



BRIEF REPORT

## Evaluation of the transition from paediatric to adult diabetic unit for adolescents with type 1 diabetes<sup>☆</sup>



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### KEYWORDS

Type 1 diabetes;  
Transition;  
Paediatric diabetes  
unit;  
Adult diabetes unit;  
Follow-up

### Abstract

**Introduction:** The transition between paediatric and adult care for young people with type 1 diabetes (T1D) is often poorly managed, with adverse consequences for health, as well as a decrease in the follow-up.

**Objective:** To analyse the metabolic control and the degree of satisfaction in a group of patients with T1D after being transferred from the paediatric diabetes unit (PDU) to adult diabetes unit (ADU).

**Patients and methods:** Retrospective study in a cohort of 49 patients (43% female) with T1D. The age at diagnosis and transfer to ADU, time of onset of the disease, metabolic control (HbA1c), presence of diabetic complications and characteristics of medical follow-up were analysed using the statistics program: SPSS, version 17.0.

**Results:** Mean age at diagnosis  $8.3 \pm 4.6$  years and transfer to ADU  $19.2 \pm 1.8$  years. Mean time since onset of T1D in paediatrics, adults and overall:  $10.8 \pm 5.0$ ,  $4.1 \pm 2.6$  and  $15.0 \pm 5.7$  years, respectively. The 6% of adult patients were not being medically tracked. Among adults, 25% did not provide data about chronic complications, and 6% did not know their last HbA1c. The metabolic control after their transfer to the ADU worsened in 52% of the patients (HbA1c  $+0.79 \pm 0.70\%$ ). No correlation was found between the time since onset and the HbA1c value. Degree of satisfaction was either good or very good in 96% of patients in the PDU and 74% in ADU.

**Conclusion:** Better planning for the transfer of paediatric patients with T1D to ADU is highly recommended, in order to avoid deterioration of control and/or loss of follow-up.

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**PALABRAS CLAVE**

Diabetes mellitus tipo 1;  
Transición;  
Unidad de diabetes pediátrica;  
Unidad de diabetes de adultos;  
Seguimiento

## Evaluación de la transición desde la Unidad de Diabetes Pediátrica a la de Adultos en adolescentes con diabetes mellitus tipo 1

**Resumen**

**Objetivo:** Analizar el control metabólico y grado de satisfacción en un grupo de pacientes con DM1 tras cambiar de Unidad (Pediátrica [UDP], Adultos [UDA]).

**Pacientes y métodos:** Estudio retrospectivo: 49 pacientes, 43% mujeres. Analizamos: edad al diagnóstico y paso a adultos, tiempo evolución, control metabólico (HbA1c), complicaciones diabéticas y características del seguimiento. Estudio estadístico: programa SPSS-versión-17.0.

**Resultados:** Edad media  $\pm$  desviación estándar al diagnóstico  $8,3 \pm 4,6$  y en transferencia  $19,2 \pm 1,8$  años. Tiempo seguimiento en UDP, UDA y global:  $10,8 \pm 5,0$ ,  $4,1 \pm 2,6$  y  $15,0 \pm 5,7$  años; el 6% perdió el seguimiento médico. En UDA: el 6% desconocía última HbA1c y el 29% las complicaciones crónicas. El control metabólico empeoró en 52% pacientes (aumento HbA1c  $+0,79 \pm 0,70\%$ ). No encontramos correlación entre el tiempo evolución y la HbA1c. El 96% de los pacientes refirieron grado satisfacción bueno/muy bueno respecto a UDP y el 74% respecto a UDA.

**Conclusión:** Parece necesaria una mejor planificación de la transición de pacientes con DM1 a las UDA para evitar el empeoramiento del control clínico y/o la pérdida de seguimiento.

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**Introduction**

The transition to adult diabetes units (ADUs) takes place during adolescence, a particularly critical period of life characterised by specific physiological and psychological changes that increase the risk of development and progression of chronic complications and of admissions related to type 1 diabetes mellitus (T1D).<sup>1,2</sup> The transition to ADU is a period with heightened risk of loss of followup and development of complications.<sup>3</sup>

There is no systematic approach to this transition, and the way it is managed is influenced by the resources of each healthcare facility.<sup>4-6</sup> The transfer process plays an essential role in the control and followup of these patients.<sup>7</sup> There is evidence showing that the implementation of specific transitional care programmes has a positive cost-benefit ratio.<sup>8</sup> There is no unified approach to the transfer of patients from paediatric diabetes units (PDUs) to ADUs in Spain.

The purpose of our study was to analyse metabolic control and degree of satisfaction in a group of patients with T1D who had been followed up in our paediatric diabetes unit (PDU) following transition to the ADU.

**Patients and methods**

We conducted a retrospective study in 49 adult patients (43% female) with a T1D diagnosis that had been transferred to an ADU from our PDU. The study was approved by the ethics committee of our institution.

The transfer was planned at around 18 years of age. Before the transition, the patient received refresher education on diabetes, and a final assessment of chronic complications was made. Patients were transferred to different ADUs depending on their assigned service area, if they

lived in Madrid, or in their cities of origin, so patients were not all transferred to the same ADU.

We obtained the paediatric data from the standardised medical records of our PDU, and the follow-up data from the ADU by means of a phone or electronic mail survey. We studied the age at diagnosis and at transition to adult care (in years), the duration of followup (in years), the levels of HbA1c (%), body mass index (BMI = weight/height<sup>2</sup>, expressed in kg/m<sup>2</sup>), the presence or absence of complications (acute [severe hypoglycaemia, ketoacidosis] and chronic) and the type and frequency of patient followup at the time of transition and at the time of the study. We also asked patients to provide a qualitative assessment of their degree of satisfaction (very good, good, fair, or poor) for each unit.

Metabolic control was assessed using HbA1c levels determined by high-performance liquid chromatography (HPLC-Menarini, standardised to DCCT/IFCC, normal range  $5.3 \pm 0.4\%$ ). According to international criteria, we defined good metabolic control as HbA1c.

In our descriptive analysis we used absolute and relative frequencies to express qualitative variables and the mean  $\pm$  standard deviation to express quantitative variables. We used parametric paired sample tests to compare the variables. The statistical analysis was performed with the SPSS PC software for Windows, version 17.0. We set the level of statistical significance at  $P < .05$ .

**Results**

The mean age at diagnosis of T1D was  $8.3 \pm 4.6$  years, and the mean age at transition to the ADU was  $19.2 \pm 1.8$  years. The mean duration of followup in the PDU was  $10.8 \pm 5.0$  years, and the mean followup in adults was  $4.1 \pm 2.6$  years,

**Table 1** Followup characteristics by type of diabetes unit.

	Checkups/year	24 h access	Support from educator	Refresher education	HbA1c (%)	HbA1c <7.5%
PDU	4–5	100%	100%	100%	7.3 ± 0.8	56%
ADU	2–3	26%	39%	39%	7.5 ± 0.9	52%
					<i>P</i> > .05	<i>P</i> < .05

ADU: adult diabetes unit; PDU: paediatric diabetes unit.  
HbA1c levels (%) expressed as mean ± standard deviation.

with an overall duration of followup of 15.0 ± 5.7 years. The characteristics of patient control and followup are summarised in Table 1. Once the patients transitioned, 93% were followed up in the public healthcare system; 84% attended an ADU; 10% were monitoring or followed-up by their primary care physician; and 6% reported having dropped out of medical care. We found no significant differences in their BMI (23.2 ± 2.3 vs. 23.0 ± 3.0 kg/m<sup>2</sup>).

None of the patients had any complications at the time of transition from paediatric care. Among the adult patients, 29% could not provide information about their diabetes complications, and 6% did not know what their last HbA1c value was. A patient reported having had mild retinopathy and another diabetic neuropathy. When it came to acute complications, there were a total of 5 episodes (in 4 patients) of severe hypoglycaemia and 3 cases (in 3 patients) of diabetic ketoacidosis in the paediatric followup; while in the adult followup patients reported three episodes of severe hypoglycaemia (3 patients, one with an episode when the patient was of paediatric age) and one of ketoacidosis (in a patient that had had a similar complication in the PDU). Metabolic control declined in 52% of patients, with rising levels of HbA1c (+0.79 ± 0.70%), and the percentage of patients with HbA1c levels below 7.5% was lower when they were assessed as adults. However, we found no significant differences between the mean levels of HbA1c in the PDU and the ADU (7.3 ± 0.8% at the time of transition, and 7.5 ± 0.9% at the time of the study). Based on international criteria, metabolic control in the PDU was good in 56% of the patients and poor in 4% of patients, vs. 52% and 10%, respectively, in ADUs. We did not find a correlation between the duration of disease and the levels of HbA1c at any of these times.

The degree of satisfaction with the PDU was good or very good in 96% of patients; with the ADU, it was good or very good in 74% of the patients; and 66% of patients perceived the overall care as worse after transferring from the PDU.

## Discussion

The efforts of patients, family, and the diabetes teams need to be coordinated to enable youths with chronic diseases diagnosed during childhood to optimise their ability to gradually assume responsibilities in the management of these conditions without a decline in their overall health.<sup>9</sup> This is particularly important in patients with T1D.<sup>10,11</sup>

Different studies have demonstrated that metabolic control, a key marker of the risk of developing complications secondary to DM1,<sup>12,13</sup> is poor in some adolescents as they transition into adulthood.<sup>14,15</sup> Several factors seem to be at

play in the poorer metabolic control observed in this age group, including the physical and psychological changes that are taking place in these patients, and their contact with and followup in diabetic units.<sup>5,16</sup> A recent study showed that transition to the ADU increases the risk of poor metabolic control in patients recently diagnosed with DM1.<sup>17</sup>

Compared to the study of Lotstein et al, our patients had better metabolic control at transition: mean HbA1c levels of 7.3% vs. 7.5%, with poor control in only 4% vs. 11% of patients.<sup>17</sup> Compared to the longitudinal study of Petitti et al., 56% of our patients had levels of HbA1c below 7.5% at transition to the ADU our patients, vs. 32% of their patients.<sup>14</sup> In our study, we observed a decrease in the number of patients with levels of HbA1c below 7.5% after transition to the ADU.<sup>14,17</sup> We did not observe an increased number of admissions attributable to acute complications in the adult group, unlike what has been described in other series.<sup>2</sup>

It is worth noting that 16% of patients were lost to followup in diabetes units, that less than half received ongoing support by a diabetes educator, and that only a quarter of the patients had access to their ADU 24 h a day. We believe that all these factors contributed to the differences in the degree of satisfaction reported by our patients. We think that the decline in metabolic control can be partly due to differences between paediatric and adult care in the management of DM1.<sup>5</sup> These results evince the need to improve the process of transfer of adolescents with T1D to the ADU.

Among the limitations of our study are the small sample size, that all our patients came from the same PDU, that the subsequent followup was conducted in different adult facilities, and that the metabolic control data for the ADU are self-reported by patients.

To conclude, we believe that the transition of paediatric patients with DM1 to ADUs requires better planning in order to optimise their short-term care and to prevent declines in metabolic control and losses to followup.

## Conflicts of interest

The authors have no conflicts of interest to declare.

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