Can a mental health treatment reduce admissions for diabetic ketoacidosis?

Christopher J. Garrett[1,2]*, Calum D. Moulton[3], Tennyson Lee[4], Stephanie A. Amiel[5], Peter Fonagy[6], Khalida Ismail[2]

[1]Diabetes and Metabolism Department, Barts Health NHS Trust, London, UK

[2]Diabetes, Psychiatry and Psychology Research Group, Institute of Psychiatry, Psychology and Neuroscience, King's College London, UK

[3]Institute of Psychiatry, Psychology and Neuroscience, King's College London, UK

[4]Deancross personality disorder service, East London Foundation Trust

[5]Division of Diabetes and Nutritional Sciences, King's College London, UK

[6]Division of Psychology and Language Sciences, University College London, UK

*Corresponding author:

chrisgarrett@nhs.net

ORCID iD: 0000-0003-4425-6609

Recurrent diabetic ketoacidosis (rDKA) is characterised by high rate of mental health (MH) comorbidity and premature mortality [1,2]. MH interventions in adolescents have reduced rDKA admissions and HbA1c, but there are no equivalent studies in adults [3].

Using a single centre clinical trial with pre and post analysis, we examined the feasibility of an adapted form of Mentalization Based Therapy (MBT), a personality disorder treatment, adapted for people with rDKA. Mentalizing, a developmental skill derived in childhood, is the process by which we make sense of ourselves and others and assists emotion regulation. We have proposed a framework linking principles of attachment theory and mentalization to T1D adaptation [4].

Primary objective was testing feasibility of MBT for rDKA, using rates of recruitment, attrition and adverse effects. Secondary objectives were reductions in DKA episodes, other admissions, Accident and Emergency (AE) presentations and HbA1c.

Individuals were recruited from 7 participant hospitals.

Inclusion criteria were people aged over 18 years old with T1D, ≥ 2 DKA admissions within 12 months of each other and 1 of the admissions within 12 months of assessment. Exclusion criteria were diagnosis of T1D ≤ 24 months, drug or alcohol dependence, non-English speaker and physical disorder limiting ability to attend appointments.

At assessment nine standardised MH questionnaires were filled (supplementary material).

Baseline measures included duration of T1D, sex, ethnicity, accommodation, work status and previous MH service contact. Data regarding HbA1c, dates of hospitalizations, diagnosis and length of admission, were collected for the two years pre-intervention (baseline), at end of treatment (interim) and 6 months after treatment ended (final follow up).

Forty weekly psychotherapy sessions were conducted by CG, a psychiatrist with MBT training and supervised by TL, an MBT-accredited consultant medical psychotherapist.

Analysis followed intention to treat principles. Statistical significance was at 5% level with two-tailed tests. Continuous variables of hospitalizations, costs and HbA1c were compared among the two time periods using Wilcoxon rank-tests.

Of 22 people meeting inclusion criteria and invited for assessment, 10 consented to participate. Seven people completed the intervention, attending mean of 15.9 (14.0) appointments of 40 offered. Median age was 27.5 (IQR 22-32) years and median age at diabetes diagnosis 18.5 years (IQR 12-25) with 9 females and 8 white British ethnicity. Seven participants were unemployed.

Six people had prior psychiatric treatment, 2 eating disorder, 2 personality disorder and 2 depression. Nine of 10 screened positive for personality disorder, which corresponded with our previous experience [5].

In twenty-four months prior to intervention, the study population had 100 hospitalizations with 52 DKA admissions. Rate of DKA (events/person/month) prior to intervention was 0.19 (0.08-0.25) and this reduced to 0.0 (0.0-0.0) at 6-month follow-up (p=0.01). HbA1c reduced from baseline 104 mmol/mol (SD=23) (11.7%) to 89 mmol/mol (SD=22) (10.3%) at 6 months follow-up but wasn't statistically significant (p=0.15) (Table 1).

| | 24 months<br>prior to intervention (N=10) | 9 months<br>of intervention<br>(N=10) | 6 months<br>of follow-up<br>(N=10) | p value<br>baseline vs 6 months<br>follow up |
|---|---|---|---|---|
| **DKA** | | | | |
| *No.* | 52 | 13 | 2 | |
| *Median/person/month (IQR)* | 0.19 (0.08—0.25) | 0.11 (0.0-0.22) | 0.0 (0.0-0.0) | 0.01 |
| **Non DKA admissions** | | | | |
| No. | 30 | 1 | 2 | |
| *Median/person/month (IQR)* | 0.08 (0.04-0.12) | 0 (0.0-0.0) | 0 (0.0-0.0) | 0.05 |
| **Accident and Emergency presentation (non-admission)** | | | | |
| No. | 18 | 5 | 2 | |
| *Median/person/month (IQR)* | 0.04 (0.0-0.17) | 0.0 (0.0-0.11) | 0.0 (0.0-0.0) | 0.19 |
| **Total hospitalizations** | | | | |
| *No.* | 100 | 19 | 6 | |
| *Median/person/month* | 0.31 (0.13-0.46) | 0.17 (0.11-0.22) | 0.0 (0.0-0.17) | 0.02 |
| **Last HbA1c in the time period** | | | | |
| *mmol/mol* | 104 | 103 | 89 | |
| *%* | 11.7 | 11.6 | 10.3 | 0.15 |
| *N* | 10 | 7 | 9 | |

Table 1: Change in service utilization and clinical characteristics over time. N=10 except for HbA1c.

These findings suggest a powered RCT could recruit sufficient numbers. Although dose (attended sessions) varied, most participants maintained a therapeutic relationship and completed intervention. Reduction in frequency of appointments would make intervention more efficient and potentially not reduce effect. Results suggested a profound fall in rate of DKA, other admissions and utilization costs.

Our clinical observation was that establishing therapeutic relationships was challenging, illustrated by number of appointments not attended, though 70% maintained monthly contact through phone or email or attendance of appointments till follow-up. Maintenance of a therapeutic relationship where other diabetes clinicians have struggled is potentially a key 'active ingredient' in our outcomes. Through this relationship, fundamental aspects of diabetes safety can be imparted including insulin regimes, glucose testing and when to ask for help; all vital to preventing admissions.

Our study was limited by small size and lack of control arm.

We conclude that our MBT-adapted for rDKA shows feasibility in patients with rDKA, and requires replication in a powered RCT.

References

[1]   D. Ehrmann, B. Kulzer, T. Roos, T. Haak, M. Al-Khatib, N. Hermanns, Risk factors and prevention strategies for diabetic ketoacidosis in people with established type 1 diabetes, Lancet Diabetes Endocrinol. 8 (2020) 436–446.

[2]   Y. Kao, C.-C. Hsu, S.-F. Weng, H.-J. Lin, J.-J. Wang, S.-B. Su, C.-C. Huang, H.-R. Guo, Subsequent mortality after hyperglycemic crisis episode in the non-elderly: a national population-based cohort study, Endocrine. 51 (2016) 72–82. https://doi.org/10.1007/s12020-015-0669-8.

[3]   H. Moulson, S. Sanders, S. Coppin, J. Meyrick, Systematic Review or Meta-Analysis What psychosocial interventions work to reduce hospital admissions in people with diabetes and elevated HbA1c: a systematic

review of the evidence, Diabet. Med. 37 (2020) 1280–1290.

[4]  C. Garrett, K. Ismail, P. Fonagy, Understanding developmental psychopathology in Type 1 diabetes through attachment, mentalisation and diabetes distress, Clin. Child Psychol. Psychiatry. (2021) 1359104521994640.

[5]  C. Garrett, C.D. Moulton, P. Choudhary, S. Amiel, P. Fonagy, K. Ismail, The psychopathology of recurrent diabetic ketoacidosis: a case-control study, Diabet. Med. (2020) e14505.