and HAMST-R PRO methodology to formulary and non-formulary agents
- Design a plan to evaluate risk reduction strategies surrounding high-alert medications at your institution




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Los Angeles Times

JPPT

### MEDICATION ERROR PREVENTION

#### Neonatal Heparin Overdose—A Multidisciplinary Team Approach to Medication Error Prevention

Jason Arimura, PharmD,<sup>1</sup> Robert L. Poole, PharmD,<sup>1</sup> Michael Jeng, MD,<sup>2</sup> William Rhine, MD,<sup>2</sup> and Paul Sharek, MD<sup>1</sup>

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Despite the efforts of many hospitals, system failures can result in medication errors that may be life threatening. During 2006 and 2007, nine neonates received potentially fatal doses of heparin. This paper will review contributing factors to the heparin medication errors and ways to minimize the risk of heparin overdose.

**KEYWORDS** heparin, medication error, medication safety, neonate

J Pediatr Pharmacol Ther 2008;13:96-98

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***An estimated 380,000 – 450,000 preventable adverse drug events occur in hospitals each year***



Khoo AL, et al. Jt Comm J Qual Patient Saf 2013;39(5):205-12

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McKenzie Shenk, PharmD

**EXPLORATORY AND MULTI-SITE VALIDATION STUDY OF HAMST-R**

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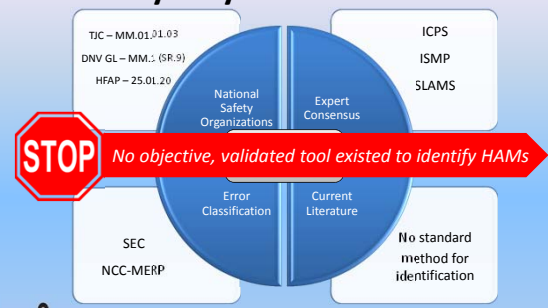
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**Key Players with HAMs**



TJC – MM.01.01.03  
 DNV GL – MM.1 (SR.9)  
 HFAP – 25.01.20  
 ICPS  
 ISMP  
 SLAMS  
 SEC  
 NCC-MERP  
 No standard method for identification

**STOP** *No objective, validated tool existed to identify HAMs*

The Joint Commission = TJC; Healthcare Facilities Accreditation Program = HFAP; Institute for Safe Medication Practices = ISMP; Indianapolis Coalition for Patient Safety, Inc. = ICPS; St. Louis Area Medication Safety Group = SLAMS; Safety Event Classification = SEC; National Coordinating Council for Medication Error Reporting and Prevention = NCC-MERP

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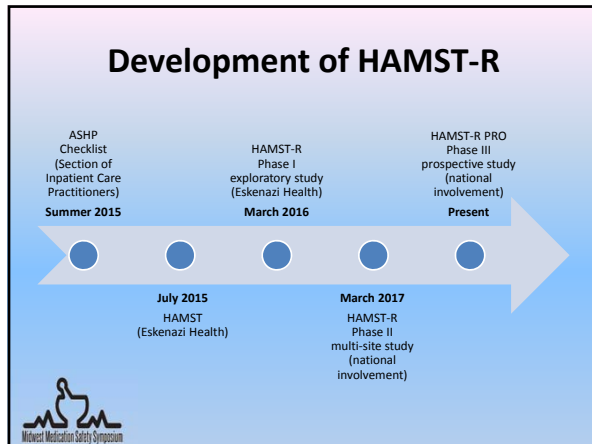
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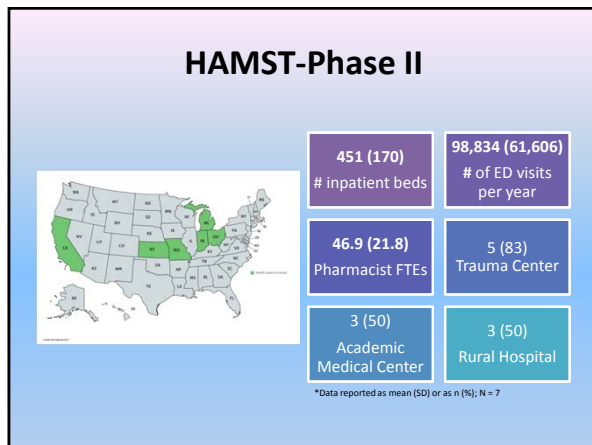
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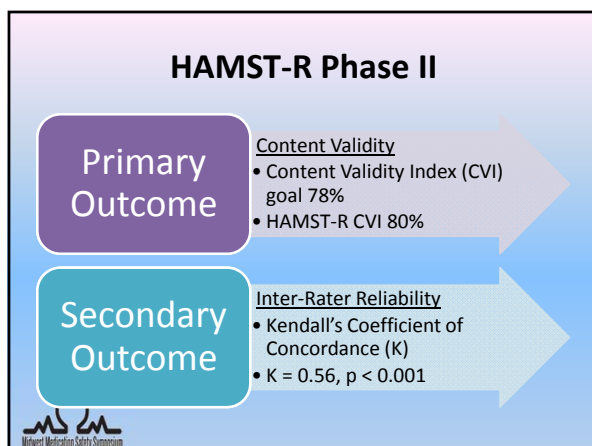
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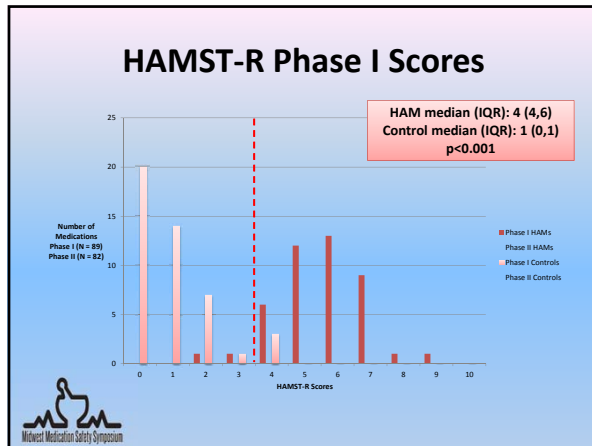
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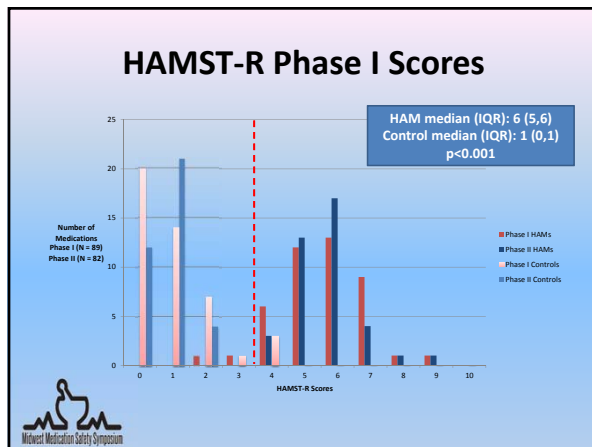
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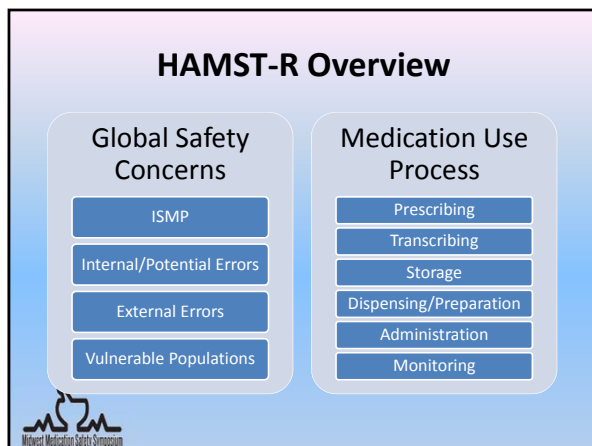
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HAMST-R Overview			
Medication: Score:		Yes 1 point	No 0 points
1. Does this medication exist on the ISMP High Alert Medication List? [1 point]			Links to ISMP HAM lists provided below: <a href="https://www.ismp.org/tools/high-alert-medications.pdf">https://www.ismp.org/tools/high-alert-medications.pdf</a> <a href="https://www.ismp.org/community/for-tools/ambulatory/high-alert.asp">https://www.ismp.org/community/for-tools/ambulatory/high-alert.asp</a>
2. Have errors resulting in serious harm/fatality been reported with this medication internally at your facility? [1 point]			*Additional HAM lists/sources should not be considered for the purposes of this scoring tool. If the medication is new to formulary, evaluate error reports of medications in the same class/category or look at other similar medications in the same therapeutic drug class. Serious harm is defined as: NCC MERP severity categories F-I F: Error requiring initial or prolonged hospitalization G: Error requiring intervention necessary to sustain life, temporary harm H: Error requiring intervention necessary to sustain life, permanent harm I: Error contributing to or resulting in patient death  Safety Event Classification (SEC) categories: Serious Safety Events and Precursor Safety Events
3. Have error reports, safety alerts, special restrictions/requirements, or fatalities been released for this medication or medication class by external bodies? [1 point]			Black boxed warnings should be taken into consideration.  Consider previous or current reports from regulatory bodies or national safety organizations (e.g. ISMP, FDA, TJC, NHC, CDC, etc.), excluding LSA alerts and case reports. Reports due to the medication itself or due to human error should be included.
4. Is use of this medication primarily restricted to treating a vulnerable patient population? a. Neonates b. Critically ill c. Pregnancy d. Immunosuppressed [1 point if yes to any of the above]			Critically ill is defined as a patient with life-threatening conditions requiring intensive care management. Immunosuppressed includes, but is not limited to: hematologic/oncology, transplant, HIV

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Group Application with HAMST-R for Alteplase	
<ul style="list-style-type: none"><li>Together we will complete Questions 1 - 4</li><li>Working in small groups at your tables, utilize HAMST-R to evaluate your two steps of the medication use process</li><li>Determine one consensus score for each of the two questions</li><li>Large group discussion and sharing will follow</li></ul>	

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Group Application with HAMST-R for Alteplase			
Medication: Score:		Yes 1 point	No 0 points
1. Does this medication exist on the ISMP High Alert Medication List? [1 point]		✓	
2. Have errors resulting in serious harm/fatality been reported with this medication internally at your facility? [1 point]			✗
3. Have error reports, safety alerts, special restrictions/requirements, or fatalities been released for this medication or medication class by external bodies? [1 point]		✓	
4. Is use of this medication primarily restricted to treating a vulnerable patient population? a. Neonates b. Critically ill c. Pregnancy d. Immunosuppressed [1 point if yes to any of the above]		✓	

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## Group Application with HAMST-R for Alteplase

- Together we will complete Questions 1 - 4
- Working in small groups at your tables, utilize HAMST-R to evaluate your two steps of the medication use process
- Determine one consensus score for each of the two questions
- Large group discussion and sharing will follow



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## Group Application with HAMST-R for Alteplase

5. PRESCRIBING: ordering the use of a specific medication, dose, route, and frequency for a specific patient	Yes	No	
a. Is this a look-alike, sound-alike drug?	✓		Include medications, not limited to currently stocked products, which are recognized as LASA by any tertiary reference (e.g. LexiComp, Micromedex, USP) ( <a href="https://www.usp.org/book/conferences/2016/10/16/2016-10-16-usp-look-alike-sound-alike-drugs.pdf">https://www.usp.org/book/conferences/2016/10/16/2016-10-16-usp-look-alike-sound-alike-drugs.pdf</a> ), etc.) or internal approval body (e.g. Medication Safety Committee).
b. Does your institution limit/standardize the liquid or intravenous concentrations available?		✗	If the institution currently stocks only limited concentrations, or has implemented standardized concentrations, consider the answer to this question yes. Do not consider labeled formulations. Do not answer yes if only one formulation is readily available. Examples include: morphine oral solution, intravenous heparin for continuous infusion, etc.
c. Are there multiple formulations available?		✗	Examples include: extended release products, liposomal formulations, products available as IV, tablets, and solutions, etc.
d. Are there standard protocols, policies, or order sets developed to guide prescribers?	✓		
e. Are there maximum dose limits when prescribing?	✓		Examples include: maximum weight-based dose (alteplase), maximum daily dose (MI olanzapine), maximum hard limit in infusion pump (diazepam), etc.
f. Is adult weight-based dosing required when prescribing?	✓		
g. Is there clinical decision support (CDS) upon prescriber order entry?	✓		Clinical decision support (CDS) provides prescribers with knowledge and patient-specific information, intelligently filtered or presented at appropriate times, to enhance health care. CDS can be provided in various ways including, but not limited to: computerized alerts and reminders, advisories such as "top-up" alerts, information display/links, or targeted highlighting of relevant data. Answer yes for this question only if the CDS is more than predefined, usual dosing suggestions.
h. Is prescribing of the medication restricted to specialized prescribers?	✓		Examples include: alteplase restricted to neurology, RESOLVE programs, etc.
<b>Q5 TOTAL SCORE (tally all "Yes" answers):</b>		(out of 8)	
If total score for this phase is 5 or more, check Yes	Yes	No	
If total score for this phase is 4 or less, check No	1 point	0 points	If 50 percent or more of questions A – H are checked yes, then score 1 point for this phase.



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## Group Application with HAMST-R for Alteplase

6. TRANSCRIBING: manual conversion of voice, written, typed, or other forms of communication from a practitioner to a functional drug order or prescription	Yes	No	
a. Are verbal and/or telephone orders or prescriptions prohibited?	1 point	0 points	✗
<b>7. STORAGE: housing medications, which are not labeled for specific patients, in medication rooms, refrigerators, storage cabinets, automated dispensing cabinets, IV rooms, or pharmacy storage areas prior to medication dispensing and administration.</b>	Yes	No	
a. Is the medication placed in a locked location or separated from other medications during the storage phase?	✓		Examples include: concentrated electrolytes, controlled substances, paralytics, etc. Storage locations include: pharmacy, automated dispensing cabinets, etc.
b. Is the medication stored only in the central pharmacy, and not on a patient care unit or in a satellite pharmacy?	✓		Examples include: alteplase stored in central pharmacy versus stored in the emergency department – allowing pharmacy to prepare patient specific dose before dispensing.
c. Is signage, stickers, color code/forms, warning labels, shelf labels, or strategy placement utilized in the storage phase?		✗	
<b>Q7 TOTAL SCORE (tally all "Yes" answers):</b>		(out of 3)	
If total score for this phase is 2 or more, check Yes	Yes	No	
If total score for this phase is 1 or less, check No	1 point	0 points	If 50 percent or more of questions A – C are checked yes, then score 1 point for this phase.



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Group Application with HAMST-R  
for Alteplase

8. DISPENSING/Preparation: preparation, packaging, labeling, record keeping, and issuing of medication in a suitable container with appropriate labeling to an intermediary or the patient, who is responsible for administration of the medication.	Yes	No	
a. Are credentials above baseline job expectations or above the initial scope of services for the profession required for dispensing and preparation of the medication?			Examples include: institution-specific certification (critical care nursing training, chemotherapy administration course, etc.) or outside organization certification (Oncology Nursing Society certification, National Pharmacy Technician Association/chemotherapy certification, etc.)
b. Are there special handling/transportation precautions during the dispensing/preparation phase?	✓		Examples include: repackaging restrictions, glove-handling requirements, chemotherapy transportation training, tube transportation restrictions (due to instability/safety concerns, noxious or controlled substance restrictions), etc.
c. Does the medication require manipulation during the dispensing/preparation phase in the pharmacy?	✓		Examples include: warming, IV room preparation, compounding, etc.
d. Is an independent double check recommended during the dispensing/preparation phase either per policy or as recommended by external bodies?	✓		"ISMP defines an independent double check of a high-alert medication as "a procedure in which two clinicians separately check (alone and apart from each other, then compare results) each component of prescribing, dispensing, and verifying the high-alert medication before administering it to the patient."
e. Are auxiliary labels for warnings applied to or are the equivalent present on the label?			Examples include: ASHP Guidelines on Preventing Medication Errors with Chemotherapy and Biotherapy recommends independent double checks for chemotherapy and biotherapy.
Q8. TOTAL SCORE (only all "Yes" answers):			(out of 5)
If total score for this phase is 3 or more, check Yes			Yes 1 point
If total score for this phase is 2 or less, check No			No 0 points



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Group Application with HAMST-R  
for Alteplase

9. ADMINISTRATION: direct application, instillation, insertion, injection, ingestion, or instillation of a medication to the body of a patient	Yes	No	
a. Are there administration limits?	✓		Examples include: duration for IV push medications, hard maximum infusion pump rate, etc.
b. Does the medication undergo an independent double check prior to administration either per policy or as recommended by external bodies?	✓		Examples include: ASHP Guidelines on Preventing Medication Errors with Chemotherapy and Biotherapy recommends independent double checks for chemotherapy and biotherapy.
c. Does the medication require special handling during administration?			Examples include: wearing gloves, do not crush, special disposal requirements (not related to controlled substance status), special tubing (yellow tubing for opiate infusions), etc.
d. Are credentials above baseline job expectations or above the initial scope of services for the profession for administration of the medication?	✓		Examples include: institution-specific certification (critical care nursing training, chemotherapy administration course, etc.) or outside organization certification (Oncology Nursing Society certification, etc.)
e. Does the medication require special reconstitution or manipulation immediately prior to administration at the bedside?	✓		Examples include: mix-bag/in container systems, vaccinations or IV push medications that require dilution/reconstitution, etc.
f. Is the primary route of administration considered high risk?	✓		High risk routes of administration include subcutaneous, intrathecal, intramuscular, epidural, intrathecal, or intravenous.
g. Is the medication vesicant or is there a heightened risk for extravasation?	✓		LeakAlert contains information regarding extravasation risk (under "Warnings/Precautions").
Q9. TOTAL SCORE (only all "Yes" answers):			(out of 7)
If total score for this phase is 4 or more, check Yes			Yes 1 point
If total score for this phase is 3 or less, check No			No 0 points



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Group Application with HAMST-R  
for Alteplase

10. MONITORING: collection and evaluation of patient data to monitor care	Yes	No	
a. Does the medication have an associated REMS requirement?			REMS requirements include: dispensing medication guides (REMS), registry requirements/implementation system, elements to assure safe use, vaccine information statement, etc.
b. Is special or more intensive monitoring beyond normal efficacy monitoring required for safety purposes?	✓		Monitoring examples include: monitoring patient for a specific amount of time after an infusion for an infusion-related reaction, monitoring equipment, etc. Medication examples include: labetipyrin (renal function), vasopressors (hemodynamic monitoring system), doxorubicin (cardiac monitoring), etc.
Q10. TOTAL SCORE (only all "Yes" answers):			(out of 2)
If total score for this phase is 1 or more, check Yes			Yes 1 point
If total score for this phase is 0, check No			No 0 points



Total Score?

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## Key Takeways

- Health-systems do not have a standard method to identify HAMs
- HAMST-R is a valid, reliable, and easy to use tool to distinguish between HAMs and non-HAMs
- HAMST-R was intended to evaluate current formulary agents



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Joel Daniel, PharmD, MS, CPPS

## HAMST-R PROSPECTIVE (HAMST-R PRO)

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## HAMST-R PRO

### Global Safety Concerns

- ISMP
- Internal/Potential Errors
- External Errors
- Vulnerable Populations

### Medication Use Process

- Prescribing
- Transcribing
- Storage
- Dispensing/Preparation
- Administration
- Monitoring



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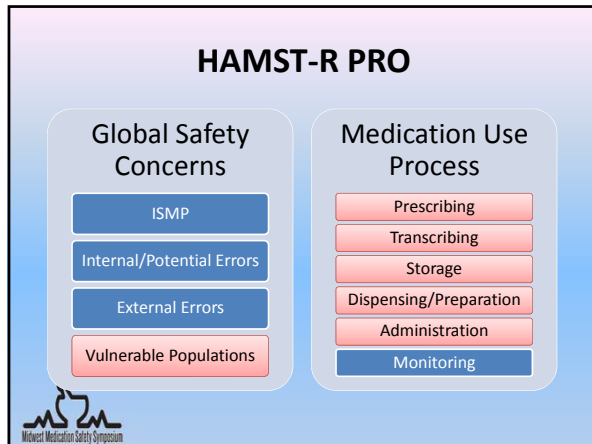
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### Group Application with HAMST-R PRO for Aripiprazole lauroxil

- Together we will complete Questions 1 - 4
- Working in small groups at your tables, utilize HAMST-R PRO to evaluate your two steps of the medication use process
- Determine one consensus score for each of the two questions
- Large group discussion and sharing will follow

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### Group Application with HAMST-R PRO for Aripiprazole lauroxil

Category	Question	Clarification	Yes/No	Score
External Lists	Does this medication exist on the ISMP High Alert Medication List?	Links to ISMP HAM lists provided below*: <a href="https://www.ismp.org/tools/highalertmedications.pdf">https://www.ismp.org/tools/highalertmedications.pdf</a> <a href="https://www.ismp.org/community/tools/arn-ham-lists-high-alert.asp">https://www.ismp.org/community/tools/arn-ham-lists-high-alert.asp</a> *Additional HAM lists/sources should not be considered for the purposes of this scoring tool	✗	0
Internal Errors	Have errors resulting in serious harm/fatality been reported with this medication internally at your facility?	Serious harm is defined as NCC MERP severity categories F-I	✗	0
External Reports	Have error reports, safety alerts, special restrictions/requirements, or fatalities been released for this medication or medication class by external bodies?	Consider previous or current reports from regulatory bodies or national safety organizations (e.g. ISMP, FDA, TIC, NIH, CDC, etc.), including LUSA alerts and case reports. Reports due to the medication itself or due to human error should be included.	✓	0
Special Populations	Is use of this medication primarily intended ONLY for the treating a vulnerable patient population?	Examples would be neonates, critically ill, pregnant patients, immunosuppressed	✗	0
	If yes, would the use of the medication outside the intended patient population cause significant adverse events?		✗	
	If yes, would potential adverse effects of use in general population be detrimental in nature?	Example: methotrexate	✗	

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## Group Application with HAMST-R PRO for ARIPIprazole lauroxil

- Together we will complete Questions 1 - 4
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## Group Application with HAMST-R PRO for ARIPIprazole lauroxil

Category	Question	Clarification	Yes/No	Score
Prescribing	Is this a look-alike, sound-alike drug?	Include medications, not limited to currently listed products, which are recognized as LISA by any tertiary reference (e.g. LexiComp, Micromedex, BNF, <a href="https://www.comp.org/look/sound/drugs">https://www.comp.org/look/sound/drugs</a> www.a9f, etc.) or internal approval body (e.g. Medication Safety Team).	✓	0
	Is there the opportunity/trend to standardize concentration and/or strength?	Do not consider tablet formulations. Do not answer yes if only one formulation is readily available. Examples include morphine oral solution, intravenous heparin for continuous infusion, etc.	✗	
	Are there multiple formulations available?	Development of standard protocols, policies, or order sets developed to guide prescribers needed for safety purposes?	✓	
	Is there a need for the reversal agent to be on the order set?	Inclusion of reversal agent for order sets should be considered when potential adverse effects are rapid and severe. Examples: naloxone.	✗	
	Should there be maximum dose limits when prescribing?	Examples include: maximum weight based dose (cefepime), maximum daily dose (IM abacavir), maximum heart limit in infusion pump (diltiazem), etc.	✗	
	In adult weight-based dosing required when prescribing?		✗	
	Should medication be hidden in CPOE outside of order set?	Example: heparin infusions, insulin drips, neuromuscular blocker infusions, etc. Note: Consider other medications in the same class.	✗	
	Is there clinical decision support (CDS) upon prescriber order entry?	CDS more active than standard order entry.	✗	
	Should the medication be considered restricted access to specialized prescribers?		✓	




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## Group Application with HAMST-R PRO for ARIPIprazole lauroxil

Transcribing / Verification	Does proposed ordering process REQUIRE a telephone call or another communication method to pharmacy?	Example: Kcentra	✗	0
	Are verbal and/or telephone orders or prescriptions prohibited?	Example: TPN or chemotherapy	✗	
Storage	Should the medication be placed in a locked location or separated from other medications during the storage phase for reasons other than being a controlled medication or for inventory control?	Examples included: concentrated electrolytes, neuromuscular blockers, etc. Storage locations include: pharmacy, automated dispensing cabinets, etc.	✗	0
	Is the medication available on the market with multiple drug forms (e.g. immediate release, extended-release, etc.)?	The storage of the same medication in different forms that would otherwise be stored next to each other is a common root cause for dispensing errors.	✓	
	Is the medication stored only in the central pharmacy, and not on a patient care unit or in a satellite pharmacy?	Examples include: alteplase stored in central pharmacy versus stored in the emergency department – allowing pharmacy to prepare patient specific dose before dispensing	✓	
	Is signage, stickers, color-coded bins, warning labels, shelf labels, or strategic placement considered in the storage phase?		✓	




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## Group Application with HAMST-R PRO for ARIPIprazole lauroxil

Category	Question	Clarification	Yes/No	Score
Dispensing / Preparation	Are credentials above baseline job expectations or above the initial scope of services for the profession required for dispensing and preparation of the medication?	Examples include: institution-specific certification (critical care nursing training, chemotherapy administration course, etc.) or outside organization certification (Oncology Nursing Society certification, National Pharmacy Technician Association chemotherapy certification, etc.)	✗	0
	Are there special handling/transportation precautions during the dispensing/preparation phase?	Examples include: repackaging restrictions, glove-handling requirements, chemotherapy transportation training, tube transportation restrictions (due to instability/safety concerns, not cost or controlled substance restrictions) etc.	✗	
	Does the medication require manipulation during the dispensing/preparation phase in the pharmacy?	Examples include: warming, IV room preparation, compounding, etc.	✗	
	If prepared in the IV room, does this product require bypassing workflow management system?	Bypassing is considered appropriate for medications that do not have a set concentration due to variable vial sizes. Example: Blood products.	✗	
	Is an independent double check recommended during the dispensing/preparation phase either per policy or as recommended by external bodies?	Examples include: ASHP Guidelines on Preventing Medication Errors with Chemotherapy and Biotherapy recommends independent double checks for chemotherapy and biotherapy.	✗	
	Are auxiliary warning labels recommended?		✗	

## Group Application with HAMST-R PRO for ARIPIprazole lauroxil

Category	Question	Clarification	Yes/No	Score
Administration	Are there administration limits?	Examples include: duration for IV push medications, hard maximum infusion pump rate, etc.	✗	0
	Should the medication be independently double checked prior to administration either per policy or as recommended by external bodies?	Examples include: ASHP Guidelines on Preventing Medication Errors with Chemotherapy and Biotherapy recommends independent double checks for chemotherapy and biotherapy.	✗	
	Does this medication require special handling during administration?	Examples include: wearing gloves, do not crush, special disposal requirements (not related to controlled substance status), special tubing (yellow tubing for epidural infusions), etc.	✓	
	Would this medication be in consideration as a Hazardous Medication that should be evaluated before the System Hazardous Drug Committee for cUSP 800?	For medications that have been released to market AFTER latest NIOSH list. The NIOSH version of the ASHP definition of a hazardous drug to be considered would be a medication that exhibits one or more of the following characteristics in humans and/or animals: -Carcinogenicity -Teratogenicity or other developmental toxicity -Reproductive toxicity -Organ toxicity at low doses -Genotoxicity -Structure and toxicity profiles that mimic existing drugs on NIOSH List of Antineoplastic and Other Hazardous Drugs	✗	

## Group Application with HAMST-R PRO for ARIPIprazole lauroxil

Category	Question	Clarification	Yes/No	Score
Administration cont	Are credentials above baseline job expectations or above the initial scope of services for the profession for administration of the medication?	Examples include: institution-specific certification (critical care nursing training, chemotherapy administration course, etc.) or outside organization certification (Oncology Nursing Society certification, etc.)	✗	
	Does the medication require special reconstitution or manipulation immediately prior to administration at the bedside?	Examples include: mini-bag plus container systems, vaccinations or IV push medications that require dilution/reconstitution, etc.	✓	
	Does this medication meet the criteria for submission to the Time Critical Medication Committee?	Examples: Carbidoopa/Levo, IV ampicillin, etc.	✗	
	Is the primary route of administration considered high risk?	High risk routes of administration include: subcutaneous, intradermal, intramuscular, epidural, intrathecal, or intravenous	✓	
	Is the medication a vesicant or is there a heightened risk for extravasation?		✗	

### Group Application with HAMST-R PRO for ARIPIprazole lauroxil

<b>Monitoring</b>	Does the medication have an associated REMS requirement for monitoring?		✗	0
	Is special or more intensive monitoring beyond normal efficacy monitoring required for safety purposes?	Monitoring examples include: monitoring patient for a specific amount of time after an infusion for an infusion-related reaction, monitoring equipment, etc. Medication examples include: tobramycin (renal function), vasopressors (hemodynamic monitoring system), dofetilide (cardiac monitoring), etc.	✓	

Total  
Score?

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### Key Takeaways

- Minor adjustments to each step of the medication use process allows for prospective review
- May need subject matter experts to review different sections

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Todd A. Walroth, PharmD, BCPS, BCCCP

### CLINICAL PEARLS FOR HAMST-R AND HAMST-R PRO

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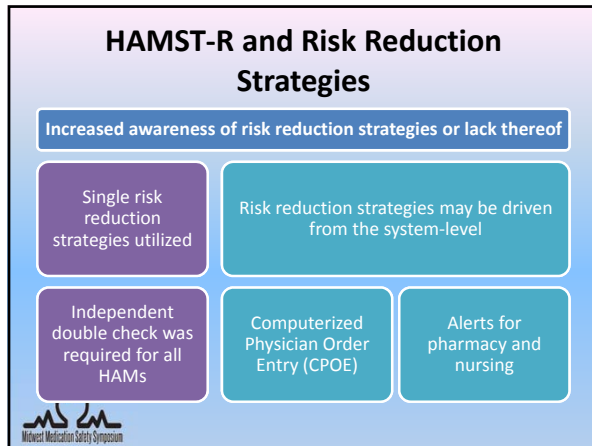
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### ISMP Safe Practice Recommendations

***"A single risk-reduction strategy for each high-alert medication is rarely enough to prevent harmful errors."***

<https://www.ismp.org/newsletters/acutecare/showarticle.aspx?id=45>, Accessed 2018 June 14

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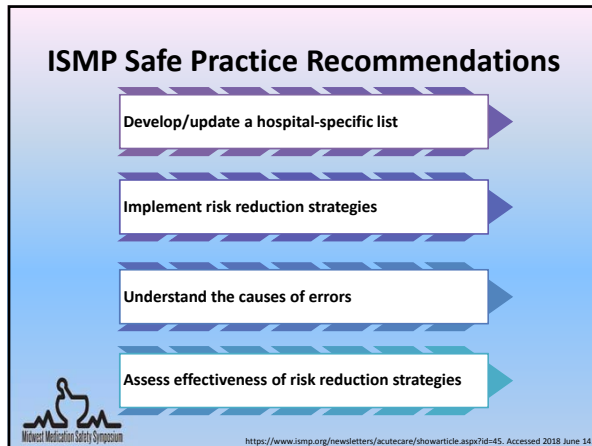
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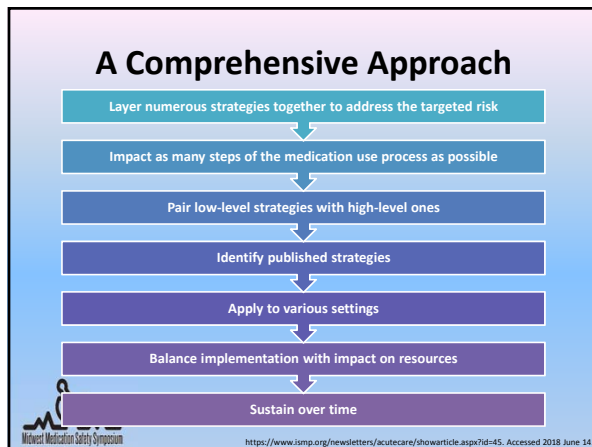
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### ASHP Guidelines on Preventing Medication Errors in Hospitals

- “...to provide pharmacists with practical recommendations and best practices for preventing and mitigating patient harm from medication errors in the health system setting.”

This is a prepress version of guidelines that will appear in final form in AJHP at a future date. Those guidelines will replace this preliminary version when they are final.

Midwest Medication Safety Symposium

<https://www.ashp.org/-/media/assets/policy-guidelines/docs/guidelines/preventing-medication-errors-hospitals.ashx?file=ashp-CF00375E109297517C3CB968DADE780059E2560A>. Accessed 2018 July 5.

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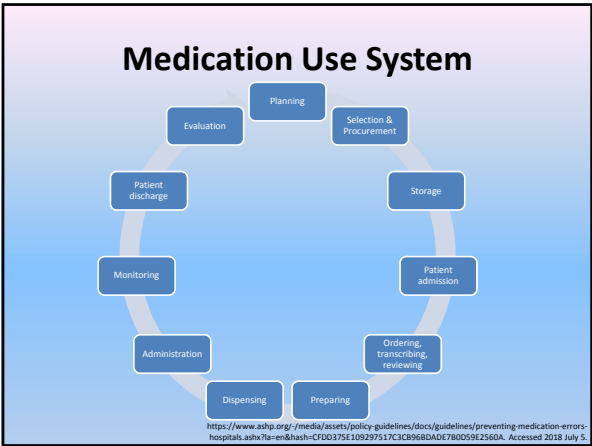
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**ICPS HAM Workgroup**

ICPS HAMSLADS Risk Reduction Strategies

A	P&T review and approval
B	Visual cues (ex: colored bins / stickers)
C	Warning or HIGH ALERT labels used on product
D	TALL Man Lettering used
E	Stored in pharmacy only
F	Not stored in ADC
G	Special storage in ADC (ex: segregated / ADC cube)
H	Standardized order set
I	Independent double check by nurse prior to administration (documented)
J	Pharmacy prepares all doses
*KN	Medication dose adjustment / monitoring via nursing
*KP	Medication dose adjustment / monitoring via pharmacy
L	Independent double check by pharmacy (ex: BSA dose calc) (Note: also encompasses Q and W)
M	Use of dosing charts, tools, protocols
N	Use of smart infusion pump
O	Stock unit/dose
P	Order intentionally (ex: to avoid look alike products, packaging)
Q	Document patient parameters, includes quantitative values (ex: INR, blood glucose, End Tidal CO2)
R	Clinical alerts or restrictions via system
S	Only standard concentration(s) available
T	Prepared bags / manufacturer only
U	Bar Code Verification (includes quarantine and confirmation it's in system, process for adding a new NDC)
V	NO verbal or telephone orders
W	Assess and document patient's response, includes qualitative values (ex: pain, symptom management, sedation scores, bleeding)
X	Limit areas or staff that can administer
Y	Staff/Physician signature only (preventing a resident couldn't order)
Z	Communication / special documentation

\*Dependent upon medication - recommendation that a specific pharmacy or nursing group monitor (can encompass I and R)

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**Medication Use Process**

MEDICATION USE PROCESS STEPS/RECOMMENDATIONS: INSULIN	Edenaid Health
<b>PRESCRIPTION</b>	
ICPS Rec. #1: P&T review and approval of insulin products	Yes
ICPS Rec. #2: Barcode verification of all insulin products (includes quarantine and confirmation it is in the system; process for adding a new NDC)	Yes
<b>COMPILING</b>	
ICPS Rec. #3: Pharmacy prepares all doses of continuous insulin infusions and U-500 insulin	Yes (See Policy #950-291 re: U-500)
ICPS Rec. #4: Only standard concentrations available for insulin infusion	Yes (U unit/2 ml)
<b>STORAGE</b>	
ASHP Rec. #1:	
A) Store only U-100 concentration insulin and U-100 administration devices in patient care areas	Yes (See Policy #600-063 for more info)
B) Ensure they are secure and segregated from other medications	Yes (See Policy #600-063 for more info)
ICPS Rec. #5: Visual cues (colored bins/stickers) or barcode verification (includes quarantine and confirmation it is in the system; process for adding a new NDC) of all insulin products	Barcode verification: Yes
<b>PRESCRIPTION</b>	
ASHP Rec. #3: Develop protocol-driven and evidence-based order sets for specific uses of insulin (order sets should include glucose monitoring and decision support to guide insulin choices)	
A) Transition from IV to Sub-Q	In progress
B) Administration via Sub-Q insulin pumps	Yes
C) Post-discharge dosing	Yes (Policy #700-150)
D) DKA	Yes (Policy #701-0019)
E) Hyperkalemia	No
F) Hypokalemia	No
G) Post-cardiac surgery care	Yes (Policy #701-0016)
ASHP Rec. #2: Eliminate the routine administration of correction/sliding scale insulin doses as a primary strategy to treat hyperglycemia	No (NICE planned)
ASHP Rec. #3: Eliminate the use of "free-text" insulin orders and replace them with protocol-driven and evidence-based order sets	Yes (Insulin order set built in Epic)
ICPS Rec. #6: Utilize a standardized order set for all insulin products	Yes (Insulin order set built in Epic)
ICPS Rec. #7: Utilize clinical alerts or restrictions via system for insulin U-500	Yes (Insulin order set built in Epic)

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## Think-Pair-Share

- Discuss how you can implement risk-reduction strategies to target vulnerable steps of the medication use process for **alteplase** and **ARIPiprazole lauroxil**
- Large group discussion and sharing will follow




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### ICPS HAMSALADs Risk Reduction Strategies

A	P&T review and approval
B	Visual cues (ex: colored bins / stickers)
C	Warning or hidden ALERT labels used on product
D	TALL Man lettering used
E	Stored in pharmacy only
F	Not stored in ADC
G	Special storage in ADC (ex: segregated / ADC cubies)
H	Standardized order set
I	Independent double check by nurse prior to administration (documented)
J	Pharmacy prepares all doses
*KN	Medication dose adjustment / monitoring via nursing
*KP	Medication dose adjustment / monitoring via pharmacy
L	Independent double check by pharmacy (ex: ISA dose calc) (Note: also encompasses Q and W)
M	Use of dosing charts, tools, protocols
N	Use of smart infusion pump
OD	Stock antibiotics
P	Order intentionally (ex: to avoid look alike products, packaging)
Q	Document patient parameters, includes quantitative values (ex: INR, blood glucose, End Tidal CO2)
R	Clinical alerts or restrictions via system
S	Only standard concentration(s) available
T	Pre-filled bags / manufacturer only
U	Bar Code Verification (includes quarantine and confirmation it's in system, process for adding a new NDC)
V	NO verbal or telephone orders
W	Assess and document patient's response, includes qualitative values (ex: pain, symptom management, sedation scores, bleeding)
X	Limit access or staff that can administer
Y	Staff/Physician signature only (preventing a resident couldn't order)
Z	Communication / special documentation

\*Dependent upon medication – recommendation that a specific pharmacy or nursing group monitor (can encompass L and R)

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## Key Takeaways

- Implementing at least one high-level impact risk reduction strategy should be considered for each step of the medication use process for HAMS
- Conducting a gap analysis comparing best practices/evidence-based recommendations to current practice may enhance the medication safety process surrounding HAMS




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## Conclusions

- Before HAMST-R, institutions did not have an objective, validated tool to identify HAMS
- HAMST-R and HAMST-R PRO methodology can be used to evaluate both formulary and non-formulary agents
- Each health-system should work to develop a multi-faceted plan to address vulnerable steps in the medication use process for HAMS




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## HAMST-R and HAMST-R PRO



- Eskenazi Health and CoxHealth will be conducting a multi-site study over the next several months
- Project aim: to validate HAMST-R PRO
- If you are interested in participating, please obtain a business card from a presenter

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