Retrospective Analysis of Continuous Glucose Monitoring Data with the Surveillance Error Grid Supports Nonadjunctive Diabetes Management Decisions

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Background and Aims

- Safe use of CGM for diabetes management decisions requires accurate data.
- The surveillance error grid (SEG) represents the assessment of diabetes clinicians with regard to the risk of inaccurate blood glucose meter values.
- We applied the SEG to data from a currently-marketed CGM system.

Methods

- Data from previously-published accuracy studies of the Dexcom G4 PLATINUM system were retrospectively analyzed with the SEG macro (Kovatchev, JDST 2014;8(4):673).
    - *Pediatric study (Laffel, DT&T 2016;18(S2):S223): N=79, age 12.2 ± 4.6 years, all with T1D.*
    - *Adult study (Bailey, JDST 2015;9(2):209): N=51, age 46.7 ± 15.8 years, 44 with T1D and 7 with T2D.*
- Data from 2 experiments with different sensor performance were further analyzed.

Results

Figure 1.

Surveillance error grid analysis for sensor wear Day 1 (left), Day 4 (center), and Day 7 (right) of the pediatric (top row) and adult (bottom row) studies.

Colors indicate associated risk levels ranging from none (dark green) to extreme (brown).
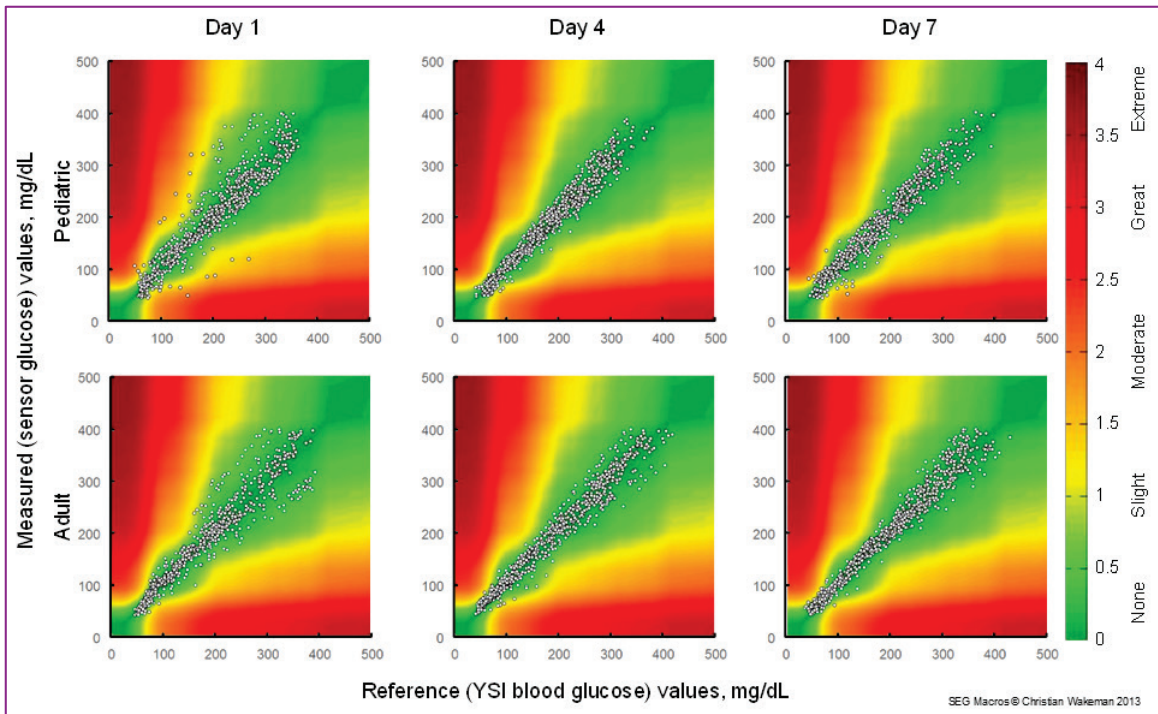

Figure 2.

Glucose concentrations during two in-clinic experiments. A: Poor performance and 3 points in the "Moderate" risk zone, designated by vertical bars colored to show the risk category. B: Good performance.
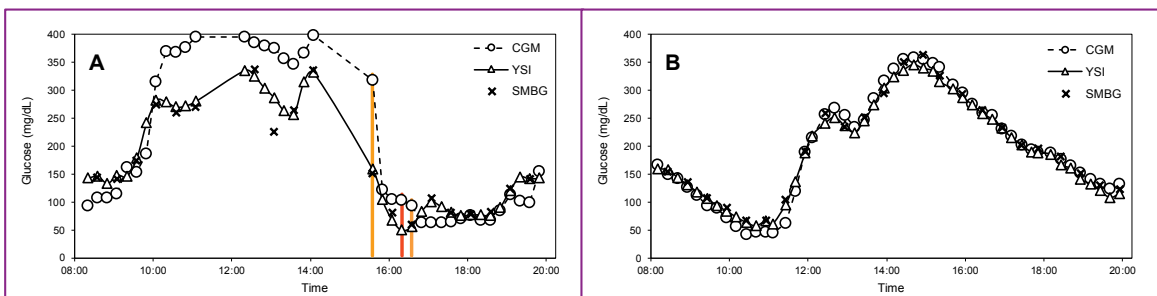

Table 1.

Surveillance error grid data point distributions for the pediatric and adult studies on each of the in-clinic study days.

Estimated Risk			Pediatric, N (%)				Adult, N (%)			
Descriptor	Grid Color	Absolute Value	Day 1	Day 4	Day 7	Overall	Day 1	Day 4	Day 7	Overall
None		≤0.5	625 (84.46%)	737 (92.70%)	628 (86.38%)	1990 (87.98%)	596 (87.65%)	725 (93.31%)	735 (91.19%)	2056 (90.85%)
Slight, Lower		>0.5 to 1	83 (11.22%)	52 (6.54%)	82 (11.28%)	217 (9.59%)	78 (11.47%)	46 (5.92%)	65 (8.06%)	189 (8.35%)
Slight, Higher		>1 to 1.5	25 (3.38%)	6 (0.75%)	15 (2.06%)	46 (2.03%)	6 (0.88%)	6 (0.77%)	6 (0.74%)	18 (0.80%)
Moderate, Lower		>1.5 to 2.0	5 (0.68%)	0	2 (0.28%)	7 (0.31%)	0	0	0	0
Moderate, Higher		>2.0 to 2.5	2 (0.27%)	0	0	2 (0.09%)	0	0	0	0
Great, Lower		>2.5 to 3.0	0	0	0	0	0	0	0	0
Great, Higher		>3.0 to 3.5	0	0	0	0	0	0	0	0
Extreme		>3.5	0	0	0	0	0	0	0	0
Overall			740	795	727	2262	680	777	806	2263

Summary

- Basing routine diabetes management decisions on point estimates from the Dexcom G4 PLATINUM system poses minimal risk.
- The risks may be mitigated by trend information and alerts.

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