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Title of project: Prevention and Treatment of Dermatological Complications Associated with Continuous Subcutaneous Insulin Infusion and/or Continuous Glucose Monitoring in Pediatric Patients with Type 1 Diabetes

ABSTRACT

The incidence of type 1 diabetes (T1D) is rising among pediatric patients, and more and more are using intensive device treatment to reach treatment targets and thereby reduce the risk of long-term complication. Unfortunately, the use of continuous subcutaneous insulin infusion (CSII or insulin pump) and continuous glucose monitoring (CGM or glucose sensor) are associated with a high frequency of dermatological complications as eczema, scars and wounds. About 60% of CSII-users and 46% of CGM-users had at least one visible site with dermatological complications. Having T1D as a child or teenager is a challenge in the everyday life, and the dermatological complications imposes an increased burden on them. Therefore, the aim of present PhD-project is to find risk factors for development and treatment-options for dermatological complications to CSII and/or CGM and prevent dermatological complications in pediatric patients with T1D using CSII or CGM. The clinical, medical PhD-project consists therefore of three studies within different research disciplines.

- The skin barrier study is a case-control study to explore the skin barrier in pediatric patients with T1D.
- The skin registry study is a retrospective cohort study using the Danish registries to investigate associations between T1D, treatment and dermatologic diagnoses.
- The prospective intervention study includes investigation of the development of dermatological complications in the first year of CSII- or CGM-use as well as the risk factors.

The results from present PhD-project will be very valuable both to pediatric patients with T1D but also to adults with T1D and other types of patients using devices in the skin as well in future for treatment or monitoring.

ABSTRAKT

Forekomsten af type 1 diabetes (T1D) er stigende hos børn og unge, og flere og flere vælger at bruge intensivt udstyr til behandling for at nå behandlingsmålet og dermed reducere risikoen for langtidskomplikationer. Desværre er brugen af insulinpumper og glukosesensorer associeret med en høj forekomst af dermatologiske komplikationer som eksem, ar og sår, hvor 60% af insulinpumpebrugerne og 46% af glukosesensorbrugerne aktuelt havde mindst et synligst sted med der-

matologiske komplikationer. At være barn eller ung med T1D er en udfordring i hverdagslivet, og de dermatologiske komplikationer øger byrden endnu mere. Derfor er målet med dette PhD-studie at identificere risikofaktorer og afprøve forskellige metoder til forebyggelse af dermatologiske komplikationer hos børn og unge med T1D, der bruger insulinpumpe eller glukosesensor samt at forebygge udviklingen af dermatologiske komplikationer hos børn og unge med T1D, der bruger insulinpumpe og/eller glukosesensor. Dette kliniske og medicinske PhD-studie består derfor af 3 studier med forskellige forskningsdiscipliner:

- Hudbarrierestudiet er et case-kontrolstudie, der skal undersøge hudbarrieren hos børn og unge med T1D.
- Hud-registerstudiet er et retrospektivt studie, der skal undersøge associationer mellem T1D, behandlingsmuligheder og hud-diagnoser ved hjælp af de danske registre.
- Det prospektive interventionsstudie indebærer undersøgelse af udviklingen af hudkomplikationer i det første års brug af insulinpumpe og/eller glukosesensor inkl. risikofaktorer.

Resultaterne fra dette PhD-projekt vil være meget værdifuld for både børn og unge med T1D, men også for voksne patienter med T1D samt andre typer af patienter, der har brug for medicinsk udstyr der penetrerer eller fæstnes til huden for behandling og monitorering.