Abstracts

Development of New Indices of Glycemic Control in Patients with Diabetes Using Digital Signal Processing

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OBJECTIVES: The objective is to examine the performance of a variety of filters used in digital signal processing and evaluate the filter coefficients as potential indices of glycemic control. Digital signal processing has played an extensive role in separating signal from noise in biological signals for decades. Cascaded adaptive filters, high-pass filters, Kalman filters as well as discrete Fourier transforms have been used to produce clean signals and obtain the frequency spectrum for ECG signals. With the rapid advances in Continuous Glucose Monitoring (CGM) sensors, a nearly continuous stream of glucose levels is made available with wavelike postprandial excursions. Extraction of key information beyond descriptive statistics from the mass of glucose data has been illusive. This is no clean classification as in the case of cardiac arrhythmias. Little prior work in the medical literature exists except a Kalman filter simulation using a sinusoidal function to represent a postprandial excursion (Palerm, 2005), and a brief note by Knobbe (2005) discussing Kalman filters in CGM. METHODS: The mathematical form of each filter is presented along with identification of associated formulas for each of their filter coefficients, a table of characteristic filter coefficients, coefficient ranges, stability and evidence of substantive interpretability. Archetype postprandial excursions are represented by truncated Taylor series. RESULTS: Characteristics compared include: stability of filter coefficient under trivial curve variation representing the post-prandial excursion waveform, range of values, sensitivity to substantial variation in the waveform, usefulness in combination with other statistics and sensitivity and specificity in predicting hypoglycemic events. CONCLUSIONS: Several signal processing filters appear to be effective for extraction of information from CGM series, and some of these appear promising as a basis for new indices of glycemic control and for classification of patients and effects of medications such as rapidly acting insulin analogs that blunt the post-prandial excursions.

Diabetes—Patient Reported Outcomes

Impact of Type of Pharmacy (Chain Versus Independent) on Medication Adherence in Patients with Type 2 Diabetes: A Retrospective Database Analysis

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OBJECTIVE: Studies have indicated that independent pharmacies outperform chain pharmacies in one-on-one personal attention and quality of patient counseling. However, there are no studies examining whether these benefits translate into outcomes

Antipsychotic Utilization and Treatment-Emergent Diabetes—Comparison of Results With and Without Propensity Scoring

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OBJECTIVE: To examine whether the relationship between antipsychotic utilization and treatment-emergent diabetes among patients newly initiated on therapy varied, when propensity scoring was (Model I) and was not (Model II) used. METHODS: Claims databases from the Veterans Administration North Texas Health Care System and the South Texas Veterans Health Care System (1995–2004) were used. Both Models I and II utilized a retrospective cohort design and an intent-to-treat method to assign treatment exposure. Covariates included demographics (age, gender, race, and region), general health comorbidities (hypertension and dyslipidemia), mental health comorbidities (bipolar disorder, depression, post-traumatic stress disorder, schizophrenia, and substance abuse), antipsychotic drug utilization patterns (monotherapy, switching, and combination therapy), treatment duration, medication re-exposure, and treatment initiation year. Claims databases from the Veterans Administration North Texas Health Care System and the South Texas Veterans Health Care System (1995–2004) were used. RESULTS: Of the eligible patients (N = 8949), regardless of variations in methodologies of the seven models, there were no significant differences in diabetes risk among patients who were: 1) initiated on the second generation antipsychotics (SGAs) compared to those on the first generation antipsychotics (FGAs); 2) initiated on olanzapine compared to those on risperidone; and 3) exposed to olanzapine or quetiapine compared to those exposed to FGAs. Inconsistent results among the models were observed when comparisons were made between: 1) patients initiated on quetiapine (increased risk vs. no difference) compared to those on risperidone, and 2) patients exposed to risperidone (decreased risk vs. no difference) compared to those exposed to FGAs. Differences occurred among the following.

METHODS: ITT retrospective cohort and ITT case-control; and AT retrospective cohort and AT case-control. CONCLUSIONS: With respect to antipsychotic utilization, results of the various models using different methodologies were largely consistent. Advantages and disadvantages of the seven models will be presented.