Comparison of Insulin Regimens for Hospitalized Type 2 Diabetics

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Background

Type 2 diabetes is a chronic condition characterized by insulin resistance and impaired insulin secretion, leading to elevated blood glucose levels.[1] In a hospital setting, managing type 2 diabetes can be challenging and insulin therapy is commonly used to manage blood glucose levels in patients with type 2 diabetes.[2] The basal-bolus insulin regimen (BBI) and sliding-scale insulin (SSI) are the two main approaches.

Purpose of Research

Choosing an insulin regimen that controls glycemic variability and effectively manages diabetes in hospitalized type II diabetics is crucial because it reduces the risk of both hypoglycemia and hyperglycemia, which are associated with adverse outcomes such as infections, delayed wound healing, and increased mortality.[2] Consistent blood glucose control also contributes to better overall patient outcomes, shorter hospital stays, and improved recovery rates.

PICOT

In hospitalized type 2 diabetics, what is the effects of basal-bolus insulin on glycemic management, decreasing hypoglycemic rates, and decreasing the length of hospital stay compared with the traditional sliding-scale insulin?

Design and Methods

Keywords: Type 2 diabetes, hospitalization, basal-bolus insulin, sliding-scale insulin, glycemic control, length of admission, hypoglycemic episodes

Inclusion: English language, articles written in the last 5 years, type 2 diabetics, hospital settings

Exclusion: Out-patient care settings, type I diabetics

Table 1. Search Results

Database	Yielded	Reviewed	Included in Analysis
EBSCO host	17	17	5
Google Scholar	744	10	2
Total:	761	27	7

Table 2. Synthesis of Evidence

Type	Integrative Literature Review	Retrospective Cohorts	Ambi-directional Cohorts	Quasi-Experiment
Total:	2	2	2	1

Results

Critically-ill type 2 diabetics (>180 mg/dL)

- Per ADA recommendations, continuous IV insulin infusion is the best practice guideline for achieving glycemic goals in critical care settings.[3]

Non-critically ill type 2 diabetics (110-180 mg/dL)

- Subcutaneous insulin is the preferred medication for glucose control in non-ICU settings.[2]
- The blood glucose level on the day of discharge was significantly lower for patients on a BBI regimen (135.5 ± 29.9 mg/dL) vs. an SSI regimen (201.4 ± 33.7 mg/dL).[4]
- 83% of patients on continuous SSI with blood glucose at 140-180 mg/dL had glycemic control without hypoglycemia, however, at >180mg/dL, it drops to 18%.[6]
- Patients on SSI only had 42.6% reach pre-prandial glycemic targets of <140 mg/dL while BBI patients had 67.2%.[7]

Table 3. Basal-Bolus Implementation Strategies

	Before Implementation	After Implementation
On SSI[7,8]	84% 38.7%	32% 31.3%
On BBI[7,8]	33% delays in basal insulin administration, 17% interrupted basal therapy 18.7%	68% with significant decrease in delay and interruption of therapy 36.7%
In-target Day[8]	32%	45%
Length of Stay[8]	31.7 days	28.4 days
Hypoglycemic Episodes (<70 mg/dL)[9]	3.7%	2.5%
Hyperglycemic Episodes (>300 mg/dL)[9]	13.5%	11.3%

Discussion

A BBI regimen is a best practice guideline for treating hyperglycemia in type 2 diabetics because it integrates the pharmacology of different insulin analogs to mimic physiologic insulin needs closely.[3] Blood glucose levels that are >180 mg/dL or are consistently high benefit from a continuous IV insulin infusion to ensure that blood sugar is controlled adequately. BBI has been proven to improve in-target ranges of blood glucose levels, decrease hypoglycemia episodes, and decrease admission length. Two hospitals created an educational program promoting BBI over 1 year and saw improvements in interruptions, in-target days, and length of admission.

Limitations

The patient population size of most of these studies analyzed had <1,000 patients. None of the studies assess clinical outcomes after the patients have been discharged. Implementation and education in hospitals may be up to employees to sustain and create changes in practice, which can be difficult. Future research is needed to observe over a long period in a hospital and after discharge the benefits of BBI over SSI. A long-term study with a large population can help to validate a BBI regimen.

Conclusion

When type 2 diabetic patients are being treated for hyperglycemia or other conditions within the hospital, managing blood glucose levels effectively is an important consideration to prevent long-term health deficits. BBI overall has improved in-target days, decreased length of hospital stay, and hypoglycemic episodes compared to SSI in non-critically ill patients. This review answered the clinical question, and the answer is expected.

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