

## Indication-Based Ordering: A New Paradigm for Glycemic Control in Hospitalized Inpatients

Joshua Lee, M.D.,<sup>1</sup> Brian Clay, M.D.,<sup>2</sup> Ziband Zelazny, M.B.A.,<sup>1</sup> and Gregory Maynard, M.D., M.Sc.<sup>2</sup>

### Abstract

#### Background:

Inpatient glycemic control is a constant challenge. Institutional insulin management protocols and structured order sets are commonly advocated but poorly studied. Effective and validated methods to integrate algorithmic protocol guidance into the insulin ordering process are needed.

#### Methods:

We introduced a basic structured set of computerized insulin orders (Version 1), and later introduced a paper insulin management protocol, to assist users with the order set. Metrics were devised to assess the impact of the protocol on insulin use, glycemic control, and hypoglycemia using pharmacy data and point of care glucose tests. When incremental improvement was seen (as described in the results), Version 2 of the insulin orders was created to further streamline the process.

#### Results:

The percentage of regimens containing basal insulin improved with Version 1. The percentage of patient days with hypoglycemia improved from 3.68% at baseline to 2.59% with Version 1 plus the paper insulin management protocol, representing a relative risk for hypoglycemic day of 0.70 [confidence interval (CI) 0.62, 0.80]. The relative risk of an uncontrolled (mean glucose over 180 mg/dl) patient stay was reduced to 0.84 (CI 0.77, 0.91) with Version 1 and was reduced further to 0.73 (CI 0.66, 0.81) with the paper protocol. Version 2 used clinician-entered patient parameters to guide protocol-based insulin ordering and simultaneously improved the flexibility and ease of ordering over Version 1.

#### Conclusion:

Patient parameter and protocol-based clinical decision support, added to computerized provider order entry, has a track record of improving glycemic control indices. This justifies the incorporation of these algorithms into online order management.

*J Diabetes Sci Technol* 2008;2(3):349-356

**Author Affiliations:** <sup>1</sup>Information Services, School of Medicine, University of California, San Diego, San Diego, California and <sup>2</sup>Hospital Medicine Division, School of Medicine, University of California, San Diego, San Diego, California

**Abbreviations:** (BMI) body mass index, (CI) confidence interval, (CPOE) computerized provider order entry, (NPO) nil per os, (POC) point of care, (SQIO) subcutaneous insulin order set, (TDD) total daily dose, (TP) time period, (UCSDMC) University of California San Diego Medical Center

**Keywords:** CPOE, diabetes, insulin, glycemic control, quality improvement

**Corresponding Author:** Joshua Lee, M.D., Associate Clinical Professor of Medicine, Medical Director, Information Services, 200 West Arbor Drive, MC 8485, San Diego, CA 92103-8485; email address [joshlee@ucsd.edu](mailto:joshlee@ucsd.edu)