Popular science summary of the PhD thesis

PhD student
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Title of the PhD thesis
An Adaptive Model-Based Approach to Personalized Basal Insulin Initiation in Type 2 Diabetes

PhD school/Department
DTU Compute/Dynamical Systems

Science summary

Type 2 diabetes is a growing global problem, with prevalence of 425 million today and predicted to grow by more than 40% in the next 25 years. The estimated cost of diabetes was 12% of the global health expenditure in 2017. Despite the advancement of medication in recent years, and promising results in clinical trials, more than 60% of people treated with insulin do not reach recommended treatment outcomes. Dosing is highly individual, and insulin initiation is therefore complex and resource consuming. The primary reason for the discrepancy in outcomes is low adherence to treatment, caused by the complexity of the treatment, a lack of perceived need for medication, and fear of hypoglycemia.

Personalized medicine, artificial intelligence, and devices supporting digital health are rapidly emerging. To address the need for support to improve glycemic outcomes, we developed and tested the feasibility of a novel concept for insulin initiation. We leverage data from diabetes management devices early in insulin treatment to model dose-response and estimate the dose a patient needs to reach the glycemic target. The estimated dose provides input to an adaptive personalized dose guidance algorithm, which minimizes risk of hypoglycemia through an adaptive glycemic target.

Our clinical study and simulation results indicate that the proposed approach is clinically feasible and can improve glycemic outcomes, even during low adherence. We expect that in a real-world setting, the solution has the potential to improve patients’ perceived need for insulin, reduce fear of hypoglycemia, and simplify the treatment, to eventually improve adherence and glycemic outcomes.

Please email the summary to the PhD secretary at the department