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Does a Double Checking Insulin Procedure Improve Patient Safety?

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Mary Beth Modic DNP, RN, CNS, CDE
Clinical Nurse Specialist – Diabetes
Cleveland Clinic

Background

• Joint Commission and Institute for Safe Medication Practices (ISMP)
• What criteria constitutes a “double check”?
• Insulin Errors – 3.5% medication related errors
• Paucity of research on topic

Research Team

Nancy Albert, PhD, RN, CCNS, CCRN, NE-BC
Zhiyuan Sun, MS
Christina Yager, BS
Theresa Cary, MSN, RN, ACNS-BC, CHFN, CCRN
Amanda Corniello, MSN, RN, ACNS-BC, PCCN
Nancy Kaser, BS, MSN, RN, ACNS-BC
Julie Simon, MSN, RN, ACNS-BC, CMSRN
Catherine Skowronsky, MSN, RN, ACNS-BC
Brian Kissinger, BSN, RN - BC, CMSRN

Double Checking Practices

• “As policy, Amy’s unit requires a second nurse to independently check every dose of insulin before it is administered. In practice, nurses found the policy cumbersome and scanned each other’s badges without ever seeing the insulin syringe.”

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AACN 2014
Research Question

• Does a double checking insulin procedure prevent or decrease insulin error medication rates?

Definition of Insulin Errors

• Insulin errors:
  – Wrong dose
  – Wrong time
  – Wrong preparation
  – Omission
  – Combination of 2 errors

Procedure for Double- Checking

• Procedure for Double Checking included eight steps:
  1. Nurse sought another nurse to participate in the double- check procedure regardless of a belief that the insulin dose was not needed.
  2. Reviewed the subcutaneous insulin order in the Electronic Medical Record (EMR) together.
  3. Verified the blood glucose result in the meter or EMR that was obtained specifically for the current insulin administration period.
  4. Reviewed the EMR for insulin dosing parameters if insulin was required.
  5. Verified the correct insulin preparation was used and the right dose was in the syringe.
  6. Compared the dose in the syringe against the physician (LIP) order.
  7. Confirmed the dose was correct and necessary.
  8. The non-administering nurse completed the data collection card verifying that this insulin preparation had been double checked.
**Methods**

- A prospective, comparative 2 group research study
  - Units were randomly assigned to usual care or double checking insulin procedures
- IRB deemed the project to be an internal quality improvement activity

**Setting and Sample**

- 1400+ bed quaternary medical center in Northeast Ohio
- Five inpatient units
  - 3 Medical and 2 Surgical units
  - One medical and surgical unit were randomly assigned to the "double checking" procedure

**Inclusion/Exclusion Criteria**

- **PATIENTS**: All patients admitted to the 5 Study units who were prescribed subcutaneous insulin. There were no exclusion criteria.

- **NURSES**: Nurses assigned to the study units were expected to complete usual insulin preparation or double-checking insulin procedure.
  - Nursing students, nurses in orientation and those who were temporarily assigned to one of the study units were excluded.

**Measurement**

- Insulin administration errors / error prevention—
  - Assessed by incident reports of medication errors documented in our electronic Safety Event Reporting System (SERS) database for all 5 nursing units.

**Measurement/Data Collection Tool**
Measurement
– Using the data collection card, the non-preparing insulin nurse reports of error prevention after performing insulin double check
– Electronic medical record (EMR) review was conducted on all patients receiving subcutaneous insulin.

Data Collection
• Two week practice period afforded to the intervention units prior to study initiation.
• Education, observation and feedback was provided by the PI during the practice period.
• In both groups, EMR of all patients were reviewed up to 9 days of hospitalization.

Data Collection
• **Control group**: all patients with subcutaneous insulin orders were included.
  – Demographic data, admitting diagnosis, type of diabetes insulin regimen, nutritional status, and blood glucose values were obtained from the EMR

Data Collection
• **Intervention group**: all patients with subcutaneous insulin orders were included.
  – Each nurse performing the “double checking” procedure completed the *Insulin Study Potential/Actual Prep Errors* card and placed it in a locked box in the medication room.

Data Collection
• *Insulin Study Potential/Actual Prep Errors* card was completed for each insulin administration event whether there was an error or not or if no insulin was required.
• The cards were completed anonymously.

Data Collection
• The same patient data was collected as was collected in the control group via the EMR.
• The nurse preparing the insulin was assigned a number and this number was used throughout the study period.
Results

- 266 patients were enrolled
- Of subjects, there were 5328 insulin administration periods

Results

- Age was 62.5 (± 14.31) years
- Male = 51.9%
- Body mass index = 30.6 (± 16.51) mg/kg2

Patient Characteristics

<table>
<thead>
<tr>
<th>Variable: N (%) unless indicated</th>
<th>Usual Care (N=163)</th>
<th>Intervention (N=103)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years*</td>
<td>60.9 (50.30)</td>
<td>65.0 (12.20)</td>
<td>.024</td>
</tr>
<tr>
<td>BMI: kg/m²</td>
<td>28.5 (6.46)</td>
<td>33.2 (23.04)</td>
<td>.049</td>
</tr>
<tr>
<td>Gender, Male; n (%)</td>
<td>82.0 (50.30)</td>
<td>55.0 (54.50)</td>
<td>.51</td>
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<tr>
<td>Ethnicity, n (%)</td>
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<td>.009</td>
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<tr>
<td>African American</td>
<td>56 (35.4)</td>
<td>21 (20.6)</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>98 (62.6)</td>
<td>76 (74.5)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4 (2.5)</td>
<td>5 (4.9)</td>
<td></td>
</tr>
</tbody>
</table>

*, mean (SD)

Effects of Double Insulin Checking Procedure; N = 5328

- Wrong Time: P < 0.001

Overall Error Rate, Not including Wrong Time

- P < 0.001
Effects of Double Insulin Checking Procedure

- In total, 2085 of 5328 (39.8%) insulin administrations were without any errors
- Not including wrong insulin administration time, 97.5% of time, there were NO errors

Multivariate Analyses

- After controlling for nurse caregiver, the double checking insulin procedure was
  - No longer effective in reducing “Wrong Time”
  - No longer effective in increasing “No Errors”
  - Effective in decreasing “Omission Errors”

Study Limitations

- Completed at only one hospital
- In the intervention group
  - Not all nurses may have followed the intervention protocol 100% of the time
  - Nurses could have failed to record and report observed errors

Effects of Double Insulin Checking Procedure

- Each insulin double-checking procedure averaged 5 minutes to complete.

Study Limitations

- In the usual care group:
  - Data collection was dependent on accurate documentation in the EMR
Conclusion

• The total error rate was 2.5% and was higher in the usual care group: 3.4% vs. 1.2%, \( p < 0.001 \)

Conclusion

• For omission errors, the double checking insulin preparation procedure decreased error rates.
• The double checking procedure MAY prove effective if a nurse was going to hold the insulin due to misunderstanding the insulin needs based on current blood glucose level.

Conclusion

• Of errors found, the predominant error was “wrong time”. It occurred in 31.1% of all insulin administration periods and was more prevalent in patients who received usual care: 33.3% vs. 27.6%, \( p < 0.001 \)

Conclusion

• However, after controlling for “nurse caregiver” the double checking insulin procedure failed to decrease “wrong time” errors.

Recommendations

• Study needs to be replicated to determine generalizability.
• An examination of workflow processes may identify barriers to timely insulin administration.
• Innovative strategies aimed at minimizing timing of insulin errors are needed.
I am over the moon to be with you today.