Evolution and determinants of glycaemic control in children and adolescents with type 1 diabetes in Belgium: A 10-year period observational real-world study

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Since 2008 all Belgian paediatric diabetes centres (PDCs) participate to a biennial audit/feedback, allowing to monitor the quality of care given in PDCs and to describe clinical and demographic characteristics of young patients (≤18 years) with type 1 diabetes (T1D) on a national level. Here we present the evolution of the hemoglobin A1c (HbA1c) between 2008 and 2019 and investigate the determinants of HbA1c among children and adolescents with T1D.

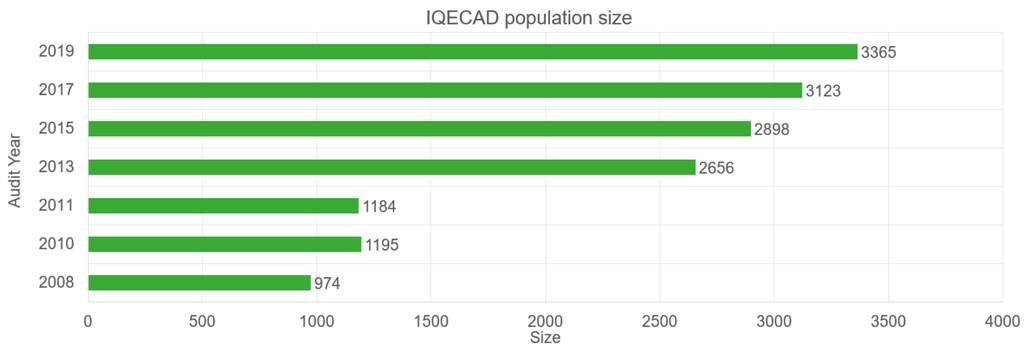
Methods

- Data were cross-sectionally collected between 2008 and 2019 from all Belgian PDCs (N=16). From 2013, 100% of the eligible patients were sampled while before 2013 this was only 50%.
- The evolution over time of HbA1c was investigated on a continuous scale with generalized estimating equations (GEE).
- The association of HbA1c with age, gender, diabetes duration, presence of nuclear family, parent ethnicity, presence of a communication problem with the medical team, and insulin regimen were studied using GEE and Tukey-Kramer tests, as was the presence of psycho-social distress in the 2019 dataset.

Results

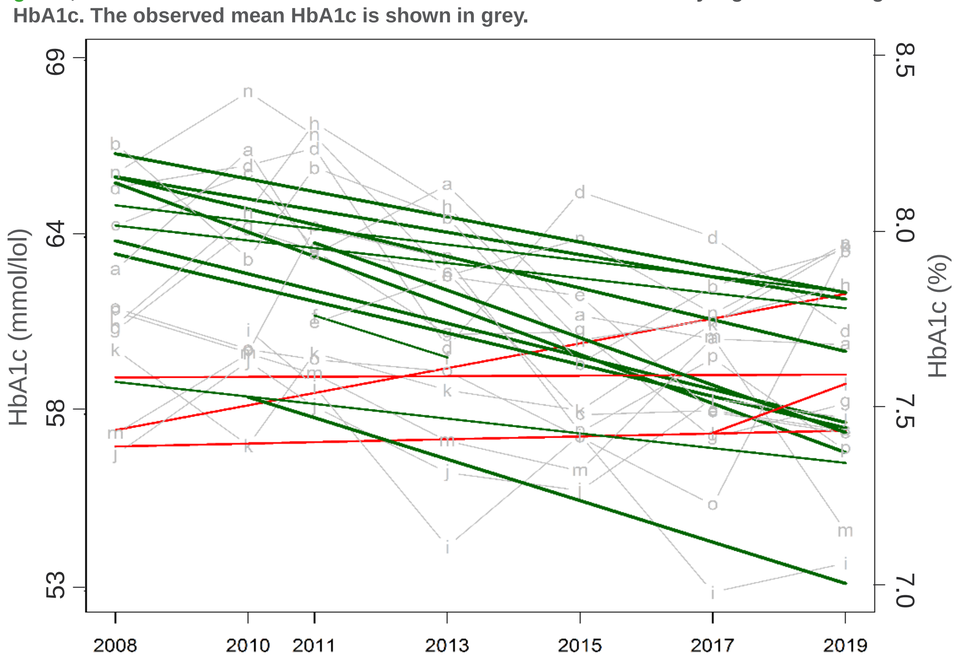
- The number of patients with T1D (1-18 years) varied from 1,948 in 2008 to 3,365 in 2019 (Fig. 1).

Fig. 1 Evolution of the IQECAD population size



- Linear decrease in HbA1c of 0.28±0.09 mmol/mol (0.03±0.01%) points per year on average: from 63 mmol/mol (7.9%) in 2008 to 60 mmol/mol (7.7%) in 2019 (P < 0.0001, adjusted for gender, age and diabetes duration) (Fig.2).

Fig. 2 Linear change of HbA1c for the 16 PDCs. PDCs with a decrease in mean HbA1c are depicted in green; those with an increase in red. Thicker lines indicate statistically significant changes in mean HbA1c. The observed mean HbA1c is shown in grey.



Conclusion

With a national mean HbA1c level of 59.6±1.1 mmol/mol (7.6±0.1%), Belgium has the 2nd best metabolic control in Europe among young people with DT1. Sweden has the first place with a mean HbA1c level of 59.6±1.0 mmol/mol (7.6±0.1%) while in US, the mean level is 70.5±1.1 mmol/mol (8.6±0.1%)[1,2].

In Belgium, glycaemic control among children and adolescents improved over the past 11 years. However several subgroups with specific demographic characteristics still have high HbA1c levels. These subgroups may have a higher risk for developing long-term complications and deserve particular attention.

In 2019, the oldest patients (16-18 years), patients with highest diabetes duration (>8.25 years), not living in a nuclear family, with two parents of non-Caucasian ethnicity (vs at least one parent of Caucasian ethnicity) (Fig.3) or having psychosocial distress had higher HbA1c compared to the other groups (P < 0.0001, adjusted for gender, age and diabetes duration) (Fig, 4). Presence of a communication problems was also associated with higher HbA1c, although less pronounced (P < 0.05, adjusted for gender, age and diabetes duration) (Fig.3).

Fig. 3 Linear change of HbA1c stratified by (a) Ages categories, (b) Family structure type, (c) Parent's ethnicity and (d) presence of communication problem.

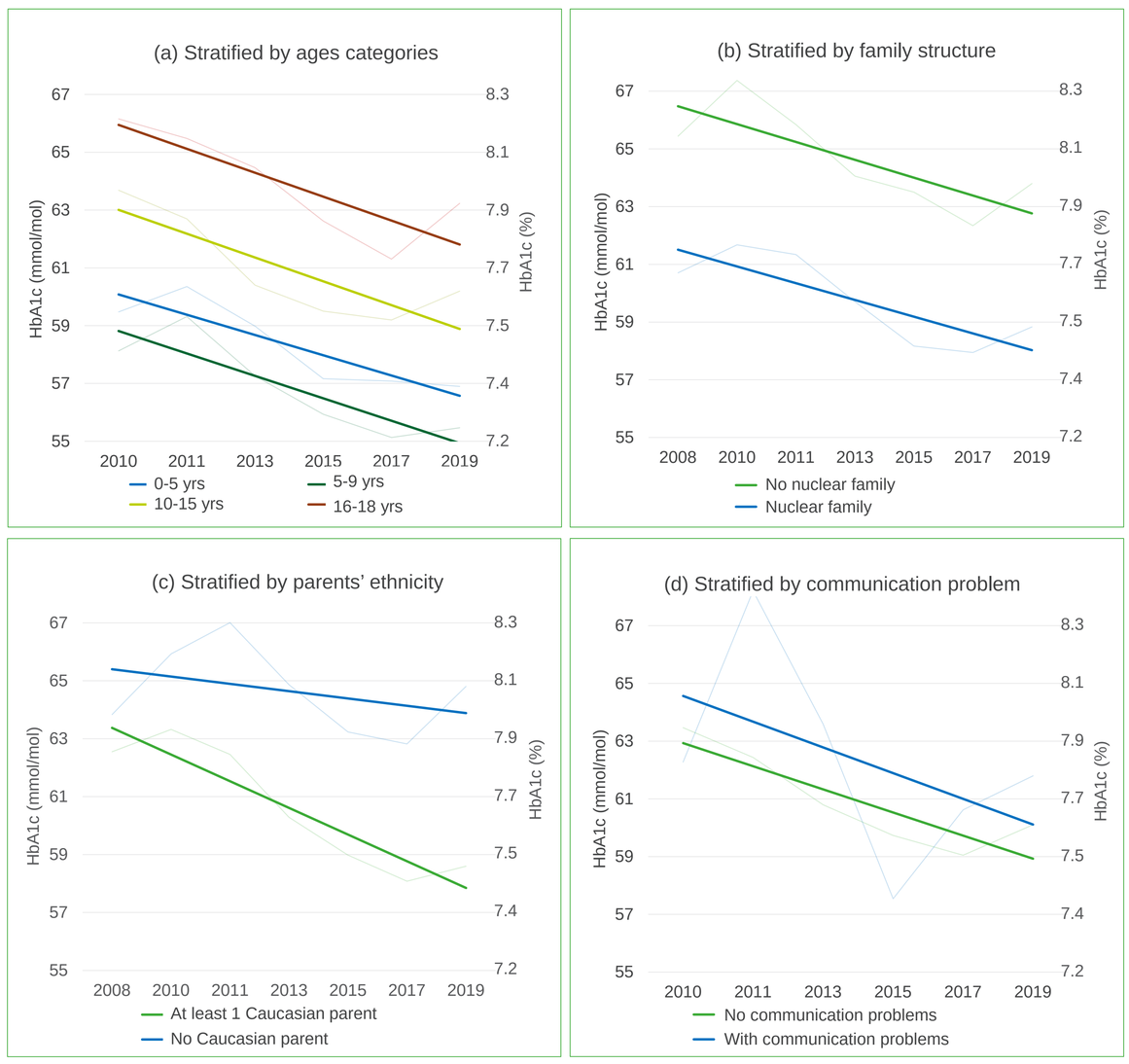
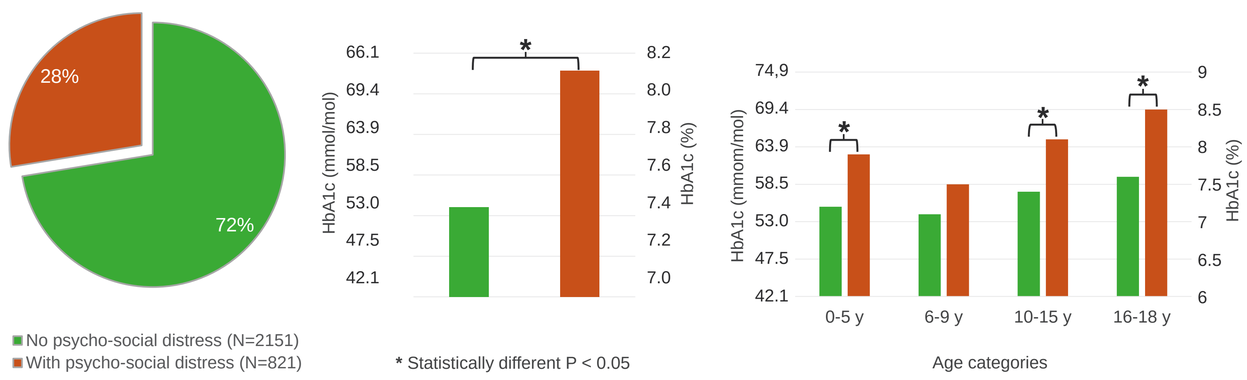


Fig. 4 Psychosocial distress (collected only in 2019)



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