“Preventing Adverse Drug Events and Harm”

Frank Federico, RPh, IHI Executive Director
Steve Meisel, Pharm.D., IHI Faculty

February 14, 2012
12:00 - 1:00pm ET
Beth O’Donnell, MPH, Institute for Healthcare Improvement (IHI), is responsible for managing and coordinating strategic partnerships. Ms. O’Donnell received her undergraduate degree at St. Lawrence University and her graduate degree from The Dartmouth Institute for Health Policy and Clinical Practice. She joined IHI in August.
Welcome to today’s session!
Please use Chat to “All Participants” for questions
For technology issues only, please Chat to “Host”
WebEx Technical Support: 866-569-3239
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Please take a moment to chat in your organization name and the number of people on the call with you.

Ex. “Institute for Healthcare Improvement – 2”
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What is an Expedition?

ex•pe•di•tion (noun)
1. an excursion, journey, or voyage made for some specific purpose
2. the group of persons engaged in such an activity
3. promptness or speed in accomplishing something
Overall Objectives

Participants will be able to:

• Identify opportunities to decrease Adverse Drug Events (ADEs)
• Describe three process changes needed to reduce ADEs
• Discuss what measures are needed to determine the impact of interventions
Frank Federico, RPh

Frank Federico, RPh, Executive Director, Strategic Partners, Institute for Healthcare Improvement (IHI), works in the areas of patient safety, application of reliability principles in health care, preventing surgical complications, and improving perinatal care. He is faculty for the IHI Patient Safety Executive Training Program and co-chaired a number of Patient Safety Collaboratives. Prior to joining IHI, Mr. Federico was the Program Director of the Office Practice Evaluation Program and a Loss Prevention/Patient Safety Specialist at Risk Management Foundation of the Harvard Affiliated Institutions, and Director of Pharmacy at Children's Hospital, Boston. He has authored numerous patient safety articles, co-authored a book chapter in Achieving Safe and Reliable Healthcare: Strategies and Solutions, and is an Executive Producer of "First, Do No Harm, Part 2: Taking the Lead." Mr. Federico serves as Vice Chair of the National Coordinating Council for Medication Error Reporting and Prevention (NCC-MERP). He coaches teams and lectures extensively, nationally and internationally, on patient safety.
Steven Meisel, Pharm.D., Director of Patient Safety for Fairview Health Services, an integrated health system based in Minneapolis, Minnesota. In this role he is responsible for all aspects of patient safety improvement, as well as related measurement, reporting, educational and cultural initiatives. Dr. Meisel has served as faculty for the Institute for Healthcare Improvement safety since 1997. Dr. Meisel is the recipient of numerous awards, including the 2005 University Health-System Consortium Excellence in Quality and Safety Award. He is the author of several publications.
Session Agenda

• Homework – What did you learn?
• Insulin
  o Safety
  o Preparation & Dispensing
  o Administration
  o Monitoring
• Q&A
• Homework
Homework

• Review your system for ensuring safety with narcotics/opiates

• How are you identifying opportunities for improvement with this group of high-alert medications?

• What outcome and process measures are you using, or will use?
Hayley Burgess, Pharm.D. is the Director of Medication Safety and System Innovations for the HCA Clinical Services Group (CSG) where she and her team evaluate the medication management system for safety gaps and create performance improvement programs for approximately 160 hospitals and 100 outpatient surgery centers affiliated with the Hospital Corporation of America.

Dr. Burgess worked with TMIT for the NQF Safe Practices for Better Healthcare 2009 and 2010 updates. She also was a member of the ISMP Advisory Panel for the 2011 ISMP Medication Safety Self Assessment. Dr. Burgess is adjoint clinical faculty for Belmont, Lipscomb, and University of Tennessee Schools of Pharmacy and serves as a program director for two PGY2 Medication Safety residents. Dr. Burgess is currently a member of the NQF critical care and pulmonary steering committee and Technical Expert Panel: ACCF/AHA on performance measures and shared accountability.

Dr. Burgess received her Doctor of Pharmacy degree from Samford University in Birmingham, Alabama. She completed a post-doctoral residency and clinical science research fellowship in Psychiatric Pharmacology and Pharmacoeconomics at the University of Texas Health Science Center in San Antonio.
Insulin: A High Alert Medication
Before insulin was discovered in 1921, everyone with Type 1 Diabetes died within weeks to years of its onset.

The Burden

- Nearly **26 million** American adults and children (8.3% of the United States population) have diabetes
  - 18.8 million have been diagnosed
  - 7 million are undiagnosed
- Hyperglycemia occurred in 38% of patients admitted to the hospital
  - Of these, two thirds had a previous history of diabetes
  - For these patients
    - 53% had orders for a special diet
    - 33% were prescribed oral agents
    - 32% received scheduled insulin doses

Diabetes in America


Reported Insulin Errors

- In 2008, USP MEDMARX data showed insulin to be the leading product involved in harmful medication errors (16.2% of all harmful errors reported)

- Between Jan 2008- June 2009, 2,700 medication error reports submitted to Pennsylvania Patient Safety Reporting System (PAPRSRS) involved insulin
  - Of those reports, 79% reached the patient and 1.8% resulted in patient harm (index E-I)
PA Patient Safety Authority: Medication Error Event Types

Pennsylvania Patient Safety Authority: Medication Errors with the Dosing of Insulin: Problems across the Continuum
Factors Contributing to Insulin Errors

- Use of abbreviations — U for Units
- Failure to follow “leading zero always/ no trailing zero” rules
- Legibility problems
- Calculation errors
- Measurement errors
- Mistiming of doses
- Decimal point errors
- Sound-alike/look-alike errors
- Pump-setting errors
- Drug therapy knowledge deficit
- Inadequate access to and interpretation of accurate patient information
- Miscommunication
- Lack of standard processes

American Society of Health-System Pharmacists. Professional Practice Recommendations for Safe Use of Insulin in Hospitals.
Foundational Insulin Safety
## ISMP List of Drug Names with Tall Man Letters

<table>
<thead>
<tr>
<th>Drug Name with Tall Man Letters</th>
<th>Confused with</th>
</tr>
</thead>
<tbody>
<tr>
<td>HumuLIN</td>
<td>HumaLOG</td>
</tr>
<tr>
<td>NovoLIN</td>
<td>NovoLOG</td>
</tr>
<tr>
<td>LantUS</td>
<td>LenTE</td>
</tr>
<tr>
<td>NovoLOG MIX 70/30</td>
<td></td>
</tr>
</tbody>
</table>

Look Alike, Sound Alike
"You know, it's really dumb to keep this right next to the cereal. ... In fact, I don't know why we even keep this stuff around in the first place."
Insulin Storage

• Segregation and Differentiation Options
Insulin Storage: Pharmacy

- Segregation and Differentiation in progress
Risk Identification and Mitigation: Creating your Roadmap to Safe Care
Insulin Safety: Where to Begin?

- Perform Failure Mode Effects Analysis (FMEA) to identify gaps in insulin safety
- Gap assessment guide:
  - Recommendations for Safe Use of Insulin in Hospitals
  - Crosswalk of evidence and best practices throughout insulin medication management process/system
- Institutional Assessment of Current Care
  - To determine current level of glycemic control methods and identify opportunities for improvement
- Available at the Society of Hospital Medicine’s website
  - [http://www.hospitalmedicine.org/ResourceRoomRedesign/html/05Analyze_Care/01_Needs_Assessment.cfm#3](http://www.hospitalmedicine.org/ResourceRoomRedesign/html/05Analyze_Care/01_Needs_Assessment.cfm#3)
Insulin Workflow: Process Mapping

- Insulin Ordered
- Patient Assessment
- Pharmacy entered or verified order
- Insulin Dispensed
- Insulin stored at nursing unit in ADC
- Insulin Injection Prepared
- Patient scanned BCMA
- Independent Double Check and Documentation
- Insulin syringe scanned BCMA
- Insulin Administered
- Continuous Monitoring
- Insulin Administered
- Patient scanned BCMA
Fumbling for his recline button, Ted unwittingly instigates a disaster.
Standardization: Reducing Unjustified Variation
Dr. Moran is a critical care specialist at Wesley Medical Center. He received his doctor of pharmacy degree from the University of Kansas and is a board certified pharmacotherapy specialist. Dr. Moran is a member of the Society of Critical Care Medicine, as well as several other professional organizations. He has adjunct appointments with the University of Kansas and Creighton University Schools of Pharmacy as well as the Newman University Nurse Anesthesia Program. Dr. Moran provides specialized clinical pharmacy services to the Emergency Department, Trauma Services, and Surgical Services at Wesley. He participates in multidisciplinary committees, assists in the development of treatment protocols, and provides education to health care professionals. Dr. Moran is the chairman of the Pharmacy Committee of the Metropolitan Medical Response System and South Central Kansas Hospital Bioterrorism system. He has been elected a Wesley Ambassador, and was a finalist for the HCA Frist Humanitarian Award.
Wesley Medical Center

- Full scope of inpatient and outpatient diagnostic and treatment services
- Medical staff of 700 physicians
- Over 2,000 additional healthcare providers and support staff
- Licensed 760-bed, tertiary teaching facility
- Serving Wichita, much of Kansas, and northern Oklahoma

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Hyperglycemia and Hypoglycemia are Adverse Drug Events of Insulin
Mission Possible

- There are many possible strategies to have a successful glycemic management program
- Numerous insulin protocols have been published with reasonable to good levels of success
- There is no “right way” or “wrong way” to use insulin in the hospital if the protocol is efficacious and safe
Keys To Success

• Agreement between all clinicians and stakeholders to glycemic targets and general philosophies of insulin use

• Education with staff, communication between staff, examination for staff for continued improvement

• A “champion” for specialties to address questions and concerns

• An appropriate culture to prioritize and standardize glycemic control
Glycemic Management: Teamwork

- Establish your multidisciplinary team
- Educate Physician, Nursing, and Pharmacy
- Standard order sets to correct hyperglycemia in a timely manner
- Basal insulin included as a key component for inpatient management of hyperglycemia
- Order sets approved for the management of hypoglycemia
# Inpatient Glycemic Control Targets

<table>
<thead>
<tr>
<th></th>
<th>ICU</th>
<th>Non-ICU, Preprandial</th>
<th>Non-ICU, Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>AACE/ADA Consensus</td>
<td>140-180 mg/dl*</td>
<td>&lt;140 mg/dl</td>
<td>180 mg/dl</td>
</tr>
<tr>
<td>Statement</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Greater benefit may be realized at the lower end of this range*

Select patients may have target goal 110 – 140mg/dl

Targets less than 110 mg/dL not recommended

American Association of Clinical Endocrinologists (AACE)
American Diabetes Association (ADA)

[http://care.diabetesjournals.org/content/35/Supplement_1/S11.full.pdf+html](http://care.diabetesjournals.org/content/35/Supplement_1/S11.full.pdf+html)
Standardized Pre-Printed Order

DEA: Use Additions
Write Clearly

ADULT HYPOGLYCEMIA ORDERS

#464 Revised 10/11

Instructions: All orders to be implemented unless crossed through by the ordering provider. Orders with (a) must be checked to be implemented.

Any changes to the order set must be initialed by the ordering provider, e.g., deletions or additions.

All adult patients with a diagnosis of diabetes or who are receiving insulin should have preprinted order 464 on the medical record.

I. Consciously aware, cooperative, able to swallow: NPO
   A. Obtain STAT bedside glucose
      B. If glucose is:
         1. Less than or equal to 70 mg/dL, WITH OR WITHOUT symptoms:
            a. Give 4 oz. of naturally sweetened juice or 15 gm glucose gel.
            b. Redecide blood glucose in 15 minutes than follow with protein type snack such as 2 squares graham crackers or 4 squares saltine crackers and either 1 tablespoon peanut butter or 1 ounce cheese.
   NOTE: If meal trays are on the unit, deliver meal tray instead of snack.
   C. Blood glucose less than 70 mg/dL, repeat with 4 oz. of naturally sweetened juice or 15 gm glucose gel and protein snack. Continue to recheck blood glucose every 15 minutes and repeat above directions.

II. Severe Reactions (patient stuporous, unconscious and/or convulsing)
   A. Obtain STAT bedside glucose and remain with patient. Notify physician.
      B. If glucose less than 70 mg/dL, and
         1. IV site present,
            a. Give 50% Dextrose in water 20 mL
         2. No IV site present,
            a. Give Glutagen 1 mg (1 amp). If patient does not regain consciousness in 15 minutes, initiate IV site and give 60% Dextrose in water 50 mL
   C. When patient regains consciousness and is capable of swallowing, treat with oral guidelines following I. E. or I.C.
   D. NPO Patient
      A. If blood glucose is:
         1. Between 40 mg/dL and 70 mg/dL, WITH OR WITHOUT symptoms:
            a. Give 50% Dextrose in water IV 25 mL
         2. Less than 40 mg/dL, WITH OR WITHOUT symptoms:
            a. Give 50% Dextrose in water IV 50 mL
      B. Notify the physician for orders regarding oral hypoglycemic agents and insulin.
   IV. If the patient is pregnant, regardless of blood glucose, obtain:
      A. Urinalysis
      B. 24 hour urine collection for total protein and creatinine clearance.

Per Order Committee of the Medical Staff approval

Physician Initials

WESLEY

ADULT HYPOGLYCEMIA ORDERS

MR464 (R10.11)

Page Number 1 of 1

INSTITUTE FOR HEALTHCARE IMPROVEMENT
CVICU Project Overview

• STS Core Measure
  — 6AM Blood Glucose < 200 mg/dL

• November 2010
  — Five (5) STS fallouts
  — 3 of the 5 fallouts were failure of current insulin titration protocol
# Insulin Titration in the CVICU

<table>
<thead>
<tr>
<th>Glucose POC (mg/dL)</th>
<th>Insulin Infusion Rate (units/hr)</th>
<th>Glucose POC (mg/dL)</th>
<th>Insulin Infusion Rate (units/hr)</th>
<th>Glucose POC (mg/dL)</th>
<th>Insulin Infusion Rate (units/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 400</td>
<td>16</td>
<td>Greater than 400</td>
<td>23</td>
<td>Greater than 400</td>
<td>30</td>
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<tr>
<td>351 – 400</td>
<td>14</td>
<td>351 – 400</td>
<td>20</td>
<td>351 – 400</td>
<td>27</td>
</tr>
<tr>
<td>301 – 350</td>
<td>12</td>
<td>301 – 350</td>
<td>18</td>
<td>301 – 350</td>
<td>24</td>
</tr>
<tr>
<td>251 – 300</td>
<td>10</td>
<td>251 – 300</td>
<td>15</td>
<td>251 – 300</td>
<td>20</td>
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<tr>
<td>201 – 250</td>
<td>8</td>
<td>201 – 250</td>
<td>12</td>
<td>201 – 250</td>
<td>16</td>
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<tr>
<td>171 – 200</td>
<td>5</td>
<td>171 – 200</td>
<td>7</td>
<td>171 – 200</td>
<td>10</td>
</tr>
<tr>
<td>151 – 170</td>
<td>3</td>
<td>151 – 170</td>
<td>4</td>
<td>151 – 170</td>
<td>6</td>
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<td>131 – 150</td>
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<tr>
<td>110 – 130</td>
<td>1</td>
<td>121 – 130</td>
<td>2</td>
<td>121 – 130</td>
<td>3</td>
</tr>
<tr>
<td>Less than 110</td>
<td>0</td>
<td>110 – 120</td>
<td>1</td>
<td>110 – 120</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 – 109 (move to Column 1)</td>
<td>0</td>
<td>60 – 109 (move to Column 2)</td>
<td>0</td>
</tr>
</tbody>
</table>
Blood Glucose Control

![Graph showing blood glucose control over 24 hours with lines for mean, max, and min glucose levels. The graph includes hourly data points from hour 1 to hour 24.]
Summary and Recommendations

• Enhanced glycemic control with new insulin titration protocol
  — Mean blood glucose 135 mg/dL
  — No hypoglycemia
  — No STS fallouts x 3 months and counting

• Continue this protocol for CVICU patients

• Implement to all adult ICUs after minor protocol change
Sliding Scale Insulin—Time to Stop Sliding

Irl B. Hirsch, MD

In most teaching hospitals in the United States, primary care first-year residents and medical students learn about sliding scale insulin (SSI), usually from a senior resident. The more experienced resident explains how to prescribe regular insulin every 4 to 6 hours without any scheduled basal or mealtime (prandial) insulin. For the typical patient who is too sick to eat, this results in a roller coaster effect on blood glucose variability due to poor matching of insulin with individual blood glucose patterns. Unfortunately, this can also result in different patient outcomes based on the type of diabetes. With the more common type 2 diabetes mellitus manifested by insulin resistance and relative insulin deficiency, long periods of insulin deficiency or even insulin stacking (when insulin doses are injected at times too close together, resulting in an overlap of action of the insulin) will usually not result in any metabolic crisis. However, in patients with type 1 diabetes mellitus, who generally are not resistant to insulin and have complete insulin deficiency, SSI is more apt to result in clinically significant hyperglycemia, ketosis, ketoacidosis, or hypoglycemia. No
Do NOT Use Abbreviations
Write Clearly

STANDARDIZED SUBCUTANEOUS INSULIN ORDERS

Revised ~A~ 10/11

Instructions: All orders are to be implemented unless crossed through by the ordering provider.
Exception: Orders with ☐ must be checked to be implemented.
Any changes to the order set must be initialed by the ordering provider, e.g. deletions or additions

1. Diagnosis
   ☐ Type 1 Diabetes  ☐ Type 2 Diabetes  ☐ Gestational Diabetes  ☐ Other __________
   ☐ Controlled  ☐ Uncontrolled  ☐ With Complications

2. Blood glucose target range 70-180 mg/dl or specify __________-________ mg/dl

3. Diet: __________ calorie ADA diet  ☐ Other __________

4. Discontinue all previous insulin orders

5. Place Preprinted Order # 464 - Diabetes Mellitus Hypoglycemia Orders on chart.

6. If patient is made NPO for procedure, place Preprinted Order #209 - Diabetic Patients NPO Greater than Four Hours, on the chart, and call physician for insulin doses for:
   a. Night before (If on NPH or Levemir, suggest 20% reduction. If on Lantus, continue at same dose.)
   b. Morning of procedure (If on NPH or Levemir, suggest 50% reduction. If on Lantus, continue at same dose and HOLD other scheduled insulin.)

7. Bedside blood glucose
   ☐ before meals and at bedtime  ☐ fasting and 2 hours postprandial  ☐ other __________

8. Call physician for any blood glucose below 40 mg/dl or 2 consecutive blood glucose values above 180 mg/dl or a single blood glucose above 300 mg/dl

9. All scheduled and correction dose insulin is to be given subcutaneously

10. Scheduled Insulin

<table>
<thead>
<tr>
<th>Time Range</th>
<th>Basal Insulin</th>
<th>Prandial Insulin (meal)</th>
<th>Pre-mixed Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00-09:00 / Breakfast</td>
<td>Give _____ units ☐ NPH ☐ Lantus ☐ Levemir</td>
<td>Give _____ units ☐ Humalog ☐ Regular</td>
<td>Give _____ units ☐ Humulin 70/30 ☐ NovoLOG 70/30</td>
</tr>
<tr>
<td>11:00-13:00 / Lunch</td>
<td>Give _____ units ☐ NPH ☐ Lantus ☐ Levemir</td>
<td>Give _____ units ☐ Humalog ☐ Regular</td>
<td></td>
</tr>
<tr>
<td>17:00-19:00 / Dinner</td>
<td>Give _____ units ☐ NPH ☐ Lantus ☐ Levemir</td>
<td>Give _____ units ☐ Humalog ☐ Regular</td>
<td>Give _____ units ☐ Humulin 70/30 ☐ NovoLOG 70/30</td>
</tr>
<tr>
<td>21:00 / Bedtime</td>
<td>Give _____ units ☐ NPH ☐ Lantus ☐ Levemir</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Physician Initial __________
Error Reducing Strategies

Forcing Functions & Constraints

Automation & Computerization

Standardization & Protocols

Checklists & Double-Checks

Policies & Procedures

Education & Information

Standardized protocols for insulin (Basal/Bolus), insulin drips, hypoglycemia, and DKA
Preparation and Dispensing
Pharmacy Storage
High Risk Populations

• Insulin unit of use and infusions are prepared in pharmacy and sent patient specific to patient care area for:
  – Patients receiving insulin U-500
  – Pediatrics
  – Patients receiving insulin infusion

• Pharmacy labels the insulin syringe with patient specific information and barcode
WARNING: This is CONCENTRATED insulin--500 UNITS/ML!

THIS ITEM MAY ONLY BE USED FOR 'MS' ORDER TYPE ORDERS!!!
Individual Patient Insulin Dose

NOTE:
- ALLERGIES: aspirin
- ADR's: *** NO ADRs ENTERED FOR THE PATIENT ***
- HT: 170.18cm (5ft, 7in)  WT: 68.04kg (150lb, .00oz)  BSA: 1.79m²  IBW: 54.89 Kg
- HT/WT EDIT: 01/26/12  CR CL: 230 ml/min (Est)  BMI: 23.54 kg/m²
- AOM DIAGNOSIS: TEST
- SLEEP APNEA: NOT ASSESSED

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose/Vol</th>
<th>Sig/Rate</th>
<th>Route</th>
<th>C</th>
<th>Start</th>
<th>Stop</th>
<th>L</th>
<th>Sta</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSULIN LISPRO (Humalog)</td>
<td>10 12 UNITS DAILYBKFT SQ</td>
<td>* 01/27-0730</td>
<td>None</td>
<td>CKD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INSULIN LISPRO (Humalog)</td>
<td>10 15 UNITS DAILYLHNC SQ</td>
<td>* 01/27-1200</td>
<td>None</td>
<td>CKD</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>INSULIN LISPRO (Humalog)</td>
<td>10 8 UNITS DAILYWSUPP SQ</td>
<td>* 01/26-1730</td>
<td>None</td>
<td>CKD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Insulin Infusion Preparation

- Insulin may be added to TPN’s (with a maximum of 100 units/bag).
- Insulin infusions are prepared in a bag at a standard concentration of 1 unit/ml.
- Insulin infusions are only infused utilizing smart pump technology.
Error Reducing Strategies

- Forcing Functions & Constraints
- Automation & Computerization
- Standardization & Protocols
- Checklists & Double-Checks
- Policies & Procedures
- Education & Information

- Removing insulin U-500 from floor stock
- Insulin stored in ADM with single pocket access
- Utilizing smallest package sizes for floor stock (e.g. 3mL vials)
Administration
Insulin Storage: Nursing Unit

Medication room refrigerator
Insulin Storage: Nursing Units

- Stored in automated dispensing machine (ADM)
  - Each type of insulin is stored separately with single pocket access in an ADM
  - When medications are loaded into the ADM, each medication is scanned to ensure filling accuracy
  - Pocket contains insulin and respective barcode label to be placed on the filled insulin syringe
Insulin Storage: Nursing Units

• Stored in automated dispensing machine (ADM)
  – Pharmacy places an expiration date label on each insulin vial dispensed from pharmacy
    ➢ Expiration date: 28 days, beginning when pharmacy dispenses
  – Nurses are only able to override regular insulin
Administration

HIGH RISK MEDICATION

Last: <None in 32 Hours>

Select Answer

1. Insulins are HIGH RISK Medications.
2. Carefully check drug and dose prior to admin.
Involve the Patient to Prevent Errors

• Patients are the last line of defense in averting errors. Patients are the first source of information to prevent errors. Let your patients know the critical role they play and encourage them to ask more questions and give more information.

http://atlas2.medcity.net/portal/site/patientsafety/menuitem.4439d2f89a8a5297d9d8aed1ac01aa0/. Property of HCA.
Other Considerations
Beyond the Med/Surg and ICU

• Limit Variation in Practice:
  ─ Same guidelines apply for areas such as OR and Labor and Delivery
  ─ CPOE in ED assists prescriber to safety steps; but no difference in storage, handling, or administration occurs
Do NOT Use Abbreviations
Write Clearly

DIABETIC PATIENTS NPO GREATER THAN FOUR HOURS

Instructions: All orders are to be implemented unless crossed through by the ordering provider.
Exception: Orders with □ must be checked to be implemented.
Any changes to the order set must be initiated by the ordering provider, e.g. deletions or additions

1. Place on all known diabetic patients who are expected to remain NPO for greater than 4 hours for a procedure
2. Place Diabetes Mellitus Hypoglycemia Preprinted Orders (#484) on chart
3. Maintain Saline Loop
4. Check Bedside blood glucose every two hours and document in the vital signs section of the chart
5. Contact the physician if the blood glucose is above 100 mg/dl or below 70 mg/dl
6. If the patient is transferred from one unit to another unit, the registered nurse caring for the patient will communicate verbally the most recent blood glucose value and time and when next bedside blood glucose is due
7. For patients with a continuous infusion insulin pump:
   a. Follow clinical practice policy E 14.2 Continuous subcutaneous insulin pump infusion therapy
   b. Place a copy of the policy E14.2 on the medical record for healthcare provider reference throughout the patient’s hospital stay

Per ___________________________ Date __/__/______ Time __________
Per Executive Committee of the Medical Staff approval ___________________________
## Technology and Insulin

### Advantages

- Studies have shown well-designed CPOE protocols improve overall glycemic control without increasing rates of hypoglycemia in non-critical care settings
- Point of Care glucose monitors with wireless sync capability

### Disadvantages

- Implementation burden
- Provider utilization
- Blood glucose transcription mismatches
  - Leading to medication errors

Monitoring: Metrics that Matter
Glycemic Control
Rescue Doses per 1000 Therapy Doses

Graph showing the rescue doses per 1000 therapy doses from January 2009 to December 2011, with data points for each month. The graph includes lines for the upper control limit (UCL), middle control limit (MCL), and lower control limit (LCL).
Measuring Insulin Safety

- Insulin harm triggers:
  - Use of 50% dextrose or glucagon
  - Hypo/hyperglycemia order sets activated
- Voluntary reporting of near miss and adverse events or errors with insulin
- Root cause analysis
  - Ketoacidosis or diabetic hyperglycemia hyperosmolar state
- Ongoing and concurrent monitoring of blood glucose measurements below established minimum critical value and above a maximum value
Other Measures

• Severe hypoglycemia (< 50 mg/dL) only 2.8% of all patient days
• A1C assessment for diabetic patients (or < 30 days prior to admission): 34%
• Glucose measurement within 8 hours of admission: 77%
• Recommended physiologic insulin therapy (or IV insulin for NPO patients): 45% (range 12-77%)
Patient Continuity of Care
Discharge Planning

- Initiate outpatient diabetes treatment regimen at least 24 hours before discharge (basal insulin)
- Plan outpatient follow-up with the patient
- Patient and family/caregiver education:
  - Administration of medications
  - Common side effects of treatment including hypoglycemia
  - Blood glucose monitoring
  - Dietary management
Summary
## Insulin: Key Changes

<table>
<thead>
<tr>
<th>Medication Safety Strategy</th>
<th>Example of Key Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fail safe and Forcing functions</td>
<td>• Use flow control pumps for continuous IV infusions</td>
</tr>
</tbody>
</table>
| Constraints                                 | • Remove U-500 from floor stock and ADC  
• Use smallest package sizes (3mL vials)  
• Limit formulary to one insulin analog mixture  
• Require expiration dates to be labeled on vials  
• Use Insulin pens for one patient only |
| Externalize and Centralize Error Prone Processes | • Move drug preparation off units (IV infusions)                                                                                                        |
| Access to Information                       | • Obtain and communicate lab values via guidelines  
• Post drug information charts on units  
• Inform patients they are receiving insulin including the name and dose  
• Educate patient on their insulin therapy and signs and symptoms of hypoglycemia |
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<tr>
<td>Standardize and Simplify</td>
<td>• Eliminate unapproved abbreviations (&quot;U&quot; for units)</td>
</tr>
<tr>
<td></td>
<td>• Avoid using slash marks to separate NPH and Regular insulin</td>
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<tr>
<td></td>
<td>• Use standardized protocols and evidence based order sets</td>
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<td></td>
<td>• Eliminate the use of sliding scale insulin</td>
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<tr>
<td></td>
<td>• Dispense medications unit dose per patient</td>
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<tr>
<td></td>
<td>• Standardize the process for alerting healthcare provider of changes in regimen and carbohydrate intake</td>
</tr>
<tr>
<td>Differentiate/ Use of Reminders</td>
<td>• Apply warning labels notifying high alert medication</td>
</tr>
<tr>
<td></td>
<td>• Label infusion lines (IV)</td>
</tr>
<tr>
<td></td>
<td>• Use tall-man lettering (i.e. humaLOG and humuLIN)</td>
</tr>
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</table>
# Insulin: Key Changes

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| **System Redundancy**      | • Independent double check before administration  
                            • Barcode medication administration (BCMA)  
                            • Recalculate dose (IV infusion)  
                            • Write down and read back verbal orders  
                            • Require verification of reason for insulin prior to administration |
| **Monitor Patient**        | • Monitor for signs and symptoms of hypoglycemia and hyperglycemia  
                            • Use flow sheets to track blood glucose values, carbohydrate intake, and insulin administration |
Final Thoughts

• Despite the concerns about hypoglycemia, the real problem in the hospital remains untreated hyperglycemia both in the ICU and on the floors. -Irl Hirsh

• Foundational leadership, teamwork, culture create a workforce that can create change from the grassroots and sustain that change.

• We cannot work harder, we must work smarter to provide safe care.
Questions
Appendix
<table>
<thead>
<tr>
<th>Organization</th>
<th>Description</th>
<th>Web Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADA/AACE</td>
<td>Standards of Medical Care in Diabetes-2012 Non-ICU patient blood glucose management 2012</td>
<td><a href="http://care.diabetesjournals.org/content/35/Supplement_1/S11.full">http://care.diabetesjournals.org/content/35/Supplement_1/S11.full</a> <a href="http://jcem.endojournals.org/content/97/1/16.full.pdf+html">http://jcem.endojournals.org/content/97/1/16.full.pdf+html</a></td>
</tr>
<tr>
<td>AHRQ</td>
<td>Quality Indicators Patient Safety Indicators</td>
<td><a href="http://www.ahrq.org">www.ahrq.org</a></td>
</tr>
<tr>
<td>CMS</td>
<td>Core Measures Hospital Acquired Conditions</td>
<td><a href="http://www.qualitynet.org">http://www.qualitynet.org</a> <a href="https://www.cms.gov/HospitalAcqCond/06_Hospital-Acquired_Conditions.asp">https://www.cms.gov/HospitalAcqCond/06_Hospital-Acquired_Conditions.asp</a></td>
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## Resources Relating to Glycemic Control

<table>
<thead>
<tr>
<th>Organization</th>
<th>Resource</th>
<th>Description</th>
<th>URL</th>
</tr>
</thead>
</table>
Homework for Next Call

• Review your system for ensuring safety with insulin
• How are you identifying opportunities for improvement with this group of high-alert medications?
• What outcome and process measures are you using, or will use?
Next Call

Session 4 - Anticoagulation Management

Date: Tuesday, February 28th
12:00-1:00pm ET
Listserv

• ade_expedition@ls.ihi.org
• Send and receive questions and comments to/from faculty and participants
• To be added to the listserv please email bodonnell@ihi.org