Association between comorbidity burden and glycaemic profiles in adults with Type 1 diabetes using Hybrid closed-loop systems

**Background:**
This study aimed to assess the association between Charlson Comorbidity Index (CCI) and baseline continuous glucose monitoring (CGM) metrics in adults with T1D

**Methods:**
We analysed data from 158 adults with T1D initiating HCL therapy across three centres in regional and metropolitan Queensland. The Charlson Comorbidity Index was calculated using documented comorbidities (e.g., heart failure, stroke, COPD, CKD, and ischaemic heart disease). Baseline CGM metrics included time in range (TIR; 3.9–10 mmol/L), time <3.9 mmol/L, time <3.0 mmol/L, time >10.1 mmol/L, time >13.9 mmol/L, and glycaemic variability (coefficient of variation, CV). Spearman correlation and non-parametric tests were used to assess associations.

**Results:**
The CCI ranged from 0 to 4, with 89% of participants scoring 1. A significant positive correlation was observed between CCI and time spent <3.0 mmol/L (ρ = 0.26, *p* = 0.003), suggesting that individuals with greater comorbidity burden experienced more severe hypoglycaemia. No significant associations were found between CCI and overall time in range (ρ = –0.03, *p* = 0.70) or hyperglycaemia-related metrics (e.g., time >13.9 mmol/L, *p* = 0.67).

**Conclusion:**
Higher comorbidity burden in adults with T1D is associated with increased risk of severe hypoglycaemia, but not with time in target or hyperglycaemic ranges. These findings highlight the importance of individualised risk assessment and comorbidity management when optimising closed-loop insulin delivery systems.