SciForschen
Open HUB for Scientific Research
(ISSN 2380-548X)

International Journal of Endocrinology and Metabolic Disorders

Research article | Volume: 1.2 | Open Access

Transition and Beyond in Adolescents and Young Adults with Type 1 Diabetes Mellitus

Suma Uday[1]*, Fiona M Campbell[1], James Yong[1] and Ramzi A Ajjan[2]

[1]*Department of Paediatric Diabetes, Leeds Children's Hospital, Diabetes centre, Leeds, UK*
[2]*Division of Cardiovascular and Diabetes Research, Leeds Institute for Genetics, Health and Therapeutics, LIGHT Laboratories, University of Leeds, Leed, UK*

***Corresponding author:** Suma Uday, Department of Paediatric Diabetes and Endocrinology, Leeds Children's Hospital, Beckett Street, Leeds LS9 7TF, UK, Tel: 0113 2064996; Fax: 0113 2064983; **E-mail:** suma.nanjundappa@yahoo.co.uk

Received date: 4 June 2015; **Accepted date:** 15 July 2015; **Published date:** 21 July 2015.

Citation: Uday S, Campbell FM, Yong J, Ajjan RA (2015) Transition and Beyond in Adolescents and Young Adults with Type 1 Diabetes Mellitus. Int J Endocrinol Metab Disord 1(2): doi http://dx.doi.org/10.16966/2380-548X.106

Abstract

Glycaemic control and microvascular complications in 104 young adults with type 1 diabetes mellitus were established by a retrospective study. Mean age and duration of diabetes were 19.5 ± 1.8 and 9.4 ± 3.9 years. Mean HbA1c was 77 ± 18 mmol/mol. Microalbuminuria was noted in 5.8% and retinopathy in 43.2% (41.3% had background changes only). Fifty patients transferred from transition to young adult clinic maintained their glycaemic control (78 ± 20 mmol/mol before transfer and 78 ± 22 mmol/mol after transfer) and clinic attendance.

Keywords: Type 1 diabetes mellitus; Transition; Transfer of care; Adolescents; Microvascular complications

Introduction

It is now well accepted that early glycaemic control in adolescents with type 1 diabetes mellitus (Type1 DM) is crucial to prevent both microvascular and macrovascular complications [1,2]. However, average HbA1c in this age group remains unacceptably high [3] secondary to psychological and behavioral barriers. This makes adherence to strict glycaemic control challenging [4,5], and contributes to long-term morbidity and mortality [6].

Deterioration in glycaemic control following transfer of patients with diabetes to adult care has been reported [7], particularly in cases of early transfer [8], which can be due to lack of engagement [9]. Despite concerns regarding the myriad of problems associated with transfer of care, there are very few studies investigating its effect on glycaemic control or clinic attendance [10].

Our aims were to:1) investigate glycaemic control, markers of microvascular and macrovascular complications in young adults with Type1 DM 2) understand trends in glycaemic control and clinic attendance in a subset of patients transferred from transition clinic to young adult clinic.

Methods

Study design

A retrospective cohort study of all adolescents and young adults, with childhood onset Type1 DM, attending the transition clinic and young adult clinic at Leeds Teaching Hospitals NHS Trust; Patients transferred from transition clinic to young adult clinic within our Trust during a 3 year period (August 2009 and August 2012) were included. Young adults transferred from other paediatric or transition clinics and those transferred out of the region for adult care were excluded due to incomplete data on these patients. Data was obtained from the electronic Diabetes Management System (DMS) and the study was cleared by the local ethical committee and in accordance with the Declaration of Helsinki.

Clinic set up

Young adults aged 16-18 years were seen in a transition clinic held in the paediatric diabetes centre where patients are seen jointly by paediatric and adult team. Young adults are subsequently transferred to a young adult clinic when deemed appropriate by the treating clinician. The young adult clinic is held in the adult diabetes centre and patients are seen by an adult diabetes physician. The transition clinic offered 3 monthly appointments and the young adult clinic 4 monthly, although more frequent reviews were provided in both units according to patient need.

Data collection

HbA1c was checked at each clinic visit in the transition clinic using the DCA 2000 analyser. Each patient also had a laboratory assay annually. In young adult clinics a laboratory assay was performed prior to each visit at the same local laboratory. Both methods were IFCC aligned. All patients had weight and blood pressure checked at each visit. Screening for retinopathy, dyslipidemia (random lipid profile) and microalbuminuria was performed annually.

Systolic blood pressure (SBP)>140 mmHg and diastolic blood pressure (DBP)>85 mmHg was classed as hypertension. We defined microalbuminuria as a urinary albumin creatinine ratio >2.5 mg/mmol in males and >3.5 mg/mmol in females, on at least two occasions. Patients were classed as having retinopathy if changes were detected on at least one screening. Retinopathy screening was undertaken by trained Ophthalmologists and screening was graded according to the UK National Screening Committee recommendations.

Email support

All patients with suboptimal diabetes control in the adult diabetes service were offered email support by the attending physician. Patients were never prompted and the role of physician was restricted to replying to patient emails.

Statistical analysis

Statistical software SPSS version 21 was used. Unpaired t-test was used to compare HbA1c between the transition clinic and young adult clinic groups. Paired t-test was used in the latter group to compare pre and post transfer HbA1c.

Results

Glycaemic control and treatment

A total of 104 patients (male=55) with a mean age of 19.5 years were identified. Fifty four patients were in the transition clinic and fifty who were transferred to adult care. Mean age at diagnosis was 9.2 ± 3.8 years and duration of diabetes 9.4 ± 3.9 years. The majority of patients (66.3%) were on multiple daily injections (MDI), with 27.9% on continuous subcutaneous insulin infusion (CSII) and a minority (5.8%) on twice daily (BD) injection regimen. Two patients were commenced on metformin following transfer to adult care. Mean HbA1c in the whole population was 77 ± 18 mmol/mol. The mean HbA1c in females was slightly higher at 81 ± 17 mmol/mol compared to males at 74 ± 18 mmol/mol, however this was not statistically significant (p=0.04).

Markers of micro and macrovascular complications

Microalbuminuria was noted in 5.8% (n=6). The incidence in males was 5.4% (n=3) and 6.1% (n=3) in females. Retinopathy was documented in 43.2%. However, only two patients had clinically significant changes (one female with pre-proliferative and one male with proliferative retinopathy requiring laser therapy) with the rest having background changes. The incidence of retinopathy was higher in females at 51% (n=25) compared to males 36% (n=20).

Mean SBP and DBP were 122 ± 11 and 71 ± 9 mmHg respectively. Fifteen (14.4 %) patients had raised diastolic blood pressure; none required treatment as 24h ambulatory BP was normal.

Mean LDL was 2.3 ± 0.67 mmol/L, only one patient required statin therapy. Sixteen patients were current smokers and five ex-smokers.

The effects of transition on diabetes control

Data were analysed in two groups: Group A, in transition clinic and Group B who were in the young adult clinic (Table 1). Patients in the young adult clinic were >1 year but <3 years post transfer from the transition clinic and the mean age at transfer was 18.5 ± 1.2 years. Mean HbA1c one year prior to transfer was 78 ± 20 mmol/mol and one year post transfer was 78 ± 22 mmol/mol (p=0.22) in 47 complete datasets. Analysis was extended to 3 years before and after transfer. Mean HbA1c 2 years before and 2 years after transfer (31 data sets) were [79 ± 18 mmol/mol and 78 ± 18 mmol/mol respectively; p=0.18], whereas 3 years pre and post transfer (9 data sets) values were [81 ± 22 mmol/mol and 79 ± 18 mmol/mol respectively; p=0.20] (Figure 1).

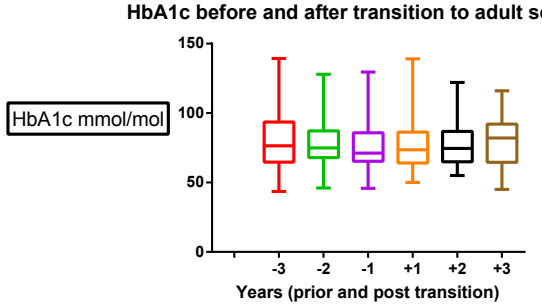

Figure 1: Mean HbA1c in the three years preceding and following transfer from paediatric to adult care. Mean (± SD) HbA1c in the first year pre and post transfer was 78 ± 20 mmol/mol (9.3 ± 1.9%) and 78 ± 22 mmol/mol (9.3 ± 2.1%) respectively and includes 47 data sets. Mean (± SD) HbA1c in the second year pre and post transfer was 79 ± 18 mmo/mol (9.4 ± 1.7%) and 78 ± 18 mmol/mol (9.3 ± 1.7%) respectively and includes 31 data sets. Mean (± SD) HbA1c in the third year pre and post transfer was 81 ± 22 mmol/mol (9.6 ± 2.1%) and 79 ± 18 mmol/mol (9.4 ± 1.7%) respectively and includes 9 data sets.

	All (n=104)	Transition clinic (n=54)	Young adult clinic(n=50)
Mean age (years)	19.5 ± 1.8	17.9 ± 0.6	21.2 ± 1.0
Male: Female (n)	55:49	30:24	25:25
Mean weight (Kg)	70.8 ± 13	68.8 ± 13.4	73 ± 12.5
Mean BMI (Kg/m^2)	24.8 ± 4	24.0 ± 3.7	25.5 ± 4.2
Mean Diabetes duration (years)	9.4 ± 3.9	8.4 ± 4.2	10.6 ± 3.2
Insulin pump therapy (%)	29 (27.9)	16 (29.6)	13 (26)
Multiple Daily Injections (%)	69 (66.3)	34 (62.9)	35 (70)
BD injections (%)	6 (5.8)	4 (7.4)	2 (4)
Mean HbA1c (mmol/mol)	77 ± 18	77 ± 19	78 ± 18
Mean HbA1c (%)	9.2 ± 1.7	9.2 ± 1.8	9.3 ± 1.7
HbA1c ≤ 58 mmol/mol (7.5%) (%)	14 (13.5)	7 (13)	7 (14)
HbA1c 59-80 mmol/mol (7.6-9.5%) (%)	50 (48)	30 (55.5)	20 (40)
HbA1c ≥ 81 mmol/mol (9.6%) (%)	40 (38.5)	17 (31.5)	23 (46)
Mean SBP (mmHg)	122 ± 11	122 ± 13	122 ± 9
Mean DBP (mmHg)	71 ± 9	68 ± 8	75 ± 8
Mean total cholesterol mmol/L	4.4 ± 0.9	4.4 ± 1	4.5 ± 0.8
Mean LDL mmol/L	2.37 ± 0.68	2.3 ± 0.6	2.4 ± 0.7
Mean Triglycerides mmol/L	1.31 ± 1.1	1.3 ± 1.1	1.3 ± 1.0
Retinopathy (%)	45 (43.3)	29 (53.7)	16 (32)
Microalbuminuria (%)	6 (5.8)	3 (5.5)	3 (6)
Hypothyroidism (%)	7 (6.7)	2 (3.7)	5 (10)
Coeliac disease (%)	4 (3.8)	1 (1.8)	3 (6)

Table 1: Glycaemic control and microvascular complications in adolescents and young adults

A small subset of patients (n=7) who opted for e-mail support provided by the Consultant in the young adult clinic demonstrated an overall improvement in the mean HbA1c over one year from 68 ± 8 mmol/mol to 63 ± 10 mmol/mol, (p=0.05). The average number of e-mails was 4.5/year, in addition to regular clinic attendance.

Clinic attendance and hospital admissions

The average number of transition and young adult clinics attended per calendar year was 3.2 (range:1-7) and 2.4 (range:0-6) respectively. No difference in failure to attend rate was observed. Three young adults were lost to follow up during transfer of care, of whom one returned to adult services 3 years later. On reengagement with services aged 23, this patient had developed proliferative retinopathy requiring laser therapy and dyslipidemia requiring statin therapy.

There were a total of 6 hospital admissions (2 diabetic ketoacidosis (DKA) due to missed insulin, 2 DKA due to illness and 2 were elective admissions for procedures) in the 3 years prior to transfer and 3 admissions (1 hypoglycaemia, 1 DKA and 1 elective admission for restabilisation) post transfer to adult care. No mortality was recorded.

Discussion

Achieving good glycaemic control in adolescents is challenging. HbA1c values in our patients are similar to previously published data [3,7,9,11]. However, in contrast to other work [7], there was no deterioration in glycaemic control following transfer to young adult care, despite reduction in clinic appointments. Interestingly, email support appeared to improve diabetes control is a small subset of patients but the numbers are too small to draw definitive conclusions and further studies are warranted. Patients taking up the email service had lower baseline HbA1c suggesting they are

more motivated and therefore strategies to engage patients with poorer control need to be devised.

The rate of background retinopathy in our cohort was higher than previously reported [6,11], which may be due to our definition of retinopathy (changes on any one occasion). However, only two patients required intervention for retinopathy, which was similar to previously reported findings [12].

Very few young adults were lost to follow-up in our cohort compared to previous reports [13], although it should be acknowledged that data on the minority, who were transferred to other centres, have not been recorded.

In conclusion, our study demonstrates that diabetes control in young adults with Type1 DM is generally poor. Glycaemic control and clinic attendance remains stable in patients who transfer through a transition service. Although a structured approach to transfer of care is believed to be effective [14-16] there are no proven interventions that help control glycaemia in this population. Email support may have a role and warrants further investigation.

Acknowledgements

We would like to thank Elizabeth Adams, Data manager, Paediatric Diabetes team, Leeds Children's Hospital, for providing support with data extraction.

We would also like to thank Julie Cropper, Transition Diabetes Specialist Nurse, Leeds Teaching Hospitals for reviewing the article.

Funding

None received

Statement of Human and animal rights

This article does not contain any studies with human or animal subjects performed by the any of the authors.

Conflict of interest

Dr S Uday, Dr F Campbell, Dr J Yong and Dr R Ajjan have no conflict of interest to declare.

Contribution statement

S Uday: Design, data acquisition, analysis, reporting, writing and final approval.

FM Campbell: Concept, design, revising article and final approval.

J Yong: Revising article and final approval.

RA Ajjan: Concept, design, acquisition of data, analysis of data, critical revision of article and final approval.

References

1. White NH, Cleary PA, Dahms W, Goldstein D, Malone J, et al. (2001) Beneficial effects of intensive therapy of diabetes during adolescence: Outcomes after the conclusion of the Diabetes Control and Complications Trial (DCCT). J Pediatr 139: 804-812.
2. No authors listed (1993) The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependant diabetes mellitus. The Diabetes Control and Complications Trial Research Group. N Engl J Med 329: 977-986.
3. Mohsin F, Craig ME, Cusumano J, Chan AK, Hing S, et al. (2005) Discordant Trends in Microvascular complications in adolescents with Type 1 Diabetes From 1990 to 2002. Diabetes Care 28: 1974-1980.
4. Cox DJ, Gonder-Frederick L (1992) Major developments in behavioral diabetes research. J Consult Clin Psychol 60: 628-638.
5. Peyrot M, Rubin RR, Lauritzen T, Snoek FJ, Matthews DR, et al. (2005) Psychosocial problems and barriers to improved diabetes management: results of the Cross-National Diabetes Attitudes, Wishes and Needs (DAWN) Study. Diabet Med 22: 1379-1385.
6. Laing SP, Swerdlow AJ, Slater SD, Botha JL, Burden AC, et al. (1999) The British Diabetic Association Cohort Study, I: all-cause mortality in patients with insulin-treated diabetes mellitus. Diabet Med 16: 459-465.
7. Lotstein DS, Seid M, Klingensmith G, Case D, Lawrence JM, et al. (2013) Transition from pediatric to adult care for youth diagnosed with type 1 diabetes in adolescence. Pediatrics 131: e1062-e1070.
8. Helgeson VS, Reynolds KA, Snyder PR, Palladino DK, Becker DJ, et al. (2013) Characterizing the transition from paediatric to adult care among emerging adults with Type 1 diabetes. Diabet Med 30: 610-615.
9. Kipps S, Bahu T, Ong K, Ackland FM, Brown RS, et al. (2002) Current methods of transfer of young people with type 1 diabetes to adult services. Diabet Med 19: 649-654.
10. Lyons SK, Becker DJ, Helgeson VS (2014) Transfer from pediatric to adult health care: effects on diabetes outcomes. Pediatr Diabetes 15: 10-17.
11. Peters A, Laffel L (2011) Diabetes care for emerging adults: recommendations for transition from pediatric to adult diabetes care systems. Diabetes Care 34: 2477-2485.
12. Weissberg-Benchell J, Wolpert H, Anderson BJ (2007) Transitioning From Pediatric to Adult Care: A new approach to the post-adolescent young person with type 1 diabetes. Diabetes Care 30: 2441-2446.
13. Wills CJ, Scott A, Swift PG, Davies MJ, Mackie AD, et al. (2003) Retrospective review of care and outcomes in young adults with type 1 diabetes. BMJ 327: 260-261.
14. Perros P, McCrimmon RJ, Shaw G, Frier BM (1995) Frequency of thyroid dysfunction in diabetic patients: value of annual screening. Diabet Med 12: 622-627.
15. Svensson M, Eriksson JW, Dahlquist G (2004) Early Glycemic Control, age at Onset, and development of microvascular complications in childhood-onset type 1 diabetes: a population-based study in northern Sweden. Diabetes Care 27: 955-962.
16. Cadario F, Prodam F, Bellone S, Trada M, Binotti M, et al. (2009) Transition process of patients with type 1 diabetes (T1DM) from paediatric to the adult health care service: a hospital-based approach. Clin Endocrinol (Oxf) 71: 346-350.