

Diabetic Ketoacidosis Costs Up

BY MIRIAM E. TUCKER
Senior Writer

AMSTERDAM — Direct medical costs for diabetic ketoacidosis in children and adolescents in the United States totaled approximately \$258 million in 2006, Dr. Arleta Rewers and Dr. Marian Rewers reported in a poster at the annual meeting of the European Association for the Study of Diabetes.

The figure, which breaks down to about \$73 million for cases occurring at the onset of diabetes and \$185 million for already established cases, represents an increase of approximately 40% from 1995, when the total cost was \$184 million (\$48 million for new-onset diabetes patients and \$136 million for established diabetes patients), said Dr. Arleta Rewers, a pediatric emergency physician, and Dr. Marian Rewers, a pediatric endocrinologist, both at the Children's Hospital, Denver, and the University of Colorado at Denver.

Total direct medical costs were 67% higher for patients who were at the onset of diabetes than for those patients who had established diabetes.

Those overall U.S. data were extrapolated from the 1,093 validated cases of diabetic ketoacidosis (DKA) among 777 patients

seen at the Children's Hospital, Denver, during 1995-2006. The median age at DKA was 12.0 years (range 0-19 years). Slightly more than half (55%) were female. Overall, 23% of patients were treated in the emergency department, 12% were in the observation unit (staying less than 24 hours), and 65% were hospitalized for a median of 1 day (range 1-61 days).

Total direct medical costs, including hospital charges and professional fees, were 67% higher for patients at the onset of diabetes (which was when 49% of all diabetic ketoacidosis events occurred) than for patients with established diabetes, with a median of \$10,890 versus \$8,010 for the entire 11-year period.

Two-thirds (66%) of the patients had private insurance or were covered through a health maintenance organization, 27% had government insurance or indigent coverage, and 7% were uninsured. Among those with new-onset diabetes, having indigent coverage or no insurance predicted a nearly fourfold higher cost of diabetic ketoacidosis treatment, after adjustment for gender, ethnicity, and age. In contrast, there was no relationship between insurance status and the cost of diabetic ketoacidosis among patients with established diabetes, the two researchers reported.

After adjustment for inflation, the median direct cost of diabetic ketoacidosis treatment increased 20% from 1995-96 (\$8,836) to 2005-06 (\$10,551).

The cost extrapolations to the entire U.S. population were based on four sets

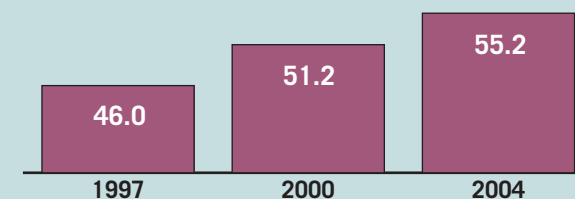
of data: a previous study suggesting that the prevalence of diabetic ketoacidosis in newly diagnosed youth is approximately 25.5%; another finding that the incidence of diabetic ketoacidosis in patients with established diabetes is 8 per 100 patients per year; estimates of the prevalence and incidence of diabetes among youth from the SEARCH for

Diabetes in Youth study database; and U.S. census population data.

The reason that diabetic ketoacidosis is more costly in newly diagnosed cases—especially those with suboptimal insurance—is likely because of more severe presentation and lower family resources for transition to outpatient management, the researchers said. ■

DATA WATCH

U.S. Hospital Admissions for Short-Term Diabetes Complications Increasing in Adults (rate per 100,000 population)



Note: Based on data for diabetic ketoacidosis, hyperosmolarity, and coma.

Source: Healthcare Cost and Utilization Project

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*Model is for illustrative purposes only.

Indications and usage

Levemir is indicated for once- or twice-daily subcutaneous administration for the treatment of adult and pediatric patients with type 1 diabetes mellitus or adult patients with type 2 diabetes mellitus who require basal (long-acting) insulin for the control of hyperglycemia.

Important safety information

Levemir is contraindicated in patients hypersensitive to insulin detemir or one of its excipients.

Hypoglycemia is the most common adverse effect of all insulin therapies, including Levemir. As with other insulins, the timing of hypoglycemic events may differ among various insulin preparations. Glucose monitoring is recommended for all patients with diabetes. Levemir is not to be used in insulin infusion pumps. Any change of insulin dose should be made cautiously and only under medical supervision. Concomitant oral antidiabetic treatment may require adjustment.

Inadequate dosing or discontinuation of treatment may lead to hyperglycemia and, in patients with type 1 diabetes, diabetic

ketoacidosis. Levemir should not be diluted or mixed with any other insulin preparations. Insulin may cause sodium retention and edema, particularly if previously poor metabolic control is improved by intensified insulin therapy. Dose and timing of administration may need to be adjusted to reduce the risk of hypoglycemia in patients being switched to Levemir from other intermediate or long-acting insulin preparations. The dose of Levemir may need to be adjusted in patients with renal or hepatic impairment.

Other adverse events commonly associated with insulin therapy may include injection site reactions (on average, 3% to 4% of patients in clinical trials) such as lipodystrophy, redness, pain, itching, hives, swelling, and inflammation.

Whether these observed differences represent true differences in the effects of Levemir, NPH insulin, and insulin glargine is not known, since these trials were not blinded and the protocols (eg, diet and exercise instructions and monitoring) were not specifically directed at exploring hypotheses related to weight effects of the treatments compared. The clinical significance of the observed differences in weight has not been established.

For your patients with type 2 diabetes, start once-daily Levemir®

Levemir helps patients with diabetes achieve their A1C goal.^{1,2}

- 24-hour action at a once-daily dose^{3,4}
- Provides consistent insulin absorption and action, day after day^{3,5,6}
- Less weight gain^{7†}

References: 1. Meneghini LF, Rosenberg KH, Koenen C, Meriläinen MJ, Lüddecke H-J. Insulin detemir improves glycaemic control with less hypoglycaemia and no weight gain in patients with type 2 diabetes who were insulin naive or treated with NPH or insulin glargine: clinical practice experience from a German subgroup of the PREDICTIVE study. *Diabetes Obes Metab*. 2007;9(3):418-427. 2. Hermansen K, Davies M, Derezinski T, Ravn GM, Clauson P, Home P, for the Levemir Treat-to-Target Study Group. A 26-week, randomized, parallel, treat-to-target trial comparing insulin detemir with NPH insulin as add-on therapy to oral glucose-lowering drugs in insulin-naïve people with type 2 diabetes. *Diabetes Care*. 2006;29(6):1269-1274. 3. Klein O, Lynge J, Endahl L, Damholt B, Nosek L, Heise T. Albumin-bound basal insulin analogues (insulin detemir and NN344): comparable time-action profiles but less variability than insulin glargine in type 2 diabetes. *Diabetes Obes Metab*. 2007;9(3):290-299. 4. Philis-Tsimikas A, Charpentier G, Clauson P, Ravn GM, Roberts VL, Thorsteinsson B. Comparison of once-daily insulin detemir with NPH insulin added to a regimen of oral antidiabetic drugs in poorly controlled type 2 diabetes. *Clin Ther*. 2006;28(10):1569-1581. 5. Data on file. Novo Nordisk Inc, Princeton, NJ. 6. Heise T, Nosek L, Rønn BB, et al. Lower within-subject variability of insulin detemir in comparison to NPH insulin and insulin glargine in people with type 1 diabetes. *Diabetes*. 2004;53(6):1614-1620. 7. Data on file. NDA21-536. Novo Nordisk Inc, Princeton, NJ.



Levemir®

insulin detemir (rDNA origin) injection



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