

SHARING OUR EXPERIENCE: ONBOARDING A TEENAGER WITH HIGH HBA1C TO HCL INSULIN PUMP THERAPY



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Clinical case

Our experience: ULA insulin with HCL

Compare with Our High HbA1C data

Amelia (not the child's real name) Now 17 years old

- 12 yrs
- Abscess
- Osmotic symptoms
 - » Hyperglycaemia with ketonemia
 - » Blood gas – no DKA
 - » Diagnosed to have type 1 Diabetes
 - » Immediate surgical management followed by SC insulin with diabetes education

- At diagnosis mom, dad and 3 brothers
- COVID
- Single parent (father)- type 1 diabetes
- Grandma- A retired nurse

CHALLENGES

- Diabetes

- Missing insulin
- Engagement
- WNB
- Lipohypertrophy
- CGM no readings or alarms off

- Empowerment vs Supervision

- Refused elective admissions

Jan 20	Diagnosis		Oct, Nov, Dec 21	WNB	
April 20	WNB- Tel		April 22	CIN Nan Missing insulin Lipohypertrophy	
June 20	Tel		July 22	Libre 16% in target Fear of Hypo	
Aug 20	WNB- Tel		Oct 22- Jan 23	Planned ward admission	
Oct 20	Libre 2		Jan 23- Dec 23	WNB/ Missing insulin, Libre on and off – alarms off; Dexcom Youth-worker support	
Jan 21	Annual rv No Libre download		Jan to Dec 24	Tired, keen on HCL, Dexcom	
Mar 21	WNB		Feb 25	HCL start with Tresiba	
May 21 July 21	School attendance 30% With Nan		May 25	Hurray!	

18.1

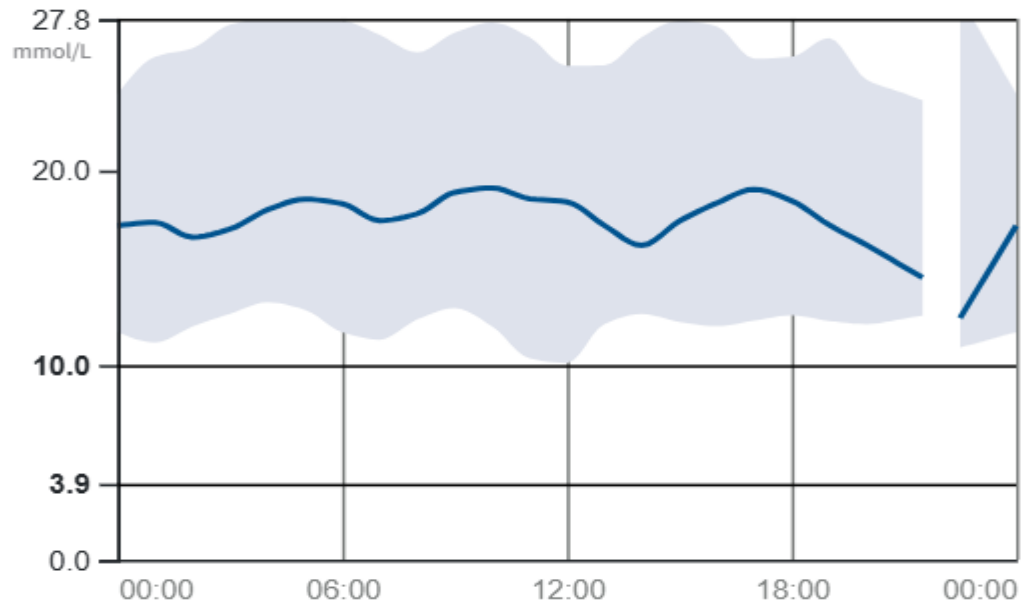
mmol/L
Average Glucose

100%

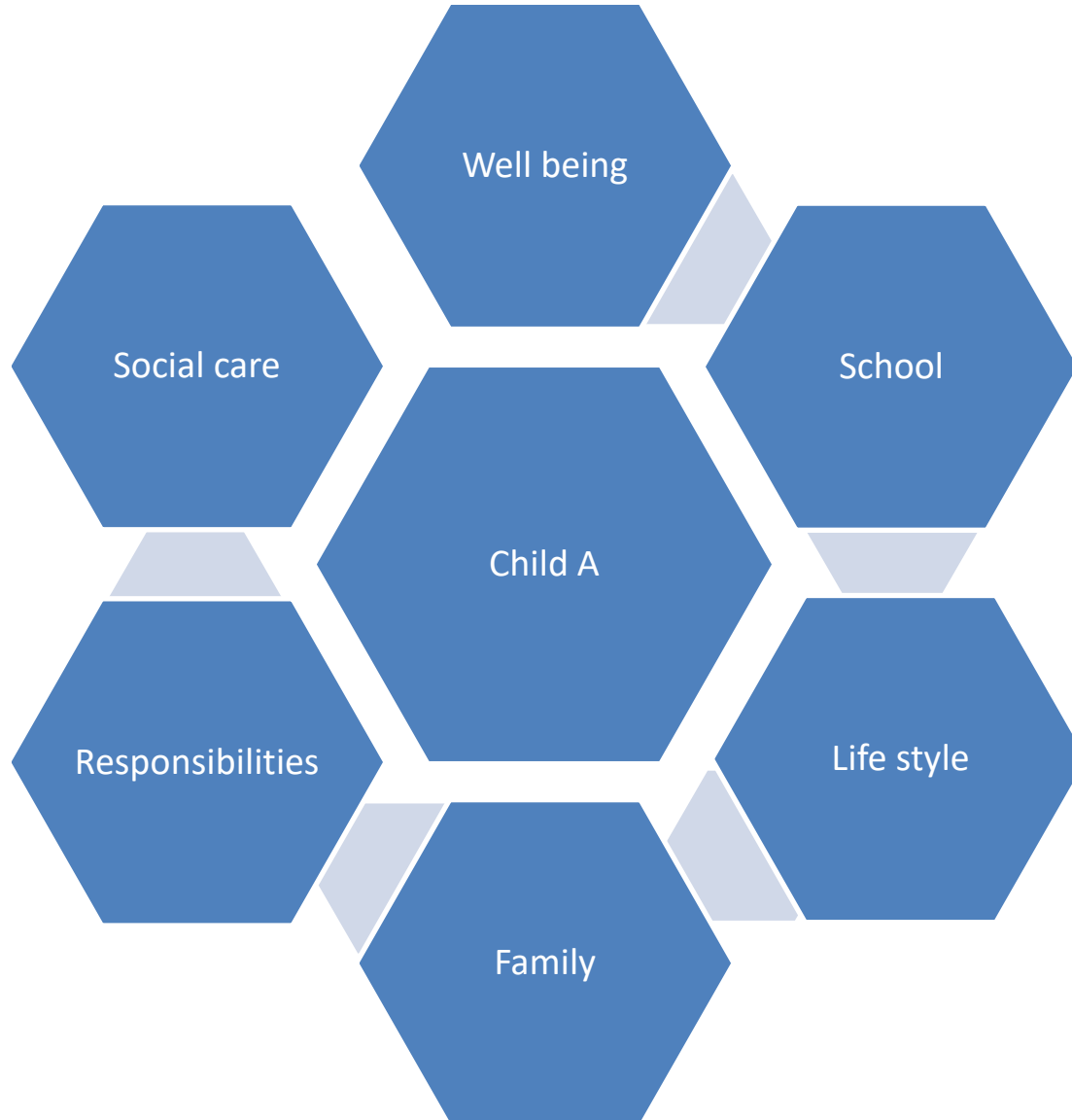
Days of Data

0

Hypo events

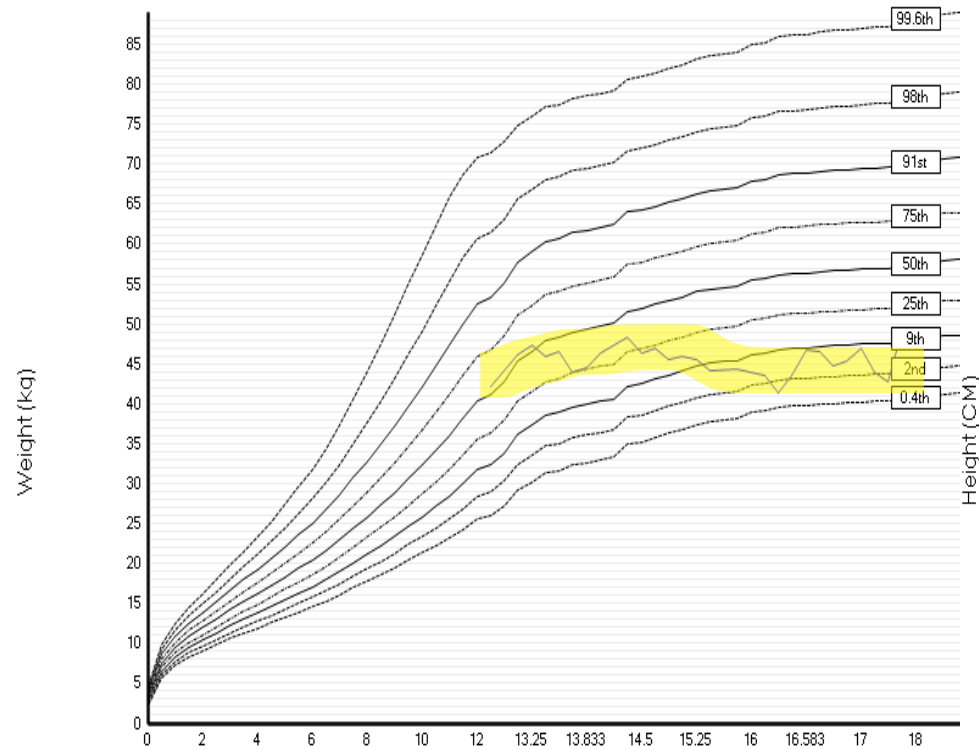


Challenges Beyond Diabetes



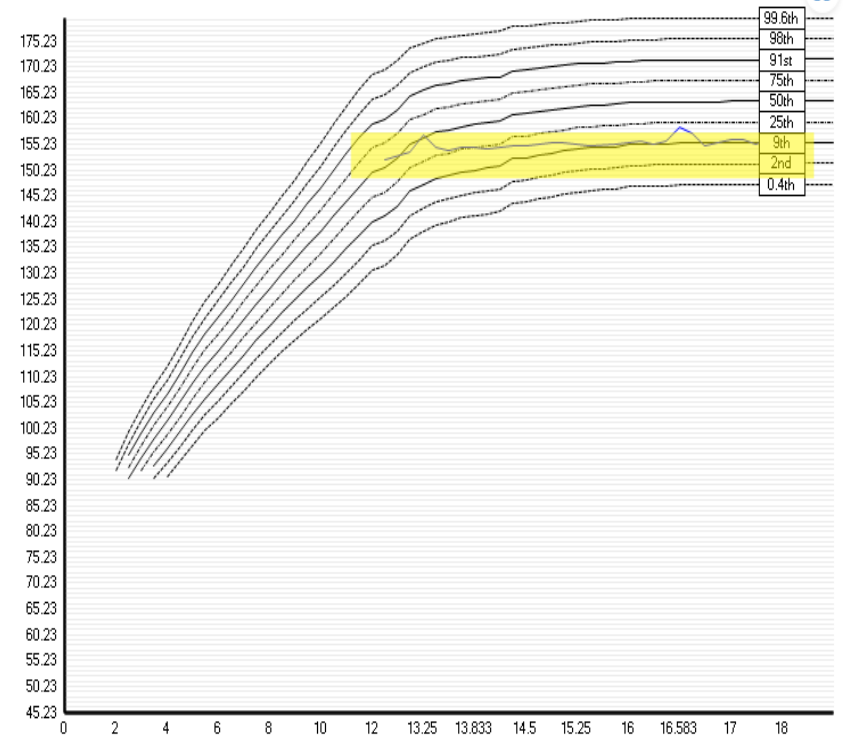
Growth Charts

Weight Chart



Age

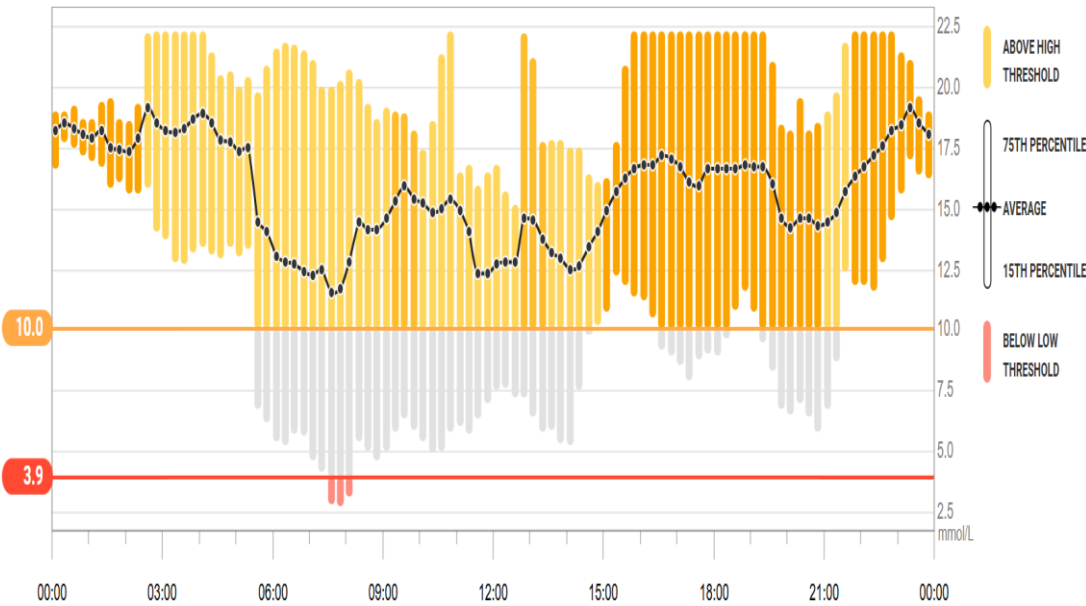
Height Chart



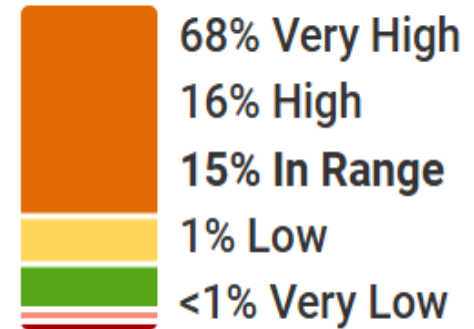
CHANGE

- Ward admission
- Youth Worker
- HCL

This graph shows your data averaged over 21 days



Time in Range



Target Range:
3.9-10.0 mmol/L

Decision

- NICE TA 943
- Local Onboarding Criteria
- Team agreement

Impact of HCL On Patients

NPDA data

Southampton systematic review

National Paediatric Diabetes Audit (NPDA) 2025 Report on Care and Outcomes 2023/24

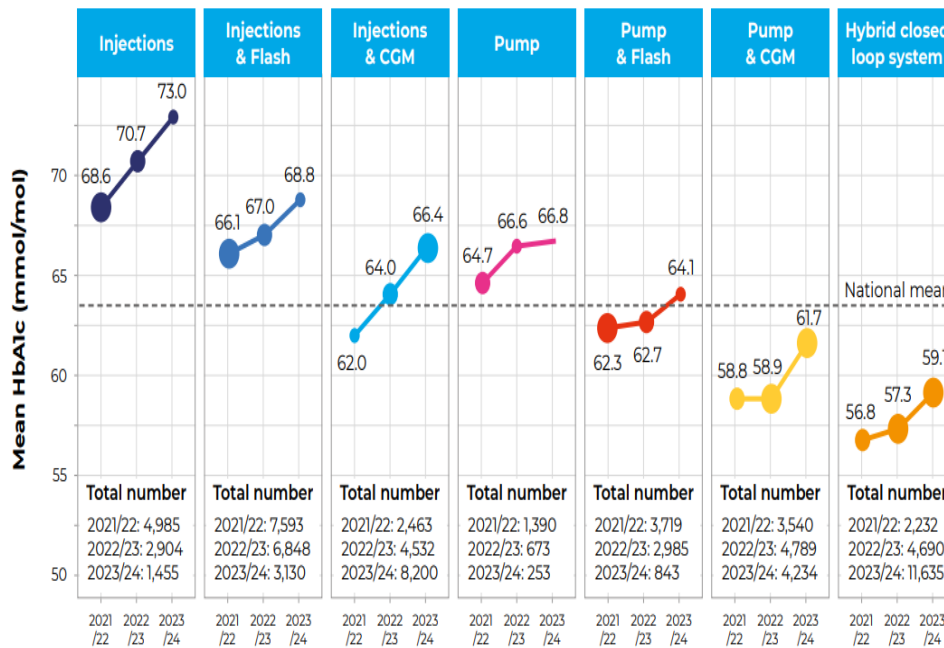
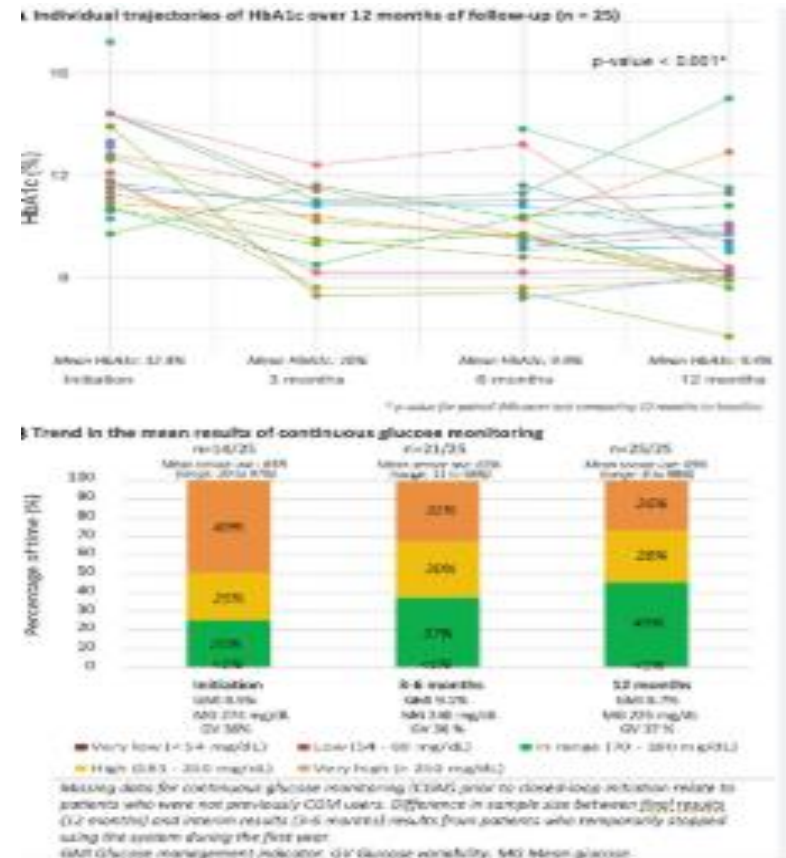


Figure 8: Mean HbA1c for children and young people with Type 1 diabetes using different combinations of treatment regimen and glucose monitoring in 2021/22 - 2023/24. Circle size represents the number of children and young people.



NHS Pilot Adult study- HCL impact on patients with High HbA1C

- Baseline HbA1C 79 mmol/mol (9.4%)
- Decrease of HbA1C of 16.2 mmol/mol with HCL

Do No More Harm

- Status Quo

Complications

- Cautious step
- Added ultralong acting insulin

LIMITED EVIDENCE

- Individual patient data
 - Often had Tresiba with no meal-time insulin
 - No admissions with DKA or significant hypos
 - **Low carbohydrate diet by choice**

- Soyster, N., Brewer, L. and Scott, M. (2024) '465 - Successful treatment of a patient with type II diabetes mellitus and familial partial lipodystrophy with glucagon-like peptide-1 agonist, hybrid closed loop pump system, and off label use of subcutaneous daily degludec due to high total daily dose of insulin', *The American Journal of the Medical Sciences*, 367(Supplement 1), pp. S279–S280. doi:10.1016/S0002-9629(24)00518-4.

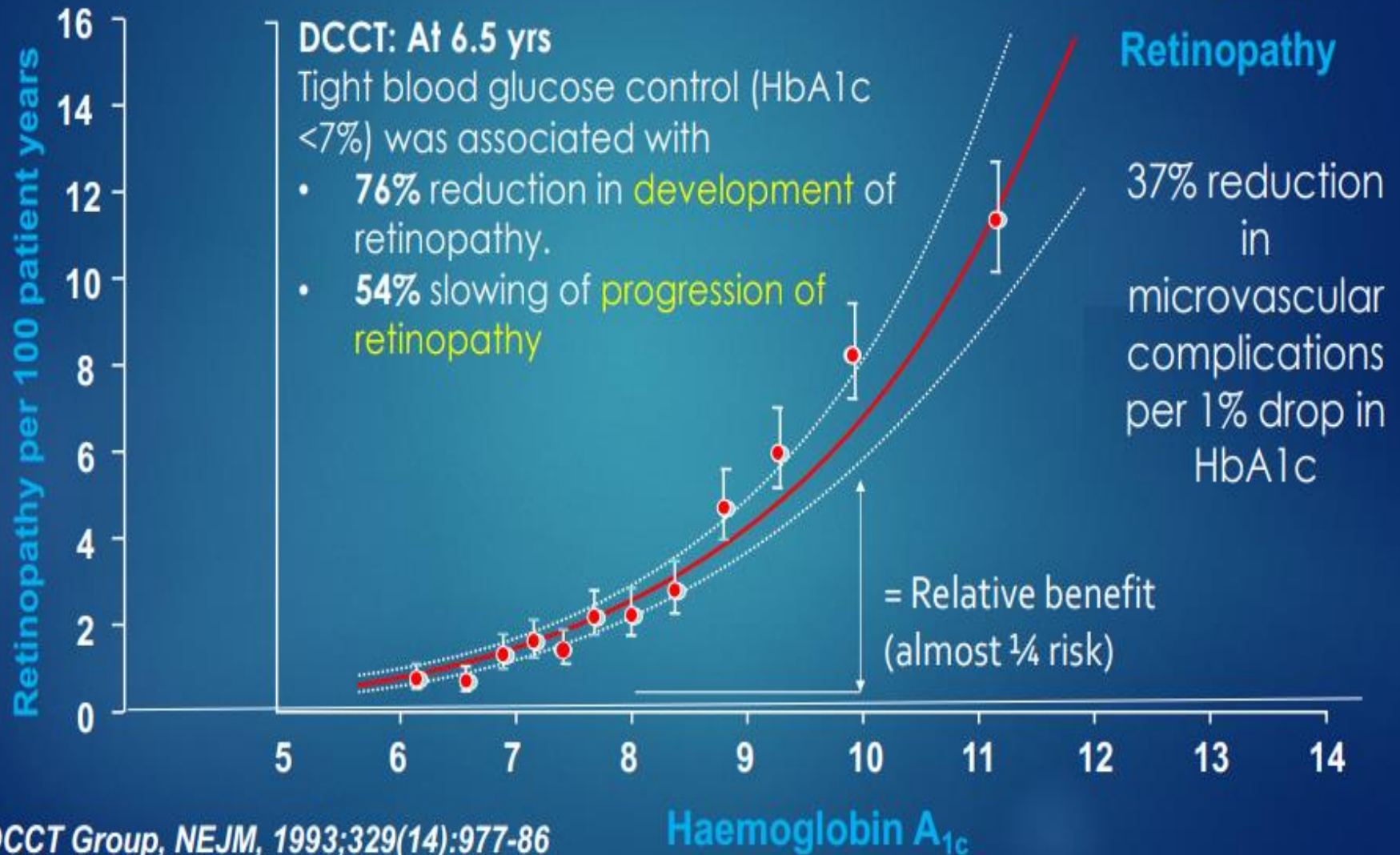
Long acting insulin with HCL

- Insulin of choice
- Dose calculation
- Timing
- How long?
- Weaning plan

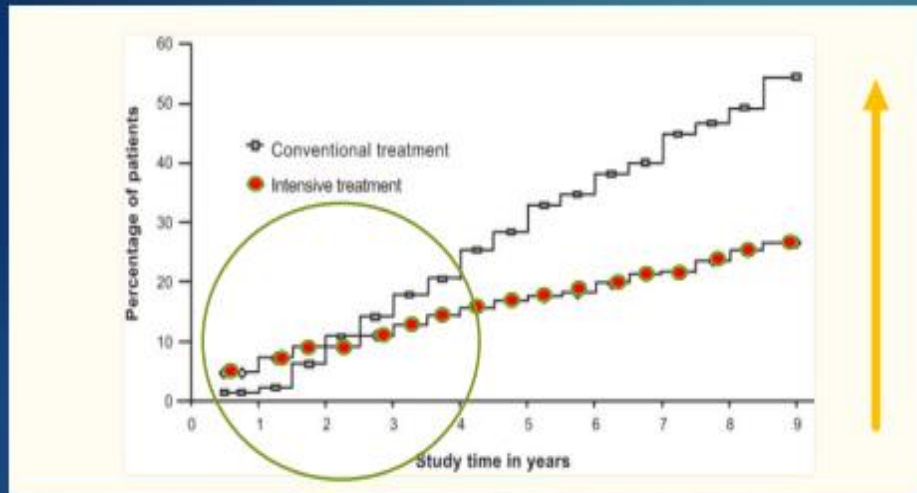
Challenges – Targets

- HbA1C
- Range of target blood glucose on rtCGM
- Percentage of the time in range
- Target blood glucose setting on pump
 - Symptoms
 - Microvascular complications
- Correction TBG

Glycaemic Control (DCCT & UKPDS)



Paradoxical worsening of DR with sudden drop in glucose level : A Double-Edged Sword



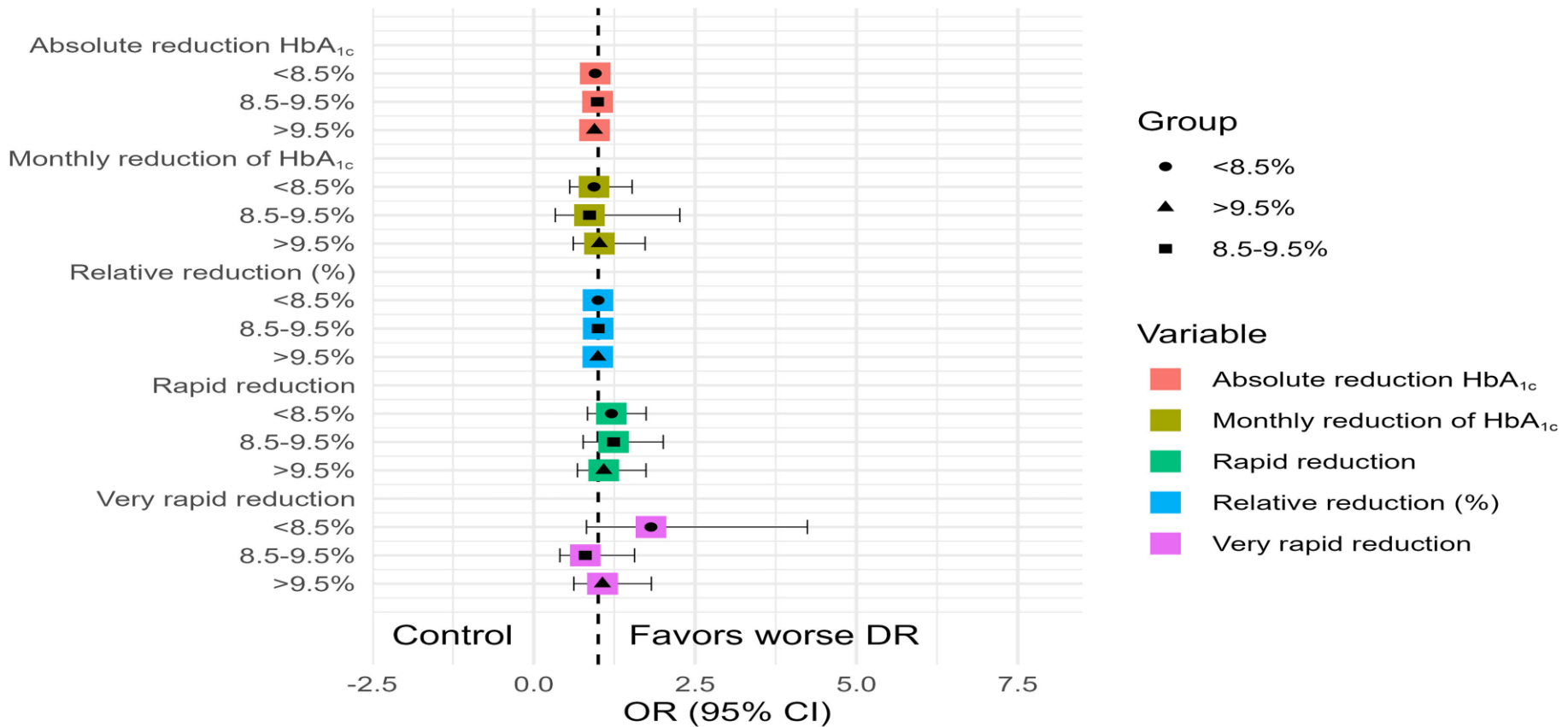
Cumulative incidence of DR progression in the secondary intervention group (those with mild DR at baseline).

- The DCCT trial showed early worsening of retinopathy in some patients after sudden drop in HbA1c in type 1 patients.
- Early worsening of DR was found in 13.1% of people on intensive insulin therapy and 7.6% of those on conventional insulin therapy.
- A drop in HbA1c of 1.5% over 3 months or 2% over 6 months) can be associated with early progression of pre-existing DR.
- Still did better in the long term (up to 18 yrs) ^{1,3}
- Worse if baseline HbA1c higher, greater drop, duration of diabetes higher, baseline level of DR₁.
- May occur in pregnancy/ post bariatric surgery ^{2,3}
- Stabilised after 18 months ^{1,3}

References 1) Aiello LP. Diabetic retinopathy and other ocular findings in the diabetes control and complications trial/epidemiology of diabetes interventions and complications study. *Diabetes Care*. 2014;37:17-23 2) Bain SC, Klufas MA, Ho A, Matthews DR. Worsening of diabetic retinopathy with rapid improvement in systemic glucose control: A review. *Diabetes Obes Metab*. 2019 Mar;21(3):454-466 3) Akil H et al. *Diabetes Ther* (2022) 13:1-23 Early Worsening of Retinopathy in Type 1 and Type 2 Diabetes After Rapid Improvement in Glycaemic Control: A Systematic Review

Diabetes Care. 2023;46(9):1633-1639. doi:10.2337/dc22-2521

Forest plot of odds ratios* and confidence interval (95%)
Subgroup analysis



* Odds ratios adjusted by model 4

Forest plot of ORs for EWDR taking into account the baseline level (9.5%) and the indicators of HbA_{1c} reduction.

HCL Pump start with rtCGM

- Pt choice Omnipod 5

Degludec

Individualised goals

Intense support

AGP

Average glucose

10.4 mmol/L

GMI

7.8 %

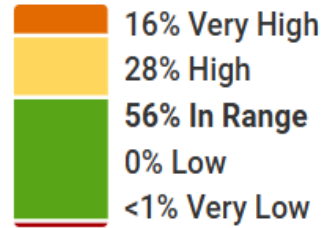
Standard deviation

3.2 mmol/L

Coefficient of Variation

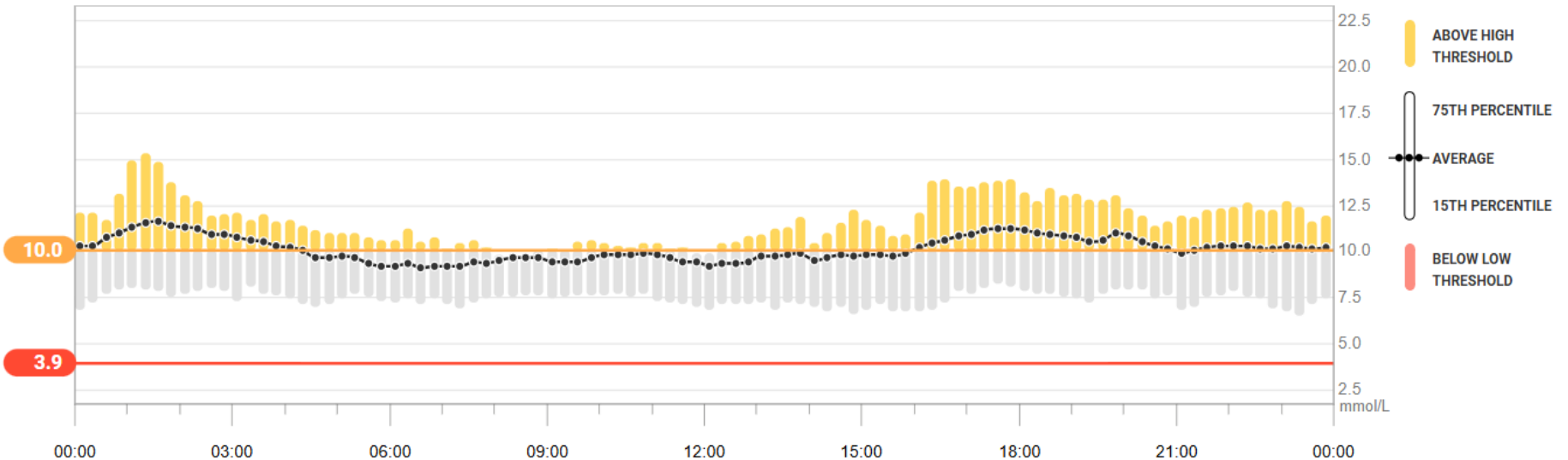
31.0 %

Time in Range



Target Range:
3.9-10.0 mmol/L

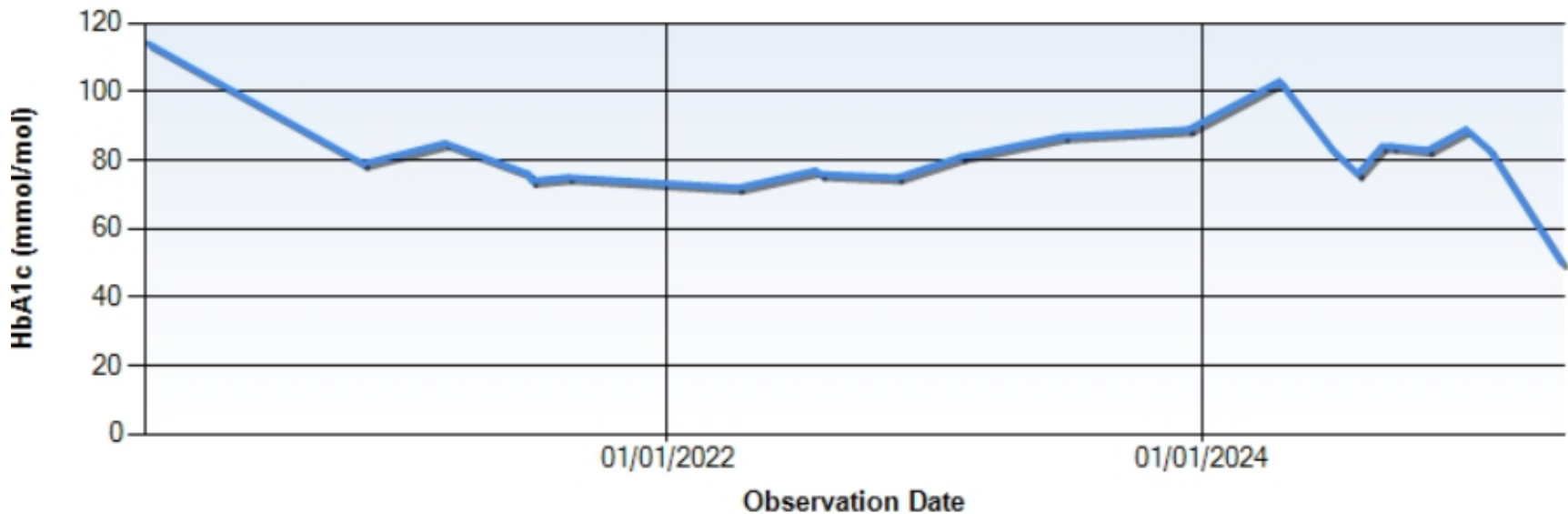
This graph shows your data averaged over 14 days



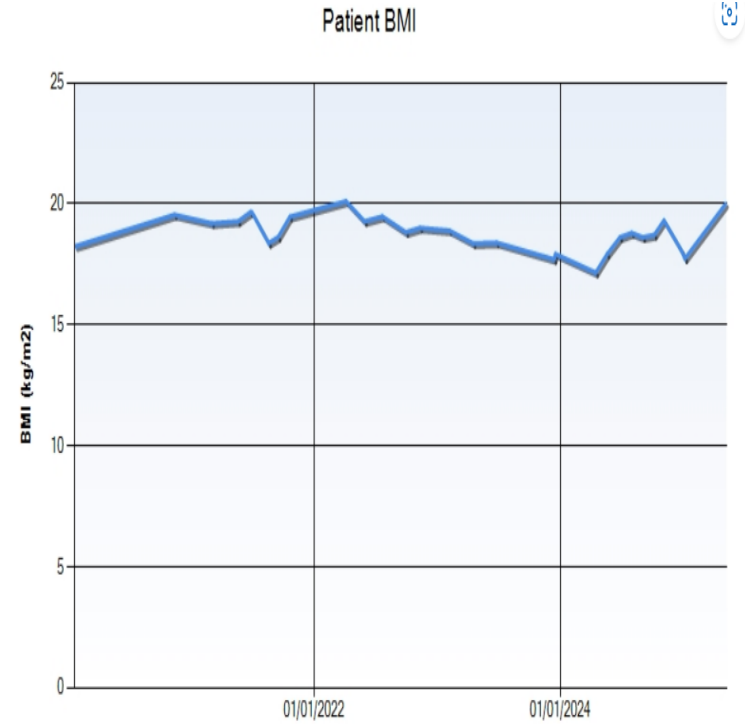
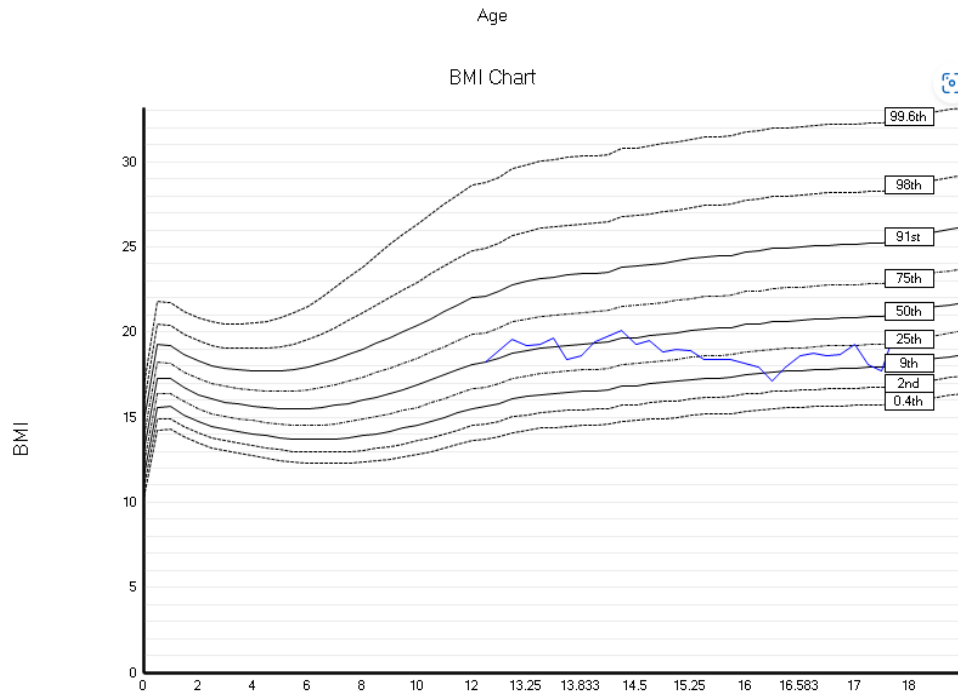
HbA1c trend over time

Current 52 mmol/mol (7.2%)

Patient HbA1c (IFCC)



BMI Centile chart



Quality of Life

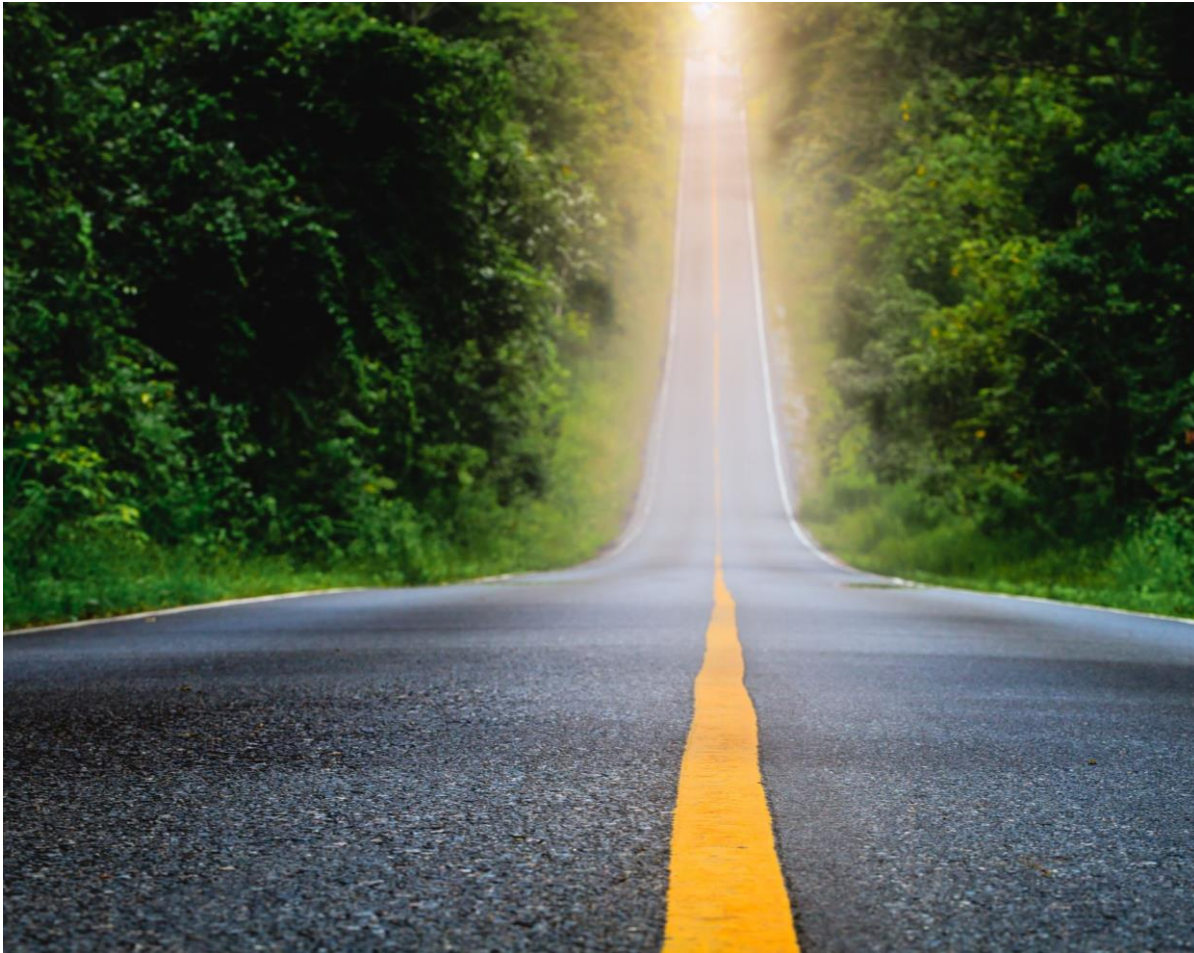
Wallander JL, Schmitt M, Koot HM. Quality of life measurement in children and adolescents: issues, instruments, and applications. J Clin Psychol. 2001; 57:571–85. doi: 10.1002/jclp.1029.

- treatment satisfaction,
- Family relationships,
- self-efficacy,
- lifestyle flexibility,
- anxiety, fears of glucose fluctuations,
- fear of diabetes complications, and
- treatment expectations.

'A' as a young person

- Very Happy
- More motivated
- Self caring
- Outlook towards T1D and life improved
- More engaged family
- Better BG control
- 'Best HbA1C I ever had'
- Alarm to switch back from manual mode

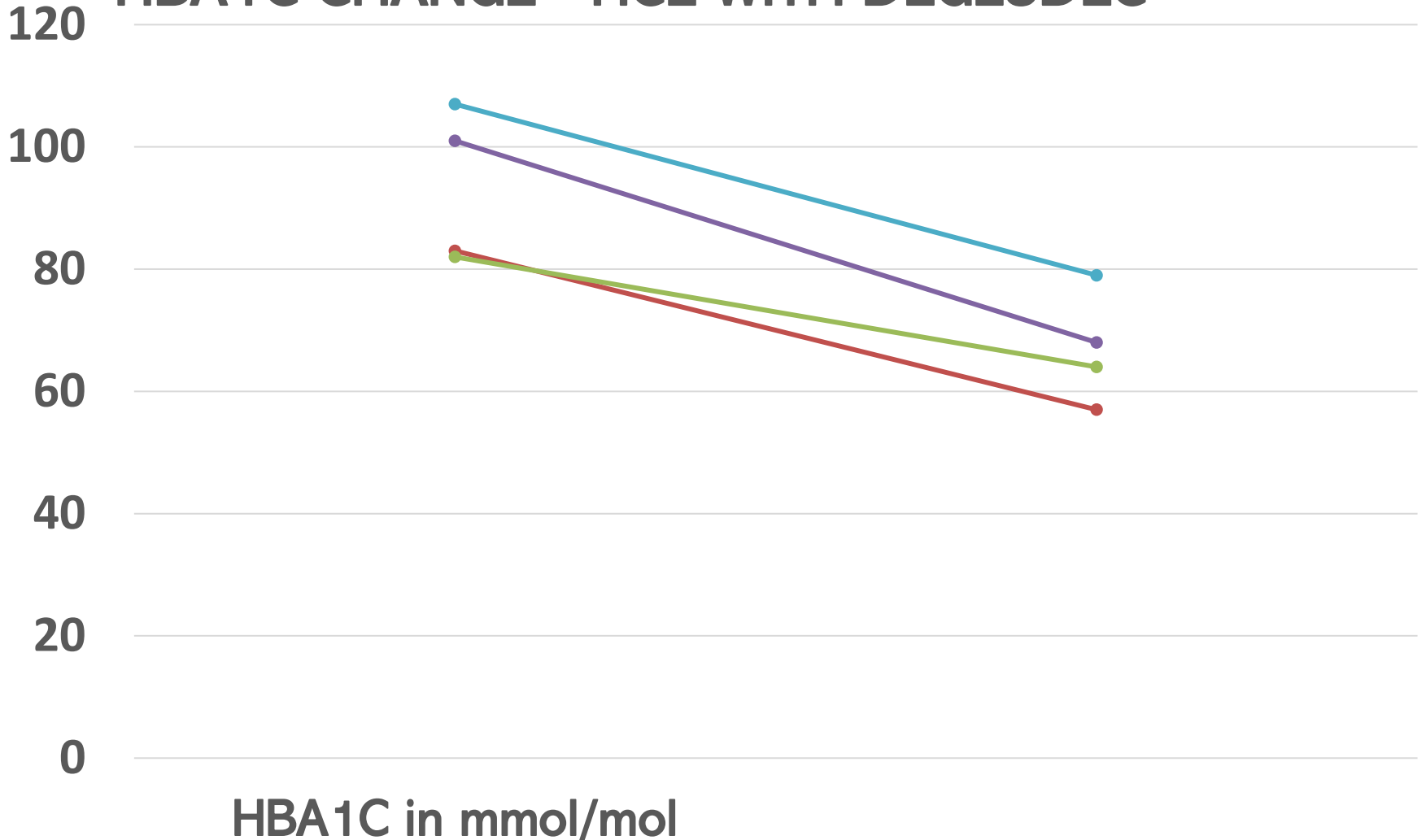
“A long Journey but now we are able to speak and think of a life beyond diabetes”



- PATIENTS ON ULTRALONG ACTING INSULIN
WITH HCL INSULIN PUMP

HIGH HBA1C COHORT

HBA1C CHANGE - HCL WITH DEGLUDEC



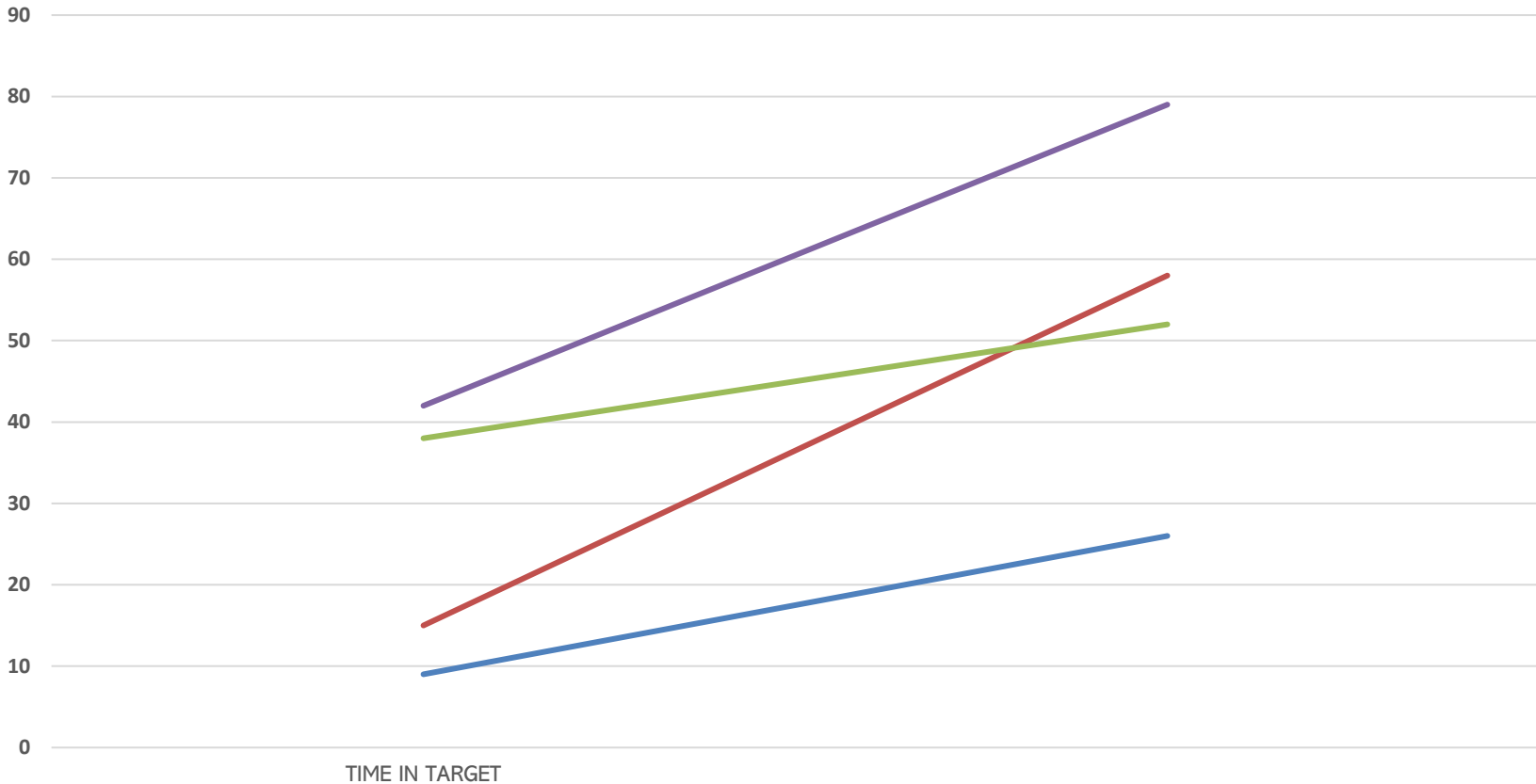
TIME IN RANGE

HCL WITH DEGLUDEC - HIGH HBA1C COHORT



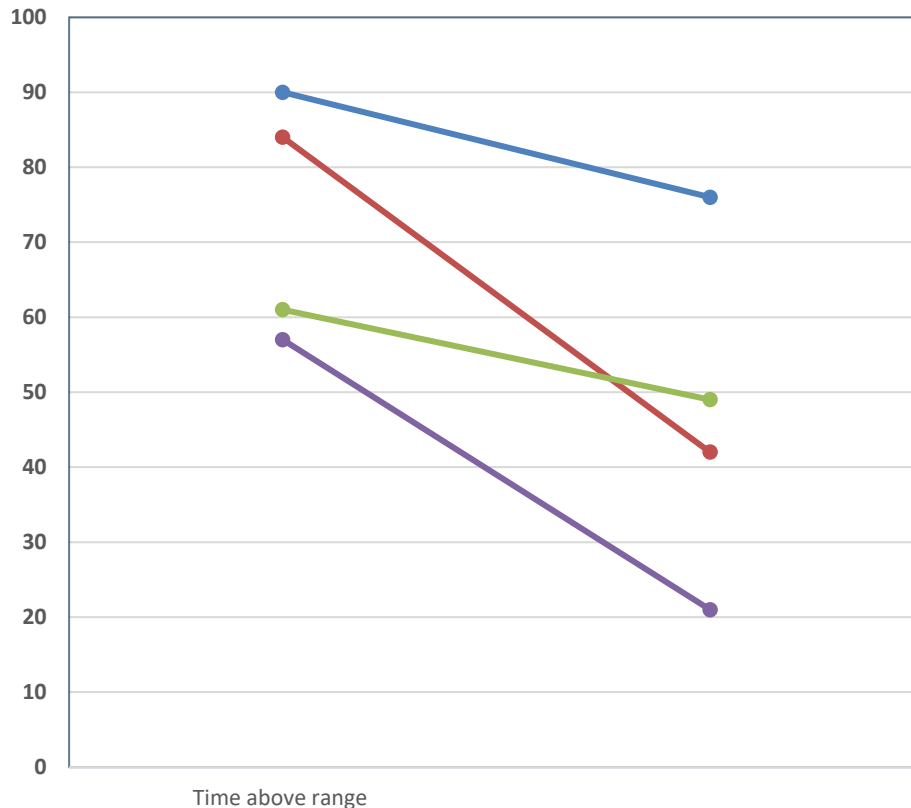
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CHANGE IN THE PERCENTAGE TIME IN TARGET (3.9-10 Mmol/L)

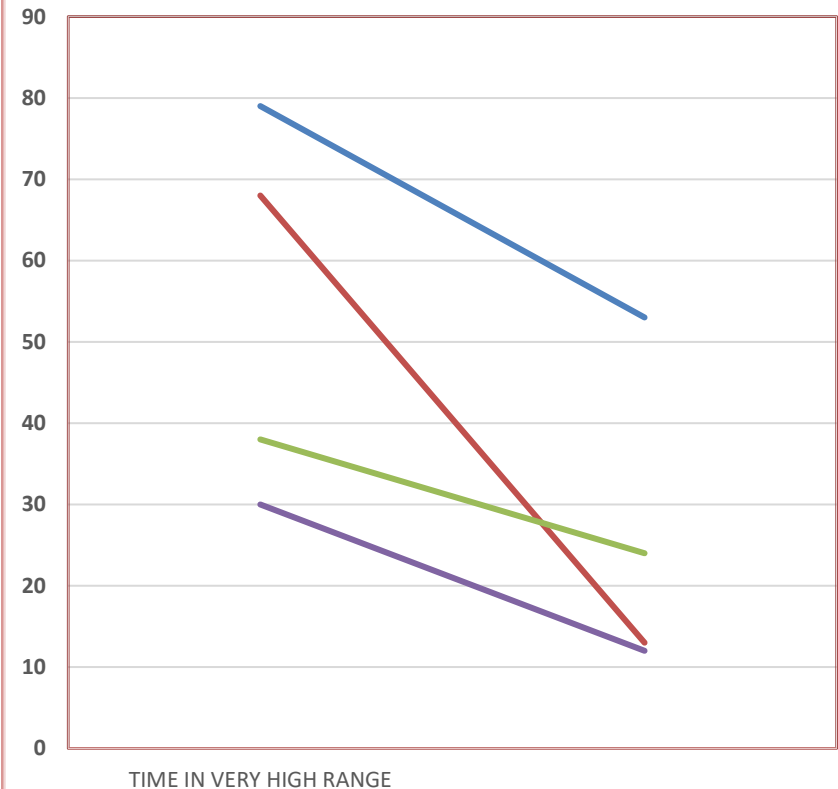


Decrease in Percentage of Time above range

CHANGE IN THE PERCENTAGE OF
TIME ABOVE RANGE (TAR) BG > 10 MMOL/L
Mean 26%



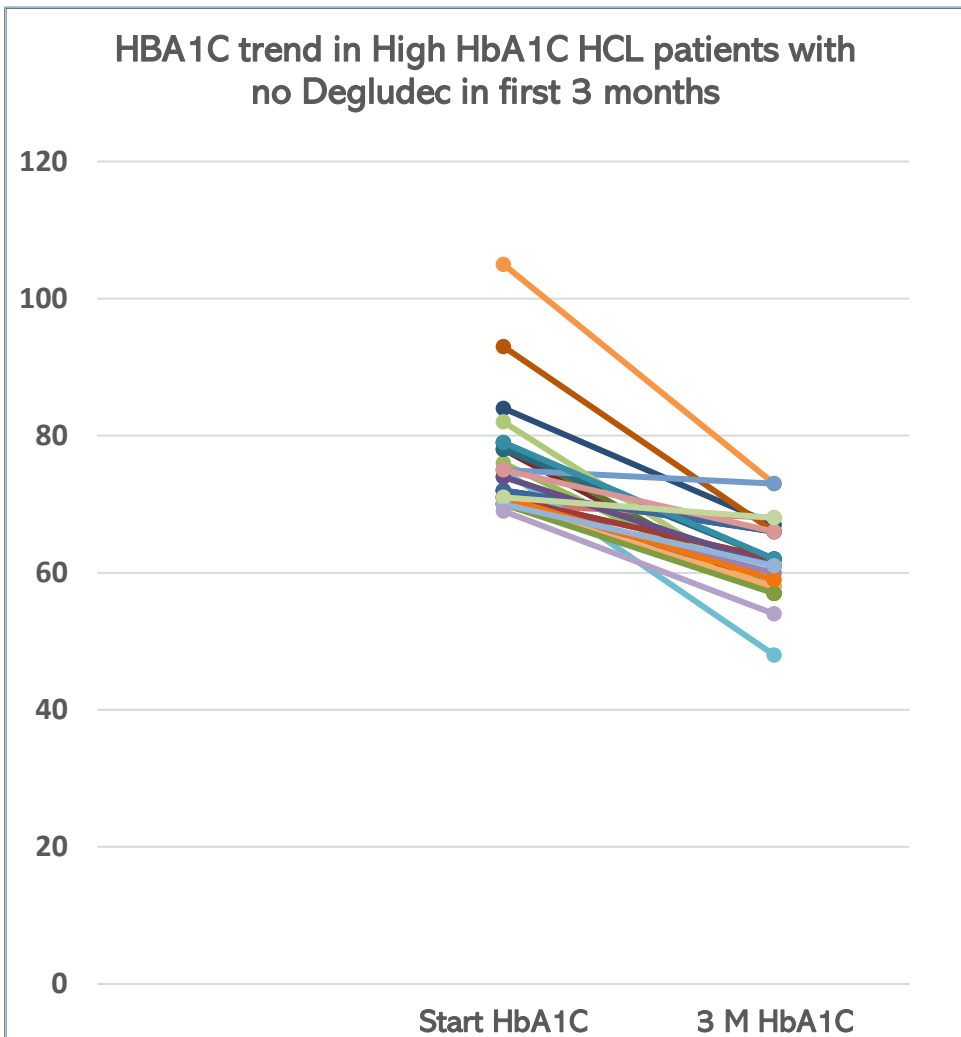
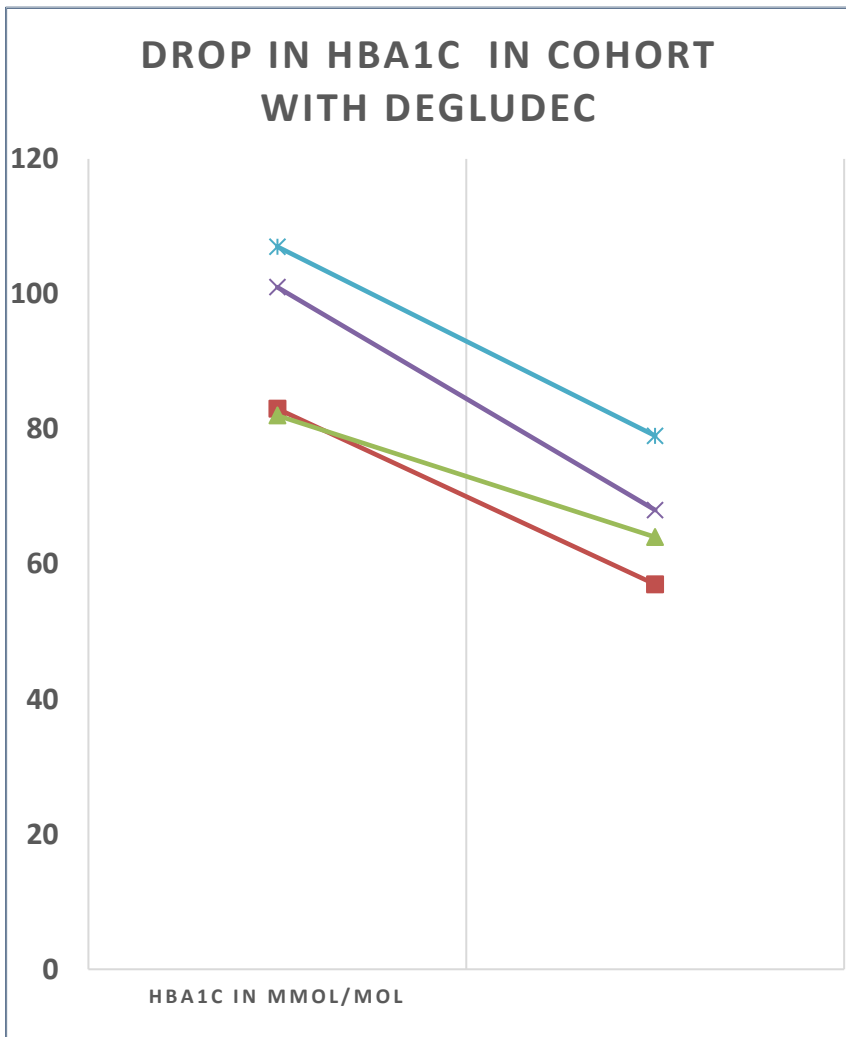
Change in The Percentage of time in
Time in very high range > 14
mmol/L- Mean 23%



COMPARISON WITH HIGH HBA1C PATIENTS ON HCL WITH NO DEGLUDEC

HCL patients with and Without Degludec

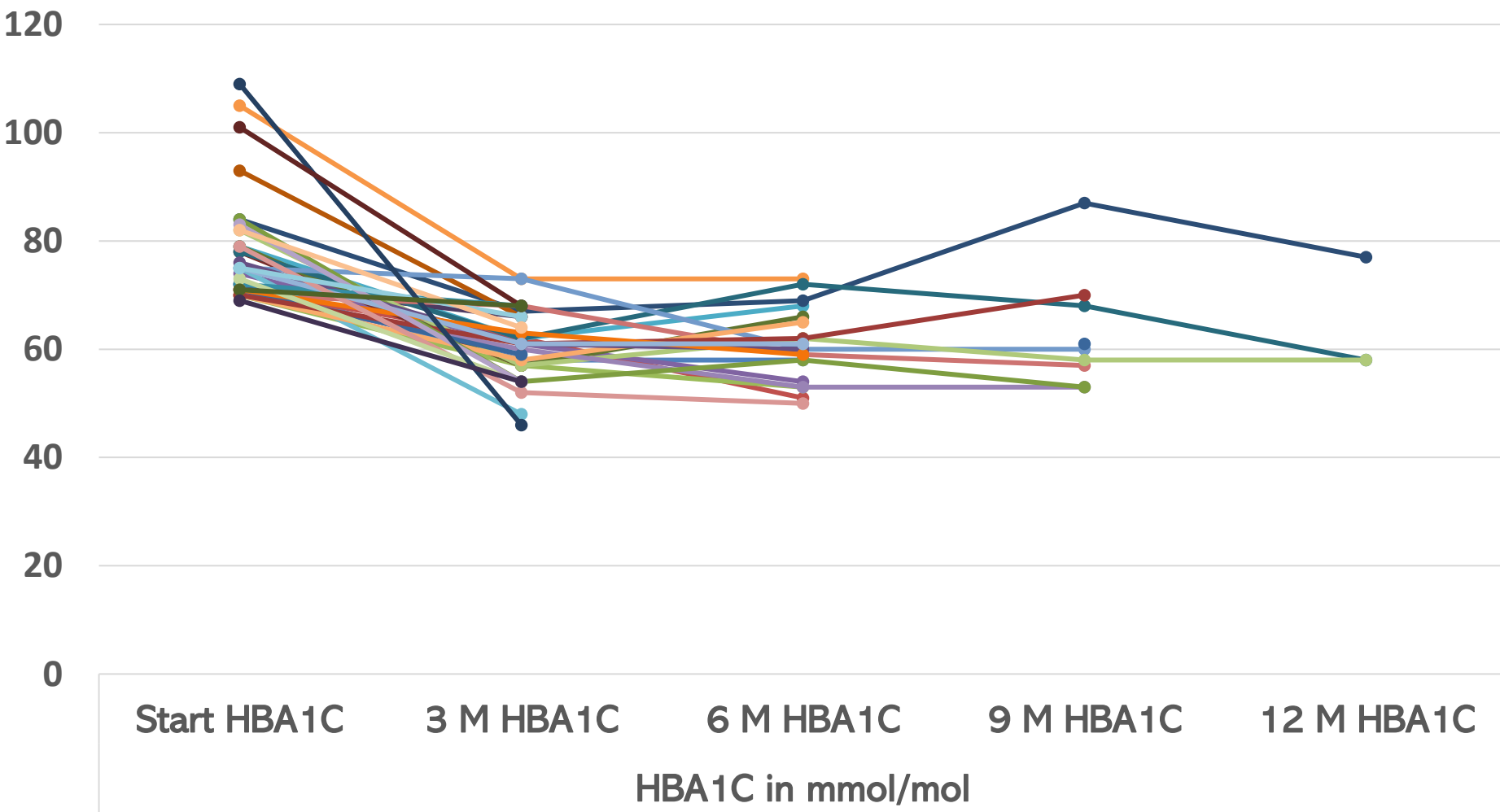
Starting High HbA1C cohort > 68 mmol/L



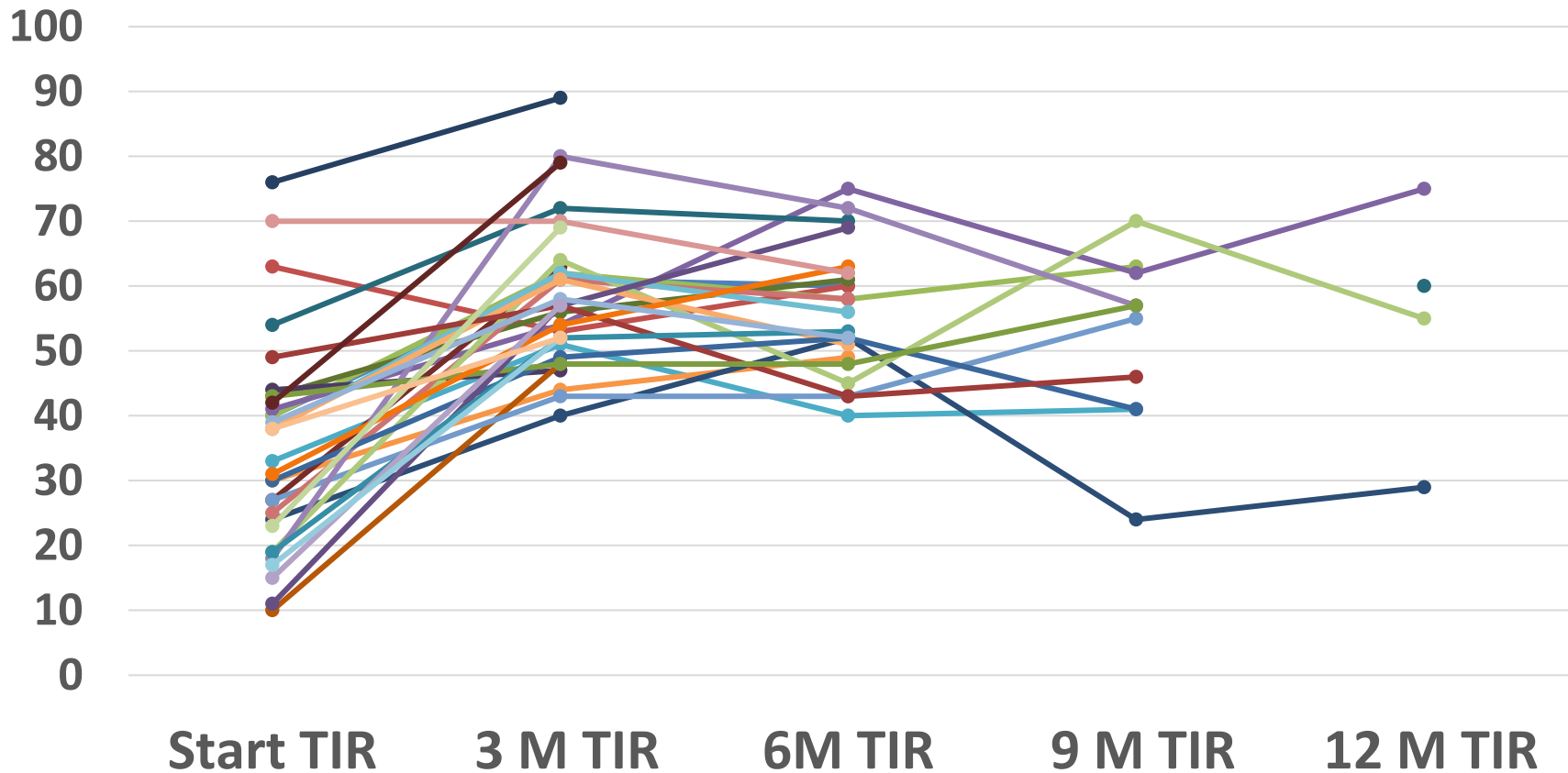
HbA1C trends in High HbA1C patients > 68 mmol/mol.



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Improvement in Percentage of the Time in Range (TIR- BG 3.9-10 mmol/L)



- Weaning Tresiba
 - 4- 6 M Stable Glycaemic control
 - Confidence
 - Engagement
 - Option
 - 10% reduction
- Positive reinforcement

SUMMARY

- HCL for high Hba1c patients
- Adding Ultralong acting insulin seems to help
- Close supervision with individualised targets

Thank you

