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Longitudinal monitoring of pediatric insulin treatment in Germany and Austria: Age-dependent analysis of 63,967 children and adolescents with type 1 diabetes from the DPV registry

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Disclosure statement
The authors declare that they have no conflict of interest.

Conclusion

In all age-groups, treatment of type 1 diabetes was intensified over the last 20 years. Differences in age-groups were observed in the number of patients on insulin pumps, in the proportion with 4 or more injections per day, in the use of long-acting insulin analogues, and in the frequency of SMBG per day.

Background and Objective

Depending on age, needs and preferences in insulin therapy strongly differ between children and adolescents with type 1 diabetes. We therefore analyzed trends in insulin regimen and type of insulin used over the last two decades in three age-groups of pediatric patients with type 1 diabetes from Germany and Austria.

Methods

- Diabetes-Patients-Follow-up (DPV) database: Software for standardized, prospective documentation of diabetes care and outcome (www.d-p-v.eu) (**Fig. 1**).
- **63,967 subjects** (<18yr of age) with type 1 diabetes documented between 1995 and 2014. Patients were assigned to age-groups
  - 0.5-<6 years; n= 3,172 / 6-<12 years; n=13,601 / 12-<18 years; n=47,194
- Regression models were built for
  - ≥ 4 injection time points per day,
  - use of insulin pumps,
  - use of rapid- and long-acting insulin analogues,
  - frequency of self-monitoring of blood glucose (SMBG) per day.
- Confounders: sex, diabetes duration, and migration background.
- P-value for trend (SAS:9.4)
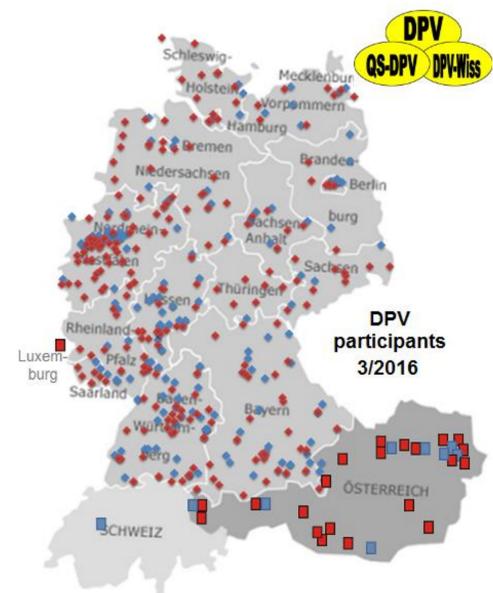
Results of regression models

- ≤ 3 injection time points/day decreased from 1995 to 2014 to <5% in all age-groups (p<0.0001).
- ≥ 4 injections/day increased until the early 2000s, and then decreased until 2014 (**Fig. 2a**).
- Pump use increased in all age-groups (p<0.0001), especially in patients <6yr (**Fig. 2b**).
- The use of rapid-acting insulin analogues increased in all age-groups (p<0.0001, respectively) accounting for 78.4% in 2014 for all subjects.
- The use of NPH insulin declined whereas the use of long-acting insulin analogues increased (all p<0.0001) which the latter were most frequently used in the oldest age-group (46%).
- Number of SMBG/day increased in all age-groups (all p<0.0001) with the highest frequency in the youngest children. After stratification by ICT (≥ 4 injections/day) or pump use, the highest frequency was still observed in patients <6yr. (**Fig. 3a/b**).

Fig. 1: DPV registry

a) 4 or more injection time points per day

b) pump use
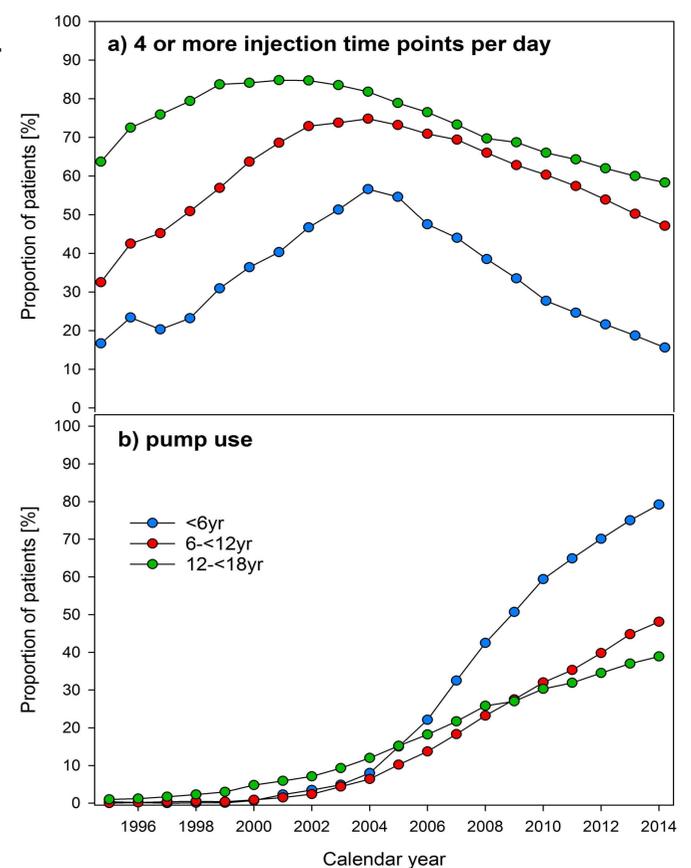
Fig. 2: Frequency of a) 4 or more injections per day, and b) use of insulin pumps in pediatric patients with type 1 diabetes, stratified by calendar year and age-groups. Data adjusted for sex, diabetes duration, and migratory background.

a) SMBG in subjects with ICT

b) SMBG in subjects with insulin pumps

<6yr
6-<12yr
12-<18yr
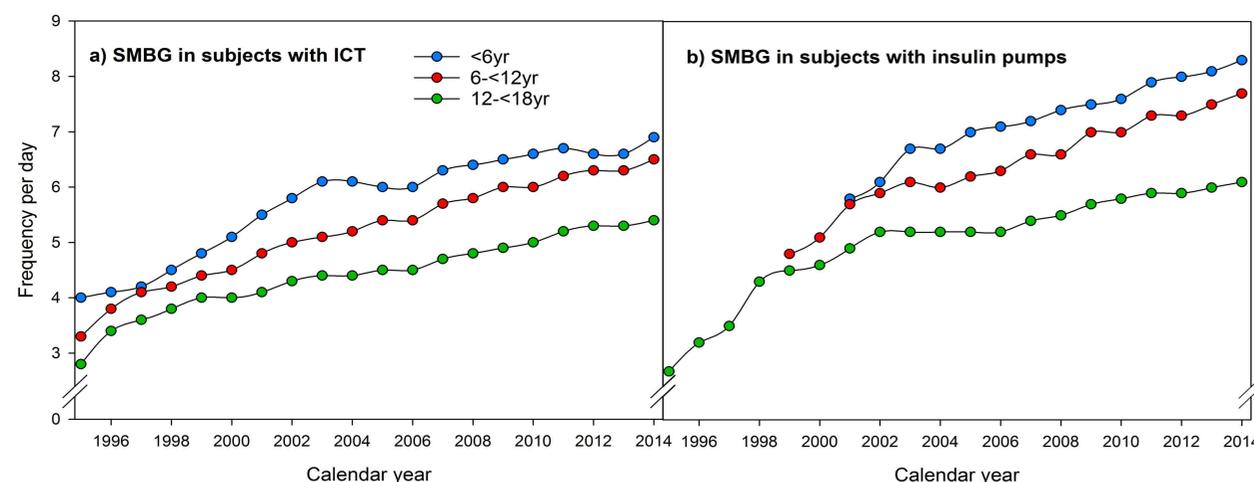
Fig. 3: Frequency of SMBG per day in a) subjects with ICT (≥ 4 injections/day), and b) subjects with insulin pumps, stratified by calendar year and age-groups. Data adjusted for sex, diabetes duration, and migratory background (data for small number of cases <20 are not shown).

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