

# IMPROVED GLYCEMIC STABILITY WITH REDUCED INJECTIONS UTILIZING V-GO® DISPOSABLE INSULIN DELIVERY DEVICE IN THE LONG-TERM CARE SETTING

A. BOONIN<sup>1</sup> and B. BALINSKI<sup>1</sup> | J. SAUTER<sup>2</sup> | J. MARTINEZ<sup>3</sup>, S. ABBOTT<sup>3</sup> and N. DAVIS<sup>3</sup>

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## ABSTRACT

Poorly controlled diabetes mellitus (DM) and fluctuations in blood glucose (BG) present a significant problem for patients (pts) and staff in the long-term care (LTC) setting. V-Go® provides insulin via a continuous pre-set basal rate with on-demand bolus dosing; it is replaced every 24 hours, and simplifies insulin therapy. The objective was to describe the impact of utilizing V-Go in pts requiring insulin for Type 2 DM in the LTC setting.

A retrospective review of 4 pts evaluating 31 days Pre- and Post-V-Go use was conducted. Efficacy variables included proportion of time in euglycemia (100-200 mg/dL), change in total daily insulin (TDD), and the associated change in insulin cost. Daily BG readings were obtained by nursing staff at up to 4 time points each day. The average age was 79 years. Pts were on insulin therapy.

Pre-V-Go mean BG was 198 mg/dL and Post-V-Go was 176mg/dL, reflecting a calculated A1C change of 8.53 to 7.76%. The percentage of time spent in euglycemia (100mg/dl -200mg/dl) Pre-V-Go was 45.1% and Post-V-Go was 56.2%. There was no reported BG <50mg/dl and the incidence of BG exceeding 200 mg/dl was reduced by 32%. Mean TDD was reduced by an average of 7.3 units/day and was achieved by using one rapid-acting insulin instead of different insulins (long- and rapid-acting), which require multiple daily injections. The resulting insulin therapy cost was reduced by approximately \$190/month. The mean number of injection sites decreased from 5.25/day to 1/day.

This first report on the use of V-Go in the LTC setting resulted in improved glucose control, reduced BG fluctuations and number of injection sites. Additional studies are needed to assess V-Go as well as cost and resource utilization in the LTC setting.

## INTRODUCTION

### Background

- Evidence supports that patients with poor glycemic control and glucose fluctuations (hyper- and hypo-glycemic events) are:
  - More likely to have diabetic and cardiovascular complications (2), falls (5), and higher healthcare costs.
  - At increased risk for cognitive impairment, vascular dementia, Alzheimer's dementia and hospitalization. (9)
- Present a significant challenge for the healthcare staff that cares for them.
- According to HHS, people who reach the age of 65 have a 40% chance of entering a nursing home and 10% of the people who enter nursing homes will stay there at least five years, with the average stay being two-and-a-half years (1). There are over 15,700 Nursing Homes in the country servicing more than 1.4 million residents. (6,7)
- More than 25% of the US population and Nursing Home Residents aged >= 65 years have diabetes (3, 4). Projections by the CDC suggest that the prevalence will double in the next 20 years, in part due to the aging population.

### V-Go Disposable Insulin Delivery Device

- V-Go® Disposable Insulin Delivery Device (Figure 1) is approved for the continuous delivery of insulin in adult patients requiring insulin and is designed to provide patients a simple method to deliver basal-bolus insulin therapy using one insulin type (U-100 fast acting).
- V-Go delivers a continuous preset basal rate of insulin over 24 hours and provides on-demand bolus dosing at mealtimes, which may help improve glycemic control.
- V-Go provides the convenience of basal-bolus therapy in one injection that may improve adherence.
- Improvements in administration and timing would improve glycemic control, helping to reduce morbidity and mortality rate

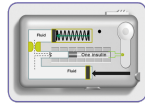


Figure 1: V-Go Disposable Insulin Delivery Device

## METHODS

- A retrospective analysis was conducted to evaluate the health and economic impact of Nursing Home/Long Term Care patients with insulin-dependent diabetes, switched to V-Go Disposable Insulin Delivery Device (V-Go) to simplify insulin delivery.
- Clinical data was extracted at baseline and for all subsequent data points where the patient (resident) remained on V-Go therapy. Data collected using the electronic medical record (EMR) database for The Meadows Nursing and Rehabilitation Center

## HEALTH ANALYSES

- Evaluate the % increase of time in range (100mg/dl - 200mg/dl) and decrease in glucose fluctuations (>200mg/dl) for LTC patients on V-Go therapy
- Evaluate the change in Total Daily Dose (TDD) of insulin and insulin cost
- Evaluate the decrease in number of injections/sites per day

## ECONOMIC ANALYSES

- All insulin costs calculated at Wholesale Acquisition Cost (WAC) based on ProspectoRx (online database) (8)
- Resulting change in nursing labor costs (Nursing wage and benefits calculated using a surveyed average inclusive of hourly wage and benefits package)
- Calculated the cost savings and impact of any corresponding change in TDD

## PATIENT CHARACTERISTICS

- Four female Nursing Home residents with insulin-dependent diabetes
- Average age of 79 years (range 68 – 91)
- Duration of diabetes and insulin therapy > 1 year

## RESULTS

- Change in average daily Blood Glucose (BG)
  - Pre-V-Go was 198.0 mg/dl and showed a statistically significant (p=0.009) change to 175.9 mg/dl on V-Go, representing a 10.5% reduction
  - Time in Range (Glycemic control)/Glucose stability - between 100mg/dl to 200mg/dl
  - Time in Range during V-Go therapy increased to 56.2% from 45.1% pre-V-Go, reflecting a 21.7% increase
- Glycemic Control (Glucose Fluctuations >200mg/dl)
  - Pre-V-Go glucose excursions above 200mg/dl were 59 and decreased to 40 showing a 32% reduction while on V-Go therapy
  - There were no reported BG readings <50mg/dl during V-Go therapy
  - Number of unique injection sites decreased from a Pre-V-Go average of 5.25 (ranging from 3 to 7 per day) to 1 application of the V-Go per day with no additional injections/sites necessary
- Observed 9.3% reduction of TDD of insulin requiring a branded-insulin cost savings of should be \$220/per 4 Patients/Month
  - Nursing/Staff administration time and cost savings
  - Calculated labor cost savings of \$436/month/patient or \$1,746/month for the four patients in this retrospective review

Figure 2. Blood Glucose Fluctuations Pre- and Post-V-Go

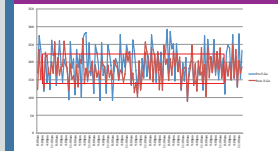


Table 1. Average Blood Glucose Levels

Time Point	Pre-V-Go	During V-Go
4-8 AM (n=4)	4	4
Mean (SD)	198.0 (10.0)	175.9 (10.0)
Min-Max	181.4 - 204.9	153.9 - 214.6
9-11 AM (n=4)	4	4
Mean (SD)	181.1 (12.0)	174.3 (10.9)
Min-Max	157.7 - 192.0	146.3 - 179.3
11-1 PM (n=4)	4	4
Mean (SD)	174.6 (15.0)	174.0 (10.1)
Min-Max	159.0 - 200.0	141.1 - 200.0
1-3 PM (n=4)	4	4
Mean (SD)	170.0 (9.5)	155.6 (9.5)
Min-Max	161.1 - 190.0	137.4 - 190.0
3-5 PM (n=4)	4	4
Mean (SD)	174.0 (10.2)	174.2 (10.1)
Min-Max	170.0 - 200.0	170.0 - 200.0

Figure 3. Percentage of Blood Glucose Measures Within a Defined Range: Improved Time in Range with V-Go

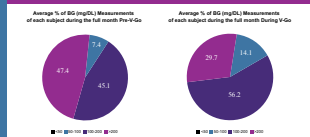


Figure 4. Calculated Improvement in A1C Based on Blood Glucose Measures

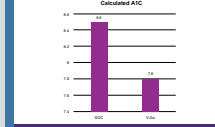


Table 2. Estimated Cost Savings After Switching to V-Go

Category	Pre-V-Go	Post-V-Go	Impact
Insulin Administration (Units/Day/Patient)	5.25	1.00	80.0%
Insulin Administration (Cost/Day/Patient)	\$6.30	\$1.00	84.1%
Nursing Labor Cost Savings (Per Patient/Month)	\$190.00	\$0.00	100.0%
Total Cost Savings (Per Patient/Month)	\$190.00	\$0.00	100.0%

Table 3. Meaningful Changes in Glucose Management After Switching to Insulin Delivery with V-Go

Metric	Pre-V-Go	During V-Go	Impact
>200mg/dl	59	40	419 (22%)
Mean BG	198	175	423 (21%)
MAIOE (BGD > SD)	86	72	414 (16%)
Avg #Injections/sites	5.25	1	44.25 81%

## LIMITATIONS

- Our findings regarding glycemic improvement or costs may not be generalizable to all LTC patients with diabetes.

## INSTITUTIONS

- The Meadows Nursing and Rehab Center, Dallas, PA
- Evolution Pharmacy Services, Plains, PA
- Valeritas, Inc., Bridgewater, NJ

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## SUMMARY AND CONCLUSIONS

- Data shown represents four patients, 31 days before V-Go therapy and 31 days on V-Go therapy covering 713 blood glucose data points
- Time in Range (100 - 200mg/dl) during V-Go therapy increased to 56.2% from 45.1% pre-V-Go, reflecting a 19.8% increase
- Glucose excursions >200 mg/dl were reduced 32% with no reports of hypoglycemic events below 50 mg/dl
- Considerable savings were calculated for both nursing/labor costs, \$20,940/year and branded-insulin costs, \$2,313/year for the four patients included in this retrospective review
- Improved timing of insulin administration - closer to meal time and more physiologic
- V-Go therapy resulted in maintenance of patient dignity and increased their sense of control for their situation.
- Additional potential benefits include:
  - Reduction of MEDPASS errors on administration
- Reduction in "finger sticks" and OSHA reportable events
- Enhanced quality audits for storage and refrigeration of insulin and reduced number of insulin vials
- The following CMS Quality Rating System (CMS) and NCQA Quality metrics were achieved:
  - HbA1C Control < 8%
  - Blood Pressure Control (below 140/90mm Hg)
  - Glycemic targets of the American Diabetes Association (ADA), International Diabetes Federation (IDF) and American Geriatric Society (AGS) for older adults were achieved (10, 11, 12)
- Currently, 12 patients are utilizing V-Go for insulin delivery and we are anticipating nursing/labor cost savings of over \$62,800 per year and branded-insulin cost savings approaching \$7,000

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