**Title:** Real-world evaluation of hybrid closed-loop therapy in type 1 diabetes: a

multicentre study across regional and metropolitan Queensland, Australia

**Aim/Background:** Hybrid closed-loop (HCL) insulin delivery systems, which integrate continuous glucose monitoring (CGM) with automated insulin dosing, have emerged as a transformative therapy. However, real-world data on HCL effectiveness, particularly in regional Australia, remain limited. This study therefore aims to provide novel insight into the real-world outcomes of HCL insulin therapy across regional and metropolitan Australian communities.

**Methods:** We conducted a retrospective audit across three Australian hospital sites - Logan

(metropolitan), Mackay, and Townsville (regional) to evaluate the impact of HCL therapy in

adults with Type 1 Diabetes Mellitus (T1DM). Data on demographics, comorbidities, CGM

metrics, and clinical outcomes were extracted from medical records and device platforms. The primary outcome was change in HbA1c and CGM time-in-range (TIR; 3.9–10 mmol/L) at follow-up. Secondary outcomes included changes in body weight, glycaemic variability, and predictors of HbA1c reduction.

**Results:** The study consisted of 158 people living with T1DM who were initiated on HCL therapy. Following HCL initiation, mean TIR improved from 53.4% to 70.0% (p < 0.0001), and time in hyperglycaemia (>13.9 mmol/L) declined from 18.7% to 8.4% (p < 0.0001). The mean HbA1c significantly decreased from 8.62% (1.70) at baseline to 7.34% (1.31) at follow-up across the entire study cohort (p < 0.0001), with 42.7% achieving <7% and 64.1% achieving <7.5% at follow-up. Multivariable regression identified higher baseline HbA1c (P<0.0001) as the sole significant predictor of HbA1c reduction. Improvements were consistent across HCL-pump types and geographical settings.

**Conclusion:** HCL therapy significantly improves glycaemic control in adults with T1DM in

both regional and metropolitan Australia. Our findings support the real-world efficacy of HCL

systems and highlight their potential to bridge care gaps across diverse settings.