

How to provide optimal treatment for Korean children and adolescents with type 1 diabetes

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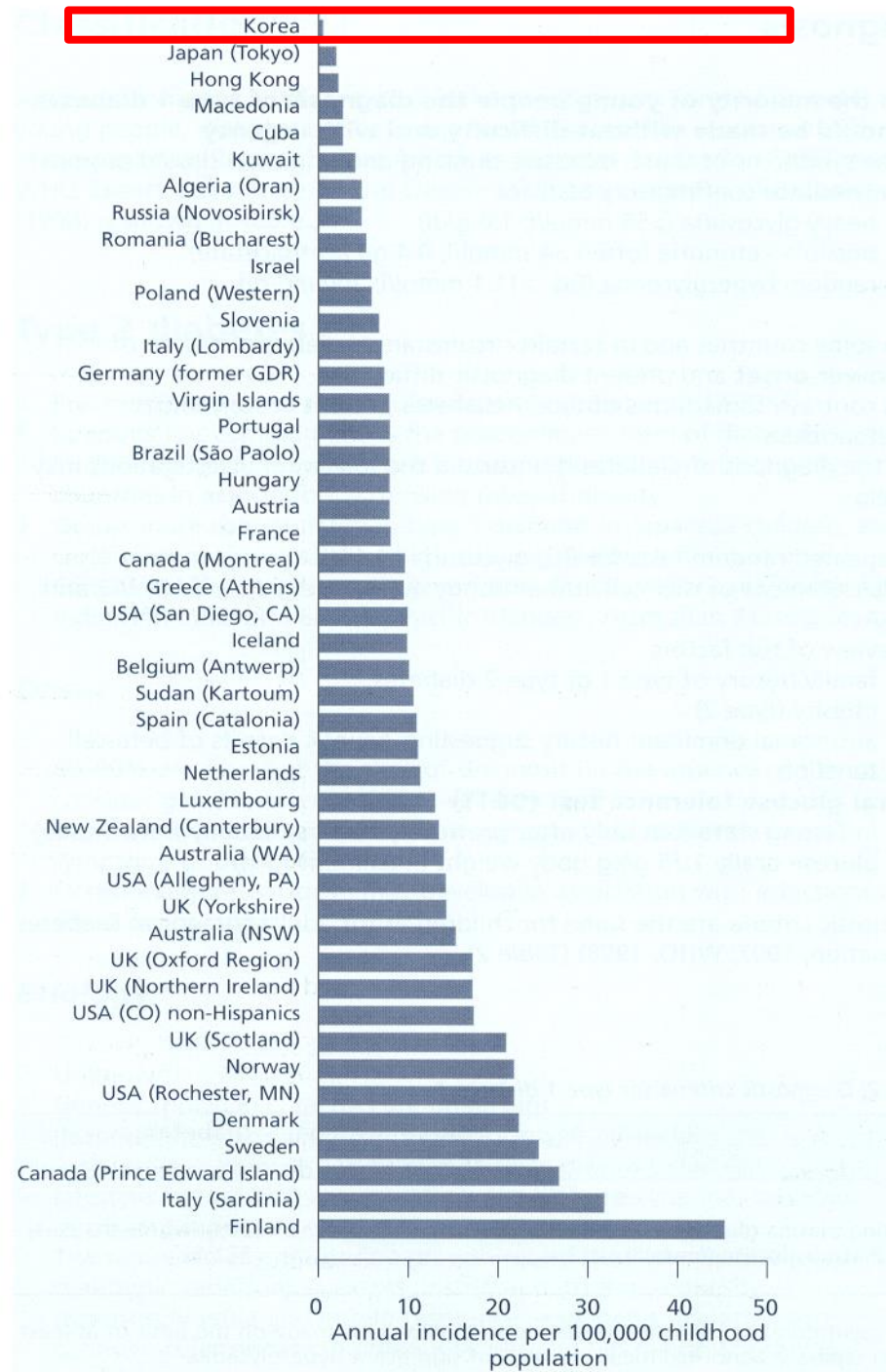
AGENDA

- T1DM in Korean children & adolescents
- Korean guidelines for T1DM
 - Diagnosis
 - Education
 - Glycemic control & Insulin treatment
 - Nutrition
 - Emergency care
 - Psychologic care

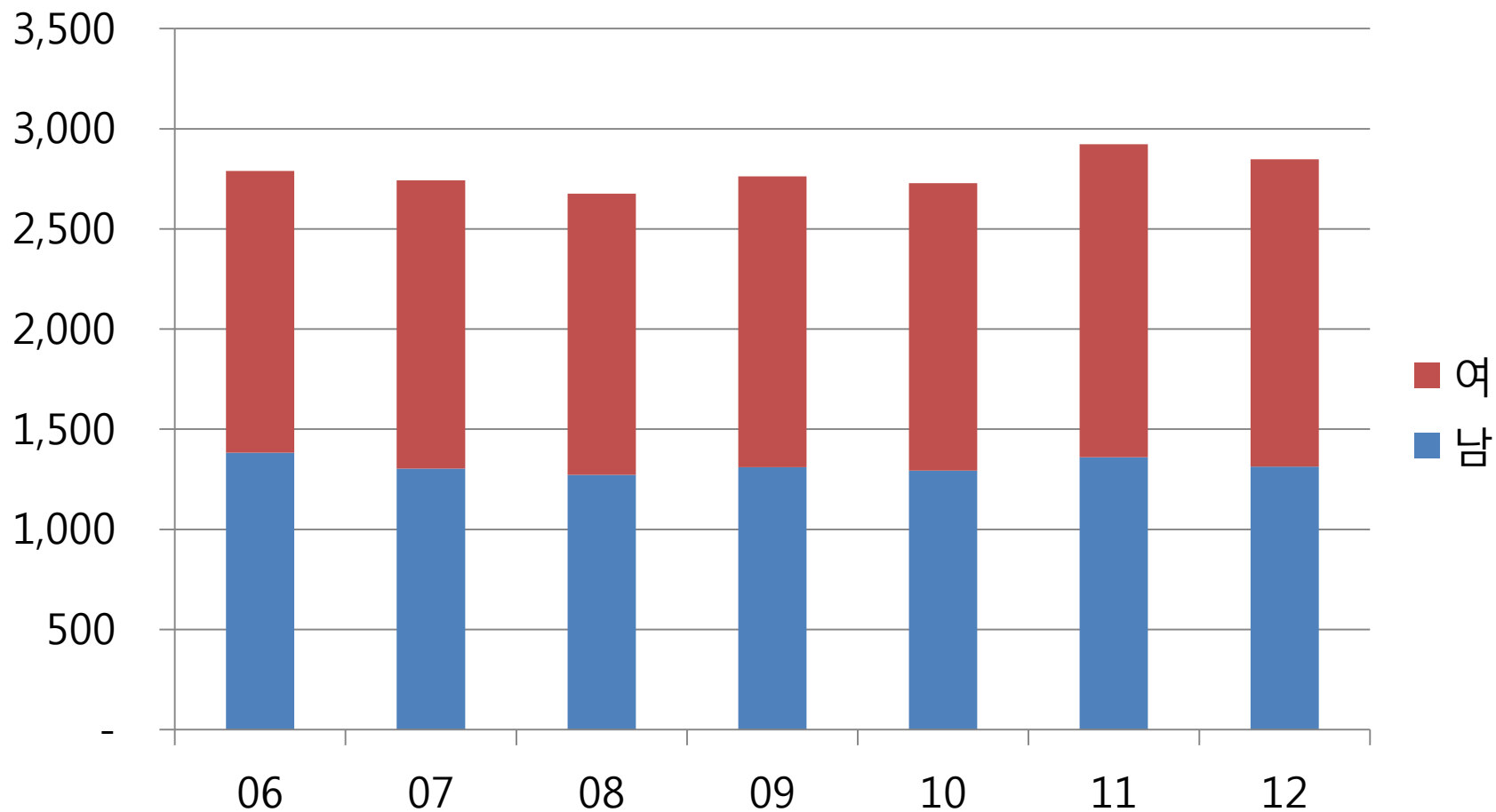
Type 1 Diabetes

in Korean children & adolescents

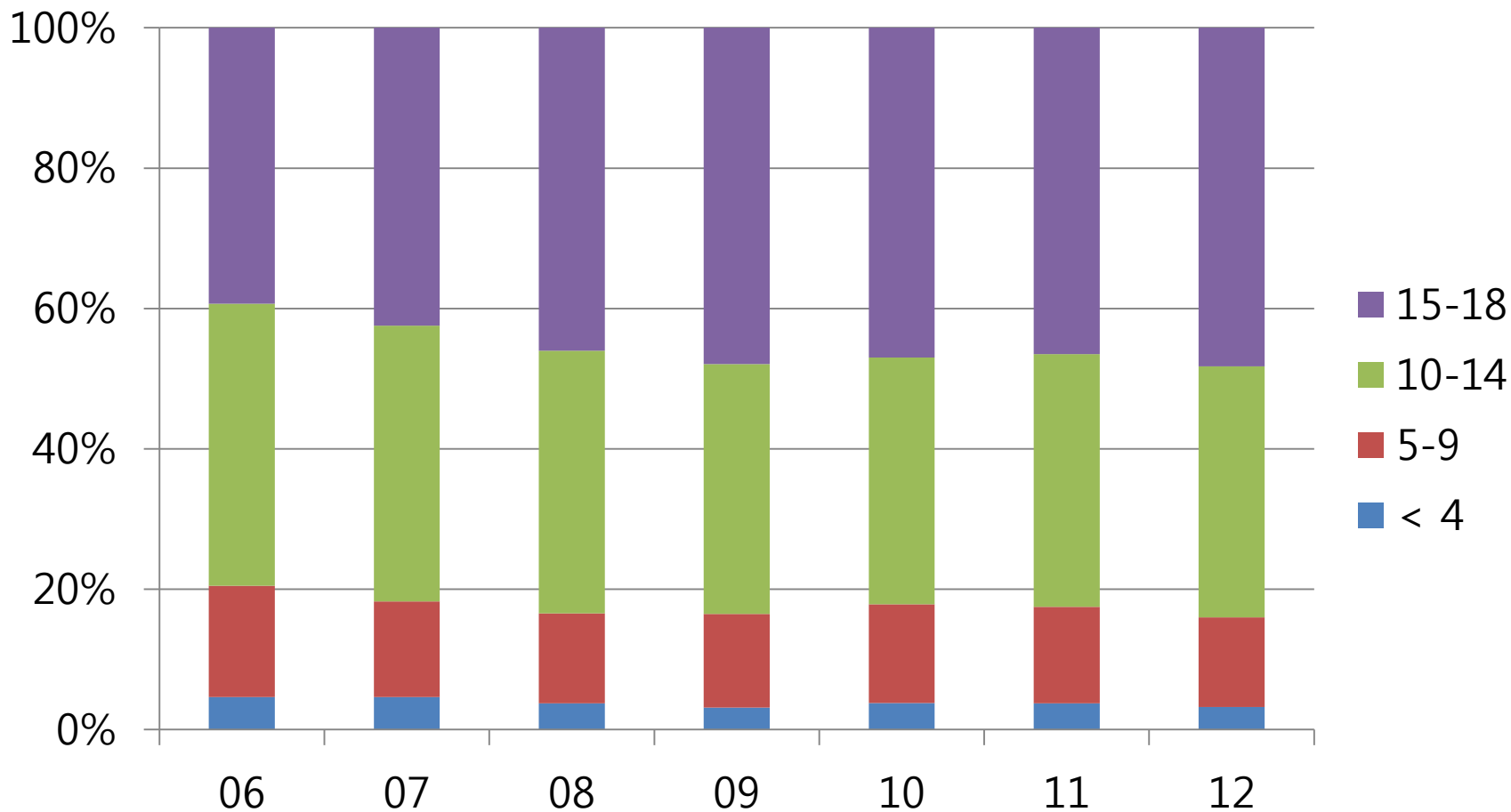
The incidence of type 1 diabetes (T1DM) was very low (1.36/100,000 population) in Korea.



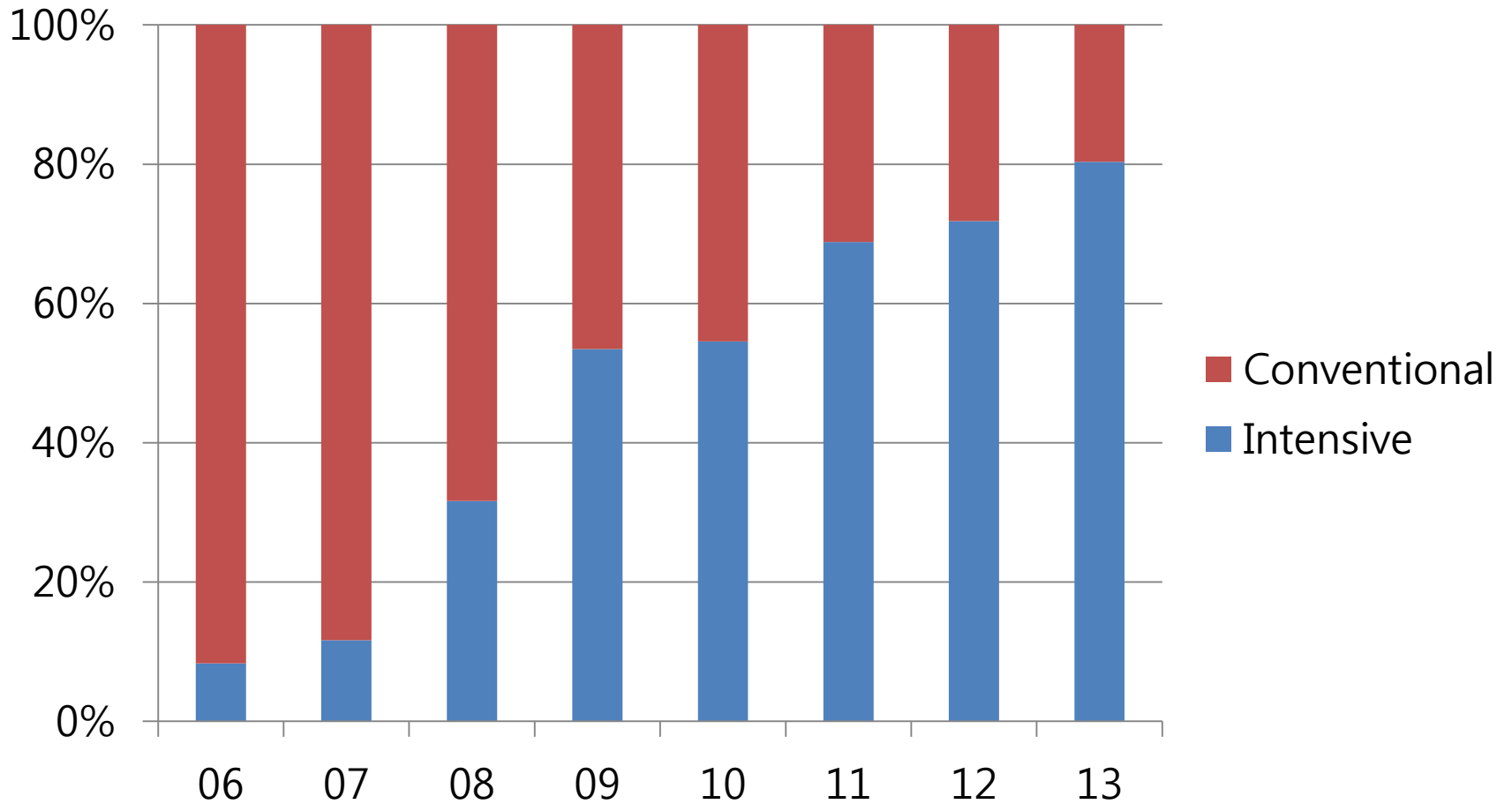
Prevalence of T1DM in youth



Age Distribution of T1DM



Trend for Insulin injection methods



Diabetes Camp

여름건강캠프

“ 2013년 여름방학을 맞이하여 경인지역 당뇨캠프 위원회에서는 제 28회 소아당뇨 여름건강캠프를 개최합니다. 재미있고 안전하고 유익한 여름건강캠프에 소아 당뇨인 여러분의 많은 관심과 참여 바랍니다. ”

| 일 시 | 2013년 8월 9일(금) ~ 8월 12일(월), 3박 4일

| 장 소 | 양평 미래내캠프 청소년 수련원 (경기도 양평군 지평면 월산리 582, 홈페이지 <http://yangpyeong.mirinaecamp.com/>)

| 참가대상 | 초등학교 3학년 ~ 고등학교 3학년의 인슐린 주사를 맞는 제1형 당뇨인

| 인 원 | 60명

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| 신청방법 | 인터넷으로 신청. <http://cafe.daum.net/dm365day> 접속 - 회원가입 후 [캠프] 참가 신청합니다"의 신청방법 참조

| 참가자발표 | 2013년 7월 5일(금), 캠프 홈페이지 (<http://cafe.daum.net/dm365day>) 공지

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* 주의사항 : 홈페이지 등록과 동시에 입금하여 주십시오. 모집인원보다 많은 인원이 입금하는 경우 입금이 되지 않으며, 입금이 안되는 경우 등록이 안되는 것이오니 착오 없으시기 바랍니다.

| 주 최 |  경인지역당뇨캠프위원회

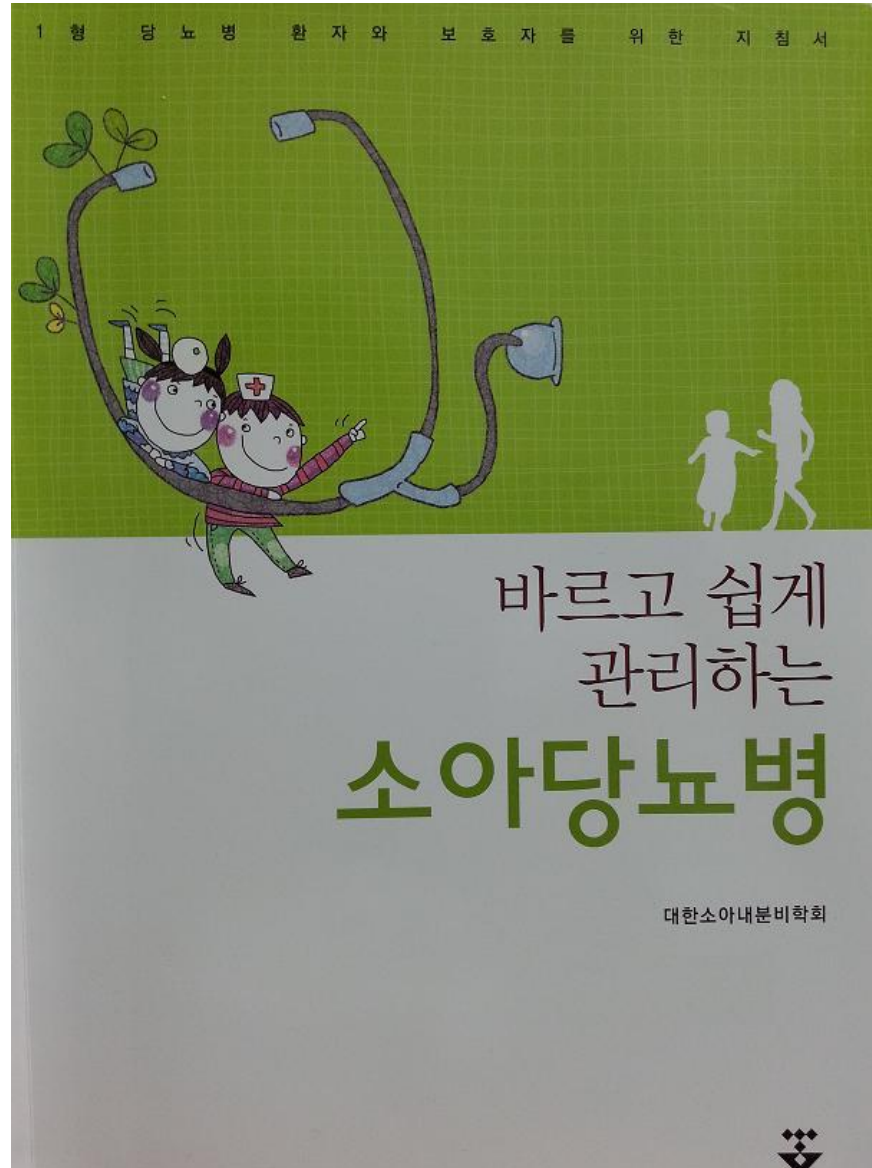
자세한 사항은 캠프 홈페이지 (<http://cafe.daum.net/dm365day>)를 참조하시기 바랍니다.



Korean Guideline

For Type 1 Diabetes (2013)

A Guidebook for Type 1 diabetes



Diagnosis of T1DM

- absolute **deficiency of insulin** secretion
 - prone to ketoacidosis
- usually, markers for **autoimmunity**
 - ICA, IAA, GAD, IA-2, ZnT-8
- the date of onset is defined as
 - the date of 1st insulin injection

Criteria for the diagnosis for DM

- One of the followings
 - Symptoms + BG \geq 11.1 mmol/L (200 mg/dL)
 - FG \geq 7.0 mmol/L (126 mg/dL)
 - PP 2hr BG \geq 11.1 mmol/L (200 mg/dL) in OGTT
 - HbA_{1c} \geq 6.5%

Clinical Characteristics of DM

Characteristic	Type 1	Type 2	Monogenic
Genetics	Polygenic	Polygenic	Monogenic
Age of onset	6 months to young adulthood	Usually pubertal (or later)	Often post pubertal except glucokinase and neonatal diabetes
Clinical presentation	Most often acute, rapid	Variable; from slow (often insidious) to severe	Variable (may be incidental in glucokinase)
Autoimmunity	Yes	No	No
Ketosis	Common	Uncommon	Common in neonatal diabetes, rare in other forms
Glycemia	High	Variable	Variable
Obesity	Population frequency	Increased frequency	Population frequency
Acanthosis nigricans	No	Yes	No
Frequency (% of all diabetes in young people)	Usually 90%+	Most countries < 10% (Japan 60-80%)	1-2%
Parent with diabetes	2-4%	80%	90%

from 2011 IDF-ISPAD guidelines for DM

Diabetes Education

- should be delivered by **interdisciplinary pediatric diabetes team**
 - as a minimum a doctor, nurse and dietitian
 - acknowledging their different skills with a clear understanding of the special and changing needs of young people and their families as they grow through the different stages of life

Diabetes Education

- learner-centered
- should include
 - immediate knowledge-based education
 - practical survival skills
- followed by graduated levels of education

Treatment	Quality indicator
Normal growth	Percentage of patients with height < 3 rd percentile
Normal physical development	Average BMI in diabetic children compared with non-diabetic children Percentage of patients with BMI > 85 th percentile
Normal pubertal development	Mean age at menarche in girls with diabetes
Low rate of acute complications	Frequency of severe hypoglycaemia in all patients Frequency of severe hypoglycaemia in all patients younger than 5 years of age Frequency of admission because of diabetic ketoacidosis after onset of diabetes
Prevention of microvascular complications	Percentage of patients with eye exams during the past year Percentage of patients with urine albumin excretion rate determined during the past year Mean HbA _{1c} achieved in all patients Mean HbA _{1c} achieved in adolescent patients Percentage of patients beyond 5 years of diabetes with diabetic retinopathy Percentage of patients beyond 5 years of diabetes with diabetic nephropathy Percentage of patients with persistent microalbuminuria not receiving ACE-inhibitors (or other interventions for microalbuminuria)

Prevention of cardiovascular complications	<p>Percentage of patients with lipid levels available during the past year</p> <p>Percentage of patients with blood pressure recordings available during the past year</p> <p>Percentage of patients with hypertension</p> <p>Percentage of patients with hyperlipidaemia</p> <p>Percentage of patients with hypertension not receiving antihypertensive therapy</p> <p>Percentage of patients with hyperlipidaemia not receiving lipid-lowering therapy</p> <p>Mean HbA_{1c} achieved in all patients</p> <p>Mean HbA_{1c} achieved in adolescent patients</p>
Optimal social adjustment	<p>Average number of days spent in hospital</p> <p>Average number of days where school was missed because of diabetes</p> <p>Percentage of patients on flexible insulin regimen (beyond remission)</p> <p>QOL in patients with diabetes</p> <p>QOL in parents of patients with diabetes</p> <p>Percentage of patients missing appointments</p>
Number of visits annually	<p>Percentage of patients with three or more, ambulatory visits annually</p> <p>Number of visits per patients per year and mean and median number of visits per patient per year</p>

BMI, body mass index; HbA_{1c}, glycated haemoglobin; QOL, quality of life.

Glycemic Control

- self-monitoring of blood glucose (SMBG)
 - should be **prescribed** at a frequency
 - usually **four to six times a day**
- ketone testing (urine or blood)
 - during illness with fever and/or vomiting
 - BG > 14 mmol/L (250 mg/dl)
 - persistent polyuria with elevated blood glucose
 - especially for small children & patients on insulin pumps.

Glycemic Control

- **HbA_{1c}** monitoring
 - 4~6 times/year in younger children
 - 3~4 times/year in older children
 - target < **7.5%** for all age-groups
- glycemic target must be increased
 - when **severe hypoglycemia** occurs
 - when **hypoglycemia unawareness** is present

Monitoring of Hypoglycemia

- Hypoglycemia should be prevented because:
 - Its occurrence is frequently predictable
 - It is often associated with significant psychosocial dysfunction
 - It can lead to permanent long-term sequale and is potentially life threatening

Monitoring of Hypoglycemia

- Hypoglycemia treatment requires:
 - An immediate source of **glucose or sucrose**.
 - Equipment for blood glucose measurement for confirmation and safe management of hypoglycemia.
 - **Glucagon**
 - **IV dextrose**
 - if glucagon is not available
 - if the hypoglycemia is unresponsive to glucagon.

Insulin Treatment

- should be started ASAP after diagnosis
 - to prevent metabolic decompensation and diabetic ketoacidosis (DKA)
- needs good technical skill
- RI + NPH vs. rapid + long acting insulin
- insulin storage after 1st usage
 - 3 months if kept at 2~8°C
 - 4 weeks if kept at room temperature

Nutritional Management

- specialist pediatric dietitian
 - at diagnosis
 - 2~4 following session in the 1st year
 - ongoing annual nutrition counselling and reassessment
- conventional vs. intensive care (multiple)
 - conventional (calori-based)
 - intensive care (carbohydrate-based)

Nutritional Management

- Recommended daily intakes of **vitamins** and **minerals** should be achieved for general health (and vascular protection)
- Monitoring of at risk nutrients
 - i.e.) iron and calcium
- Dietary advice/meal planning should be **revised regularly**

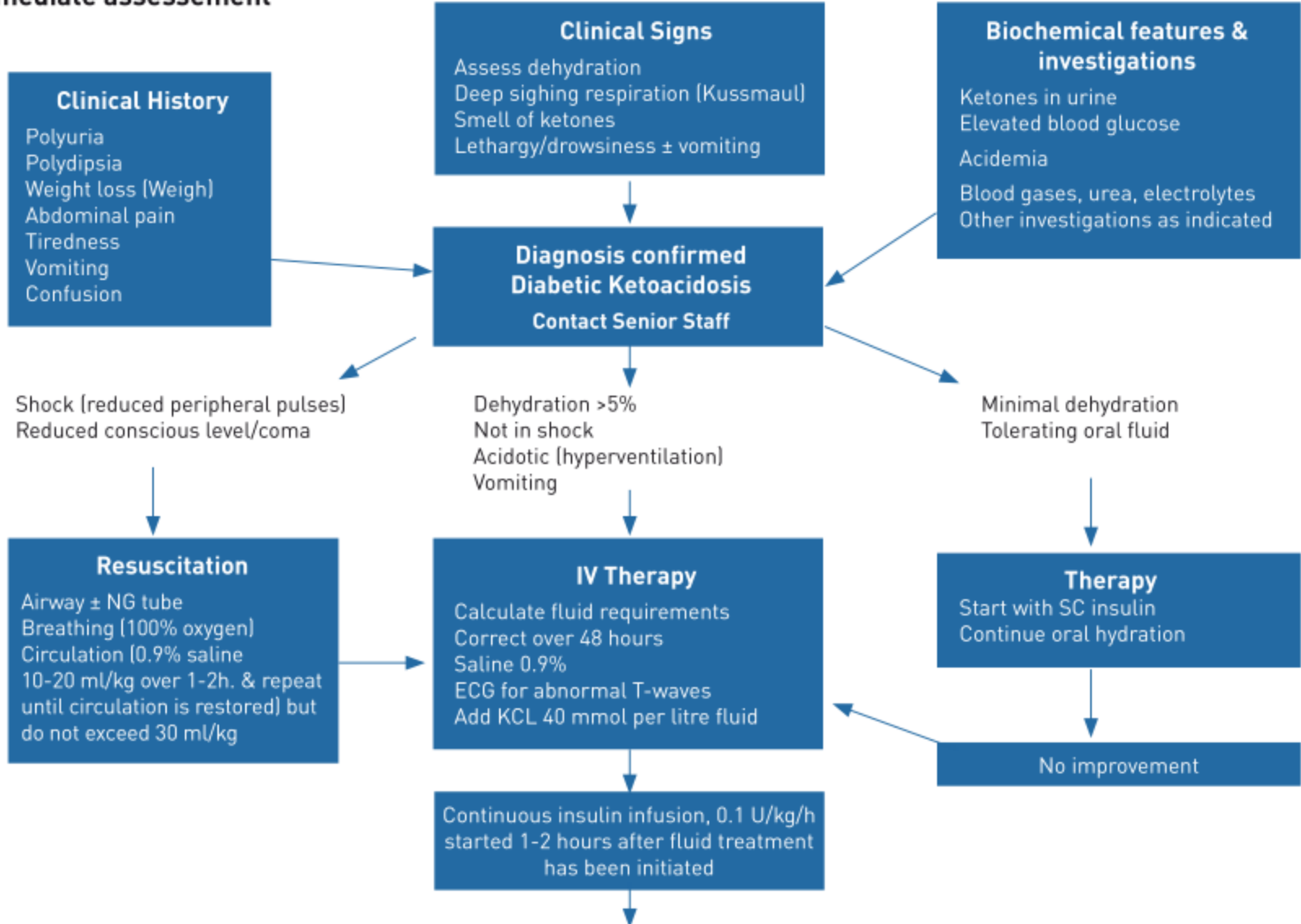
Emergency (DKA)

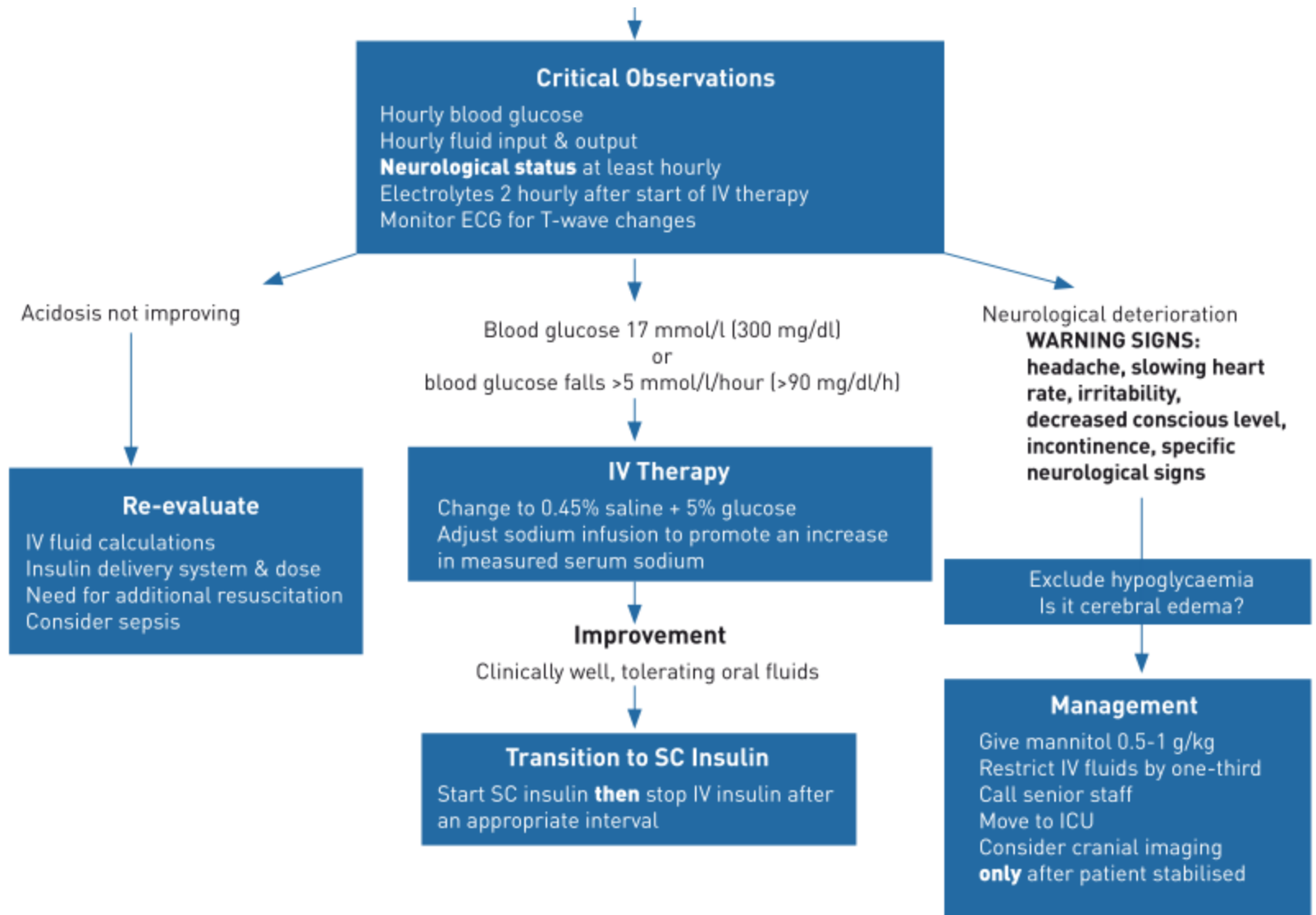
- Check weight, severity of dehydration, level of consciousness
- Laboratory work up
 - plasma glucose, electrolytes, BUN/Cr, pH, Ca/P, Mg
 - ketones (urine or blood)
 - R/O infection

Emergency (DKA)

- Supportive measures
 - keep airway, IV catheter for blood sampling, EKG monitoring, circulation, infection control
- Fluids and salt replacement
 - begin immediately with 0.9% saline
 - correct acidosis & electrolyte deficit (Na^+ K^+)
- Insulin therapy
 - plasma glucose decrease at a rate of less than 100 mg/dL/hr

Immediate assesement





Algorithm for the management of diabetic ketoacidosis

Source: adapted from Dunger et al. Karger Publ. 1999

Exercise

- Regular exercise and participation in sport
- Decreased insulin dose prior to exercise
- 1-1.5 g CHO/kg/hour during exercise
- Avoid exercise if pre-exercise BG > 14 mmol/L, 250 mg/dL with ketonuria/ketonaemia.

Sick Day Management

Ketones		Blood glucose				
Blood ketones mmol/l	Urine ketones	< 5.5 mmol/l < 100 mg/dl	5.5- 10 mmol/l 100-180 mg/dl	10-14 mmol/l 180-250 mg/dl	14-22 mmol/l 250-400 mg/dl	> 22 mmol/l > 400 mg/dl
< 0.6	Negative or trace	Do not give extra insulin. May need to consider mini-doses of glucagon (see Table 1 if <4mmol [70 mg/dl])	No need to worry.	Increase dose of insulin for next meal if BG is still elevated	Give extra 5% of TDD or 0.05 U/kg	Give extra 10% of TDD or 0.1 U/kg. Repeat if needed.
		Check BG and ketones again in two hours.				
0.6-0.9	Trace or small	Starvation ketones. Extra carbohydrates and fluid are needed.	Starvation ketones. Extra carbohydrates and fluid are needed.	Give extra 5% of TDD or 0.05 U/kg	Give extra 5-10% of TDD or 0.05-0.1 U/kg.	Give extra 10% of TDD or 0.1 U/kg. Repeat if needed.
1.0-1.4	Small or Moderate	Starvation ketones. Extra carbohydrates and fluid are needed.	Starvation ketones. Extra carbohydrates and fluid are needed. Give ordinary bolus dose.	Extra carbohydrates and fluid are needed. Give 5-10% of TDD or 0.05-0.1 U/kg.	Give extra 10% of TDD or 0.1 U/kg	Give extra 10% of TDD or 0.1 U/kg.

1.5-2.9	Moderate or large	High levels of starvation ketones. Check BG meter. Recheck BG and ketones. Extra carbohydrates and fluid are needed.	High levels of starvation ketones. Extra carbohydrates and fluid are needed. Give 5% of TDD or 0.05 U/kg. Repeat when blood glucose has risen.	Extra carbohydrates and fluid are needed. Give 10% of TDD or 0.1 U/kg.	Give extra 10-20% of TDD or 0.1 U/kg. Repeat dose after 2 hours if ketones do not decrease.
		May need IV glucose if child cannot eat or drink. Risk of developing ketoacidosis! Check BG and ketones every hour.			
≥ 3.0	Large	Very high levels of starvation ketones. Check BG meter. Recheck BG and ketones. Extra carbohydrates and fluid are needed. "	Very high levels of starvation ketones. Extra carbohydrates and fluid are needed. Give 5% of TDD or 0.05 U/kg. Repeat when blood glucose has risen. "	Extra carbohydrates and fluid are needed. Give 10% of TDD or 0.1 U/kg.	Give extra 10-20% of TDD or 0.1 U/kg. Repeat dose after 2 hours if ketones do not decrease.
		There is an immediate risk of ketoacidosis if the blood ketone level is ≥ 3.0 mmol/l. Insulin treatment is needed urgently! Consider evaluation of patient at emergency department.			

Psychological Care

- Monitor the school performance
- General family functioning
 - conflict, cohesion, adaptability, parental psychopathology
- Emotional behavior at the personal level
 - the early identification of depression
- diabetes-related functioning
 - communication
 - parental involvement and support
 - roles and responsibilities for self-care behaviors

Diabetes in Adolescence

- **Transitional** phase of development between childhood and emerging adulthood
- **Training** to become an independent adult – success and failure
- Time when **vascular complications** first become apparent.

Complications

- Screening for complication - from age 11 years with two years diabetes duration
 - Blood pressure
 - Retinopathy
 - Microalbuminuria
 - Fasting blood lipid
 - Neuropathy

CONCLUSIONS

Limitations

- The articles or reports about T1DM in pediatrics were **not many** in Korea
- Most of pediatric endocrinologists individually met only **a few T1DM patients** in practice.

In the Future...

- To know and provide optimal treatment for the youth with T1DM in Korea, **multicenter database or registry** should be required as soon as possible
- **Co-work** with endocrinologist for adult should be required

**Thank you for your
attention**