Insulin pump therapy (CSII) offers the best chances for achieving optimal glycemic control. Many technological features can be used to adapt the insulin therapy to patients' daily life and achieve a more refined control of basal and bolus insulin need. However, it remains unclear how often these technological features are used as many patients do not achieve better glycemic control. Patients should be informed and educated about new technologies as well as technological features of insulin pumps that can help them to effectively use these features and how to integrate these features in their daily routine.

The usage of the following insulin pump features was assessed at baseline and follow-up on a 5-point scale (0: not at all – 1: 1-3 per month – 2: once a week – 3: several times a week – 4: daily). Using temporary basal rates and using an analysis software to interpret glucose and pump data more often or to determine the bolus insulin dose reflected an increase in using these features as calculated as “follow-up – baseline” so that negative values represent a decrease in A1c ergo worse glycemic control. Patients who started using FGM with an insulin pump (either starting or continuously using FGM) was associated with improving glycemic control. In summary, patients should receive specific diabetes education programs for CSII-therapy in order to learn how to use these features and achieve better glycemic control.

# INTRODUCTION
Insulin pump therapy (CSII) offers the best chances for achieving optimal glycemic control. Many technological features can be used to adapt the insulin therapy to patients’ daily life and achieve a more refined control of basal and bolus insulin need. However, it remains unclear how often these technological features are used as many patients with CSII-therapy struggle to achieve better glycemic control. In this study, we analyzed how often various features of insulin pumps were used and whether a change in the usage of these features was associated with an improvement in glycemic control.

# METHODS
197 patients with CSII treatment were analyzed at baseline and 12 weeks later (Table 1). At all three measurements the assessed in the same central laboratory. The usage of the following insulin pump features was assessed at baseline and follow-up on a 5-point scale (0: not at all – 1: 1-3 per month – 2: once a week – 3: several times a week – 4: daily).

- Using temporary basal rates
- Using various bolus options (e.g. multi-wave)
- Using different basal profiles (e.g. for the weekend)
- Using a bolus calculator to determine the bolus insulin dose
- Using an analysis software to interpret glucose and pump data

## Linear regression analysis

The change in using these features were included as independent variables.

- Using temporary basal rates
- Using bolus calculator
- Using analysis software

## Sample Characteristics

Table 1: Sample Characteristics

- **Age (in years)**
  - Mean: 42.2 ± 14.9
  - Range: 18-85

- **Gender**
  - Male: 55 (37.6%)
  - Female: 81 (54.5%)

- **BMI (kg/m²)**
  - Mean: 28.0 ± 5.8

- **Duration of diabetes (in years)**
  - Mean: 16.8 ± 11.9

- **Duration of CSII (in years)**
  - Mean: 6.8 ± 4.5

- **Glycemic Control (in mmol/L)**
  - Mean: 7.4 ± 2.8

- **A1c (in %)**
  - Mean: 8.3 ± 0.9

- **Change in A1c (in %)**
  - Mean: -0.23 ± 0.16

## Change in Usage of Pump Features

-永远 basal rates
- Using bolus calculator
- Using analysis software

### RESULTS

The study cohort had a long history of diabetes and were performing CSII therapy for almost 10 years (± 9.6). Almost all of them had taken part in a structured diabetes education and the mean number of education courses they participated was 4.5 (± 1.3). 11% have used a CGM and 31% have used a FGM in the 6 months prior to baseline. Glycemic control was suboptimal with a mean A1C of 8.3% (± 0.9). Usage of pump features at baseline (Table 3):

- Whereas nearly 74% of the sample have used temporary basal rates at least once a month, 75% have never used different basal profiles.
- Bolus options were only used several times a week by 38% of the sample.
- Interstitially, bolus calculators were used quite frequently with 60% of the sample reporting that they have used bolus calculators daily.
- Only 68% of the sample have never used an analysis software to read out their pump and/or glucose data, while only 1% used this several times a week.
- 80% never paired a CGM device with their pump.

### Change in the Usage of Pump Features and Corresponding Change in A1c

A1c. The greatest predictors of improvement in A1c was an increased pairing of a CGM device with their insulin pump (β = -0.23; p = .002).

The usage of temporary basal rates, using bolus calculator, and using an analysis software were significantly associated with an improvement in A1c (β = -0.16; p = .027) and (β = -0.16; p = .025) respectively. The strongest predictors of improvement in A1c was an increased pairing of a CGM device with their insulin pump (β = -0.23; p = .002).

### Associations of change in the usage of pump features with change in A1c

- A1c (in %)
  - Mean: 8.3 ± 0.9
- Change in A1c (in %)
  - Mean: -0.23 ± 0.16

### Change in Usage of Pump Features

- Different basal rate profiles
- Bolus options
- Using temporary basal rates
- Using bolus calculator
- Using analysis software

### Discussion

The results showed that patients did not fully utilize the features that modern CSII therapy offers. However, an increased usage of temporary basal rates, using analysis software to interpret glucose and pump data were more often, and using CGM to control the pump was associated with achieving better glycemic control. Patients should receive specific diabetes education programs for CSII-therapy in order to learn how to effectively use these features and how to integrate these features in their daily routine.