# USE OF A VERY HIGH PROTEIN LOW CARBOHYDRATE PEPTIDE-BASED DIET IN CRITICALLY ILL PATIENTS: ASSOCIATION WITH LOWER FREQUENCY OF HYPERGLYCEMIA

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## BACKGROUND

- Hyperglycemia (HG) in critically ill patients is common and associated with increased morbidity and mortality. [1]
- Optimization of blood glucose levels improves clinical outcomes.[2]
- Provision of nutrition support may challenge regulation of blood glucose due to the addition of glucose or glucogenic components in the nutrition solution.[3]
- Meeting caloric goals with traditional carbohydrate (CHO) amounts recommended by the Institute of Medicine Acceptable Macronutrient Distribution Range of 45-65% of total calories, may worsen hyperglycemia in critically ill patients receiving enteral tube feedings (ETF).[4,5]
- 100% whey, peptide-based very high protein and low carbohydrate ETF (VHP-WPBD) is a nutritionally complete high protein formula wherein the protein has undergone hydrolyzation for more efficient absorption, medium chain triglycerides have been added for enhanced digestibility and tolerance, and 30% of total calories are in the form of CHO to support the nutritional management of blood glucose.

## OBJECTIVES

- The primary objective of this real-world evidence, retrospective, observational analysis was to compare the frequency of HG, as well as clinical characteristics and outcomes, in patients receiving a VHP-WPBD versus other peptide-based ETF without 100% whey protein (OPBD) as well as intact protein standard and diabetic ETF (SETF), in the intensive care unit (ICU) setting.

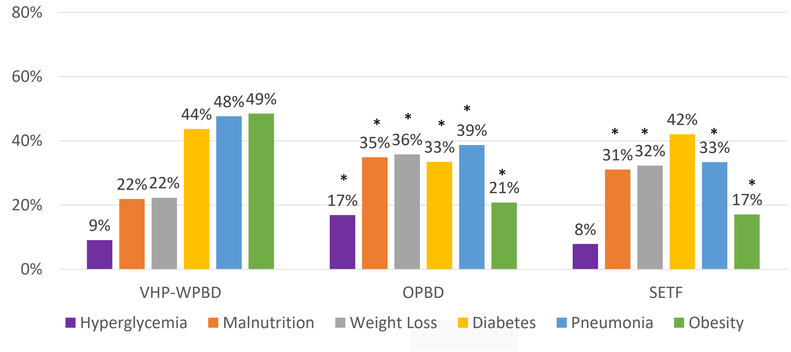
## METHODS

- The Premier Healthcare Database, an administrative database representative of hospitals in the United States, was utilized for the study.
- The study included adult patients (≥ 18 years) receiving VHP-WPBD, OPBD or SETF for any condition during acute hospitalization from October 2015-2019.
- Patients who received VHP-WPBD (**Peptamen® Intense VHP**), OPBD or SETF for 3 consecutive days or 3 of 5 consecutive days were identified via text string searches in billing descriptions. Patients on more than one ETF product billed during the same inpatient stay were excluded.
- Pairwise statistical comparisons (Wilcoxon and chi-square tests) were made between VHP-WPBD and OPBD, and between VHP-WPBD and SETF. An adjusted multivariable logistic regression analysis was used to examine the association between ETF selection and HG. Regression coefficients were exponentiated to evaluate odds ratios and 95% confidence intervals (CI).
- HG was defined by a primary discharge diagnosis ICD-10-CM code of R73.09 or R73.9 during inpatient index hospitalization.

## RESULTS

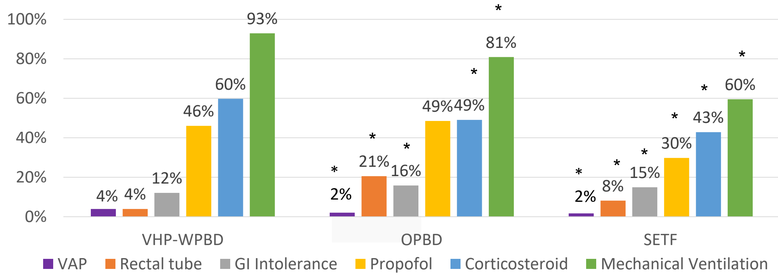
- 17,723 patients, across 66 hospitals, 44.1% female and mean age 63.7 years (SD = 15.7), were included in the study.
- Number of patients included in each group were as follows: VHP-WPBD (1,286); OPBD (3,121); SETF (13,316).
- VHP-WPBD group had a significantly higher acuity of illness compared to OPBD and to SETF. Comorbid discharge diagnoses such as obesity, diabetes and pneumonia were reported more frequently in patients receiving VHP-WPBD than OPBD and SETF (**Figure 1**).
- Gastrointestinal (GI) intolerance and rectal tube usage were less frequent in the VHP-WPBD group than in both OPBD and SETF (**Figure 2**).
- Among patients readmitted within 30 days of index hospitalization, mortality during hospital readmission was less frequent in patients who received VHP-WPBD at index hospitalization (3.6%) compared to patients receiving OPBD (19.2%, $p$<.001) or SETF (10.5%, $p$=.009).
- **Hyperglycemia was significantly less frequent in patients receiving VHP-WPBD (9.1%) versus OPBD (16.9%) $p$<.001.**
- **After adjustment for covariates, odds of HG diagnosis for patients receiving OPBD were 81% higher (CI:1.45, 2.27, $p$<.001) compared to patients receiving VHP-WPBD. (Table 1)**

Figure 1: Comorbid Diagnoses by Nutritional Formula




*All $p$<.05 for pairwise comparisons to VHP-WPBD, except SETF hyperglycemia and diabetes.

Figure 2: Clinical Characteristics and Interventions by Nutritional Formula




GI=gastrointestinal, VAP=Ventilator associated pneumonia
*All $p$<.05 for pairwise comparisons to VHP-WPBD, except OPBD propofol.

Table 1:
Multivariable Logistic Regression Showing Associations with Presence of Hyperglycemia*

| | | 95% Confidence Limits | |
|---|---|---|---|
| **Variable** | **Odds Ratio** | **Lower, Upper** | **P-Value** |
| OPBD (ref. VHP-WPBD) | 1.81 | 1.45, 2.27 | **<.001** |
| SETF (ref. VHP-WPBD) | 0.93 | 0.75, 1.15 | **.51** |
| Elixhauser index (i.e., severity of illness) | 0.92 | 0.90, 0.95 | **<.001** |
| GI intolerance | 1.30 | 1.14, 1.50 | **<.001** |
| Mechanical ventilation | 1.47 | 1.29, 1.68 | **<.001** |
| Propofol | 1.29 | 1.15, 1.43 | **<.001** |
| Rectal tube | 1.36 | 1.15, 1.60 | **<.001** |
| Corticosteroid | 1.57 | 1.41, 1.74 | **<.001** |
| Obesity | 0.74 | 0.64, 0.86 | **<.001** |

GI=gastrointestinal, ref.=reference category.
*Odds ratio >1 associated with higher odds of presenting with HG; Odds ratio <1 associated with lower odds of presenting with HG, when all other variables are held constant and $p$<0.05. Also included in the model were demographic, visit, hospital, and additional clinical characteristics.

## CONCLUSION

- **Despite high illness acuity, patients who received VHP-WPBD had lower odds of presenting with HG, as compared to patients who received OPBD.**
- **GI intolerance and rectal tube usage were less frequent in the VHP-WPBD group, as compared to both OPBD and SETF.**
- **30-day readmission mortality was lower in patients who received VHP-WPBD at index hospitalization as compared to those who received OPBD or SETF.**

## REFERENCES

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