

could succeed for adolescents where other forms of nicotine replacement failed. Consistent with adolescent tobacco use patterns, potential benefits of NNS over other forms of nicotine replacement include the following: (1) NNS can be used intermittently, (2) in response to environmental influences, such as smoking to relieve stress, NNS has a relatively fast delivery of nicotine with reinforcing effects, and (3) compared with other forms of nicotine replacement, NNS allows greater self-control and ownership of the intervention, which adolescents prefer. Admirably, this study uses a validated nicotine dependence questionnaire for adolescents, a withdrawal symptom scale, biochemical validation of self-report, and an intention-to-treat analysis. Two noteworthy design limitations exist: First, this is an open-label trial without a placebo group. Second, although originally designed to be an effectiveness study, failure to meet sample size requirements forced the authors to truncate the study for feasibility. These limitations are relatively minor, however, because this study convincingly shows that NNS is not tolerated by adolescents. Although the delivery system holds promise for adolescent smokers, the negative side effects of the spray, in particular burning associated with use, led to such poor adherence that discussion of efficacy is moot. If future NNS preparations are better tolerated, this study deserves replication with adequate power to reexamine the issue of effectiveness for adolescents.

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Continuous glucose monitoring study does not demonstrate benefit in children and adolescents

The Juvenile Diabetes Research Foundation Continuous Glucose Monitoring Study Group. Continuous glucose monitoring and intensive treatment of type 1 diabetes. *N Engl J Med* 2008;359:1464-76.

Question Among patients with type 1 diabetes mellitus, does the use of continuous glucose monitoring result in improved glycemic control?

Design Randomized, controlled trial.

Setting Multiple centers in the United States.

Participants A total of 322 adults and children who were already receiving intensive therapy for type 1 diabetes.

Intervention Continuous glucose monitoring or a control group performing home monitoring with a blood glucose meter.

Outcomes Change in the glycated hemoglobin level at 26 weeks.

Main Results The changes in glycated hemoglobin levels in the 2 study groups varied markedly according to age group ($P = .003$), with a significant difference among patients 25 years of age or older that favored the continuous-monitoring group (mean difference in change, -0.53% ; 95% confidence interval [CI], -0.71 to -0.35 ; $P < .001$). The between-group difference was not significant among those who were 15 to 24 years of age (mean difference, 0.08 ; 95% CI, -0.17 to 0.33 ; $P = 0.52$) or among those who were 8 to 14 years of age (mean difference, -0.13 ; 95% CI, -0.38 to 0.11 ; $P = .29$). Secondary glycated hemoglobin outcomes were better in the continuous-monitoring group than in the control group among the oldest and youngest patients but not among those who were 15 to 24 years of age. The use of continuous glucose monitoring averaged 6.0 or more days per week for 83% of patients 25 years of age or older, 30% of those 15 to 24 years of age, and 50% of those 8 to 14 years of age. The rate of severe hypoglycemia was low and did not differ between the 2 study groups; however, the trial was not powered to detect such a difference.

Conclusions Continuous glucose monitoring can be associated with improved glycemic control in adults with type 1 diabetes, but was not effective in children and adolescents.

Commentary This is the largest, prospective, individually randomized unblinded controlled trial of continuous glucose monitoring (CGM). Use of CGM was associated with significantly improved glycemic control in adults with type 1 diabetes, but not children or adolescents. Between-group A1C levels fell by a mean of 0.53% in adults. Nonsignificant benefit of CGM was observed in subjects who were 8 to 14 years of age, and no benefit was observed among subjects who were 15 to 24 years of age. Why didn't children and adolescents benefit? The reasons might be related to adherence and to the study's method for randomization. Use of CGM is a tool for directing behavior on the basis of glucose levels. Adherence to a behavioral intervention is necessary for the intervention to be successful.¹ Adherence alone might account for the ranking of results between adults with the greatest compliance (80%) and greatest benefit, compared with children with the second-best compliance (50%) and second best results, and adolescents with the least compliance (33%) least benefit. The study used individual randomization, which is appropriate for a blinded trial, but in an unblinded trial of a behavioral intervention, cluster randomization of study sites is often used to prevent contamination of control subjects from knowledge of the intervention.² If control subjects learn about benefits of using CGM at the investigator's office, then they might monitor their glucose more frequently and artifactually improve their control. This behavior could improve the A1C outcome for controls and wash out the between-group benefit of the CGM intervention. Indeed, in this study the children and adolescent control subjects both had at least a

0.21% improvement in A1C, suggesting possible contamination of control subjects in this study.

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Clinical dehydration scale appears valid, but its impact on clinical outcomes is not clear

Goldman RD, Friedman JN, Parkin PC. Validation of the clinical dehydration scale for children with acute gastroenteritis. *Pediatrics* 2008;122:545-9.

Question Among children who present with acute gastroenteritis to an emergency department, is a clinical dehydration scale able to validly predict length of stay and need for intravenous fluids?

Design Prospective observational study.

Setting Emergency department at a large pediatric tertiary center in Canada.

Participants A total of 205 children, aged 1 month to 5 years, with symptoms of acute gastroenteritis.

Outcomes Length of stay, proportion of children receiving intravenous fluid rehydration, and proportions of children with abnormal serum pH values or bicarbonate levels.

Main Results The distribution of severity categories was as follows: no dehydration (score of 0), $n = 117$ (57%); some dehydration (score of 1-4), $n = 83$ (41%); moderate/severe dehydration (score of 5-8), $n = 5$ (2%). The 3 dehydration categories were significantly different with respect to the validation hypotheses (length of stay, mean \pm SD: none, 245 ± 181 minutes; some, 397 ± 302 minutes; moderate/severe, 501 ± 389 minutes; treatment with intravenous fluids: none, $n = 17$, 15%; some, $n = 41$, 49%; moderate/severe, $n = 4$, 80%; number of vomiting episodes in the 7 days before the

emergency department visit: none, 8.4 ± 7.7 episodes; some, 13 ± 10.7 episodes; moderate/severe, 30.2 ± 14.8 episodes).

Conclusions The clinical dehydration scale and the 3 severity categories were valid for a prospectively enrolled cohort of patients who were assessed in this tertiary emergency department. The scoring system was valuable in predicting a longer length of stay and the need for intravenous fluid rehydration for children with symptoms of acute gastroenteritis.

Commentary The authors' primary objective was to validate their clinical dehydration scale (CDS) in a prospective cohort of children with acute gastroenteritis. The scale consists of 4 physical examination variables: general appearance, eyes (sunken or not), moistness of mucous membranes, and presence of tears. Each variable is scored from 0 to 2 points. The results of this study seem to suggest that children with more than "none" of these clinical signs of dehydration may have a longer length of stay in the emergency department and may receive intravenous fluids. Although not unexpected, it is good to see that an increased CDS corresponds with increased use of emergency department resources. However, as we look to use this score in clinical practice, we must consider a few caveats. First, the use of "decreased tears" as a criterion is suspect, because not every child cries during their triage assessment. Second, the clinical utility of the CDS is not clear. The strength of the correlation between the CDS and the outcomes is not great enough to make me want to rely solely on these 4 findings. Third, the authors may have minimized the reasons for the variability in the length of stay or the need for intravenous fluids. The low number of children in the moderate/severe dehydration group makes the need for precision in determining outcomes even more important. Finally, the authors state that 5 children were admitted, but they do not report admission as an outcome variable (and they do not identify which CDS category these children were in, nor their length of stay). As with all clinical prediction rules, the most important evidence will come from future studies that assess its impact on practice.

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