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Clarity PSO Learning Series

Topic: High-Alert Medications

What do heparin, vancomycin and insulin have in common? They are all high-alert medications, and the top 3 most consistently involved medications in events reported to Clarity PSO.

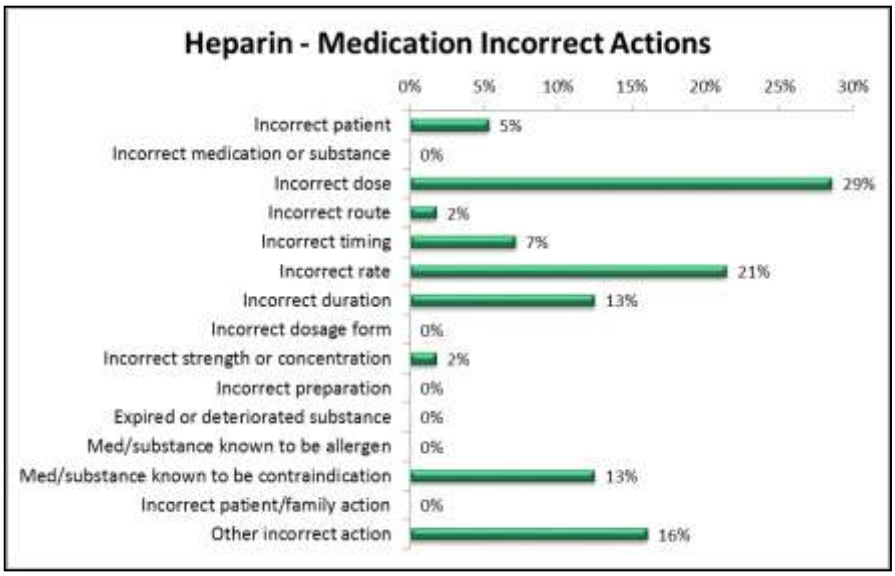
Medications like these draw specific attention because the consequences of errors are more devastating to patients than other medications. In order to reduce the level of patient harm, they require frequent, routine monitoring and dosage adjustments that are very patient specific. These requirements add complexity to the medication process, and it does not help that the number of patients treated with heparin, vancomycin and insulin is increasing.

Since these are delicate medications, the dosing is often delegated to other practitioners who are considered experts in their management. These practitioners may include pharmacists, physician consult services and advanced practice nurses. When there are multiple providers managing patient care, communication among them is key to optimizing safety and reaching the established goals and outcomes.

For this PSO Learning Series Report, Clarity PSO analyzed events related to heparin, vancomycin and insulin, in order to identify common themes and offer our recommendations for improving safety practices with these medications and reducing the potential for future events.

Data & Recommendations

What We Learned: Heparin Events



Aggregate heparin data and its associated incorrect actions

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The following themes were noted within the reported heparin events:

- The majority of events included those associated with infusions
- Breakdowns in the ordering process among consult services who place recommendations in notes, but do not place orders
- Breakdowns in the medication reconciliation process post procedure and post transfer
- Unclear orders
- Inconsistent turnaround times for pharmacy dosing consult service
- Duplicate therapy with other anticoagulants
- Transcription errors when paper forms are used
- Incorrect weights and heights documented in the electronic medical record (EMR) and/or transcribed onto paper order sheets
- Dispensing errors and delays by the pharmacy
- Delays in dosing changes, initiation or initiating at wrong doses
- Incorrect weights programmed into infusion pumps
- Infusion pump programming errors
- Dosing protocol not followed by nurses
- Labs not drawn as ordered
- Wrong patient errors for dosing adjustments

Recommendations & Action: Heparin Events

The following are best practice recommendations to maximize safety with heparin:

1. Develop pre-defined heparin protocols that are evidence based. Develop different protocols with different goals for different patient populations (high bleeding risk, etc.). Use adjusted body weight for patients greater than 20% over ideal body weight. Build protocols into the order entry system. Refer to TJC NPSG.03.05.01
2. Consider implementing a pharmacy consult to dose heparin. Pharmacists may be authorized to order labs and to change heparin dosing per protocol. Include routine lab monitoring (CBC every 3 days, etc.) into the protocol
3. Try to avoid paper processes of transcribing, faxing and labeling paper forms. Each step in the process is error prone. Build orders into electronic order entry systems
4. Develop a robust RN independent double-check process for initiation of infusion and for dose changes. The process must be defined and have a forcing function, such as requiring a witness to document administration
5. Build alerts into the order entry system for duplicate therapy with oral agents. These alerts should fire to both prescribers and pharmacists
6. Develop a pharmacy surveillance program to detect duplicate anticoagulant therapies
7. Integrate smart pumps into the electronic medical record. Scanning the order will automatically program the infusion pump to prevent pump programming errors
8. Implement effective medication reconciliation process post procedures and on transfer to another level of care. Refer to TJC NPSG.03.06.01
9. Pharmacy should scan medications prior to dispensing
10. Stock heparin infusions in Automated Dispensing Cabinets (ADCs) to prevent dispensing delays
11. For stock-outs of ADCs, implement a stock-out report, so critical medications can be restocked as soon as possible

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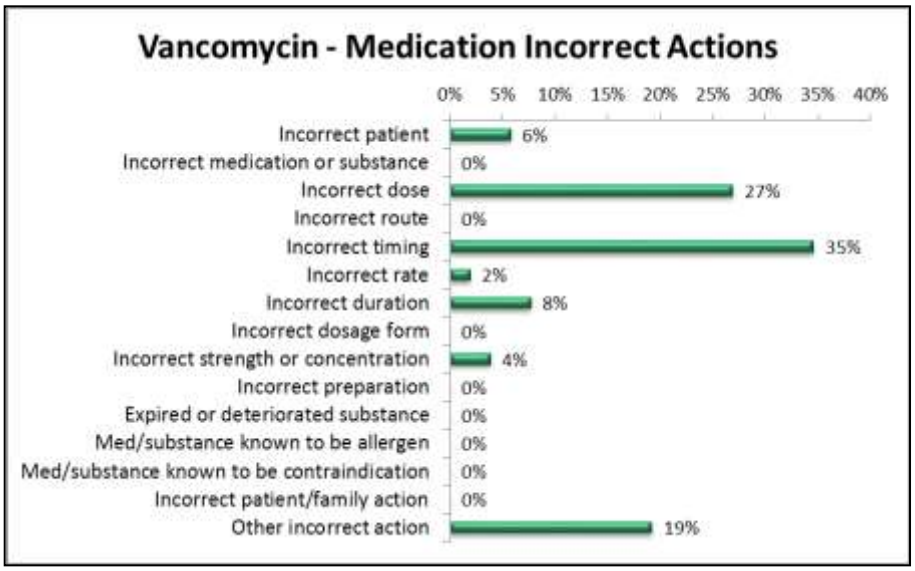
What We Learned: Vancomycin Events



Aggregate vancomycin data and its associated incorrect actions

The following themes were noted within the reported vancomycin events:

- Predominantly intravenous administration related events
- Pre-operative (pre-op) doses were given on the floor prior to sending patients to the operating room (OR)
- Delays in pre-op doses
- Doses put on “Mar Hold” and not given
- Doses were discontinued by prescribers on transfer from emergency department (ED) to floor
- Duplicate doses were ordered by different providers
- Improper dosing by physicians
- Improper dosing by pharmacists
- Wrong timing of doses
- Doses were not ordered after consult notes were written
- Pharmacists’ dosing not done in a timely manner
- Improper medication reconciliations on admission, transfer and discharge led to improper or lack of dosing
- Wrong doses dispensed or delays in dispensing by pharmacy
- Doses ordered “to dialysis” were given prior to dialysis by nurses in the dialysis area
- Doses were omitted, especially first doses
- Doses were given late
- Wrong patients received other patients’ doses
- Infusion pump malfunctions or programming errors
- Improper lab monitoring

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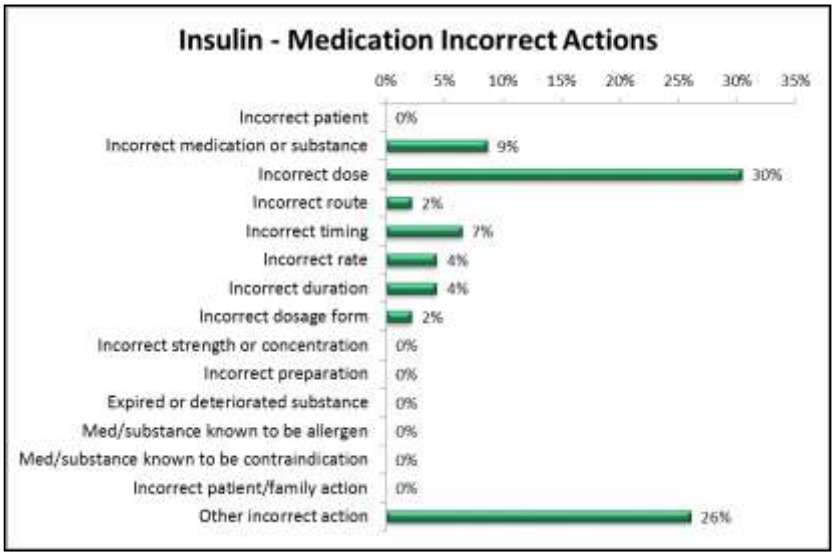
Recommendations & Action: Vancomycin Events

The following are best practice recommendations to maximize safety with vancomycin:

1. For intra-operative doses, orders should clearly state "on call" to OR. Dose to be administered in OR
2. Evaluate the administration of antibiotics prior to incision in the OR. There were reports that doses were not given in the OR. Is the anesthesia record easily available for all providers to see?
3. Implement an effective medication reconciliation process upon admission, post procedures and on transfer to another level of care. Refer to TJC NPSG.03.06.01
4. Evaluate the process for antibiotic dosing in the ED. Are doses auto-verified and then continued on the floor after transfer?
5. Develop pharmacist dosing protocols. Pharmacists should monitor daily, including weekends
6. Build dosing protocols into the order entry system
7. To prevent wrong timing errors: Try to take out defaults to the next standard administration time in the computer. Force prescribers to enter the time for the next dose due
8. Consider your peak/trough process and how it impacts the delivery of vancomycin. Be sure that this process is clearly outlined and uniformly understood as it often parallels timing of administration
9. Provide nursing staff with resources or institute forcing functions or decision support tools to ensure that vancomycin doses are administered after hemodialysis
10. Provide nursing staff with resources or decision support tools that serve as reminders that vancomycin is compatible with many medications and therefore can be administered with other medications concomitantly
11. Nurses should scan medication prior to administration to prevent wrong patient errors
12. (Multiple loading doses were not given after ordered by pharmacy protocol.) The pharmacist should be able to place the order in the computer, verify the order and dispense the dose. The pharmacist should communicate with the nurse directly to understand why doses are not given

What We Learned: Insulin Events



Aggregate insulin data and its associated incorrect actions

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The following themes were noted within the reported insulin events:

- Insulin events involved infusions and all types of subcutaneous (SC) injections
- Improper medication histories taken
- Insulin ordered for wrong patients
- Wrong maintenance doses of insulin ordered on admission
- Ten-fold overdoses ordered
- Wrong types of insulin ordered
- Improper dosing conversions
- Delays in treatment of diabetic ketoacidosis (DKA) within EDs
- Verbal orders to hold insulin were not placed in the medical record
- Infusion pumps malfunction or programming errors
- Insulin pens given to patients at discharge that belonged to other patients
- Wrong SC doses given (misread sliding scale, etc.)
- No insulin available within EDs
- Delays in insulin administration
- Doses omitted
- Insulin given at wrong times
- Improper dosing or lack of dosing when patients are nothing by mouth (NPO)
- Omitted doses: due to miscommunication of blood glucose results, automated dispensing cabinets (ADC) empty, unaware of new orders
- Wrong types of insulin given
- Wrong doses documented
- Improper methods for collecting blood samples
- Nurses not following orders for insulin administration and diabetes management
- Wrong protocol forms used
- Transcription errors

Recommendations & Action: Insulin Events

The following are best practice recommendations to maximize safety with insulin:

1. Implement an effective medication reconciliation process upon admission, post procedures and on transfer to another level of care. Refer to TJC NPSG.03.06.01
1. Develop a hyperkalemia protocol. If the patient is already receiving insulin, then this should be taken into account and new insulin orders may be needed
2. Orders to hold insulin should be entered into the EMR
3. Ensure patient eats within 15 to 30 minutes of getting a short acting insulin
4. Review best practice for insulin pen use in hospitals: Label pen with patient label from pharmacy to capture both the patient and the medication during scanning
5. Stock regular insulin in the ED. Develop a stock-out report, so critical medications can be restocked as soon as possible
6. Develop protocols for insulin dosing when the patient is NPO. There is an inconsistency among hospitals. Some hospitals hold the insulin, and others don't. Should not just hold insulin
7. Encourage RNs to obtain the blood glucose from a finger stick, and not from a peripherally inserted central catheter (PICC) line, especially if total parental nutrition (TPN) is running through the PICC line. Consider providing RNs with a protocol for obtaining accurate and precise blood glucose from a PICC line if clinically necessary

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8. If insulin is held/not administered as ordered/planned, be sure that the patient's status reflects a clinical necessity to do so and is documented accordingly. Provide RNs resources to accurately document the clinical reasoning behind their decision making. If there is no clinical necessity to hold the insulin, they must follow the order exactly or contact a prescriber for a new order or to get an order to hold the insulin
9. U-500 is high risk. If a hospital is not going to add this product to formulary, then safety strategies should be in place for use. Pharmacy should be involved in converting doses from U-500 to U-100

Summary & Resources

The recommendations presented to improve safety with heparin, vancomycin and insulin are not all inclusive. They are meant to hit the highlights and focus on reducing the potential for recurrent events based on the noted themes. Managing high-alert medications can be a difficult process, and it is important that you identify the strategies that work the best for your organization.

In addition to our recommendations, there are many resources available through organizations and societies that promote medication safety best practice, such as:

- The Institute for Safe Medication Practices (ISMP) offers self-assessments on its website that are free of charge and easy to download: *ISMP Medication Safety Self-Assessment® for Antithrombotic Therapy in Hospitals* and *ISMP Medication Safety Self-Assessment for Hospitals*

- The American Society for Heath System Pharmacists (ASHP) provides guidelines on Preventing Medication Errors in Hospitals. ASHP also provides special feature articles on many medication safety related topics, such as *"Enhancing insulin-use safety in hospital: Practical recommendations from an ASHP Foundation expert consensus panel"*

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