The Role of Education in the Management of Type 1 Diabetes Mellitus in England

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Background
- Type 1 diabetes mellitus (T1DM) affects approximately 400,000 people in the UK, amounting to £1 billion in direct healthcare costs in 2012.6
- Statistics from the most recent National Diabetes Audit (NDA), published in 2012/13, suggest that 92.4% of T1DM patients in England fail to achieve optimal haemoglobin A1c (HbA1c) levels (<48 mmol/mol (6.5)%).6
  - Data from the NDA suggest that newly-diagnosed (ND) patients are more likely to achieve an optimal HbA1c result compared to the established T1DM population (which consists of diabetics diagnosed before the NDA data collection period).6
- Dose Adjustment For Normal Eating (DAFNE) is the most widely available structured education programme in the UK, and studies have reported that it leads to improved biomedical and psychological outcomes.4,1

Objective
- To determine the relationship between educational course accessibility and optimal HbA1c achievement for patients with T1DM.

Methods
- The Clinical Commissioning Groups investigated were split into 9 regions in England.
- HbA1c, percentage achievement rates for both the ND and established T1DM populations were extracted from the 2012/13 NDA.
- DAFNE centre location and service records were obtained from a 2013 fact sheet released by DAFNE, and numbers were allocated according to their distribution in each of the regions.7
- Regional statistics for area size were obtained from a 2012 publication by the Office for National Statistics.9
- From this data, two parameters were calculated:
  - The number of DAFNE services per 1,000 km²
  - The number of ND or established T1DM patients per DAFNE service
- The relationships between each of these two parameters and the percentage of ND and established T1DM patients achieving optimal HbA1c were tested using Pearson correlation coefficients and logistic regression analyses.
  - A univariate analysis was used due to the limited number of data points available.

Results
- ND patients were identified as being more likely to achieve an optimal HbA1c result, with a mean 1.3% percentage point increase in HbA1c between them and their established T1DM counterparts (data not shown).4
- No significant correlations were found between the number of DAFNE services per 1,000 km² and HbA1c achievement of the ND population, or the number of ND patients per DAFNE service and HbA1c achievement of the ND population (data not shown).
- A non-statistically significant result was observed between the number of DAFNE services per 1,000 km² and the percentage of established T1DM patients achieving an optimal HbA1c (Pearson correlation coefficient r=0.575, p=0.105) (Figure 1).
  - As such, this parameter was not included in the logistic regression model.
- A moderate negative association was observed between the number of established T1DM patients per DAFNE service and the percentage of established T1DM patients achieving an optimal HbA1c (Pearson correlation coefficient r=−0.768, p=0.016).
- Logistic regression analysis confirmed that the number of established T1DM patients per DAFNE service was significantly associated with achieving optimal HbA1c (b=4.66;100; p<0.0001) (Figure 2).
  - As the number of patients per DAFNE service increased by 1,000, there was an average 4% relative reduction in the predicted probability of patients achieving optimal HbA1c.

Discussion
- Despite identifying ND patients as having improved optimal HbA1c outcomes compared to the established population, structured education was not found to be a significant predictor of achieving an optimal HbA1c in this population.
  - A potential reason for this could be that ND patients receive more care and follow-ups within their first year of diagnosis, which does not fall under DAFNE educational support.
  - Established T1DM patients typically have reduced capacity to detect and correct hypoglycaemia,4,9 and as a result may be less selective in insulin therapy. Target attainment may therefore be more likely for ND patients, as they are more willing to adapt insulin dosages and have a better perception of hypoglycaemia.
- Limitations of our analyses include:
  - Lack of available data regarding structured education course uptake by the established T1DM. With this data available we would have been able to conduct further analyses with comparisons to the ND population (for which data was available).
  - Lack of available data regarding other structured education courses. DAFNE was the only course with enough data to form comparisons to the ND population (for which data was available).
  - Dose Adjustment For Normal Eating was the most widely available structured education programme in the UK, and studies have reported that it leads to improved biomedical and psychological outcomes.4,1

Conclusions
- The only identified parameter found to affect the achievement of improved HbA1c outcomes was the number of established T1DM patients per DAFNE service.
- Increasing the number of DAFNE services able to serve the T1DM population will therefore likely result in improved HbA1c results, and our analyses demonstrate that this is of particular importance to the established T1DM population.
  - Our findings suggest a need for the NHS to focus on further improving access to DAFNE services for that patient group.
- Increasing access to services in regions with a high number of patients served by each DAFNE service should become policy, even if there is already a high number of DAFNE services within a region.
- Extracting results from future audits may offer an opportunity to examine the impact of updated NICE guidance in relation to a potential increase in educational course awareness, uptake and target HbA1c achievement, given that NICE has recommended structured education courses and top-up courses for all T1DM patients.

References