Diabetes Self-Management Profile for Flexible Insulin Regimens

Cross-sectional and longitudinal analysis of psychometric properties in a pediatric sample

THE DIABETES RESEARCH IN CHILDREN NETWORK (DIRECNET) STUDY GROUP*

Available measures of diabetes treatment adherence (1–5) are typically based on measuring deviation from a prescribed regimen and cannot readily capture problem solving and self-regulation that typify modern regimens. Measurement of diabetes self-management must accommodate these advances in therapy.

The Diabetes Self-Management Profile (DSMP), a previously validated, structured interview assessment of adherence in type 1 diabetes (6–8) was modified by the Diabetes Research in Children Network (DirecNet) research group and the authors of the DSMP to construct the DSMP for Flexible regimens (DSMP-F). This study evaluates the psychometric properties of the DSMP-F both cross-sectionally and longitudinally. Data were obtained from youths with type 1 diabetes and their parents during a DirecNet Study Group trial of the GlucoWatch G2 Biographer (GW2B; Cygnus, Redwood City, CA) (9).

RESEARCH DESIGN AND METHODS — The randomized trial included 200 youths with type 1 diabetes who were enrolled at five centers; the methodological details have been published previously (9). Each child was randomized to GW2B use or usual care. Diabetes management in both groups was similar, except for use of the GW2B. Within the sample, 161 youths were treated using flexible insulin regimens (93 on insulin pumps and 68 on "basal-bolus" regimens). HbA_{1c} (A1C) was measured at baseline and after 3 and 6 months at the DirecNet central laboratory.

The DSMP-F interview quantifies adherence to the prescribed regimen and self-management behaviors such as remediation or prevention of unwanted glucose excursions through adjustment of insulin, diet, or exercise. Four DSMP diet items were reworded to be more consistent with dietary management using carbohydrate counting and insulin adjustment based on carbohydrate-to-insulin ratios. Two trained interviewers completed the 15- to 20-min DSMP-F interview by telephone separately with parents and children ≥11 years of age and jointly with parents and children <11 years of age at baseline and after 6 months. Higher scores reflect more meticulous self-management. Analyses for this report were limited to DSMP total scores.

RESULTS — Table 1 presents descriptive statistical analyses of the DSMP-F (n = 161 parents and 117 adolescents). Total scores (means ± SD) were virtually identical for parents (62.7 ± 8.7) and adolescents (62.7 ± 7.0). There were no significant between-group differences in baseline DSMP-F total scores for parents (62.0 ± 8.6 and 63.5 ± 8.8 for GW2B and usual care, respectively) or adolescents (63.5 ± 6.4 and 61.8 ± 7.4 for GW2B and usual care, respectively). These scores indicate mean adherence scores of 73% of the maximum DSMP total score (86), suggesting that overreporting of adherence was unlikely.

Internal consistency (Cronbach's α coefficient) for the DSMP-F total score, with the GW2B and usual care groups combined, was 0.69 for parents and 0.47 for adolescents at baseline and 0.70 for parents and 0.65 for adolescents at 6 months. The α coefficient obtained in the earlier DSMP study (6) was 0.76 for parents and for youths. Among the 117 parent-adolescent pairs who were both interviewed with the DSMP-F, parent and adolescent DSMP total scores correlated (0.59, $P < 0.001$). Test-retest reliability of the DSMP-F (Pearson correlations between baseline and 6-month scores) were similar in the usual care (parents $r = 0.73$, $P < 0.001$; adolescents $r = 0.42$, $P = 0.002$) and GW2B (parents $r = 0.71$; adolescents $r = 0.51$; both $P < 0.001$) groups.

Compared with the prior study (6), associations of the total score with A1C were similar in this study ($r = -0.20$ vs. -0.28). The present study enrolled a more selected sample of patients that were in better glycemic control and were well motivated to improve their diabetes self-management. These characteristics might decrease variability in DSMP-F scores and A1C, reducing the magnitude of statistical associations. Changes in DSMP-F total scores from parents or adolescents were not correlated significantly with change in A1C over the 6-month study ($P = 0.79$ and 1.00, respectively).

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Received for publication 2 December 2004 and accepted in revised form 11 May 2005.

*A complete list of DirecNet Study Group members can be found in ref. 9. The writing committee for this article can be found in the APPENDIX.

Abbreviations: DirectNet, Diabetes Research in Children Network; DSMP, Diabetes Self-Management Profile; DSMP-F Diabetes Self-Management Profile for flexible regimens; GW2B, GlucoWatch G2 Biographer.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

Table 1—*Raw scores for each DSMP-F subscale and total obtained from 161 parents and 117 youths ≥11 years of age*

	Parents	Youths	Maximum score
Exercise	9.0 ± 2.6	8.0 ± 2.9	12
Eating	11.5 ± 3.2	12.4 ± 2.9	17
Hypoglycemia	8.9 ± 1.6	8.8 ± 1.6	11
Blood glucose testing	22.1 ± 4.0	21.9 ± 3.6	30
Insulin	11.2 ± 3.2	11.6 ± 2.7	16
Total	62.7 ± 8.7	62.7 ± 7.0	86

Data are means ± 1 SD unless otherwise indicated.

CONCLUSIONS — The present study yielded substantial psychometric data on the DSMP-F, including descriptive data obtained from a multicenter sample that can be used for comparison with DSMP-F scores obtained in future studies. The modest internal consistency estimates may indicate that the DSMP-F measures several independent dimensions of diabetes self-management behavior, as has been shown by others (10,11), and thus, a high α coefficient would not be expected.

This work extends the previous validation of the DSMP-F by evaluating an adapted interview protocol appropriate for patients treated with flexible insulin regimens. Further research could compare the interview procedure with varied modes of data collection such as questionnaires, hand-held computers, or automated interactive telephone interview methods. Examination of the psychometric properties of the DSMP when administered to adult patients would be another valuable contribution.

Acknowledgments— This research has been supported by National Institutes of Health/National Institute of Child Health and Human Development Grants HD041919-01, HD041915-01, HD041890, HD041918-01, HD041908-01, and HD041906-01 and by Nemours Research Programs.

The GlucoWatch G2 Biographers were purchased from Cygnus at a discounted price.

Alexandra Taylor, MACP, and Amy Milkes, MA, of Nemours Children's Clinic completed all interviews of participants in this study.

Portions of these data were previously published as an abstract in *Diabetes* [53 (Suppl. 2): A436, 2004] and presented at the Scientific Sessions of the American Diabetes Association in Orlando, Florida, 4–8 June 2004.

APPENDIX

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