Improving the Safety of Select High-Alert Medications: Insulin, Heparin, and Vancomycin

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Objectives

- Review aggregate data for the top medications involved from medication event reports
- Present a synopsis of the themes of the incorrect actions that occurred
- Outline safety strategies and best practice recommendations to reduce the potential for recurrence of events
- Provide references and additional resources to improve medication safety

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Analysis of Incorrect Actions

- Top three medications involved in reported events
  - Insulin
  - Heparin
  - Vancomycin

- Why?
  - High Alert
  - Patient specific dosing
  - Frequent, routine monitoring
  - Multiple products with different concentrations
  - Dosing by other practitioners
  - Increased use

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Insulin Vials

Rapid Acting Insulin	Mixed Insulin: NPH + regular	Long Acting Insulin
Apidra (glulisine)	Humalog 50/50 +75/25	Lantus (glargine)
Humalog (lispro)	Novolog 70/30	
Novolog (aspart)	Novolin 70/30	Levemir (detimir)
	Humulin 70/30	

Short Acting Insulin	Intermediate Acting Insulin
Humulin R (regular)	Humulin N (NPH)
Novolin R (regular)	Novolin N (NPH)
	Insulin U-500

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Insulin Pens

Rapid Acting Insulin	Intermediate Acting
Apidra Solostar (Glulisine)	Humulin N (NPH)
Novolog Flex (Aspart)	Insulin U-500
Humalog Kwik (Lispro)	
Mixed Insulin	**Long Acting Insulin**
Humalog Mix KwikPen 50/50 Humalog Mix KwikPen 75/25	Lantus Solostar (Glargine)
Novolog Mix FlexPen 75/25	Toujeo (Glargine)
Humulin Pen 70/30	Levemir Flexpen (Levemir)

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Insulin Events

Safety Strategies for Events Related to Admission

- Implement an effective medication reconciliation process on admission
- Consider incorporating pharmacists or pharmacy technicians into the process for taking medication histories
- Utilize outpatient pharmacy records to confirm medications, doses, and last refill history
  - Pharmacy labels
  - Prescription databases
  - Contact pharmacy directly
- Develop a process for prescribers to continue home medications

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Insulin Events

Safety Strategies for Events Reported due to Incorrect Prescribing

- Limit the number and types of insulin products on formulary
- Involve pharmacists for dosing conversions
- Incorporate dosing of insulin for NPO status into order sets or alert prescriber during order entry to adjust insulin doses

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Insulin Events

Safety Strategies for Events Reported due to Special Medical Conditions

- Develop a protocol/order set for treatment of Diabetic Ketoacidosis
- Stock regular insulin in the ED's Automated Dispensing Cabinet (ADC) to prevent delays
- Develop stock out reports for the ADC, so critical medications can be restocked as soon as possible
- Develop a hyperkalemia protocol/order set. If the patient is already receiving insulin, then this should be taken into account, and insulin orders should be adjusted or discontinued

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Insulin Events

Safety Strategies for Events Reported due to Pharmacy Issues

- Stock insulin vials in the ADCs to prevent delays
- Develop stock out reports, so critical medications can be restocked as soon as possible
- To prevent transcription errors
  - Implement computerized prescriber order entry
  - Implement the use of order sets to standardize the type of insulin and dosing

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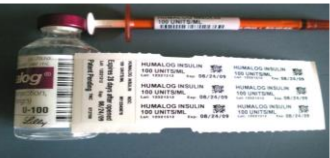
Insulin Events

Safety Strategies for Events Reported due to Incorrect Administration



- Implement barcode scanning to prevent administration of wrong type of insulin and wrong time errors
- Implement an effective medication reconciliation process upon admission, post procedures and on transfer to another level of care
- Upload finger stick results into the EMR before insulin administration
- Standardize dosing in infusion pumps, so nurses don't have to calculate
- If pump malfunctions, sequester the pump for investigation and interrogation
- Educate RNs to obtain the BG from a finger stick, and not from a PICC line
- Contact prescriber to hold insulin or to obtain new orders
- Enter all verbal orders into the medical record immediately
- Ensure that patients eat within 30 minutes of receiving short acting insulin

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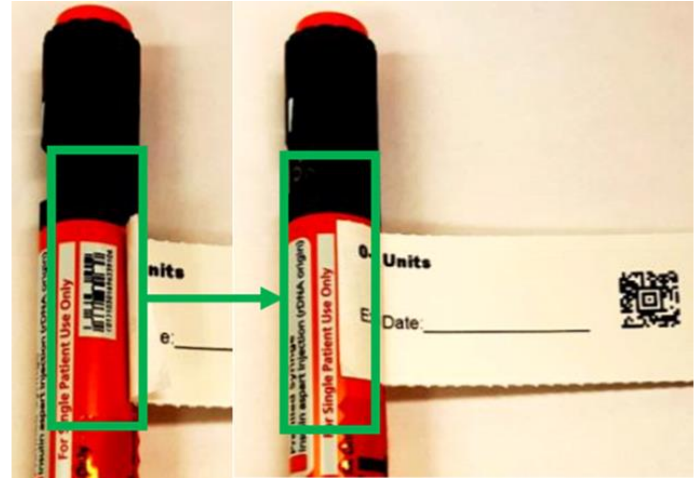
Insulin Events

Safety Strategies for the use of Insulin Pens

- Never use insulin pens for more than one patient, even when the needle is changed
- Pharmacy should scan pen and cover manufacturer barcode with pharmacy label, so nurse scans the barcode on the pharmacy label to include confirmation of correct patient and correct medication
- Patients exposed to a used insulin pen should be promptly notified and offered appropriate follow-up including blood borne pathogen testing



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Insulin Events

Safety Strategies for Events Reported Involving Non-Standard Concentrations of Insulin

- Do a risk assessment before adding non-standard concentrations of insulin to formulary: U-300, U-500
- Patients could use their own supply to avoid dispensing errors
- If add to formulary, pharmacy should scan all insulin products before dispensing
- Involve pharmacists in dosing conversions for non-standard insulin concentrations
- Implement barcode scanning to prevent wrong type of insulin errors

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Heparin Events

Safety Strategies for Prescribing Issues

- To prevent transcription errors
  - Implement computerized prescriber order entry
  - Implement the use of order sets to standardize the type of insulin and dosing
- Develop protocols or order sets that are evidence based
  - Base on therapeutic goals for different patient populations
  - Should be weight based. Use adjusted weight for obese patients
  - Build routine lab monitoring into the protocol/order set
  - Prohibit the modification of paper forms
  - Refer to TJC NPSG.03.05.01
- Try to avoid paper processes
  - Transcribing, faxing, and labeling paper forms creates the chances for error
  - Build orders into electronic order entry systems

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Heparin Events

Safety Strategies for Prescribing Issues

- Build alerts into the order entry system for duplicate therapy with oral agents. Alerts should fire to both prescribers and pharmacists
- Develop a pharmacy surveillance program to detect duplicate anticoagulant therapies
- Implement a consult service: pharmacy to dose
  - Must guarantee same level of service 24/7 for all patients
  - Expectations should be clear
    - What is turnaround time for consult?
    - How will recommendations be communicated to primary prescriber?
    - Consider pharmacy collaborative practice agreements
- Implement an effective medication reconciliation process post procedures and post transfer to another level of care
  - Refer to TJC NPSG.03.06.01

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Heparin Events

Safety Strategies for Events Reported due to Transcription Issues

- Build protocols/order sets into the EMR
- If paper forms are used, prohibit modifications
- Standardize the process for documentation of weight and height
  - Use metric system, but could display both metric and imperial in EMR
  - Select a dosing weight for medications
    - Weight on admission unless otherwise directed in medication order
    - If using adjusted weight, then a separate infusion should be used

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Heparin Events

Safety Strategies for Events Reported due to Pharmacy Issues

- Pharmacy should scan medications prior to dispensing. Evaluate whether your system has a Dispense Prep software that can be utilized
- Stock heparin infusions in Automated Dispensing Cabinets (ADCs) to prevent dispensing delays
- For stock-outs of ADCs, implement a stock-out report, so critical medications can be restocked as soon as possible
- Set clear expectations for consult service

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Heparin Events

Safety Strategies for Events Reported due to Administration and Monitoring Issues

- Develop a robust RN independent double-check process with forcing function
  - Initiation of infusion
  - Dose changes
- Integrate smart pumps into the electronic medical record. Scanning the order will automatically program the infusion pump to prevent pump programming errors
- Nurse can create a future task in the EMR as a reminder to draw labs

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Vancomycin Events

Safety Strategies for Events Reported due to Transitions of Care

- 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
- Evaluate the process for antibiotic dosing in the ED
  - Do ED prescribers order one time doses?
  - Does pharmacy have to review order again after transfer?

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Vancomycin Events

Safety Strategies for Events Reported due to Perioperative Process

- For intra-op doses, orders should clearly state “on call” to OR. Dose to be administered in OR
- Evaluate the administration of antibiotics prior to incision in the OR
  - Are protocols being followed?
  - Is the anesthesia record easily available for all providers to see?
- Evaluate the processes for placing medications “on hold” and resuming them
- 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

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Vancomycin Events

Safety Strategies for Events Reported due to Prescribing Issues

- Develop and implement dosing protocols/order sets
- Take out defaults to the next standard administration time
  - Force providers to enter the time the next dose is due
- Consider implementing pharmacy dosing of vancomycin. Pharmacists may be authorized to order labs and to change dosing per protocol
  - Must guarantee same level of service 24/7 for all patients
  - Expectations should be clear
    - What is turnaround time for consult?
    - How will recommendations be communicated to primary prescriber?
    - Consider pharmacy collaborative practice agreements
      - The pharmacist should be able to place the order in the computer, verify the order, and dispense the dose
      - If doses are not given on time, pharmacist should communicate with the nurse to understand why there was a delay

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Vancomycin Events

Safety Strategies for Events Reported due to Administration Issues

- Provide nursing staff with resources or institute forcing functions or decision support tools to ensure that vancomycin doses are administered after hemodialysis
- 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
- Nurses should scan medication prior to administration to prevent wrong patient errors
- Include vancomycin in the library of infusion pumps with a standard infusion rate of 1 gram per hour

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Vancomycin Events

Safety Strategies for Events Reported due to Dispensing or Monitoring

- Implement scanning of doses prior to dispensing in pharmacy to prevent dispensing errors
- Dispense oral doses in unit dose ready to administer
- Build lab monitoring into protocols
- Encourage nurses to create future tasks like blood draws

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Summary

- Aggregate analysis of the reported events for the top medications involved: insulin, heparin, and vancomycin
- Types of errors were presented
- Safety strategies were recommended
- References and additional resources are provided for review to improve medication safety

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