

How do you know how much insulin a person with type 1 diabetes needs?



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The title question is one we clinicians in the UK have paid little attention to. The standard approach in people newly diagnosed with type 1 diabetes has been to pick an arbitrary low dose of insulin and gradually titrate it, based on the prevailing blood glucose

levels. This approach is logical enough, but what about the person with established diabetes who appears under your care or the young person with diabetes who transfers to the adult service? Is there a way of estimating basal and bolus needs for these patients?

The study by Wiegand et al from Germany (summarized alongside) may not be written in the best English (but then how many of us have written a paper in German?), however the data it draws upon is fascinating. The study recorded the daily insulin dose in units per kg in over 22 000 young people with type 1 diabetes, aged 3–25 years. The 50th insulin dose percentile varied from 0.67 unit/kg at age 3, 0.93 unit/kg at age 13 and 0.7 unit/kg at age 23. Differences between males and females were also observed.

Clearly, there are many things that can affect the insulin dose prescribed, including body mass index, stage of puberty and level of physical fitness; knowing how much the average young

person might need, however, can often help to identify those patients who are receiving too much or too little insulin. A common mistake when caring for adolescents with type 1 diabetes is the failure to reduce insulin doses as the patient enters adulthood, a time during which insulin requirements decrease. Failure to make the necessary alterations in dose during this transition can result in frequent episodes of hypoglycaemia or excess weight gain, as the person eats more in order to avoid hypoglycaemia.

It is sometimes worth doing a general re-evaluation and calculating the estimated median insulin dose based on body weight and comparing it with the actual insulin dose prescribed. This can be particularly helpful when changing insulin regimens, typically from a twice-daily fixed mixture to a basal–bolus regimen. For individuals requiring a lot more insulin than predicted, re-estimating insulin dose might prompt a revision of doses downwards beginning with a basal dose of approximately 0.3 unit/kg. As is illustrated in the German study, even lower doses are required for those using insulin pump therapy.

In conclusion, therefore, this paper provides valuable data on insulin requirements across a range of ages against which we can benchmark our patients. Calculating insulin doses in terms of units/kg may help to identify people with diabetes who are over- or under-insulinised.

EUROPEAN JOURNAL OF ENDOCRINOLOGY

Insulin requirements decrease with age

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 Prescribing the right insulin dose for children and adolescents with type 1 diabetes is imperative for good blood glucose control; however, current guidelines on insulin dose ranges for patients are not definitive and do not consider factors such as age or sex.

2 This study aimed to define insulin dose percentiles for children and adolescents with type 1 diabetes, based on age, sex, body mass index and type of insulin delivery.

3 Patients included in this large cohort were children or adolescents who had type 1 diabetes for more than 2 years, (48% were female); insulin dose percentiles were determined by statistical analysis.

4 Statistical comparisons of insulin dose percentiles showed that overall, insulin dose increases from age 3 to age 13, and decreases by age 23; the highest insulin dose percentile was 0.94 units/kg in female patients aged 12 years and 0.92 units/kg in males aged 14 years.

5 Insulin dose percentiles were found to be significantly higher in patients receiving multiple insulin injection therapy, compared with continuous subcutaneous insulin infusion; overall, the association of insulin dose with age, gender and type of delivery was found to be significant ($P > 0.001$).

6 These results provide important insight into the factors influencing insulin dose requirements in different patient groups; the figures presented will also help identify patients who have unusually high or low insulin requirements.

Wiegand S, Raile K, Reinehr T et al (2008) Daily insulin requirement of children and adolescents with type 1 diabetes: effect of age, gender, body mass index and mode of therapy. *European Journal of Endocrinology* **158**: 543–9

DIABETIC MEDICINE

DTTPs are beneficial for adolescents

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 The Diabetes Teaching and Training Programme (DTTP) aims to help patients achieve a flexible approach to therapy and dietary freedom through effective self-management.

2 This study investigated the use of DTTP in adolescent patients; a

total of 1592 participants aged 12–24 attended a DTTP, which involved a 5-day course with a fixed curriculum of education and training, and an introduction to dietary freedom.

3 Success of the DTTP was measured by changes in HbA_{1c} levels, incidence of severe hypoglycaemia and severe ketoacidosis, all of which decreased after DTTP attendance, indicating that DTTP is beneficial for this patient group.

Sámán A, Lehmann T, Kloos C et al (2008) Flexible, intensive insulin therapy and dietary freedom in adolescents and young adults with type 1 diabetes: a prospective implementation study. *Diabetic Medicine* **25**: 592–6

Type 1 diabetes

DIABETIC MEDICINE

Parents and family dynamics affect glycaemic control in adolescents

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 This large, multi-national study aimed to assess the effect of family factors in adolescents with type 1 diabetes.

2 A total of 2062 adolescents (aged 11 to 18 years) and 1995 parents participated in this study; data were recorded on incidence of severe hypoglycaemic events, episodes of diabetic ketoacidosis, and type of insulin regimen followed by the patient.

3 Adolescent participants provided blood samples for HbA_{1c} measurement, and

completed the parental involvement scale section of the Diabetes Quality of Life for Youth-Short Form; both adolescents and parents completed the Diabetes Family Responsibility Questionnaire, and parents also completed the Parental Burden of Diabetes score.

4 Several factors were shown to affect metabolic outcomes, including parental cohabitation, parental employment, perception of parental over-involvement in diabetes care and disagreements between patient and parent regarding responsibility for diabetes care ($P < 0.001$ for all).

5 The family dynamic factors identified were found to be stronger predictors of metabolic control than other demographic factors, such as insulin, age, or treatment regimen.

6 However, these family factors do not account for the significant differences in metabolic outcomes observed between paediatric centres.

Cameron FJ, Skinner TC, de Beaufort CE et al (2008) Are family factors universally related to metabolic outcomes in adolescents with type 1 diabetes? *Diabetic Medicine* **25**: 463–68

DIABETES CARE

Fathers monitoring has effect on diabetes control

Readability	✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 This study investigated the levels of parental acceptance of diabetes care in adolescents, and aimed to identify the effect of parental monitoring on diabetes control.

2 A total of 185 adolescents (aged 10–14 years) and their parents (185 mothers and 145 fathers) participated in this study; parents

provided data regarding acceptance of diabetes and monitoring of diabetes care, and adolescents were evaluated for treatment adherence.

3 Overall, predictions of adherence to care were independently affected by both parents' acceptance of diabetes; monitoring by fathers, however, was the only factor that independently positively affected glycaemic control.

4 These results highlight the importance of encouraging acceptance and increased monitoring of diabetes care by fathers as an important part of the management of adolescents with type 1 diabetes.

Berg CA, Butler JM, Osborn P et al (2008) Role of parental monitoring in understanding the benefits of parental acceptance on adolescent adherence and metabolic control of type 1 diabetes. *Diabetes Care* **31**: 678–83

JOURNAL OF HEALTH PSYCHOLOGY

Body image affects eating attitude in adolescent girls

Readability	✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓

1 Adopting positive eating habits in adolescent females with type 1 diabetes is challenging; this study evaluated the association between

perceived body image on patient adherence to treatment and glycaemic control.

2 Analyses of data obtained from 75 females with diabetes and their mothers confirmed that negative perception of body image can lead to negative communication, eating attitudes and behaviours.

3 These effects were, however, negated by adherence to treatment; no participants supported the option to forgo insulin to improve body image.

Kichler JC, Foster C, Opari-Arrigan L (2008) the relationship between negative communication and body image dissatisfaction in adolescent females with type 1 diabetes mellitus. *Journal of Health Psychology* **13**: 336–47