Evaluation of Cloudcare, a population health management solution for people with diabetes; Ongoing prospective cohort study

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Background

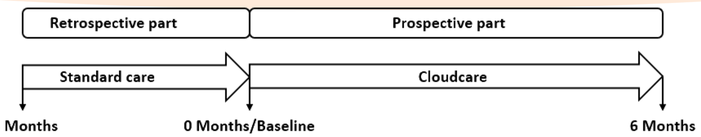
- Increasing use of technology in type 1 diabetes (T1D) care is contributing to improved outcomes, treatment experience and decision support.[1,2]
- Glucose-sensing technologies yield large volumes of data: healthcare professionals (HCPs) need new tools and solutions for central collection and analysis of these data to make it actionable by the care team (i.e. population health management or PHM systems).
- We developed CloudCare,[3] a CE-marked eHealth application/PHM system for remote glucose monitoring and triaging, aiming to:
  - provide continuous insights on the status of people with type 1 diabetes (PWDs) between scheduled appointments
  - complement and facilitate hybrid care pathways
  - improve outcomes, treatment satisfaction, and cost-effectiveness using validated parameters
  - enable data driven and personalized care models regardless of the technology PWDs use

Research questions

- This study aimed to investigate the effects of the CloudCare application on daily practice by assessing:
  - treatment satisfaction, using the DTSQs (status) and DTSQc (change) questionnaires[4, 5]
  - perceived diabetes-related distress, using the PAID-5 questionnaire[6]
  - glycemic control
  - number and type of contacts between HCPs and PWDs

Study design

- Single center observational prospective cohort study (Clinicaltrials.gov: NCT05431140)

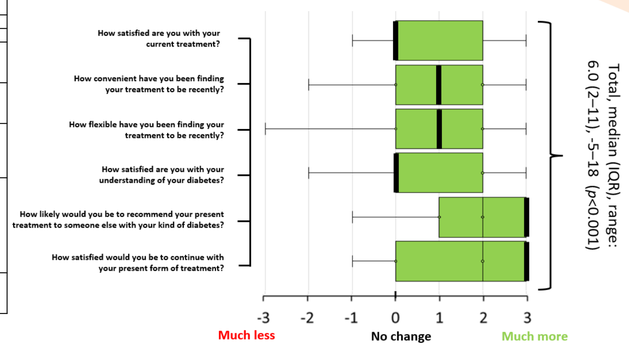


Baseline characteristics:

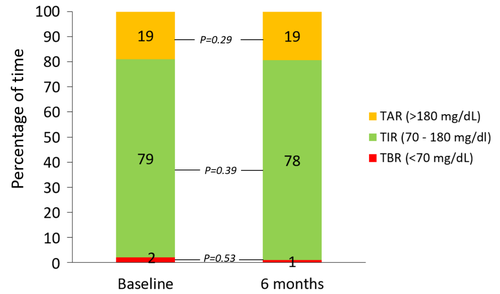
Characteristic	N	N (%), unless stated otherwise
Age (years), median (IQR)	175	29.9 (24.6–42.0)
Sex, female	175	108 (62)
Lab HbA1c (mmol/mol), median (IQR)	127	
mmol/mol		48.0 (44.0–51.9)
%		6.5 (6.2–6.9)
GMI, mean (SD)	149[a]	
mmol/mol		50.1 (3.2)
%		6.7 (0.3)
Glucometrics	154[a]	
TIR (70–180 mg/dL), median (IQR)		79 (73–84)
TAR (>180mg/dL), median (IQR)		19 (13–25)
TBR (<70mg/dL), median (IQR)		2 (1–3)
Current insuline therapy	173[b]	
MDI (FGM)		12 (7)
Pump		161 (93)
• Minimed 670G		5 (3)
• Minimed 780G		150 (87)
• Tandem Slim X2		3 (2)
• Other		3 (2)

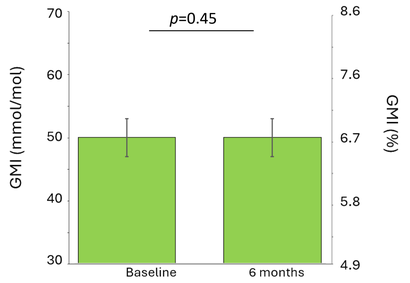
[a] Glucometrics were not available for n=19 participants due to lack of data availability around the visit dates. GMI data (calculated for ≥14 days) are different from TIT/TBR/TAR data [19].
[b] For n=2 participants it was not clear if they were on MDI or on pump as they were registered for both.

DTSQc 6 months:

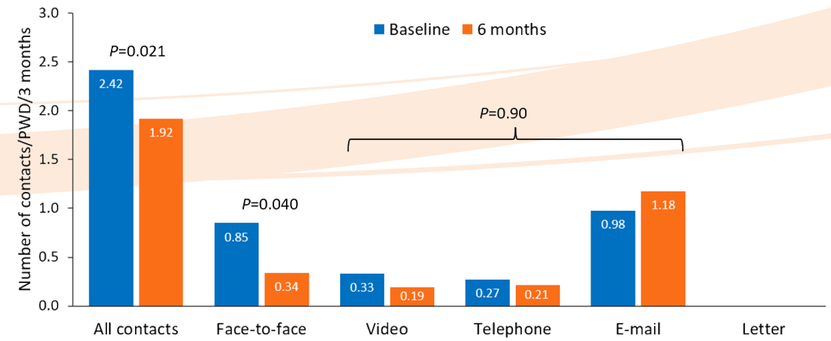


Glucometrics:





Contacts between PWDs and HCPs:



Interim results (N=175)

- Treatment satisfaction: mean DTSQs was 30.4 points (out of 36) at baseline. DTSQc showed a median increase of + 6.0 points (0 is no change in treatment satisfaction) at 6 months (p<0.001).
- Perceived diabetes-related distress: median PAID-5 remained stable at 5.0
- Mean Glucose Management Indicator (GMI or estimated Hb1Ac) was 50 mmol/mol (6.7%) at both baseline and at 6 months.
- TIR was 79% at baseline and 78% at 6 months (NS).
- Number of face-to-face contacts per PWD decreased from 0.85 at baseline to 0.34 at 6 months (p=0.040).
- Details are shown in the tables and graphs.

Conclusions & Discussion

- These preliminary results show that after 6 months the CloudCare application:
  - increases PWD treatment satisfaction
  - decreases the number of face-to-face contacts
  - does not affect glucometrics
- 12-months results will be collected to assess longer-term effects.
- CloudCare can improve PHM and total care delivery by the HCP team to PWDs by:
  - directing care team resources where they are deemed most needed (need-driven care delivery)
  - leveling care team resources and means with the actual need status of the PWD, maximizing the impact on the total cohort

Acknowledgments

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References

[1] Carlson AL et al. Diabetes Technol Ther 2021;23(S3):S56-s65
[2] Tchero H et al. Telemed J E Health 2019;25(7):569-583
[3] https://diabeter.com/cloudcare/
[4] Handbook of Psychology and Diabetes: a guide to psychological measurement in diabetes research and practice. Harwood Academic Publishers: Chur, Switzerland; 1994; pp. 111-132.
[5] Bradley C. Diabetes Care 1999 Mar;22(3):530-2.
[6] McGuire *et al.* Diabetologia. 2010 Jan;53(1):66-9

Disclosures

Diabeter is a focused clinic, owned by Medtronic, but with independent prescription and in full accordance with Dutch Healthcare laws and regulations.

DTSQc, Change version of Diabetes Treatment Satisfaction Questionnaire; FGM, flash glucose monitoring; GMI, glucose management indicator; HbA1c, glycated hemoglobin A1c; HCP, healthcare professional; IQR, interquartile range; MDI, multiple daily insulin injections; NS, non-significant; PAID-5, Problem Areas In Diabetes-5; PHM, population health management; PWD, person with diabetes; SD, standard deviation; TAR, time above target glucose range; TBR, time below target glucose range; TIR, time in target glucose range.