Evaluation of an Insulin Infusion Protocol for Diabetic Ketoacidosis at a Rural, Community Teaching Hospital

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Background

- Diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS) are two of the most serious acute complications associated with diabetes.
- The mainstay of therapy in DKA is regular insulin via continuous intravenous infusion. Continuous intravenous regular insulin is the preferred route of insulin administration due to its short half-life and ease of titration.
- According to the American Diabetes Association Consensus Statement of 2009, if the plasma glucose does not decrease by 50-75 mg/dL within the first hours, the insulin infusion should be increased until a steady decline in glucose is achieved.
- At St. Claire Regional Medical Center (SCR), there are currently two insulin infusion protocols within our ordering system: Insulin Infusion for Diabetic Ketoacidosis and Insulin Infusion per physician. The protocol used for this study is the Insulin Infusion for Diabetic Ketoacidosis.
- The current protocol allows the nursing staff to adjust the insulin infusion rate based on the results of finger stick blood sugars every hour and a basic metabolic panel every four hours.

Objective

- To evaluate the compliance rate of the insulin infusion protocol at St. Claire Regional Medical Center beginning with the initial dosing and each titration opportunity to determine the need for a change to the current infusion protocol

Research Methods

Study Design

- Retrospective chart review of protocol compliance at each titration interval from January 1, 2013 through August 31, 2015
- Electronic medical records (EMR) were evaluated to determine adherence to the protocol based on laboratory values obtained

Patient Population

- ≥18 years of age
- Admission diagnosis of hyperglycemia and treated with intravenous insulin during time period

Insulin Infusion for Diabetic Ketoacidosis

<table>
<thead>
<tr>
<th>Blood Sugar Level</th>
<th>Protocol Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥270 mg/dL</td>
<td>Hold insulin</td>
</tr>
<tr>
<td>200-269 mg/dL</td>
<td>Increase infusion rate by 0.5 units/hr</td>
</tr>
<tr>
<td>150-199 mg/dL</td>
<td>Increase infusion rate by 1 units/hr</td>
</tr>
<tr>
<td>100-149 mg/dL</td>
<td>Increase infusion rate by 1.5 units/hr</td>
</tr>
<tr>
<td>89-99 mg/dL</td>
<td>Decrease infusion rate by half</td>
</tr>
<tr>
<td>≤ 88 mg/dL</td>
<td>Stop insulin infusion</td>
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Results

- Compliance to the protocol, number:
  - 2013: 35
  - 2014: 43
  - 2015: 35
  - Total: 113
- Compliance rate:
  - 2013: 18%
  - 2014: 22%
  - 2015: 29%
  - Total: 25%

Limitations & Conclusions

- Retrospective study design
- Quality of documentation for data collection
- Differences in documentation amongst nurses
- No clear determining factor as to why the protocol was not followed
- Due to these compliance rates, a new DKA protocol has been proposed by the pharmacy department
- Protocol is being reviewed by the Critical Care Service line for approval
- After approval and education regarding the revised protocol, another study will be conducted to determine the adherence rate to the revised protocol
- Conducting a prospective, observational study would be beneficial as this would provide data as to why protocol deviations exist

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Discussion

- The mainstay of therapy in DKA is regular insulin via continuous intravenous infusion during time period
- Continuous intravenous regular insulin is the preferred route of insulin administration due to its short half-life and ease of titration.
- According to the American Diabetes Association Consensus Statement of 2009, if the plasma glucose does not decrease by 50-75 mg/dL within the first hours, the insulin infusion should be increased until a steady decline in glucose is achieved.
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References


Disclosure

The author of this presentation has no financial or personal relationships with commercial entities that they have to disclose.