Children and Adolescents with Diabetes: Clinical Characteristics in 3 Age Groups' Comparison

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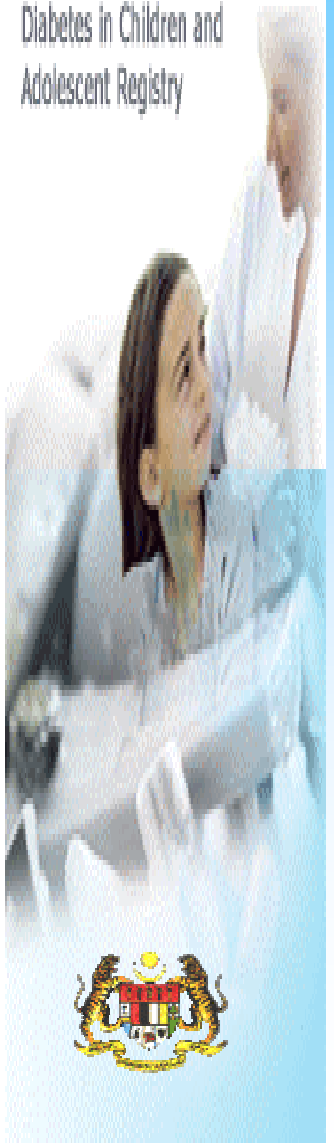
DiCARE

Diabetes in Children and Adolescent Registry



Introduction:

- Globally, there are close to 500,000 children under the age of 15 with type 1 diabetes.
- Every year, 70,000 children under the age of 15 develop type 1 diabetes.
- Type 1 diabetes is increasing in children at a rate of 3% each year
- Finland, Sweden and Norway have the highest incidence rates for type 1 diabetes in children.
- Type 2 diabetes has been reported in children as young as 8 years and reports reveal that it now exists in children previously thought not to be at risk.
- Over half of children with diabetes develop complications within 15 years.

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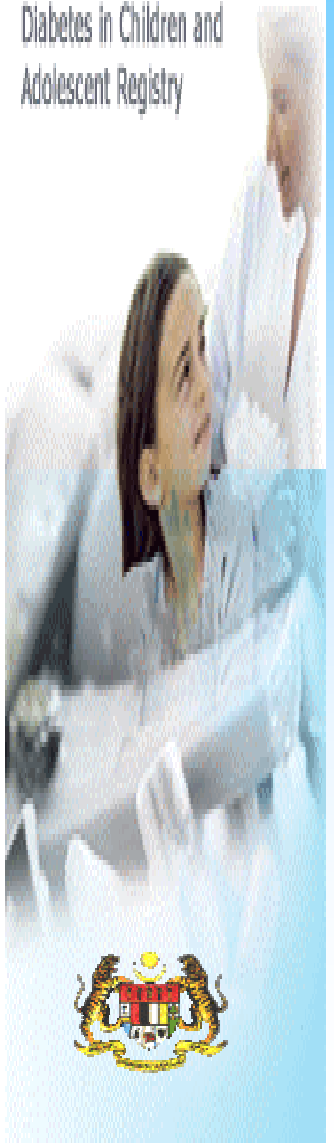

Diabetes at Different Stages of Life

PRESCHOOL children

- imaginative thinkers. Parents look after all aspects of the diabetes
- often have difficulty recognizing hypos
- the aim is to keep blood glucose levels between 5 -12 mmol/L (and 7-12 mmol/L at bed time).

SCHOOL GOING CHILDREN

- concrete thinkers- curious and sociable, increasingly responsible.
- usually start doing their own finger pricks, start trying some of their own injections from around nine to ten years or sometimes earlier
- The target range for blood glucose levels is between 4-10 mmol/L (and 7-12 mmol/L at bed time).

ADOLESCENCE

- time of major physical, psychological change & increasing independence
- Body image is very important & peer pressure can lead to denial- self-neglect and risk—taking behavior.
- The target range for blood glucose levels in this age group is between 4-8 mmol/l (7-12 mmol/l at bed time).

Methodology:

- The Diabetes in Children and Adolescents Registry (DiCARE) is a Ministry of Health (MOH) supported registry whose aim is to collect information about DM in children and adolescents in Malaysia.
- This will ultimately enable us to determine the incidence of DM among children and adolescents and to evaluate the risk factors and the management.
- The DiCARE, officially launched on 30th August 2006, was the first step towards establishing a national DM registry among children and adolescents.

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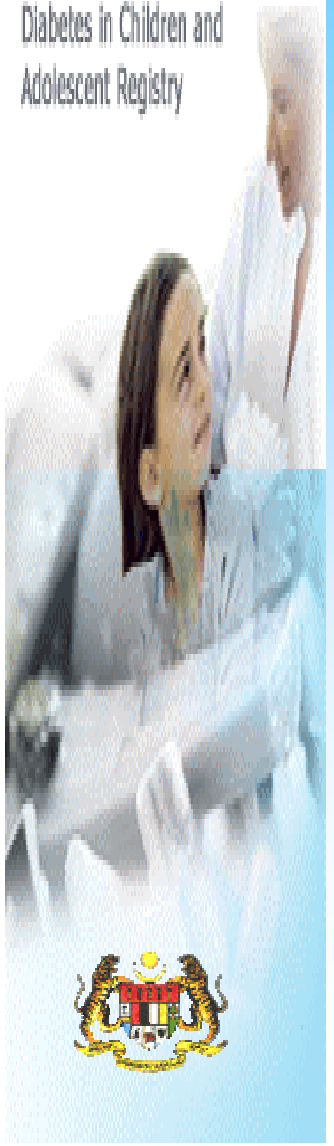
Diabetes in Children and Adolescent Registry



Methodology:

- Post-Hoc analysis of all cases from the register of diabetic patients < 20 years old in DiCARE.
- The clinical characteristics of patients in 3 age groups were examined for differences.

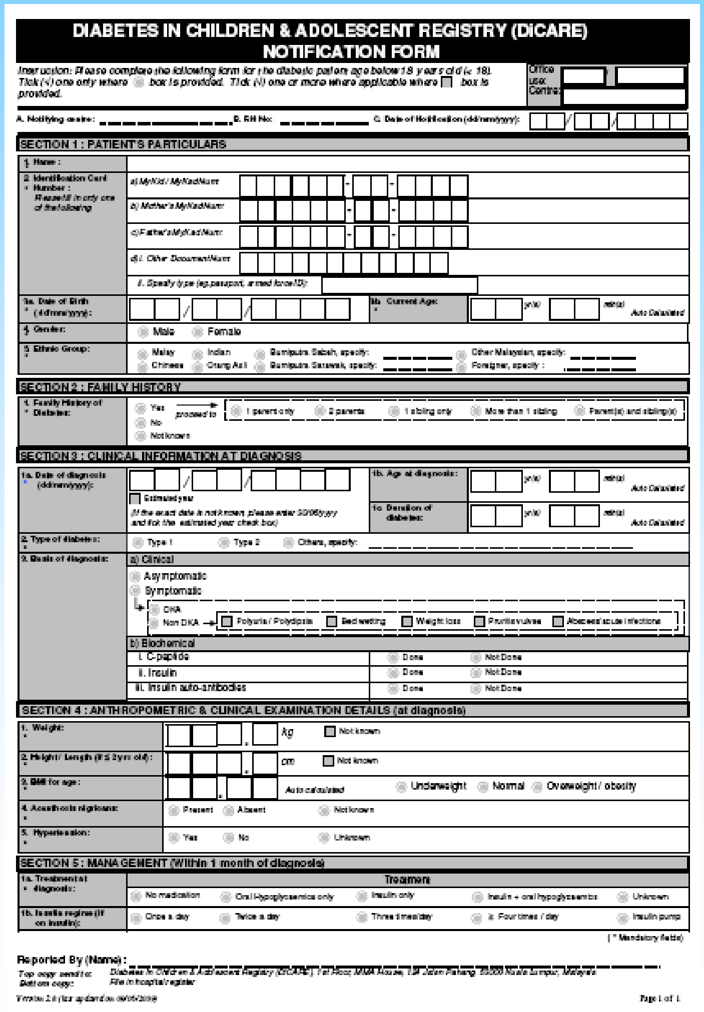
- **young children**: < 7 years old
- **children:** 7 to <13
- **adolescents:** 13 to <20

DiCARE

Diabetes in Children and Adolescent Registry

Case Report Forms

DiCARE Notification Form



DIABETES IN CHILDREN & ADOLESCENT REGISTRY (DiCARE)
NOTIFICATION FORM

Instruction: Please complete the following form for the diabetic patient age below 18 years old (< 18). Tick (√) one only where ○ box is provided. Tick (√) one or more where applicable where ☐ box is provided.

Office use: Centre:

A. Notifying centre: B. RN No: C. Date of Notification (dd/mm/yyyy):

SECTION 1 : PATIENT'S PARTICULARS

1. Name :
2. Identification Card Number : a) MyKid / MyKad Num; b) Mother's MyKad Num; c) Father's MyKad Num; d) i. Other Document Num; ii. Specify type (eg passport, armed force ID)
3a. Date of Birth (dd/mm/yyyy): 3b. Current Age: yr(s) mth(s) Auto Calculated
4. Gender: ○ Male ○ Female
5. Ethnic Group: ○ Malay ○ Indian ○ Bumiputra Sabah, specify: ○ Other Malaysian, specify: ○ Chinese ○ Orang Asli ○ Bumiputra Sarawak, specify: ○ Foreigner, specify:

SECTION 2 : FAMILY HISTORY

1. Family History of Diabetes: ○ Yes proceed to ○ 1 parent only ○ 2 parents ○ 1 sibling only ○ More than 1 sibling ○ Parent(s) and sibling(s); ○ No; ○ Not known

SECTION 3 : CLINICAL INFORMATION AT DIAGNOSIS

1a. Date of diagnosis (dd/mm/yyyy): ☐ Estimated year (If the exact date is not known, please enter 30/06/yyyy and tick the estimated year check box)
1b. Age at diagnosis: yr(s) mth(s) Auto Calculated
1c. Duration of diabetes: yr(s) mth(s) Auto Calculated
2. Type of diabetes: ○ Type 1 ○ Type 2 ○ Others, specify:
3. Basis of diagnosis: a) Clinical: ○ Asymptomatic ○ Symptomatic: ○ DKA ○ Non DKA → ☐ Polyuria / Polydipsia ☐ Bedwetting ☐ Weight loss ☐ Pruritus vulvae ☐ Abscess/acute infections
b) Biochemical: i. C-peptide ○ Done ○ Not Done; ii. Insulin ○ Done ○ Not Done; iii. Insulin auto-antibodies ○ Done ○ Not Done

SECTION 4 : ANTHROPOMETRIC & CLINICAL EXAMINATION DETAILS (at diagnosis)

1. Weight: kg ☐ Not known
2. Height/ Length (if ≤ 2yrs old): cm ☐ Not known
3. BMI for age: Auto calculated ○ Underweight ○ Normal ○ Overweight / obesity
4. Acanthosis nigricans: ○ Present ○ Absent ○ Not known
5. Hypertension: ○ Yes ○ No ○ Unknown

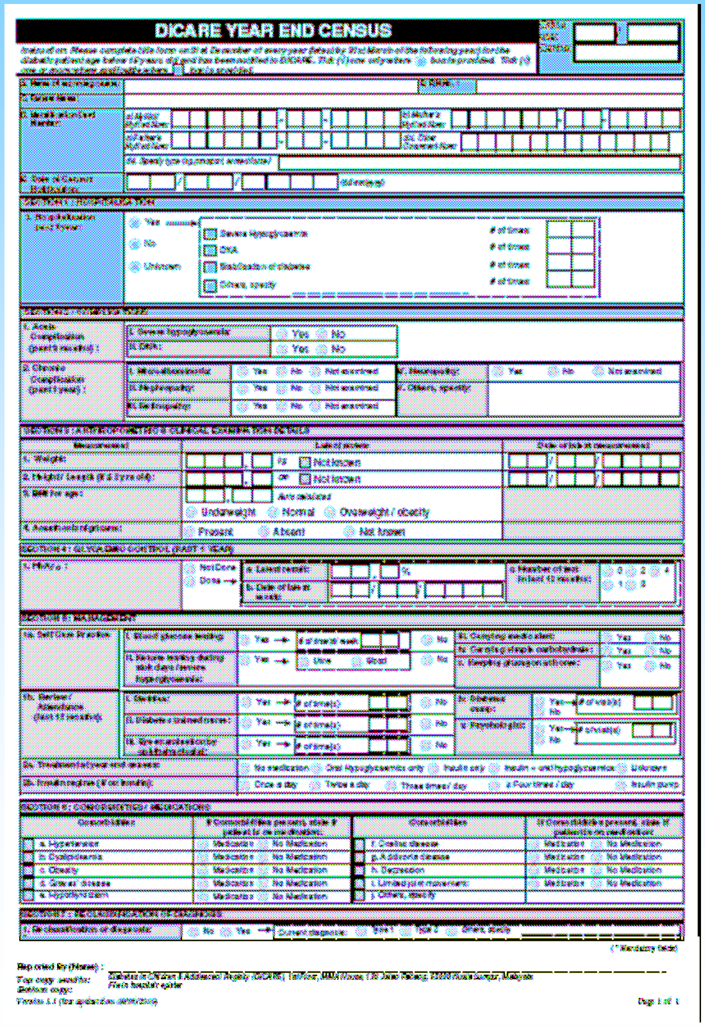
SECTION 5 : MANAGEMENT (Within 1 month of diagnosis)

1a. Treatment at diagnosis: Treatment: ○ No medication ○ Oral Hypoglycaemics only ○ Insulin only ○ Insulin + oral hypoglycaemics ○ Unknown
1b. Insulin regime (if on insulin): ○ Once a day ○ Twice a day ○ Three times/day ○ ≥ Four times / day ○ Insulin pump

(* Mandatory fields)

Reported By (Name):

DiCARE Annual Census Form



DICARE YEAR END CENSUS

SECTION 1 : HOSPITALISATION

SECTION 2 : COMPLICATIONS

SECTION 3 : ANTHROPOMETRIC & CLINICAL EXAMINATION DETAILS

SECTION 4 : GLYCAEMIC CONTROL (PAST 1 YEAR)

SECTION 5 : MANAGEMENT

SECTION 6 : COMORBIDITIES / MEDICATIONS

Reported By (Name):

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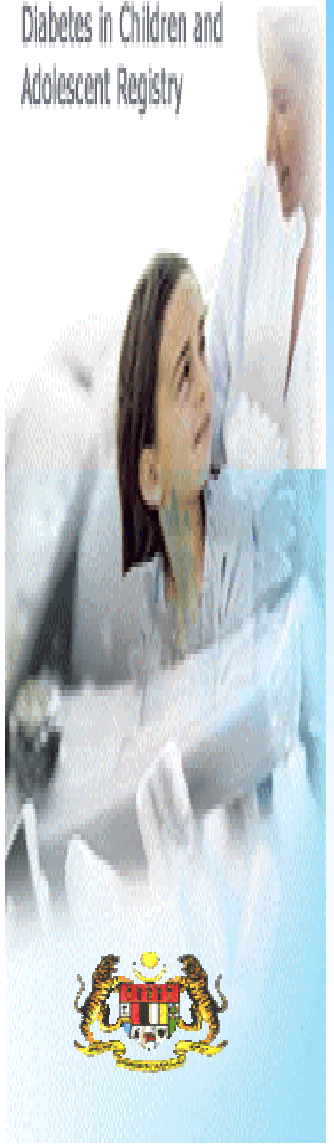
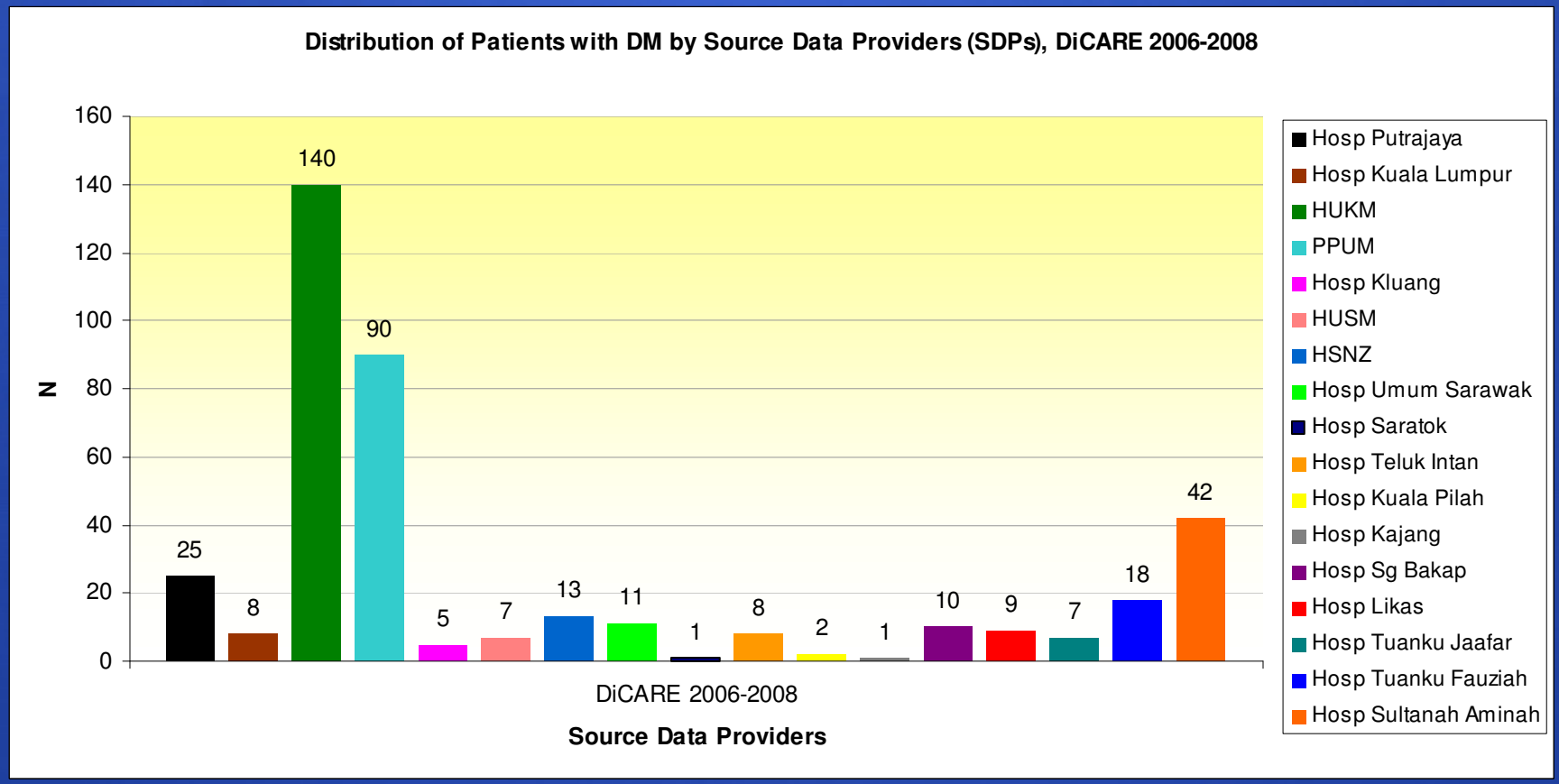


RESULTS

17 Reporting Centers

- There were 397 patients from 1 to 19 years old notified by 17 centres in Malaysia from Aug 2006 till Dec 2008.

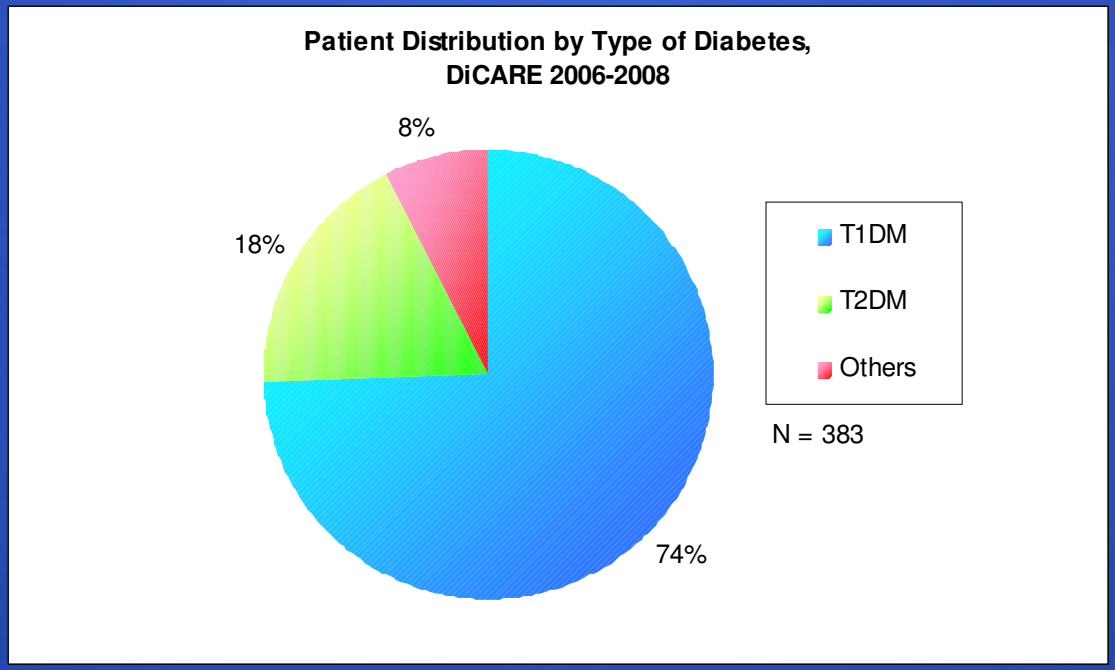


Patients' Characteristics

- The mean age was 12.0 (4.1) years.
- 45.8% were boys.
- The mean age at diagnosis was 7.9 (4.1) years old.
- The estimated mean duration of diabetes of 3.8 (3.5) years.

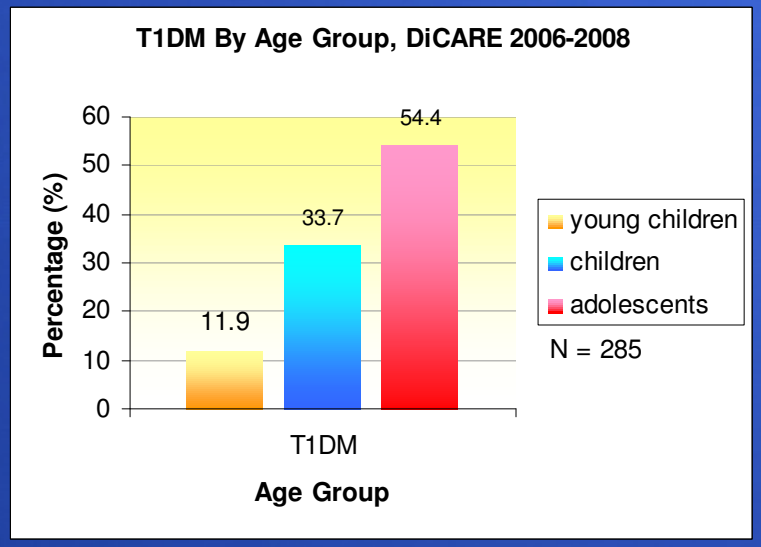
Types of Diabetes

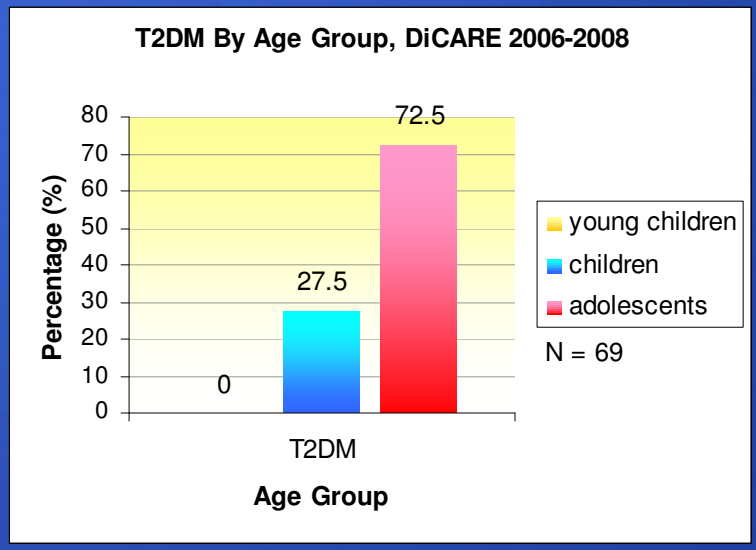
- Of 383 patients with known classification of diabetes, 74% had type 1, 18% had type 2 and 8% had other types of DM.



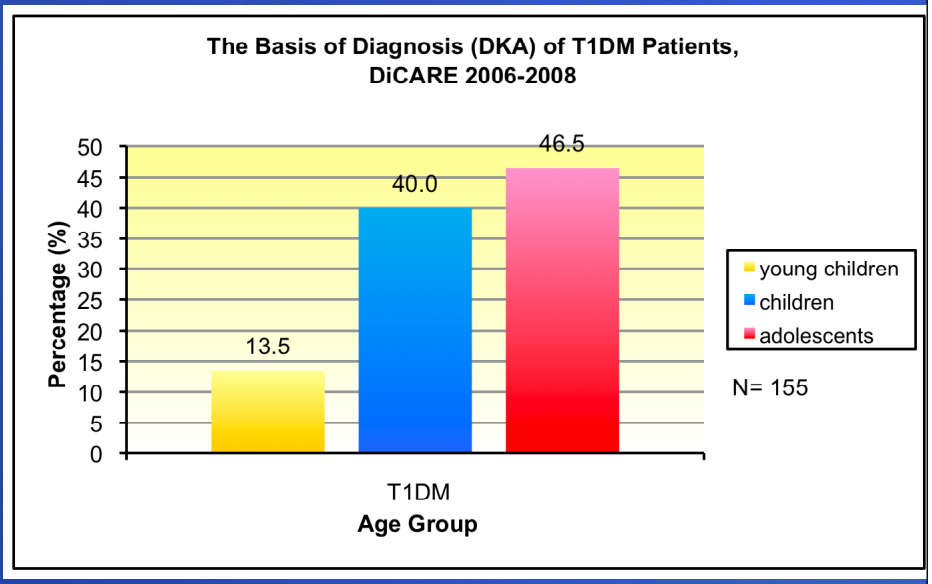
Type of Diabetes in 3 Age Groups

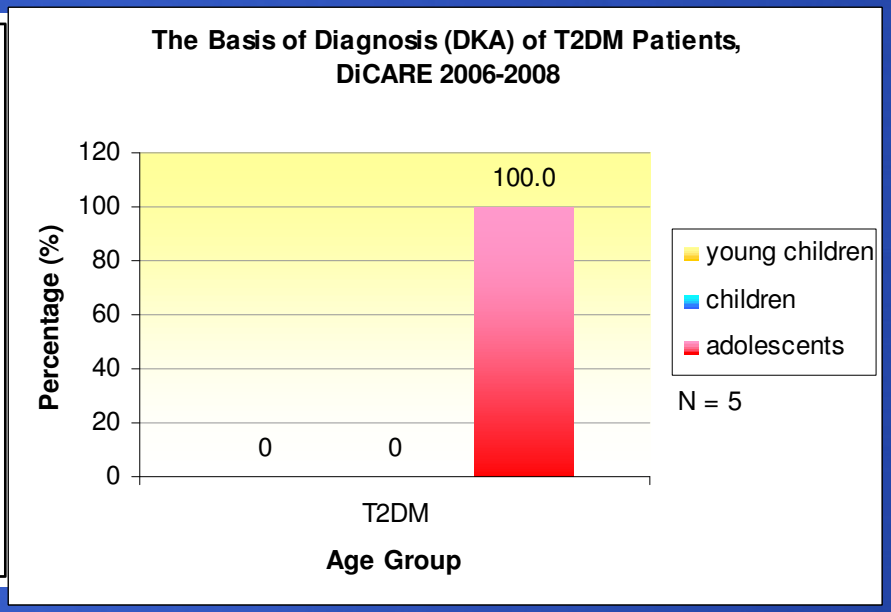
- Of type 1 DM (T1DM), 11.9%, 33.7%, 54.4% were in the young children, children and adolescents, respectively.
- For type 2 DM (T2DM), there was no patient in the young children, 27.5% in the children and 72.5% in the adolescents.





Diabetes Ketoacidosis (DKA)





- Diabetic ketoacidosis (DKA) is common in T1DM.

- In Type 2 Diabetes, DKA is not a common presentation.
- All who presented with DKA were adolescents

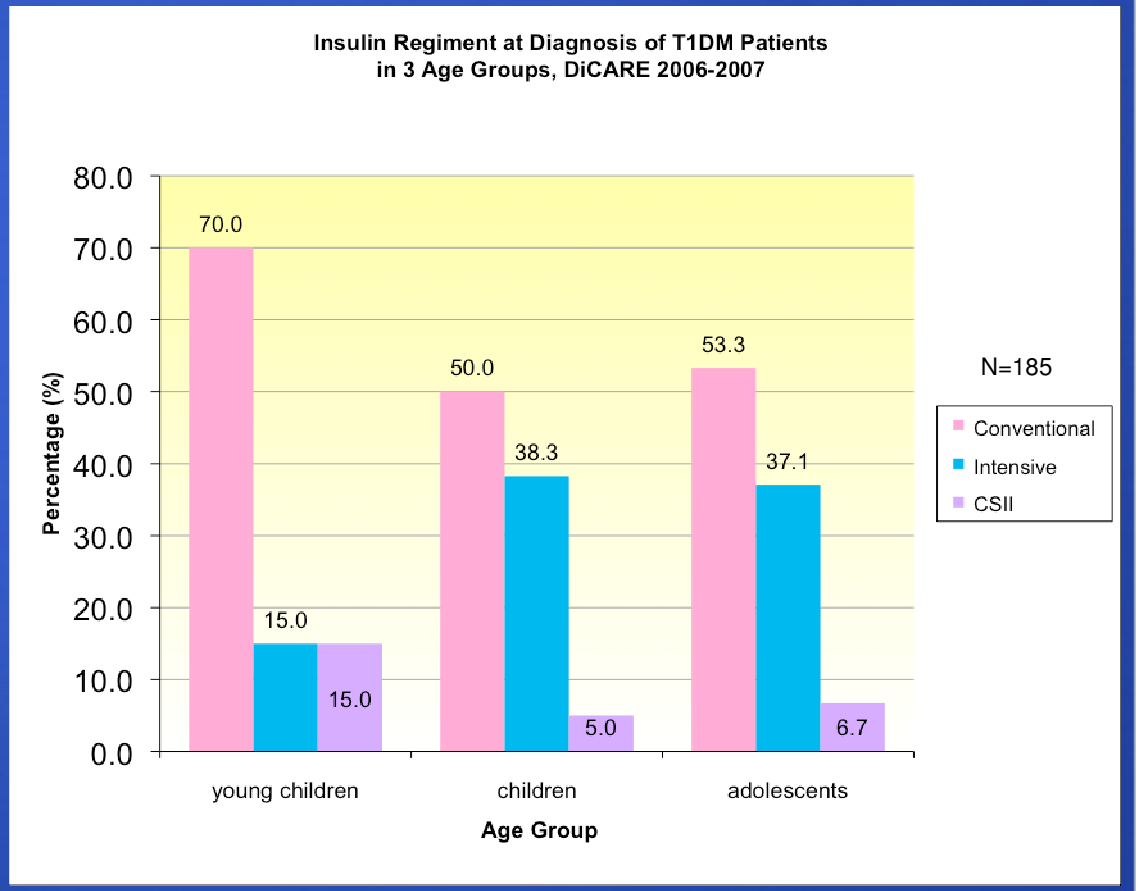
Treatment of T1DM

- Of 64.9% (185/285) T1DM patients with their insulin regimen reported,

Intensive regimen

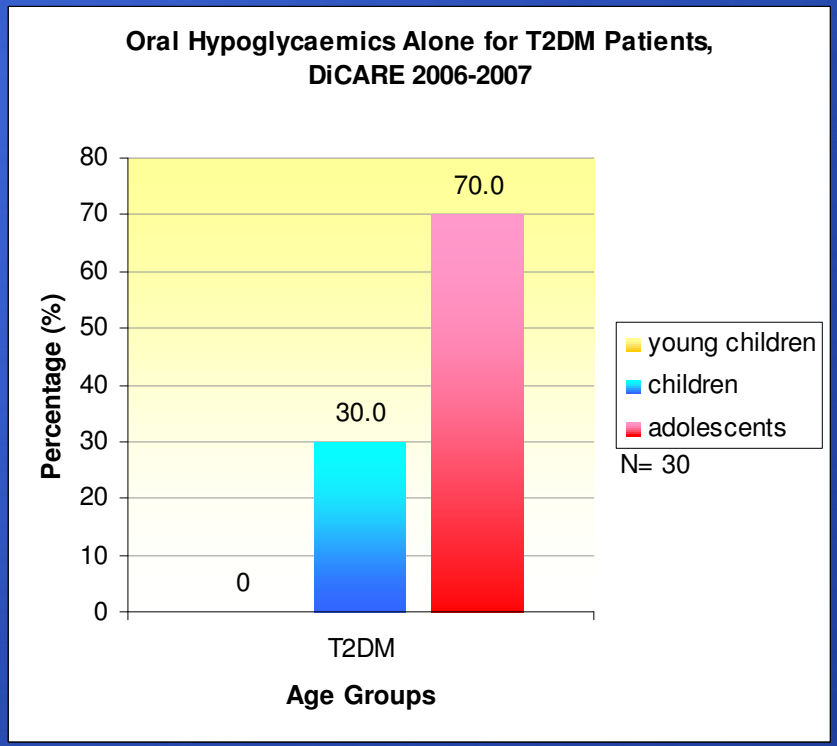
were used in:

- 30.0% of the young children
- 43.3% and 43.8% of the children and adolescents



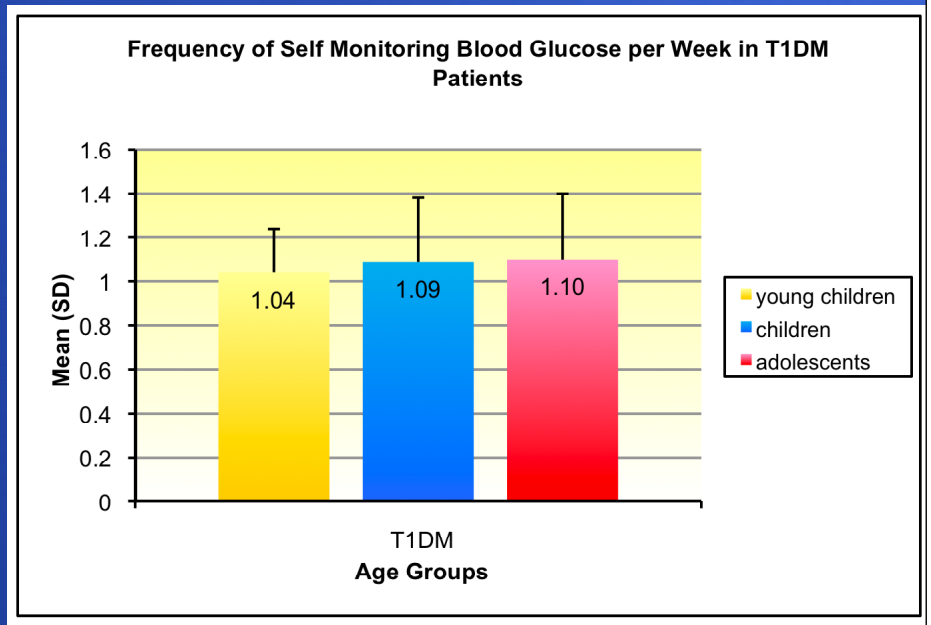
Treatment of T2DM

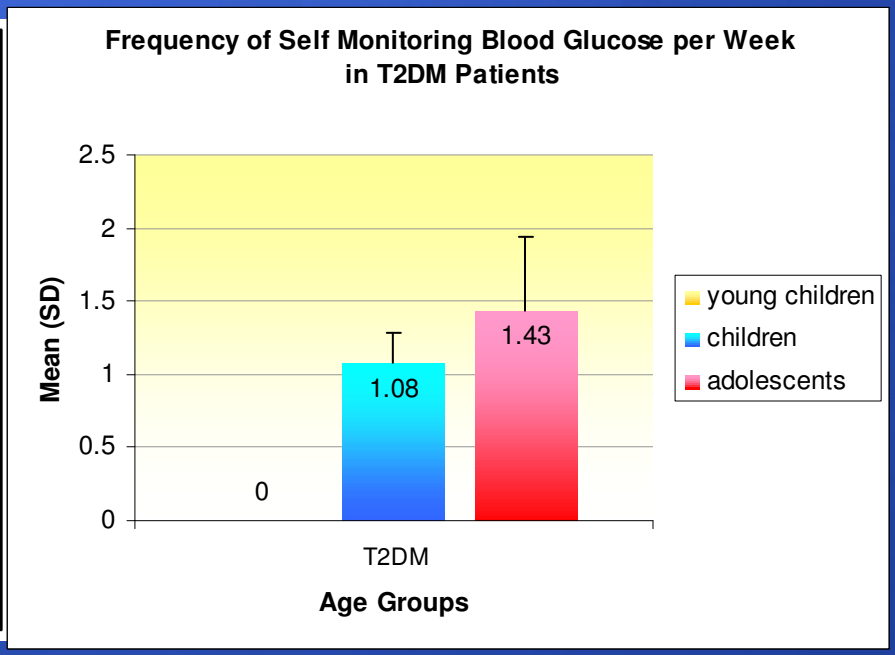
- Of 43 T2DM patients,
  - 23.3% (10/43) were on insulin injection.
  - 7.0% (3 /43) T2DM patients were on insulin plus oral hypoglycemic agent
  - 69.7% (30 / 43) were on oral hypoglycemic agent



Home Blood Glucose Monitoring

- 93.7 % (267/285) of T1DM practice HBGM
- 59.4% (41/69) of T2DM patients practice HBGM

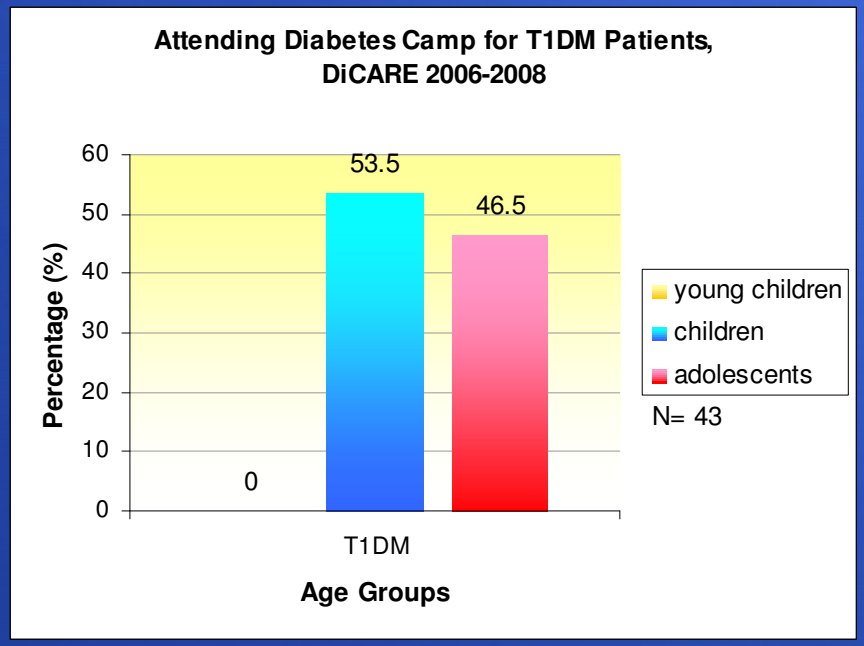




Attending Diabetes Camp

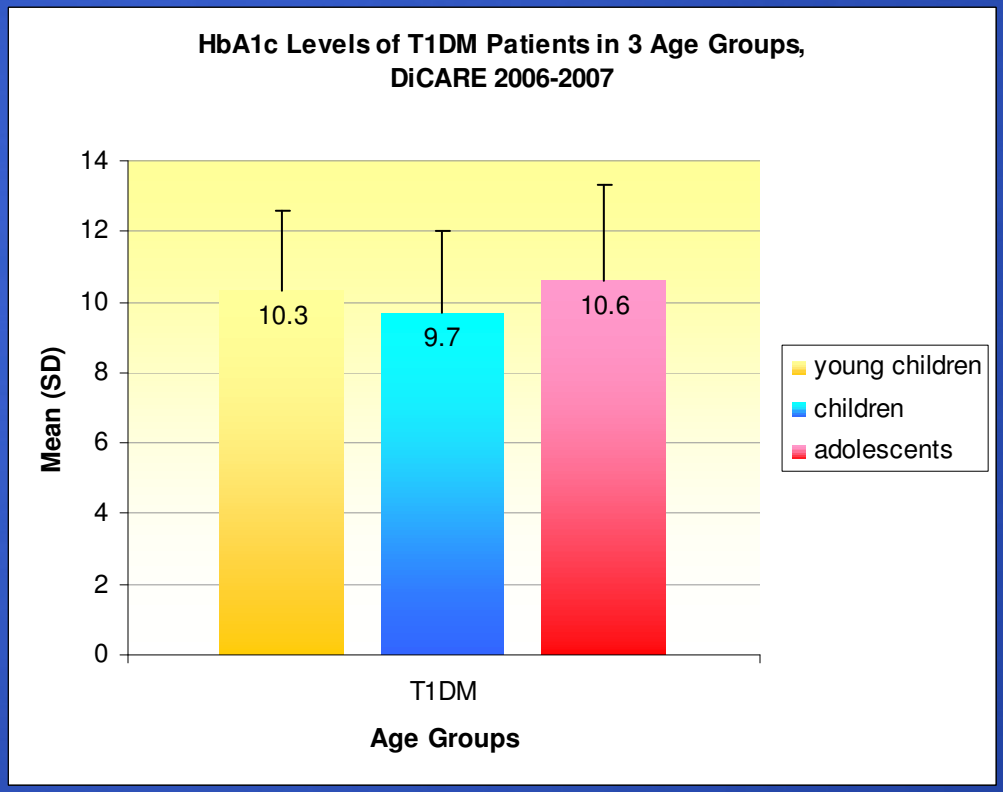
- **T1DM**
  Overall: 15.1% (43/285)
  - **Young children: 0%**
  - **Children: 53.5% (23/43)**
  - **Adolescents: 46.5% (20/43)**

- **T2DM**
  Overall: 1.4% (1/69)



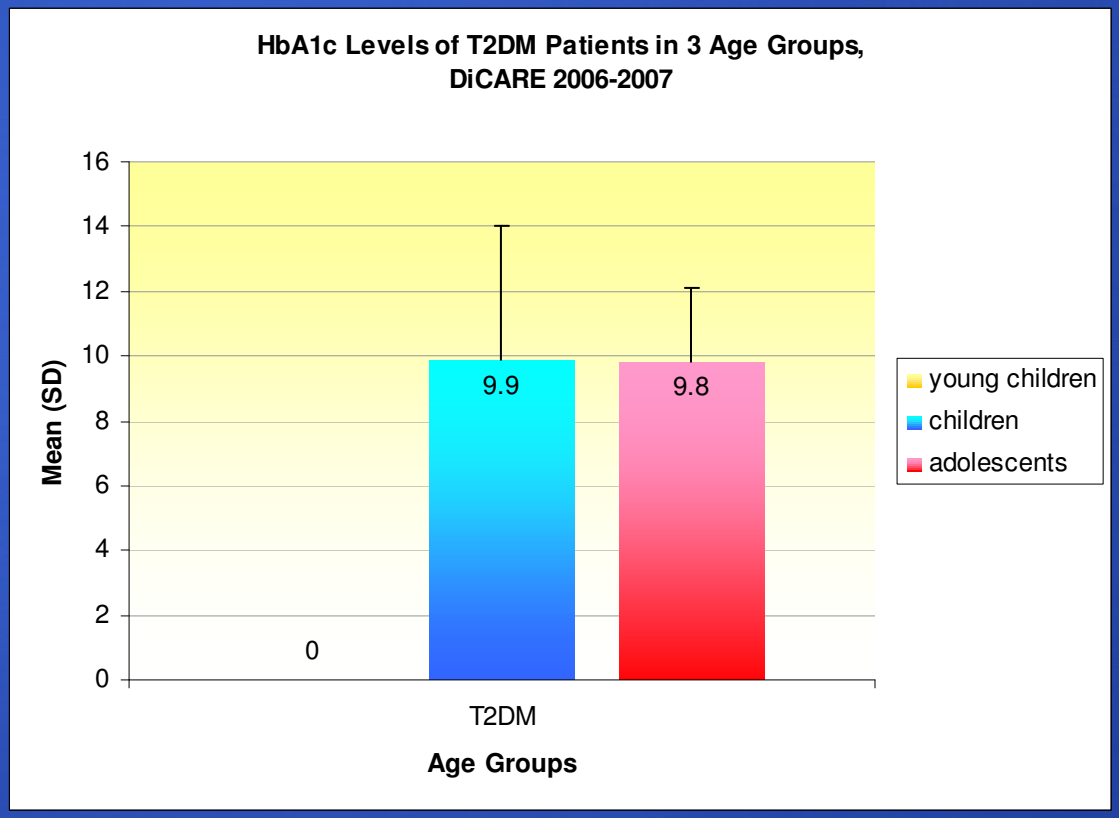
T1DM: HbA1c Level

- The mean HbA1c levels for T1DM were comparable between the 3 age groups,
  - with 10.3% (2.3), 9.7% (2.3) and 10.6% (2.7) seen in the young children, children and adolescents respectively.



T2DM: HbA1c Level

- The mean HbA1c level for T2DM was comparable between the age groups,
  - with 9.9% (4.1) and 9.8%(2.3) seen in children and adolescents respectively.

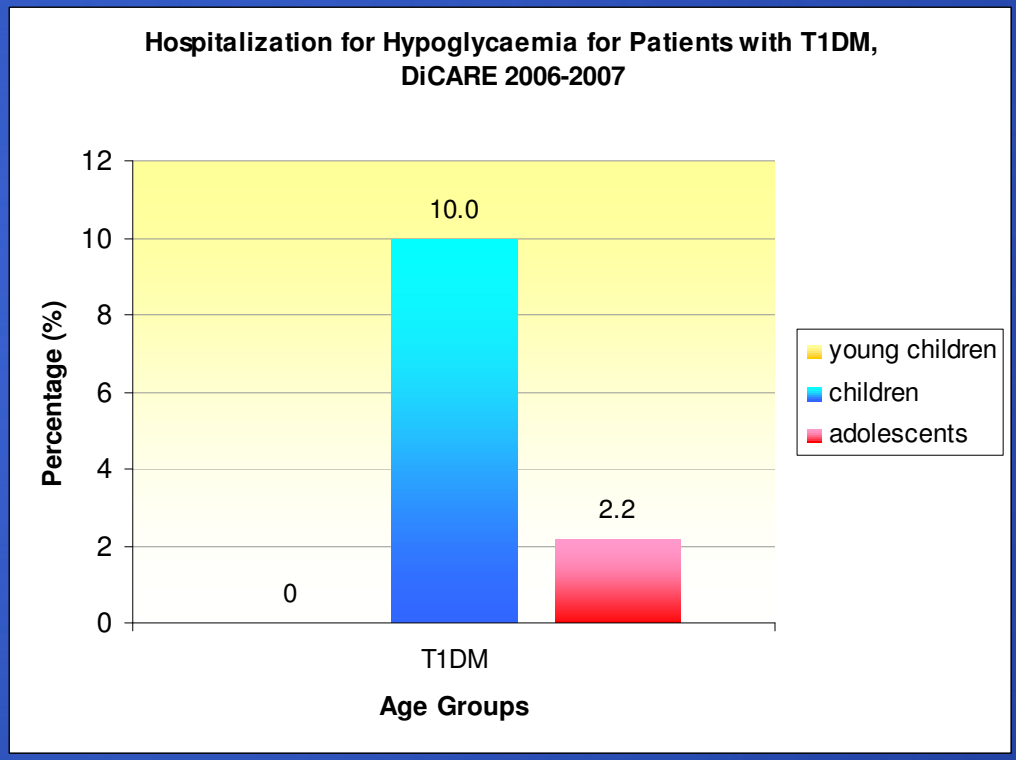


Hospitalization for DKA

- Hospitalization for DKA in T1DM was seen in:
  - 4.0% (1 in 25) of the young children
  - 5.2% (3 in 57) of the children
  - 2.1% (2 in 94) of the adolescents.
- For T2DM, there was no hospitalization for DKA in the three age groups.

Hospitalization for Hypoglycemia

- Hypoglycemia requiring hospitalization was seen in 4.4% of T1DM patients (4/90 –total hospitalization of T1DM patients) (3 children and 1 adolescent), but not in T2DM.



Summary -1

- In this registry, 74.0 % had type 1, 18.0 % had type 2 and 8.0% had other types of DM.
- T2DM is only noted in patients from 7 years onwards
- The mean HbA1c level for T1DM and T2DM were far from target.
- Only about one third of patients were on intensive regimen (30.0%,43.3% and 43.8% in the young children, children and adolescents respectively).
- About ¼ of T2DM (23.0%) patients were solely on insulin injection.

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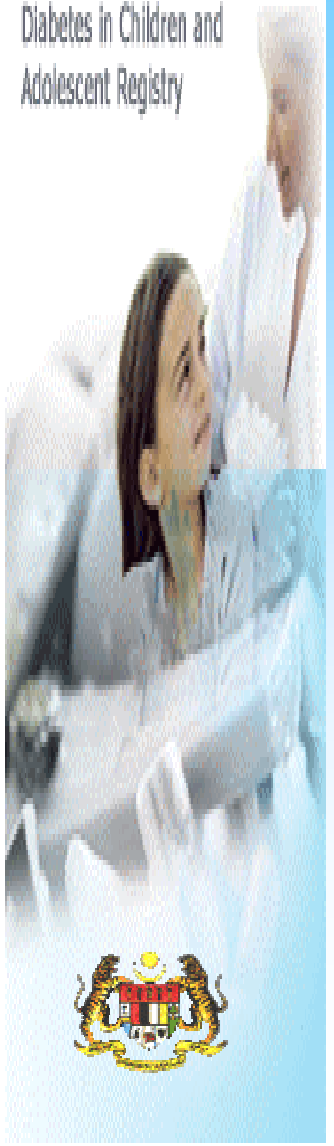

Summary - 2

- Very few (15.1% of T1DM) (1.4% of T2DM) patients attended diabetes camp
- Hospitalization for DKA was only observed in T1DM, (4.0% of the young children, 5.2% of children, 2.1% of adolescents) , and noted to be more common in children < 13 years old.
- Hypoglycemia requiring hospitalization occured in 4.4% of T1DM (3 children and 1 adolescent); none in T2DM patients.

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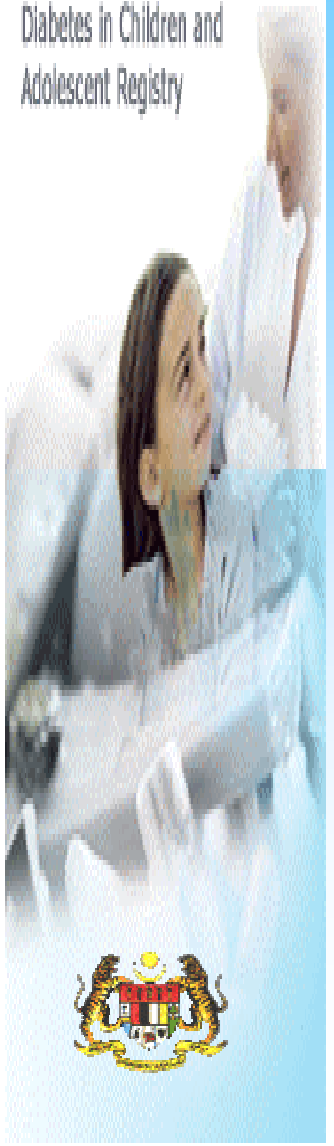

Conclusion:

The poor glycaemic control was likely due to the lack of intensification of therapy, ie the insulin regimen in T1DM and the delay in initiation of insulin in T2DM.

Other factors contributing to the poor glycaemic control and hospitalizations for DKA/hypos include lack of self monitoring practice and lack of resources to provide diabetes education and activities (eg, diabetes camp)

Despite having comparable HbA1c, DKA and severe hypoglycemia appeared to be more common in children aged <13 years, indicating that this age group may need extra attention besides general effort to improve glycaemic control for children and adolescents.

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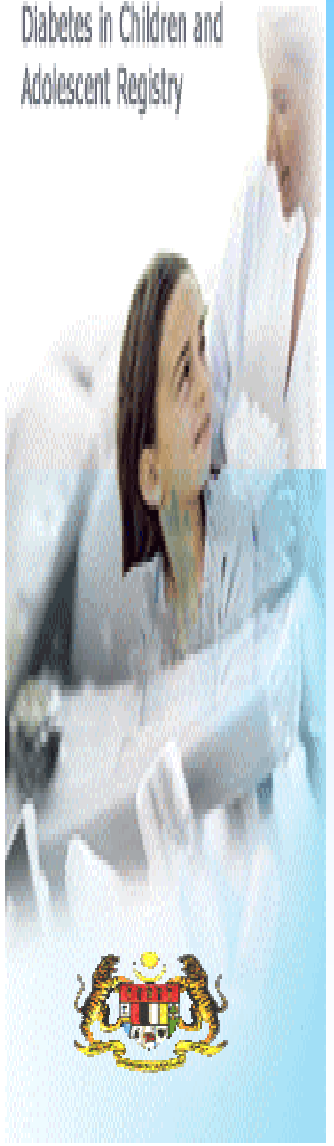

Thank You