**INTRODUCTION**

**Nature and context of the problem:**

There are large discrepancies between diabetic associations worldwide in defining targeted value of HbA1c. Taking into consideration the aforementioned fact and large differences in metabolic control of paediatric patients with type 1 diabetes mellitus, a question about the real impact of those guideline values on metabolic control still needs to be answered.

**Aim of review:**

To compare achieved HbA1c concentrations with targeted guideline values in paediatric patients with DM1 worldwide.

**Rationale:**

Measurement of HbA1c concentration is a valid clinical test for metabolic control of patients with diabetes mellitus. The guideline values for HbA1c differ among countries, especially when paediatric population is taken into consideration. There is hardly evidence that could assess which guidelines are the most appropriate to accurately control this disease among patients under 18 yrs.. Therefore we aim in this review to compare the HbA1c values after 1 yr. after diagnosis and appropriate treatment with relation to guideline values between different countries worldwide.

**RESEARCH QUESTION**

**Population**

Paediatric population (<18 yrs.) with diagnosed T1DM and treated with insulin (Multiple Daily Injections, Continuous Subcutaneous Insulin Infusion) for more than 1 yr.

**Reference standard**

Guideline values that were applied at the moment when the study was on-going.

**Outcomes**

HbA1c concentration (mean±SD) among participants at the beginning of each study; difference (delta (Δ)) of [HbA1c] values between guideline and actual HbA1c value in each study; subgroups in studies with HbA1c values below 10%; regarding gross-domestic product (GDP) and prevalence of acute diabetic complications

**Study designs included in our review**

Registries, interventional trials, cross-sectional trials will be included in the review as well as case series with start date in 2008 and number of participants more than 50, because such case series with lower number of patients often include preferred groups, e.g. only good metabolic control patients

**SEARCH PLAN**

Scoping searches
Scoping searches*, to identify systematic reviews and health technology assessments on this topic will be undertaken in the following:

**Cochrane Database of Systematic Reviews (CDSR)**  
[http://www.library.nhs.uk/default.aspx](http://www.library.nhs.uk/default.aspx)

**Database of Reviews of Effects (DARE)**  
[http://www.crd.york.ac.uk/crdweb/](http://www.crd.york.ac.uk/crdweb/)

**Health Technology Assessment Database (HTA)**  
[http://www.crd.york.ac.uk/crdweb/](http://www.crd.york.ac.uk/crdweb/)

**Agency for Health Technology Assessment in Poland (AHTAPol)**  
[http://www.aotm.gov.pl](http://www.aotm.gov.pl)  
*based on the ARIF protocol - [http://www.arif.bham.ac.uk/strategy.shtml](http://www.arif.bham.ac.uk/strategy.shtml) [accessed 7-2-11]*

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### Main review searches

The main aim of the search will be to systematically identify studies. The following data sources will be searched:

- Bibliographic databases including Cochrane Library (CENTRAL), MEDLINE, EMBASE
- Citation lists of relevant studies
- Contact with experts in the field
- Conference proceedings – any specific paediatric conferences
- Treatment algorithms; Guidelines
- Previous trials unit protocols.

Up to the moment guideline values will be obtained from official websites of national associations for diabetes in each of selected countries.

No language restrictions will be applied. We will take into consideration studies no older than five years. If we find a systematic review and it is reliable one (after critical appraisal) then we will narrow our search date to update the evidence we have.

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### Example of search strategy
Database: Embase <1996 to 2013 Week 34>
Search Strategy:
--------------------------------------------------------------------------------
1 paediatric.mp. or pediatrics/ (72936)
2 limit 1 to yr="2008 -Current" (39429)
3 paediatric.mp. or pediatrics/ (210372)
4 limit 3 to yr="2008 -Current" (116292)
5 2 or 4 (135620)
6 diabetes.mp. or diabetes mellitus/ (463736)
7 limit 6 to yr="2008 -Current" (259967)
8 insulin.mp. or insulin treatment/ or insulin dependent diabetes mellitus/ or insulin/ (360982)
9 limit 8 to yr="2008 -Current" (185073)
10 insulin therapy.mp. or insulin treatment/ (16700)
11 limit 10 to yr="2008 -Current" (8835)
12 9 or 11 (185073)
13 haemoglobin.mp. or hemoglobin/ (79530)
14 limit 13 to yr="2008 -Current" (46243)
15 glycosylated hemoglobin/ or hemoglobin A1c/ or hemoglobin A/ or hemoglobin analysis/ or hemoglobin blood level/ or hemoglobin.mp. or hemoglobin/ (147579)
16 limit 15 to yr="2008 -Current" (86235)
17 HbA1c.mp. or hemoglobin A1c/ (42210)
18 limit 17 to yr="2008 -Current" (28330)
19 14 or 16 or 18 (88821)
20 5 and 7 and 12 and 19 (759)

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Making inclusion/exclusion decisions.

Three reviewers will independently assess papers for inclusion/exclusion criteria using the title and articles’ abstract. Disagreements will be resolved by discussion. Full paper copies of relevant or potentially relevant references will be obtained for detailed examination. Foreign language publications will be screened using English abstracts. Translations will be obtained where necessary or were possible, within the resources and timeframe of the project.

DATA HANDLING

Data extraction strategy

Data will be extracted using a pre-designed data extraction form, by one reviewer and checked by a two other reviewers. Where information is missing authors will be contacted, but within the resources and timeframe of the project. Data from studies with multiple publications will be extracted and reported as a single study, in case of discrepancies the publication with biggest representative population will be utilized.

Methods of analysis
A descriptive analysis of included studies will be undertaken and relevant evidence will be categorised and summarised in tables (excel and word). GLM model for regression analysis will be used since no intervention is assessed. When appropriate, weighted variable will be used e.g. GPD per capita, number of patients included into the study.

Identified research evidence will be appropriately interpreted according to the assessment of methodological strengths and weaknesses and the possibility of potential biases.

The following subgroup analyses will be undertaken:
- High-income countries’ HbA1c median values.
- Median value of HbA1c with exclusion of measurements higher than 10%

**Data extraction**

Standard data extraction table designed for this study will be used.  
General study characteristics: Abstract/Full-text article, Critical evaluation, Type of Study  
Population: Country, GPD per capita, Number of patients included into the study, Age, T1DM duration  
Control: Guideline HbA1c targeted values  
Outcomes: Primary; secondary; HbA1c value, ΔHbA1c

**TIMELINES**

**Meeting and Project Schedule**

1st quarter of August 2013 – Presentation of the protocol and preliminary searches (scoping searches); allocation of work  
Up to 26th August 2013 – Systematic search and screening by title and abstract: September 2013 – Obtaining full-text papers  
Till the end of May 2014 – assessment of eligibility (PIROS)  
June – September 2014 – Data extraction [HbA1c]  
1st quarter of October 2014 – Search for guideline values  
Till the end of November 2014 – e-mail contact with authors for data complementation  
December 2014 – Data analysis  
January 2015 – Conclusions and drafting the full-text article  
End of January 2015 – Full-text article (supplementary data) submission.
Supplementary material 2. Search strategy examples.

Database: Embase <1996 to 2013 Week 34> Search Strategy:

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1     paediatric.mp. or pediatrics/ (72936)  
      limit 1 to yr="2008 -Current" (39429)  
      paediatric.mp. or pediatrics/ (210372)  
2      limit 3 to yr="2008 -Current" (116292)  
3      2 or 4 (135620)  
4      diabetes.mp. or diabetes mellitus/ (463736)  
5      limit 6 to yr="2008 -Current" (259967)  
6      insulin.mp. or insulin treatment/ or insulin dependent diabetes mellitus/ or insulin/ (360982)  
7      limit 8 to yr="2008 -Current" (185073)  
8      insulin therapy.mp. or insulin treatment/ (16700)  
9      limit 10 to yr="2008 -Current" (8835)  
10     9 or 11 (185073)  
11     haemoglobin.mp. or hemoglobin/ (79530)  
12     limit 13 to yr="2008 -Current" (46243)  
13     glycosylated hemoglobin/ or hemoglobin A1c/ or hemoglobin A/ or hemoglobin analysis/ or hemoglobin blood level/ or hemoglobin.mp. or hemoglobin/ (147579)  
14     limit 15 to yr="2008 -Current" (86235)  
15     HbA1c.mp. or hemoglobin A1c/ (42210)  
16     limit 17 to yr="2008 -Current" (28330)  
17     14 or 16 or 18 (88821)  
18     5 and 7 and 12 and 19 (759)  
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Database: Ovid MEDLINE(R) <1946 to August Week 2 2013> Search Strategy:

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1     Infant, Newborn/ or Infant/ or Child/ or Pediatrics/ or paediatric.mp. or Child, Preschool/ or Adolescent/ (2870946)  
2      limit 1 to yr="2008 -Current" (580408)  
3      pediatric.mp. or Pediatrics/ (187262)  
4      limit 3 to yr="2008 -Current" (59566)  
5      2 or 4 (586699)  
6     Diabetes Mellitus, Type 1/ or diabetes.mp. (389842)  
7      limit 6 to yr="2008 -Current" (125463)  
8      Insulin/ or insulin therapy.mp. (161735)  
9      limit 8 to yr="2008 -Current" (31546)  
10    Hemoglobin A, Glycosylated/ or haemoglobin.mp. (45341)  
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11  limit 10 to yr="2008 -Current" (14104)
12  Hemoglobin A, Glycosylated/ or glycated.mp. (26259)
13  limit 12 to yr="2008 -Current" (10818)
14  11 or 13 (15239)
15  Hemoglobin A, Glycosylated/ or HbA1c.mp. or Hemoglobin A/ (30984)
16  limit 15 to yr="2008 -Current" (11949)
17  14 or 16 (17494)
18  5 and 7 and 9 and 17 (606)

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Supplementary material 3. HbA1c comparisons within subgroups:

1. Comparison of actual HbA1c regarding targeted HbA1c level:

![Graph showing HbA1c comparisons](image)

**Figure 1** Comparison for actual HbA1c values between groups of 6.5% (47.53 mmol/mol), 7.0% (53 mmol/mol) and 7.5% (58.46 mmol/mol) as guideline values. (AKW p=0.0203)

**Table 1** Comparison of actual HbA1c values regarding binding guideline levels. Values are given in % and mmol/mol in square brackets [mmol/mol]. (IQR – interquartile range, MWU – Mann-Whitney U-test, GLM – general linear model, AKW- KruskalWallis one-way analysis of variance)

| Subgroup of:                 | Median (IQR) HbA1c in “6.5%” | Median (IQR) HbA1c in “7.5%” | p-value for comparison “6.5%” vs. “7.5%” (MWU; GLM with beta parameters) | Median (IQR) HbA1c in “7.0%” | p-value for comparison “6.5%” vs. “7.5%” vs. “7.0%” (AKW) |
|------------------------------|-------------------------------|------------------------------|--------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------------|
| High-income countries        | 8.20 (7.858.67)%; [66.11 (62.2971.12) mmol/mol] | 8.40 (8.208.70)%; [68.29 (66.1171.58) mmol/mol] | p=0.0935; p=0.0245; beta=-0.16 | 7.85 (7.7.458.20)%; [62.29 (57.91-66.11) mmol/mol] | 0.0542 |

(continued...
| Studies without HbA1c values > 10% | 8.20 (7.858.50)%; [66.11 (62.29-69.39) mmol/mol] | 8.40 (8.208.70)%; [68.30 (66.1171.58) mmol/mol] | p=0.0287; beta=-0.24 | 7.85 (7.458.20)%; [62.29 (57.91-66.11) mmol/mol] | 0.0227 |

Figure 2 Comparison within high-income countries. "6.5" vs. "7.5" group (a) "6.5" vs. "7.0" vs. "7.5" (b)
Figure 3 Comparison within studies without HbA1c values > 10%. "6.5" vs. "7.5" group (a) "6.5" vs. "7.0" vs. "7.5" (b)

2. Comparison of ΔHbA1c regarding targeted HbA1c level:
Table 2 Comparison of $\Delta$HbA$\text{\textsubscript{1c}}$ values regarding binding guideline levels. Values are given in % and mmol/mol in square brackets [mmol/mol]. (IQR – interquartile range, MWU – Mann-Whitney U-test, GLM – general linear model, AKW- KruskalWallis one-way analysis of variance)

| Subgroup of:     | Median (IQR) $\Delta$HbA$\text{\textsubscript{1c}}$ in “6.5%” | Median (IQR) $\Delta$HbA$\text{\textsubscript{1c}}$ in “7.5%” | p-value for comparison “6.5%” vs. “7.5%” (MWU; GLM with beta parameters) | Median (IQR) $\Delta$HbA$\text{\textsubscript{1c}}$ in “7.0%” | p-value for comparison “6.5%” vs. “7.5%” vs. “7.0%” (AKW) |
|------------------|---------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------|
| High-income      | 1.70 (1.35-2.00)%; [18.15 (13.12-21.86) mmol/mol]            | 0.90 (0.70-1.20)%; [8.19 (4.37-12.35) mmol/mol]              | <0.0001                                                            | 0.85 (0.45-1.20)%; [9.29 (4.92-13.12) mmol/mol]              | <0.0001                                                             |
| countries        |                                                               |                                                               |                                                                    |                                                               |                                                                     |
| Studies without  | 1.70 (1.35-2.00)%; [18.58 (14.76-21.86) mmol/mol]            | 0.90 (0.70-1.20)%; [8.19 (4.37-12.35) mmol/mol]              | <0.0001                                                            | 0.85 (0.45-1.20)%; [9.29 (4.92-13.12) mmol/mol]              | <0.0001                                                             |
| HbA$\text{\textsubscript{1c}}$ values > 10% |                                                               |                                                               |                                                                    |                                                               |                                                                     |
Figure 5 Comparison of ΔHbA1c within high-income countries. "6.5" vs. "7.5" group (a) "6.5" vs. "7.0" vs. "7.5" (b)
Figure 6 Comparison of ΔHbA1c within studies without HbA1c values > 10% (85.79 mmol/mol).
"6.5" vs. "7.5" group (a) "6.5" vs. "7.0" vs. "7.5" (b)
Figure 7 Forrest plot for difference between guideline and actual HbA1c: A. among studies of 6.5% as the guideline value B. among studies of 7.5% as the guideline value
### Supplementary material 5. Table with characteristics of included studies.

Characteristics of included studies with data extracted for quantitative analysis. Presented mean values concern the whole population of each study. Studies are presented in order of HbA1c guideline, mean HbA1c and study design. Regarding complications (diabetic ketoacidosis and hypoglycemia) “1” indicates that they occurred more frequently in the study population (specific subset of patients) than the literature reports [119, 120]. Null indicates in these columns on standard frequency. Regarding insulin therapy if more than a half of patients were treated with MDI then a study was appointed with “1” if more than 50% of patients were treated with CSII then a study was appointed with “0”. HbA1c – concentration of glycated hemoglobin A1c, GDP – gross domestic product, yrs. – years, DM – diabetes mellitus, MDI – multiple daily injections, CSII – continuous subcutaneous insulin infusion, NS – not stated in the paper.

| No. | Authors | Title | Journal article (1)/ conference proceeding (0) | Study design | Country | HbA1c, value according to local guidelines | Mean HbA1c values in the study (%) | GDP per capita ($) | Number of patients in the study | Mean age in the study (yrs.) | Mean duration of DM in the study (yrs.) | Type of insulin therapy [MDI > 50% - 1; CSII > 50% - 0] | Hypoglycaemia in the beginning of the study (1 - more frequent than in the literature. 0 - normal) | Diabetic ketoacidosis in the beginning of the study (1 - more frequent than in the literature. 0 - normal) |
|-----|---------|-------|-----------------------------------------------|--------------|---------|-----------------------------------------|---------------------------------|----------------|-----------------------------------|----------------|---------------------------------|-----------------------------------------------|------------------------------------------------|------------------------------------------------|
| 1   | Sumnik Z et al. | Long-term improvement of fasting glycaemia after switching basal insulin from NPH to detemir in children with type 1 diabetes: a 1-year multicentre study [85] | 0 | Cohort study | Czech Republic | 6.5 | 6.40 | 18690 | 72 | 10.60 | NS | 0 | NS | NS |
| 2   | Szypowska A. et al. | Insulin requirement in preschoolers treated with insulin pumps at onset of type 1 diabetes mellitus [111] | 1 | Case series | Poland | 6.5 | 6.70 | 23273 | 58 | 3.3 | 1 | NS | 0 | 0 |
| 3   | Sarnblad S et al. | Diabetes care in Swedish schools - A national survey [82] | 0 | Cross sectional | Sweden | 6.5 | 6.90 | 55040 | 317 | 11.40 | NS | NS | NS | NS |
| 4   | Hanberger L et al. | Health-related quality of life in intensively treated young | 1 | Cross sectional | Sweden | 6.5 | 7.10 | 55040 | 400 | 13.20 | 5.10 | 1 | NS | NS |
| Study | Investigators | Title | Study Design | Country | Mean Age (yr) | HbA1c Mean (%) | HbA1c SD | Statistic | p-Value | HbA1c Mean (% Control) | HbA1c SD (Control) | Statistic | p-Value |
|-------|---------------|-------|--------------|---------|--------------|----------------|----------|------------|---------|------------------------|-----------------|------------|---------|
| 5     | Olinder AL. Et al. | Missed bolus doses: devastating for metabolic control in CSII-treated adolescents with type 1 diabetes [110] | Cross sectional | Sweden | 6.5 | 7.30 | 55040 | 90 | 14.80 | 7.90 | 0 | NS | NS |
| 6     | Pankowska E et al. | Application of novel dual wave meal bolus and its impact on glycated haemoglobin A1c level in children with type 1 diabetes [78] | Cross sectional | Poland | 6.5 | 7.42 | 23273 | 499 | 10.60 | 4.34 | 0 | NS | NS |
| 7     | Chobot A et al. | Helicobacter pylori infection in type 1 diabetes children and adolescents using 13C urea breath test [28] | Cohort study | Poland | 6.5 | 7.45 | 23273 | 129 | 13.30 | 4.43 | NS | NS | NS |
| 8     | Kordonouri O et al. | Sensor augmented pump therapy from onset of type 1 diabetes: late follow-up results of the pediatric onset study [32] | Interventional study | Germany, Austria, Switzerland | 6.5 | 7.65 | 42597 | 131 | NS | NS | 0 | NS | NS |
| 9     | Doggen K et al. | Care delivery and outcomes among Belgian children and adolescents with type 1 diabetes [24] | Cross sectional | Belgium | 6.5 | 7.70 | 43399 | 974 | 12.70 | 4.30 | 1 | 1 | 0 |
| 10    | Zubkiewicz-Kucharska A et al. | The efficacy of bolus calculator on metabolic control in pediatric patients using CSII [59] | Cross sectional | Poland | 6.5 | 7.75 | 23273 | 129 | NS | NS | NS | 0 | 0 |
| 11    | Tagelsir A et al. | Dental caries and dental care level (restorative index) in children with diabetes mellitus type 1 [46] | Case-control study | Belgium | 6.5 | 7.85 | 43399 | 52 | 9.84 | 4.61 | 0 | NS | NS |
|   | Study Authors and Details | Study Design | Location | Sample Size | Mean Age (y) | HbA1c (% or mg/dL) | Number of Patients | Mean Body Mass Index | p-Value (HbA1c) | p-Value (BMI) | p-Value (other metric) |
|---|---------------------------|--------------|----------|-------------|-------------|-------------------|-------------------|---------------------|----------------|----------------|---------------------|
| 12 | Luyckx K et al. Glycemic control, coping, and internalizing and externalizing symptoms in adolescents with type 1 diabetes [103] | Cross sectional | Germany, Austria, Switzerland | 6.5 | 7.85 | 42597 | 109 | 13.77 | 4.95 | NS | NS | NS |
| 13 | Rabbone I et al. Pandemic influenza A H1N1 in Italian children and adolescents with type 1 diabetes [74] | Cross sectional | Italy | 6.5 | 7.90 | 33816 | 1461 | 13.00 | 6.00 | NS | NS | NS |
| 14 | Besser REJ et al. Preserved endogenous insulin secretion as measured by urinary C-peptide creatinine ratio is associated with improved HbA1c and less glycaemic variability in paediatric Type 1 diabetes [42] | Cross sectional | UK | 6.5 | 8.00 | 38920 | 135 | 13.20 | 3.90 | NS | NS | NS |
| 15 | Scaramuzza AE et al. Use of integrated real-time continuous glucose monitoring/insulin pump system in children and adolescents with type 1 diabetes: A 3-year follow-up study [54] | Cohort study | Italy | 6.5 | 8.00 | 33816 | 622 | 13.02 | 6.22 | 0 | 0 | 0 |
| 16 | Haliloglu B et al. Diabetes related problems and diabetic controls among the school children with type 1 diabetes mellitus living in Istanbul [30] | Cohort study | Turkey | 6.5 | 8.10 | 5480 | 114 | NS | 1.00 | 1 | NS | NS |
| 17 | Haugstvedt A et al. Fear of hypoglycemia in mothers and fathers of children with type 1 diabetes is associated with | Cross sectional | Norway | 6.5 | 8.10 | 99636 | 114 | 10.60 | 3.90 | NS | NS | NS |
| Study Id | Authors | Title | Study Design | Country | n | Mean Age | BMI | Mean HbA1c | Mean Body Mass Index | Mean HbA1c | Significance | Significance | Significance | Significance |
|----------|---------|-------|--------------|---------|---|----------|-----|------------|----------------------|------------|-------------|-------------|-------------|-------------|
| 18       | Krebs A et al. | Poor glycaemic control and parental emotional distress: a population-based study [106] | Cross sectional | Germany, Austria, Switzerland | 6.5 | 8.10 | 42597 | 270 | 13.75 | 5.70 | NS | NS | NS |
| 19       | Fradin D et al. | Cardiovascular risk in pediatric type 1 diabetes: Sex-specific intima-media thickening verified by automatic contour identification and analyzing systems [40] | Case-control study | France | 6.5 | 8.10 | 39746 | 485 | 12.10 | 7.50 | NS | NS | NS |
| 20       | Spinks JJ et al. | Paediatric Diabetes services - evidence that expanding the workforce allows intensification of insulin regimens and improves glycaemic control [109] | Case series | UK | 6.5 | 8.16 | 38920 | 70 | NS | NS | NS | 0 | 0 |
| 21       | Huemer M et al. | Low levels of asymmetric dimethylarginine in children with diabetes mellitus type 1 compared with healthy children [55] | Cross sectional | Germany, Switzerland | 6.5 | 8.20 | 42597 | 85 | 12.30 | 4.08 | NS | NS | NS |
| 22       | Cherubini V et al. | Metabolic control in Italian children with type 1 diabetes: Is it changing during the years? Preliminary results of vikids study [84] | Cross-sectional | Italy | 6.5 | 8.20 | 33816 | 792 | NS | NS | NS | NS | NS |
| No. | Authors                  | Title                                                                 | Study Type | Countries          | Area                    | Start Age | End Age | Sample Size | Mean BMI | BMI SD | Mean HbA1c | HbA1c SD | p-Value | p-Value | p-Value |
|-----|--------------------------|-----------------------------------------------------------------------|------------|---------------------|--------------------------|------------|---------|-------------|-----------|--------|-------------|---------|---------|---------|---------|
| 23  | van Vliet M et al.       | Overweight Is Highly Prevalent in Children with Type 1 Diabetes And Associates with Cardiometabolic Risk [72] | Cross sectional | Netherlands | 6.5 | 8.22 | 45960 | 283 | 12.72 | 5.36 | 0 | NS | NS |
| 24  | Kristensen LJ et al.     | Psychometric Evaluation of the Adherence in Diabetes Questionnaire [88] | Cross sectional | Denmark | 6.5 | 8.25 | 56364 | 766 | 12.30 | 5.20 | NS | NS | NS |
| 25  | Skrivarhaug T et al.     | Norwegian Childhood Diabetes Registry: Childhood onset diabetes in Norway 1973-2012 [16] | Cross sectional | Norway | 6.5 | 8.30 | 99636 | 2520 | NS | NS | 0 | 0 | 1 |
| 26  | Fredheim S et al.        | Diabetic ketoacidosis at the onset of type 1 diabetes is associated with future HbA1c levels [20] | Cross sectional | Denmark | 6.5 | 8.34 | 56364 | 2964 | 9.17 | 5.84 | 1 | 1 | 1 |
| 27  | Zucchini S et al.        | Usefulness of CGM with iPro2 in children with T1DM and correlations between Glucose Variability and metabolic control [26] | Cohort study | Italy | 6.5 | 8.40 | 33816 | 70 | 13.80 | 7.40 | 1 | NS | NS |
| 28  | Simsek DG et al.         | Diabetes care, glycemic control, complications, and concomitant autoimmune diseases in children with type 1 diabetes in Turkey: A multicenter study [12] | Cohort study | Turkey | 6.5 | 8.40 | 5480 | 1032 | 12.50 | 4.70 | 1 | 0 | 0 |
| 29  | Rohrer TR et al.         | Down's syndrome in diabetic patients aged <20 years: an analysis | Cross sectional | Germany, Austria, Switzerland | 6.5 | 8.47 | 42597 | 42281 | 13.81 | 5.44 | NS | 0 | 0 |
| Study Number | Authors                        | Title                                                                 | Study Design | Country(s)                          | Duration (in years) | Follow-Up (in months) | Mean HbA1c (SD) | Mean Glycemic Control (SD) | Mean BMI (SD) | Mean Physical Activity (SD) | Mean Life Quality (SD) | P-Value |
|-------------|-------------------------------|----------------------------------------------------------------------|--------------|-------------------------------------|---------------------|------------------------|----------------|-----------------------------|----------------|-----------------------------|------------------------|---------|
| 30          | Glowinska-Olszewska B et al.  | Relationship between circulating endothelial progenitor cells and endothelial dysfunction in children with type 1 diabetes: a novel paradigm of early atherosclerosis in high-risk young patients [23] | Cohort study | Poland                             | 6.5                 | 23273                  | 8.50           | 14.50                        | 6.00           | NS                          | NS                    | NS      |
| 31          | Mottram LM et al.             | Does physical activity and fitness influence glycemic control and insulin requirement in children and young people with Type 1 diabetes? [45] | Cohort study | UK                                 | 6.5                 | 38920                  | 8.50           | 12.90                        | 1.00           | NS                          | NS                    | NS      |
| 32          | Galler A et al.               | Association Between Media Consumption Habits, Physical Activity, Socioeconomic Status, and Glycemic Control in Children, Adolescents, and Young Adults with Type 1 Diabetes [94] | Cross-sectional | Germany, Austria, Switzerland      | 6.5                 | 42597                  | 8.57           | 13.7                         | 6.1            | NS                          | NS                    | NS      |
| 33          | Froisland DH et al.           | Health-related quality of life among Norwegian children and adolescents with type 1 diabetes on intensive insulin treatment: a | Cohort study | Norway                            | 6.5                 | 99636                  | 8.66           | 13.83                        | 5.43           | 0                           | 0                     | 1       |
|   | Study Title                                                                 | Study Details                                                                 | Location | Methodology | Mean Age (y) | Mean HbA1c (%) | Number of Participants | Change in HbA1c (%) | Significance |
|---|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------|-------------|--------------|-------------------|----------------------|-------------------|--------------|
| 34 | Continuous glucose monitoring may improve metabolic control in children and adolescents with type 1 diabetes | Population-based study [10]                                                   | Sweden   | Cohort study | 6.5          | 8.70             | 55040                | 103               | NS           |
| 35 | Sustained benefits of continuous subcutaneous insulin infusion              | Cohort study                                                                 | UK       | Case series  | 6.5          | 8.70             | 38920                | 460               | NS           |
| 36 | The effect of insulin intensification on glycaemic control and lipid levels in children and young persons with type 1 diabetes differs in relation to ethnic group [33] | Cross sectional study                                                        | UK       | Cross sectional | 6.5          | 8.80             | 38920                | 222               | NS           |
| 37 | Pediatric estimated average glucose from continuous glucose monitoring in children and young people with type 1 diabetes mellitus [80] | Pediatric estimated average glucose from continuous glucose monitoring in children and young people with type 1 diabetes mellitus [80] | UK       | Cohort study  | 6.5          | 8.90             | 38920                | 85                | 12.97        |
| 38 | How many paediatric patients are making endogenous insulin? [43]           | Cross sectional study                                                        | UK       | Cross sectional | 6.5          | 8.90             | 38920                | 137               | 13.20        |
| 39 | The -174GG interleukin-6 genotype is protective from retinopathy and nephropathy in juvenile onset type 1 diabetes mellitus [75] | Cohort study                                                                 | Poland   | Cohort study  | 6.5          | 8.97             | 23273                | 210               | 16.59        |
|   | Author(s) and Reference | Title | Study Design | Country | Males | Females | Total | Glucose Control | 1-Year | 2-Year | 5-Year | 10-Year | NS | NS | NS | NS |
|---|-------------------------|-------|--------------|---------|-------|---------|-------|----------------|--------|--------|--------|---------|----|----|----|----|
|40 | Branco S et al. [29]     | Vitamin D deficiency in children and adolescents with type 1 diabetes | Cohort study | Portugal | 6.5 | 9.20 | 20175 | 68 | NS | 6.30 | NS | NS | NS | NS |
|41 | Gregory JW et al. [14]  | Development and evaluation by a cluster randomised trial of a psychosocial intervention in children and teenagers experiencing diabetes: the DEPICTED study | Interventional study | UK | 6.5 | 9.30 | 38920 | 693 | 10.54 | 2.64 | NS | NS | NS | NS |
|42 | Thalange NK et al. [56] | Clinical experience with prandial biphasic insulin aspart 30/70 three-times daily (TID) in paediatric patients with type 1 diabetes (T1D): Results from a single-centre audit | Cohort study | UK | 6.5 | 10.90 | 38920 | 113 | 11.80 | NS | 1 | NS | NS | NS |
|43 | Urakami T et al. [69]   | Association between sex, age, insulin regimens and glycemic control in children and adolescents with type 1 diabetes | Cross sectional | Japan | 7.0 | 7.20 | 46731 | 103 | 16.80 | 1.00 | 1 | NS | NS | NS |
|44 | Urakami T et al. [52]   | Influence of plasma glucagon levels on glycemic control in children with type 1 diabetes | Case series | Japan | 7.0 | 7.70 | 46731 | 60 | 13.30 | 6.90 | NS | NS | NS | NS |
|45 | Nakamura N et al. [68]  | Health-related and diabetes-related quality of life in Japanese children and adolescents with type 1 and type 2 diabetes | Cross sectional | Japan | 7.0 | 8.00 | 46731 | 368 | 14.00 | 6.50 | NS | NS | NS | NS |
| ID | Authors          | Title                                                                 | Study Design | Country   | Mean Age | Mean Duration | Sample Size | HbA1c | Mean Glucose | Mean Weight | Significance | p-Value |
|----|------------------|----------------------------------------------------------------------|--------------|-----------|----------|---------------|-------------|--------|--------------|--------------|--------------|---------|
| 46 | Barzel M et al.  | Coparenting in Relation to Children’s Psychosocial and Diabetes-Specific Adjustment [9] | Cross sectional | Canada   | 7.0      | 8.40          | 51206       | 61     | 10.70        | 4.90         | NS          | 0       |
| 47 | Matziou V et al. | Factors influencing the quality of life of young patients with diabetes [5] | Cohort study | Greece   | 7.5      | 7.40          | 22442       | 98     | 14.90        | 7.30         | 0           | 0       |
| 48 | Jasinski CF et al. | Healthcare cost of type 1 diabetes mellitus in new-onset children in a hospital compared to an outpatient setting [19] | Cross sectional | USA      | 7.5      | 7.43          | 51749       | 84     | 10.36        | 1.00         | NS          | NS      |
| 49 | Anderson DG et al. | Multiple daily injections in young patients using the ezy-BICC bolus insulin calculation card, compared to mixed insulin and CSII [108] | Cohort study | Australia | 7.5      | 7.60          | 67442       | 368    | 12.4         | 4.7          | NS          | 0       |
| 50 | El-Karaksy HM et al. | Prevalence of hepatic abnormalities in a cohort of Egyptian children with type 1 diabetes mellitus [66] | Cross sectional | Egypt    | 7.5      | 7.64          | 3256        | 692    | 10.48        | 3.91         | 1           | NS      |
| 51 | Redondo MJ et al. | Characteristics of pediatric type 1 diabetes (T1D) that predict HbA1c at one year [38] | Cross sectional | USA      | 7.5      | 7.80          | 51749       | 654    | 10.20        | 1.00         | NS          | NS      |
| 52 | Cengiz E et al.  | How common are episodes of diabetic ketoacidosis (DKA) and severe hypoglycemia (SH) in the first year of diagnosis with type 1 diabetes (T1D)? [39] | Cohort study | USA      | 7.5      | 7.80          | 51749       | 795    | 9.20         | 1.00         | NS          | 0       |
|   | Authors          | Study Title                                                                 | Study Type     | Country | Duration | Age | n (Diabetes) | n (Control) | HbA1c (Diabetes) | HbA1c (Control) | Effect Size | p Value |   |
|---|------------------|-------------------------------------------------------------------------------|----------------|---------|----------|-----|--------------|--------------|-----------------|----------------|------------|---------|-------|
| 53 | Sood ED et al.   | Mother-father informant discrepancies regarding diabetes management: associations with diabetes-specific family conflict and glycemic control | Cohort study   | USA     | 7.5      | 7.90| 51749        | 136          | 10.50           | 4.10           | 0          | NS      | NS    |
| 54 | Mauras N et al.  | A Randomized Clinical Trial to Assess the Efficacy and Safety of Real-Time Continuous Glucose Monitoring in the Management of Type 1 Diabetes in Young Children Aged 4 to 10 Years | Interventional study | USA     | 7.5      | 7.90| 51749        | 146          | 7.50            | 3.50           | 0          | 1       | NS    |
| 55 | Lewin AB et al.  | Brief report: normative data on a structured interview for diabetes adherence in childhood | Cohort study   | USA     | 7.5      | 7.90| 51749        | 275          | 13.30           | 2.90           | 1          | 0       | NS    |
| 56 | Mosaad YM et al. | HLA-DQB1* alleles and genetic susceptibility to type 1 diabetes mellitus | Cross sectional | Egypt   | 7.5      | 7.98| 3256         | 85           | 12.52           | 2.50           | 1          | NS      | 0     |
| 57 | Markowitz JT et al. | Re-examining a measure of diabetes-related burden in parents of young people with Type 1 diabetes: The Problem Areas in Diabetes Survey - Parent Revised version (PAID-PR) | Cross sectional | USA     | 7.5      | 8.00| 51749        | 376          | 12.90           | 6.30           | 0          | NS      | NS    |
| 58 | M Abdul-Rasoul F et al. | Quality of Life of Children and Adolescents | Cohort study   | Kuwait  | 7.5      | 8.00| 56374        | 436          | 9.10            | 5.37           | 1          | NS      | NS    |
| Study | Title                                                                 | Design          | Country | Age (median) | Duration | Sample Size | Fasting Glucose (mg/dL) | HbA1c (%) | Comparison 1 | Comparison 2 | Comparison 3 | Comparison 4 | Comparison 5 |
|-------|----------------------------------------------------------------------|-----------------|---------|--------------|----------|-------------|-------------------------|-----------|--------------|--------------|--------------|--------------|--------------|
| 59    | Goss PW et al.                                                       | Cohort study    | Australia | 7.5          | 8.20     | 67442       | 61                      | 13.90     | NS           | NS           | NS           | NS           | NS           |
| 60    | O'Connell MA et al.                                                 | Case series     | Australia | 7.5          | 8.20     | 67442       | 100                     | 13.60     | 6.10         | NS           | NS           | NS           | NS           |
| 61    | Deltsidou A et al.                                                  | Case-control study | Greece | 7.5          | 8.20     | 22442       | 100                     | 15.00     | NS           | 0            | NS           | NS           | NS           |
| 62    | Rohan JM et al.                                                     | Cross sectional | USA      | 7.5          | 8.20     | 51749       | 239                     | 10.54     | 4.41         | 1            | NS           | NS           | NS           |
| 63    | Miller AR et al.                                                    | Cross sectional | USA      | 7.5          | 8.20     | 51749       | 256                     | 11.60     | 4.67         | 0            | 0            | NS           | NS           |
| 64    | Pingul MM et al.                                                    | Cohort study    | USA      | 7.5          | 8.24     | 51749       | 152                     | 10.60     | 1.00         | NS           | NS           | NS           | NS           |
| 65    | Buckingham B et al.                                                  | Interventional study | USA    | 7.5          | 8.26     | 51749       | 72                      | 12.60     | 6.30         | 0            | NS           | NS           | NS           |
|   | Authors                          | Title                                                                 | Study Type       | Country | Follow-up (Yr) | N  | Mean Glucose (mmol/L) | SD  | p-value | NS 1   | NS 2 | NS 3 |
|---|----------------------------------|----------------------------------------------------------------------|------------------|---------|----------------|----|----------------------|-----|---------|--------|------|------|
|66| Spiegel G et al.                 | Randomized Nutrition Education Intervention to Improve Carbohydrate Counting in Adolescents with Type 1 Diabetes Study: Is More Intensive Education Needed? [113] | Interventional study | USA     | 7.5            | 8.30 | 51749                | 66  | 15.10   | 5.50   | 0    | NS   |
|67| Bergenstal RM et al.             | Effectiveness of sensor-augmented insulin-pump therapy in type 1 diabetes [101] | Interventional study | USA     | 7.5            | 8.30 | 51749                | 156 | 12.2    | 5.05   | 1    | 0    |
|68| Redondo MJ et al.                | Types of pediatric diabetes mellitus defined by anti-islet autoimmunity and random C-peptide at diagnosis [11] | Cohort study      | USA     | 7.5            | 8.30 | 51749                | 607 | 10.20   | 2.00   | NS   | NS   |
|69| Malalasekera V et al.            | Potential renoprotective effects of a gluten-free diet in type 1 diabetes [79] | Cross sectional   | Australia| 7.5            | 8.31 | 67442                | 59  | 14.19   | 7.06   | NS   | NS   |
|70| Berg CA et al.                   | Parental Involvement and Adolescents' Diabetes Management: The Mediating Role of Self-Efficacy and Externalizing and Internalizing Behaviors [112] | Cross sectional   | USA     | 7.5            | 8.38 | 51749                | 252 | 12.49   | 1.00   | 0    | NS   |
|71| Wu YP et al.                     | Is insulin pump therapy better than injection for adolescents with diabetes? [64] | Cohort study      | USA     | 7.5            | 8.40 | 51749                | 62  | 14.20   | NS     | 1    | NS   |
|72| Wysocki T et al.                 | Diabetes Problem Solving by Youths with Type 1 Diabetes and their Caregivers: Measurement, | Cohort study      | USA     | 7.5            | 8.40 | 51749                | 114 | 12.10   | 5.80   | NS   | NS   |
| Study | Authors | Title | Study Design | Country | Age (mean) | Gender (M/F) | Sample Size | HbA1c (mean) | TDI (mean) | P-value | Effect Size |
|-------|---------|-------|--------------|---------|------------|--------------|-------------|--------------|------------|---------|-------------|
| 73    | Mehta SN et al. | Dietary Behaviors Predict Glycemic Control in youth with type 1 diabetes [114] | Cross sectional | USA | 7.5 | 8.40 | 51749 | 119 | 12.10 | 5.40 | 1 | NS | NS |
| 74    | Wilkinson J | Factors affecting improved glycemic control in youth using insulin pumps [100] | Cross sectional | USA | 7.5 | 8.40 | 51749 | 150 | 13.6 | 7.1 | NS | 0 | 0 |
| 75    | Cengiz E et al. | Resetting the bar: Frequency of severe hypoglycemia (SH) and diabetic ketoacidosis (DKA) among children with type 1 diabetes (T1D) in the T1D exchange registry [37] | Cohort study | USA | 7.5 | 8.40 | 51749 | 4120 | 11.90 | 5.20 | NS | 0 | 1 |
| 76    | Gerard-Gonzalez A et al. | Comparison of autoantibody-positive and autoantibody-negative pediatric participants enrolled in the T1D Exchange clinic registry [17] | Cross sectional | USA | 7.5 | 8.40 | 51749 | 6737 | 7.80 | NS | NS | NS | NS |
| 77    | Criego et al. | Increased Body Mass Index (BMI) is associated with higher hemoglobin A1c (A1c) among 6-12 year olds but is not associated with total daily insulin dose per kg (TDI) in type 1 diabetes (T1D) participants enrolled in T1D Exchange Clinic Registry [57] | Cross sectional | USA | 7.5 | 8.43 | 51749 | 4427 | 12.90 | 5.80 | NS | 0 | 0 |
|   | Author(s)          | Title                                                                 | Study Type | Country | Follow-up | N     | Mean HbA1c | sd HbA1c | N on HbA1c | Mean GLIM  | sd GLIM | p-value | N on GLIM | N on HbA1c | Mean GLIM | sd GLIM | p-value |
|---|-------------------|----------------------------------------------------------------------|------------|---------|-----------|-------|-------------|-----------|------------|-------------|----------|----------|-----------|------------|-----------|----------|----------|
| 78| Lawrence JM et al.| Diabetes-related quality of life and glycaemic control among youth with type 1 diabetes [81] | Cross sectional | USA     | 7.5       | 8.47  | 51749      | 2601     | 13.60      | 5.20        | NS       | 0        | 0         |            |           |          |          |
| 79| Gomez-Diaz RA et al.| Association between carotid intima-media thickness, buccodental status, and glycemic control in pediatric type 1 diabetes [31] | Cross sectional | Mexico  | 7.5       | 8.50  | 9749       | 69       | 11.60      | 5.10        | NS       | NS       | NS        |            |           |          |          |
| 80| Markowitz JT et al.| Validation of an abbreviated adherence measure for young people with Type1 diabetes [47] | Cohort study | USA     | 7.5       | 8.50  | 51749      | 338      | 12.50      | 5.40        | 1        | NS       | NS        |            |           |          |          |
| 81| Rausch JR et al.  | Changes in Treatment Adherence and Glycemic Control During the Transition to Adolescence in Type 1 Diabetes [90] | Cohort study | USA     | 7.5       | 8.51  | 51749      | 225      | 12.62      | 6.46        | 0        | NS       | NS        |            |           |          |          |
| 82| Rovner AJ et al.  | Development and validation of the type 1 diabetes nutrition knowledge survey [36] | Cohort study | USA     | 7.5       | 8.60  | 51749      | 282      | 13.30      | 6.40        | 0        | NS       | NS        |            |           |          |          |
| 83| Lukacs A et al.   | Benefits of continuous subcutaneous insulin infusion on quality of life [22] | Cross sectional | Hungary | 7.5       | 8.63  | 23236      | 239      | 13.36      | 6.03        | 1        | 1        | NS        |            |           |          |          |
| 84| Markowitz JT et al.| Brief screening tool for disordered eating in diabetes: Internal consistency and external validity in a contemporary sample of pediatric patients | Cross sectional | USA     | 7.5       | 8.70  | 51749      | 112      | 15.10      | 6.80        | 1        | NS       | NS        |            |           |          |          |
| Study Number | Authors | Title | Study Type | Country | Mean Age (Years) | N | Mean | SD | t | df | p | Effect Size |
|--------------|---------|-------|------------|---------|-----------------|---|------|----|---|----|---|-------------|
| 85           | Lewin AB et al. | Validity and reliability of an adolescent and parent rating scale of type 1 diabetes adherence behaviors: The self-care inventory (SCI) | Cohort study | USA | 7.5 | 8.70 | 51749 | 164 | 14.60 | 4.70 | 0 | NS | NS |
| 86           | Patton SR et al. | Survey of Insulin Site Rotation in Youth With Type 1 Diabetes Mellitus | Cohort study | USA | 7.5 | 8.70 | 51749 | 201 | 11.80 | 5.90 | 1 | NS | NS |
| 87           | Patton SR et al. | Frequency of Mealtime Insulin Bolus as a Proxy Measure of Adherence for Children and Youths with Type 1 Diabetes Mellitus | Interventional study | USA | 7.5 | 8.80 | 51749 | 100 | 12.70 | 1.00 | 0 | NS | NS |
| 88           | Cortina S et al. | Sociodemographic and psychosocial factors associated with continuous subcutaneous insulin infusion in adolescents with type 1 diabetes | Cohort study | USA | 7.5 | 8.80 | 51749 | 150 | 15.47 | 6.04 | 0 | NS | NS |
| 89           | Hassan K et al. | Glycemic control in pediatric type 1 diabetes: Role of caregiver literacy | Cross sectional | USA | 7.5 | 8.80 | 51749 | 200 | 11.80 | 4.80 | 1 | NS | NS |
| 90           | Wiebe DJ | Longitudinal Associations of Maternal Depressive Symptoms, Maternal Involvement, and Diabetes Management Across Adolescence | Cross sectional | USA | 7.5 | 8.86 | 51749 | 82 | 12.79 | NS | NS | NS | NS |
| Study ID | Authors | Title                                                                 | Study Design | Country | Type 1 Diabetes Age | BMI | Glycemic Control | Self-Report | Comparison | ns | ns |
|---------|---------|----------------------------------------------------------------------|--------------|---------|---------------------|-----|------------------|-------------|------------|----|----|
| 91      | Herzer MH et al. | Anxiety symptoms in adolescents with type 1 diabetes: association with Blood Glucose Monitoring and glycemic control [105] | Cross sectional | USA     | 7.5                 | 8.9 | 51749            | 276         | 15.60      | 6.60 | 0  |
| 92      | Ingerski LM et al. | Correlates of glycemic control and quality of life outcomes in adolescents with type 1 diabetes [65] | Cohort study  | USA     | 7.5                 | 9.0 | 51749            | 261         | 15.70      | 7.00 | 0  | ns |
| 93      | Wintergerst KA et al. | The impact of health insurance coverage on pediatric diabetes management [71] | Cross sectional | USA     | 7.5                 | 9.0 | 51749            | 701         | 13.50      | NS  | 1  | ns |
| 94      | Graziano PA et al. | Gender differences in the relationship between parental report of self-regulation skills and adolescents' management of type 1 diabetes [51] | Cohort study  | USA     | 7.5                 | 9.06| 51749            | 109         | 15.23      | 5.06 | ns | ns |
| 95      | Guilfoyle SM et al. | Blood glucose monitoring and glycemic control in adolescents with type 1 diabetes: meter downloads versus self-report [95] | Cohort study  | USA     | 7.5                 | 9.10| 51749            | 143         | 16.00      | 6.50 | 0  | ns |
| 96      | Winsett RP et al. | Adolescent self-efficacy and resilience in participants attending a diabetes camp [99] | Cohort study  | USA     | 7.5                 | 9.20| 51749            | 81          | 13.40      | 6.63 | 0  | ns |
| 97      | Savoldelli R et al. | Vitamin D insufficiency in a Brazilian type 1 diabetes mellitus pediatric population [73] | Case series   | Brazil   | 7.5                 | 9.8 | 14987            | 117         | NS         | NS  | NS | 0  |
| Study ID | Authors | Title | Study Design | Country | Duration (years) | Sample Size | Hypoglycemia | Mean Blood Glucose (mg/dL) | Low Blood Glucose (%) | High Blood Glucose (%) | NS (% | p-value |
|----------|---------|-------|--------------|---------|-----------------|-------------|-------------|--------------------------|---------------------|---------------------|--------|---------|
| 98       | Calliari LE et al. | Ten year evolution on diagnosis and treatment of type 1 diabetes mellitus in an university center in Sao Paulo, Brazil | Cohort study | Brazil | 0 | | | | | | | |
| 99       | Tran F et al. | Glycaemic control in children with neonatal diabetes and type 1 diabetes in Vietnam | Cross sectional | Vietnam | 1 | 7.5 | 9.90 | 1755 | 93 | 11.50 | 2.60 | 1 | 0 | NS |
| 100      | Al-Hussaini AA et al. | Is There an Association between Type 1 Diabetes in Children and Gallbladder Stones Formation? | Cohort study | Saudi Arabia | 1 | 7.5 | 10.70 | 25136 | 105 | 8.50 | 2.20 | NS | NS | NS |
| 101      | Mukama LJ et al. | Improved glycemic control and acute complications among children with type 1 diabetes mellitus in Moshi, Tanzania | Cross sectional | Tanzania | 1 | 7.5 | 12.40 | 609 | 81 | NS | 1.00 | 1 | 0 | 1 |
| 102      | Juvenile Diabetes Research Continuous Glucose Monitoring Study Group | Effectiveness of continuous glucose monitoring in a clinical care environment | Interventional study | International | 1 | 7.80 | International | 50 | NS | NS | NS | 1 | NS |
| 103      | Phillip M et al. | Nocturnal Glucose Control with an Artificial Pancreas at a Diabetes Camp | Interventional study | International | 1 | 8.00 | International | 56 | 13.8 | 7 | 0 | 0 | 0 |
| 104      | de Wit M et al. | Assessing diabetes-related quality of life of youth with type 1 diabetes in routine clinical | Cohort study | International | 1 | 8.10 | International | 84 | 14.40 | 6.40 | NS | NS | NS |
Safety and patient perception of an insulin pen with simple memory function for children and adolescents with type 1 diabetes in the REMIND study [35]

| 105 | Adolfsson P et al. | Safety and patient perception of an insulin pen with simple memory function for children and adolescents with type 1 diabetes in the REMIND study [35] | 1 | Cohort study | International | International | 8.40 | International | 354 | 12.00 | 3.80 | 1 | NS | NS |

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