



Basal-Plus Insulin Regimen: Helping Patients With Diabetes Mellitus Type 2 Maintain Blood Glucose Levels During Hospitalization

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INTRODUCTION

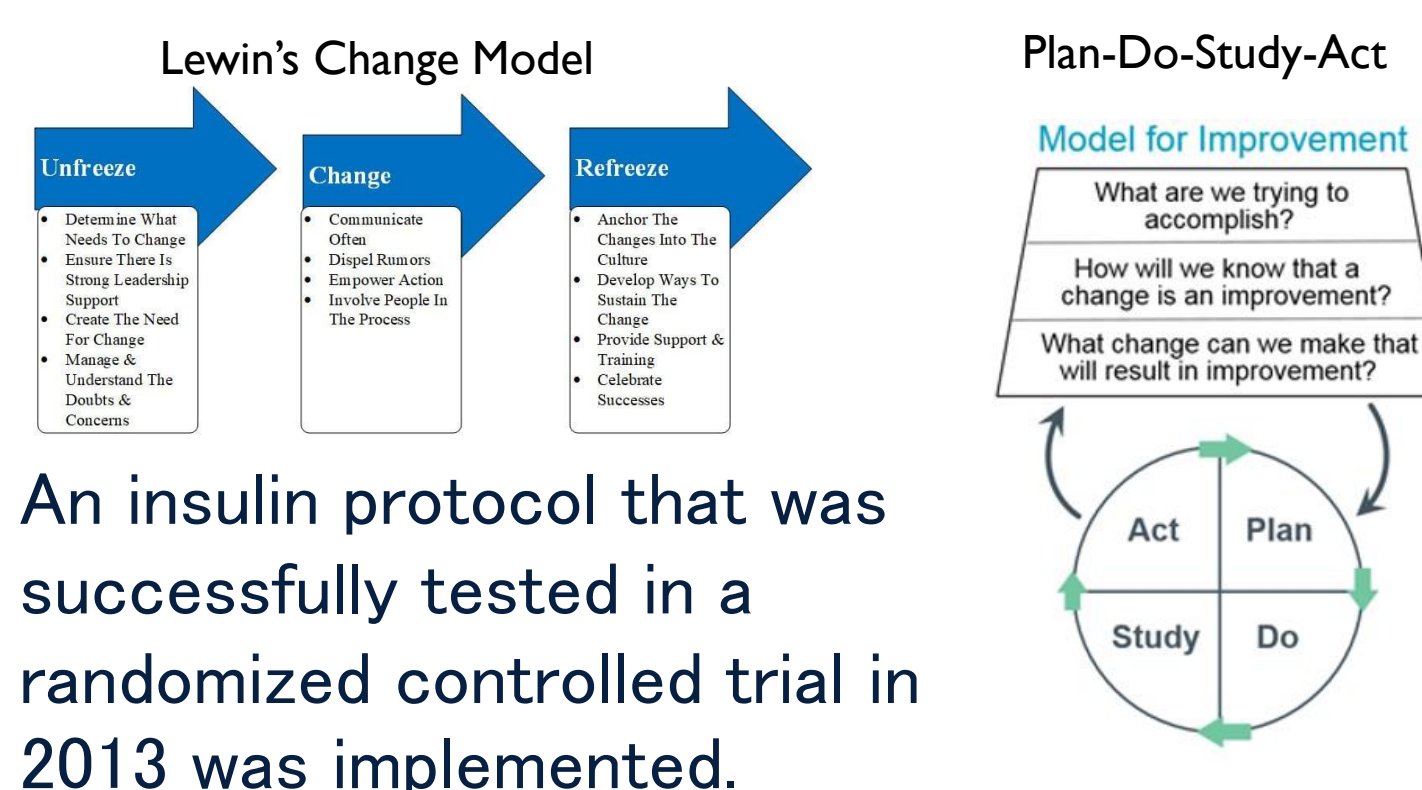
Following a 10-day self-reflective practice exercise, a practice anomaly was noted, and a PICOT question was formed considering current practice. Diabetes mellitus type 2 (DM2) patients were at risk of hyperglycemia when hospitalized. During hospital admission, oral home medications were replaced with a sliding-scale short-acting insulin therapy alone.

A randomized controlled trial using a basal-plus insulin protocol that lowered the mean blood glucose levels for noncritically ill hospitalized DM2 patients was uncovered in a literature review. Adding a long-acting insulin to the short-acting insulin sliding scale also provided minimal risk of hypoglycemia. DNP Chair approval, work site approval, and IRB approval were obtained, and the DNP project started.

RATIONALE

Following a self-reflective practice exercise, it was noted that several DM2 patients were hyperglycemic during their hospitalization. A literature review pointed to a protocol for inpatient DM2 patients that reduced hyperglycemia.

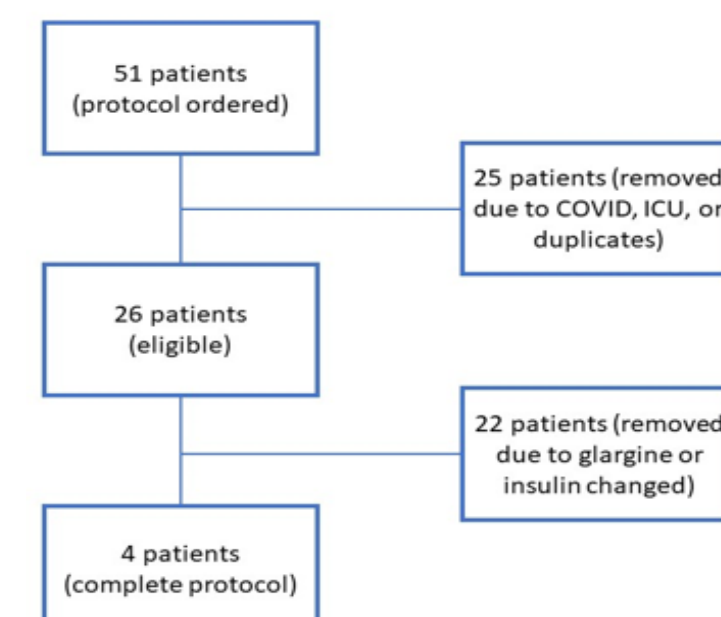
Using Lewin's Change Theory as a framework for practice improvement, a project was planned using the Plan-Do-Study-Act problem solving model.



METHODS

A detailed evidence-based basal plus insulin protocol was found within the Basal-Plus trial by Umpierrez, et al., 2013, and followed for the intervention.

- This basal-plus protocol provided detailed instructions for the addition of a basal insulin dose to the regular sliding-scale insulin correction regimen currently used by the DNP student. A single daily dose of basal-insulin was ordered on admission of 0.25 units/kg of body weight. If ≥ 70 yrs. old, or serum creatinine ≥ 2.0 , decrease basal dose to 0.15 units/kg of weight.
- Patients aged 64-98 years with DM2 who were treated by the student during work hours from 1/21/22 through 2/9/22 received the intervention. COVID-19 patients, ICU patients, and those not receiving the protocol during their stay were excluded.
- A data query performed after the intervention dates was performed, for those patients treated by the student including patients' age, gender, mean blood glucose during hospital stay, and length of stay were included, the intervention group. An identical query was performed for a similar period during the previous year, which made up the nonintervention group.



Some patients in the original intervention group did not meet eligibility criteria, and were excluded for various reasons.

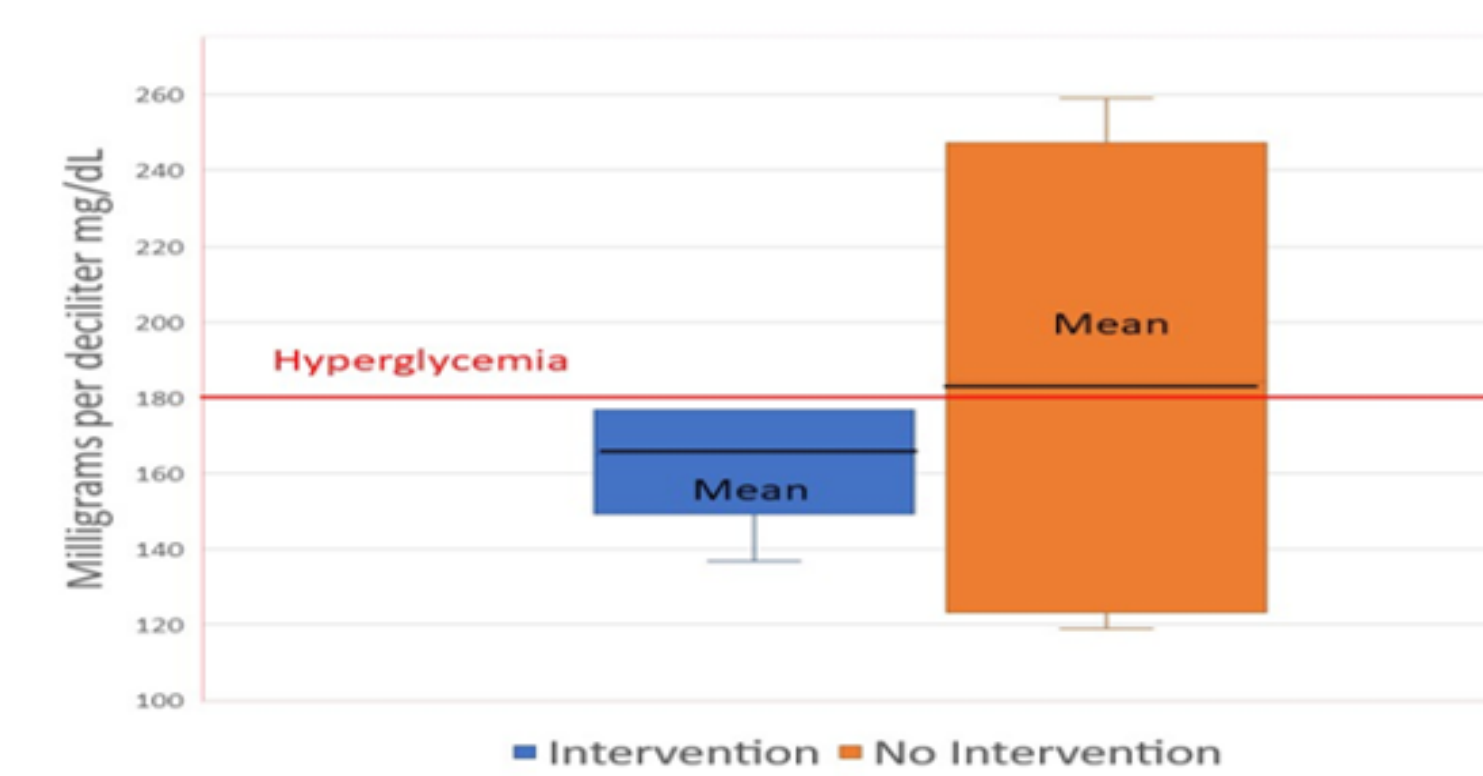
Mean Age and Gender Composition by Group

Intervention group			Nonintervention group		
Characteristics	n	%	Characteristics	n	%
Age (mean) = 76 years	-	-	Age (mean) = 68.75 years	-	-
Gender			Gender		
Female	3	75%	Female	2	50%
Male	1	25%	Male	2	50%

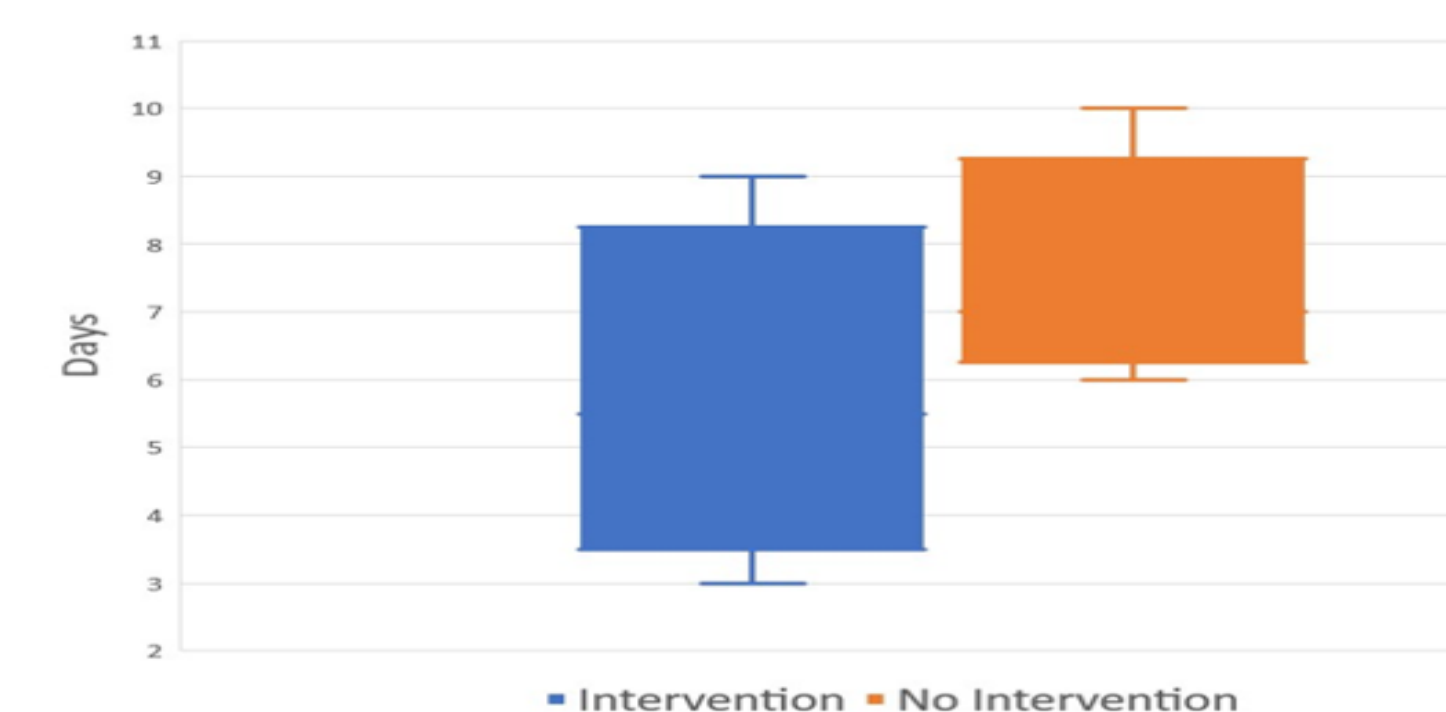
RESULTS

Specific aims included (1) decrease hyperglycemia in DM2 patients while hospitalized

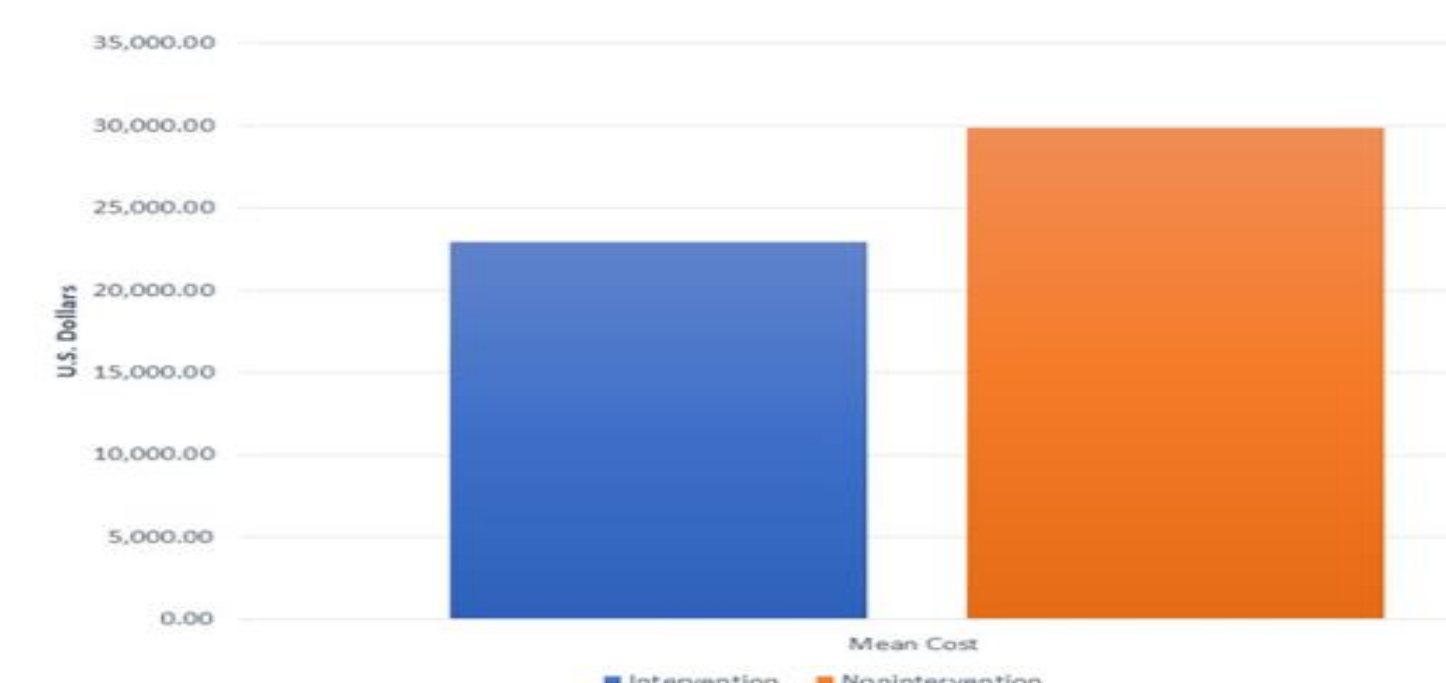
(2) Maintain mean blood glucose levels between 70mg/dL and 180 mg/dL.



- All patients receiving the intervention maintained a mean blood glucose below the 180mg/dL hyperglycemia cutoff value.
- The nonintervention group's mean blood glucose levels were above the hyperglycemia cutoff value 180 mg/dL.
- Length of stay was decreased in the intervention group by 1.75 days.



- Hospital (room charge only) at project site is \$166.025/hr. Intervention group savings is approximately \$6973.05



CONCLUSION

Basal-plus insulin regimen was successful in a randomized clinical trial to reduce mean blood glucose for hospitalized DM2 patients without hypoglycemia.

The same protocol was utilized in a busy hospitalist practice as a Quality Improvement DNP Project, and similar results were achieved.

Compared with similar patients examined retrospectively, hyperglycemia was decreased.

Entire intervention group stayed below the hyperglycemia level 180 mg/dL, without any incidence of hypoglycemia.

Cost and length of stay decreased with the intervention group.

SUMMARY

- This evidence-based DNP Quality Intervention project yielded similar results as the original study.
- The protocol used was already proven effective in a randomized control study 9 years ago.
- Adding a daily dose of long-acting basal insulin based on body weight, with minor adjustments for age or renal impairment proved to be a simple practice change.

REFERENCE

Umpierrez, G.E., Smiley, D., Hermayer, K., Khan, A., Olson, D.E., Newton, C., .. &Fonseca, V.A. (2013). Randomized study comparing a basal-bolus with a basal-plus correction insulin regimen for the hospital management of medical and surgical patients with type 2 diabetes: Basal-plus trial. *Diabetes care*, 36(8), 2169-2174.

