Scope of epidemiology and daily practice in children with type 1 diabetes in the Netherlands

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CHAPTER 9

Summary
SUMMARY

Type 1 diabetes mellitus (T1DM) is one of the most common chronic diseases in childhood. This type of diabetes mellitus is characterized by insufficient and ultimately extinction of insulin production. Worldwide the average annual incidence of T1DM is still increasing and differs between countries. T1DM has a major impact on quality of life and daily functioning of the affected children and their family. The management of this disease poses substantial demands on the children and family, leading to work restrictions, extra costs not always covered by health insurance, anxiety and worries. The mainstay of T1DM treatment is the exogenous replacement of insulin. The most commonly used treatment strategies are multiple daily injections and continuous subcutaneous insulin infusion. Optimal self-management is crucial in the successful treatment of this disease, especially in adolescents. The management of T1DM is intensive and complex, and is associated with high costs. Patients with T1DM are more prone to develop other autoimmune diseases, most commonly autoimmune thyroid disease and coeliac disease.

After presenting a typical T1DM case, the introduction (first chapter) of this thesis discusses the definition, pathogenesis, prevalence/incidence and its seasonality, treatment goals and costs of T1DM. We also discuss problems related to treatment adherence in adolescents using an insulin pump.

In chapter 2, we update the incidence data for children with T1DM in the Netherlands. In this study, we found a remarkable increase in the incidence, from 11.1 per 100 000 inhabitants in 1978-80 to 21.3 per 100 000 in 2010-11. The incidence rate in children younger than 5 years of age appeared to have remained stable. There were no significant differences in these incidence rates between the sexes.

In the third chapter, we report the results of our study examining the seasonality of T1DM incidence in children between 2009 and 2011. The incidence rate was significantly higher in autumn and winter than in spring and summer. This applied to both boys and girls, and across different age categories, with one exception: in children aged 0-4 years, the incidence peak appeared in the summer and spring.

In chapter 4, we report the investigation of the prevalence of overt thyroid disease in children in the Netherlands with and without T1DM. Children with T1DM were found to be 24 times more likely to develop thyroid disease than their peers without diabetes. The prevalence of thyroid disease in Dutch children aged 0-14 years was 3.43% in children with T1DM, compared to 0.15 % in children without T1DM. Girls were more prone to having thyroid disease than boys, particularly in the case of hypothyroidism.
In chapter 5, the overall costs of treating T1DM in children with T1DM in the Netherlands are described. The average costs were € 8,326 per child per year between 2009 and 2011. The highest costs per patient were seen in the hospitals with the highest number of T1DM patients, probably reflecting more complex diabetes management in the hospitals with the largest patient populations. In the future, these costs are likely to increase further, because of the increasing availability of more device-intensive multidisciplinary care for these patients.

In chapter 6, we assess the effects on glycaemic control (HbA1c levels) of adherence to self-measurement of blood glucose (SMBG) and insulin boluses in adolescents on insulin pump therapy. Glycaemic control in these adolescents on insulin pump therapy was strongly dependent on adherence to SMBG and the application of insulin boluses, particularly around mealtimes. Adolescents who were able to bolus each mean meal were 7 times more likely to reach the target HbA1c levels of < 58 mmol/mol as compared to patients who were unable to do this.

In chapter 7, we evaluate the association of illness perceptions, emotional responses to the disease and its management, and patient characteristics, to the adherence to optimal insulin pump management. Age was the only factor associated with adherence: the older the adolescent, the poorer the adherence.

Chapter 8 provides a summary of the results of our studies and a general discussion of the main findings, including the studies’ strengths and limitations, and the implications for future care of T1DM in children.

Overall, the results in the studies presented in this thesis improve our knowledge of the rising incidence and seasonal variation of T1DM in children in the Netherlands, as well as its association with thyroid disease. In adolescents with T1DM on insulin pump therapy, the frequency of boluses and blood glucose measurements around main meals is strongly related to glycaemic control of T1DM. Unfortunately, adherence to these crucial interventions worsens with increasing age of the adolescent. These results highlight the need for ongoing involvement in the management of T1DM in adolescents by the parents and the health care team throughout adolescence.