

# **SWEET Benchmarking - just a nice to have? The Luxembourg experience**

**IQECAD meeting Jan 11<sup>th</sup> 2024 Brussels Airport  
Dr. Michael Witsch, Centre Hospitalier de Luxembourg**





**For my work for SWEET I receive a honoraria since 2020. The 10 years before I worked for SWEET without any grant. My role in SWEET is to create and to develop the benchmarking reports.**

**No further declarations.**

After this talk I hope that

- ... you know what SWEET is
- ... you know what SWEET offers
- ... you know some SWEET results
- ... you will understand why Luxembourg participates in SWEET
- ... you will understand how we integrate the work for benchmarking in our daily practice
- ... you will understand why we like benchmarking



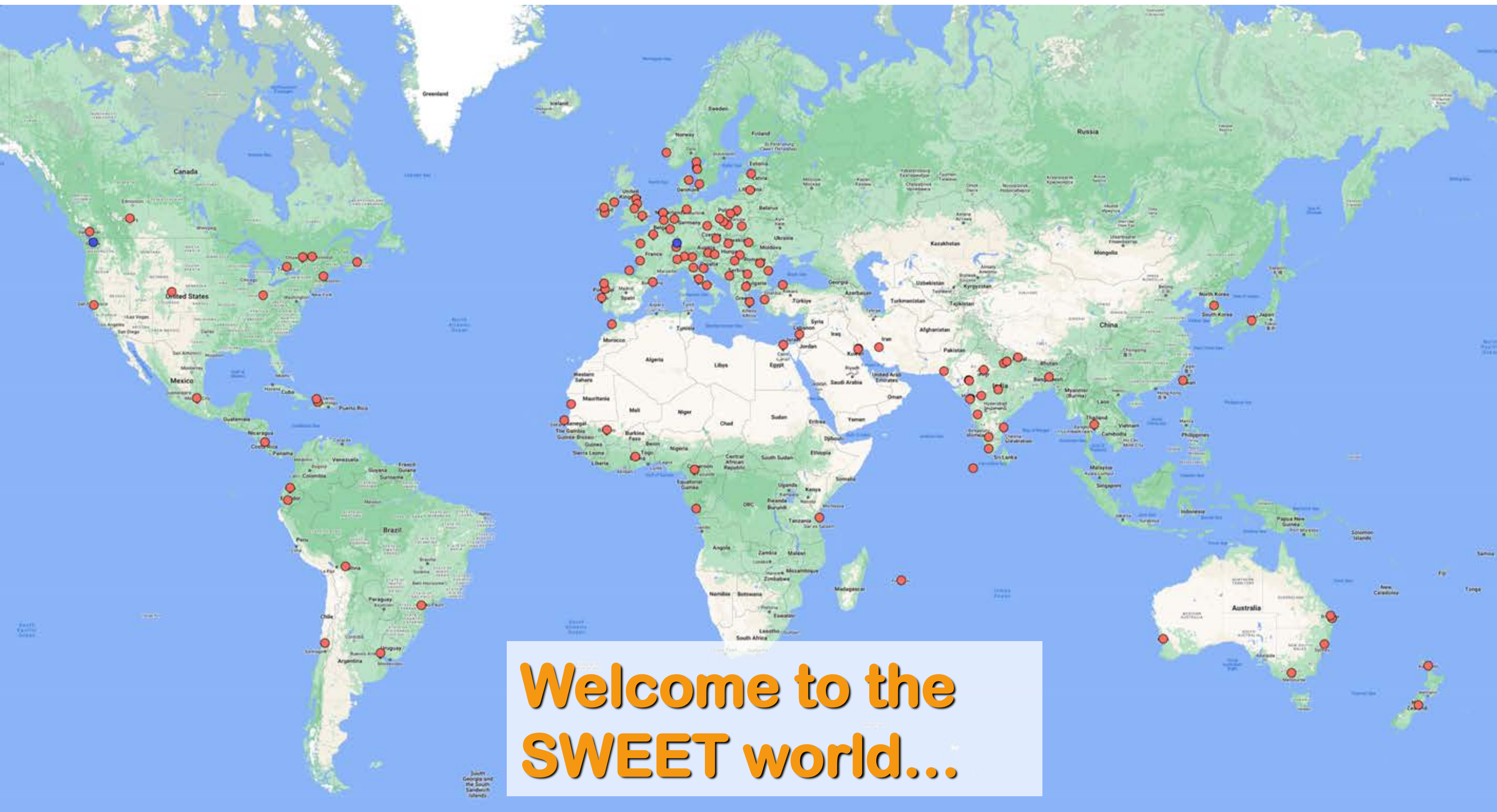


## Vision and Mission of SWEET

**Vision: Equal high quality care for all children and adolescents with diabetes**

**Mission: Harmonize care to optimize outcomes in children and adolescents with diabetes mellitus worldwide**





Welcome to the  
**SWEET** world...

## SWEET: main pillars



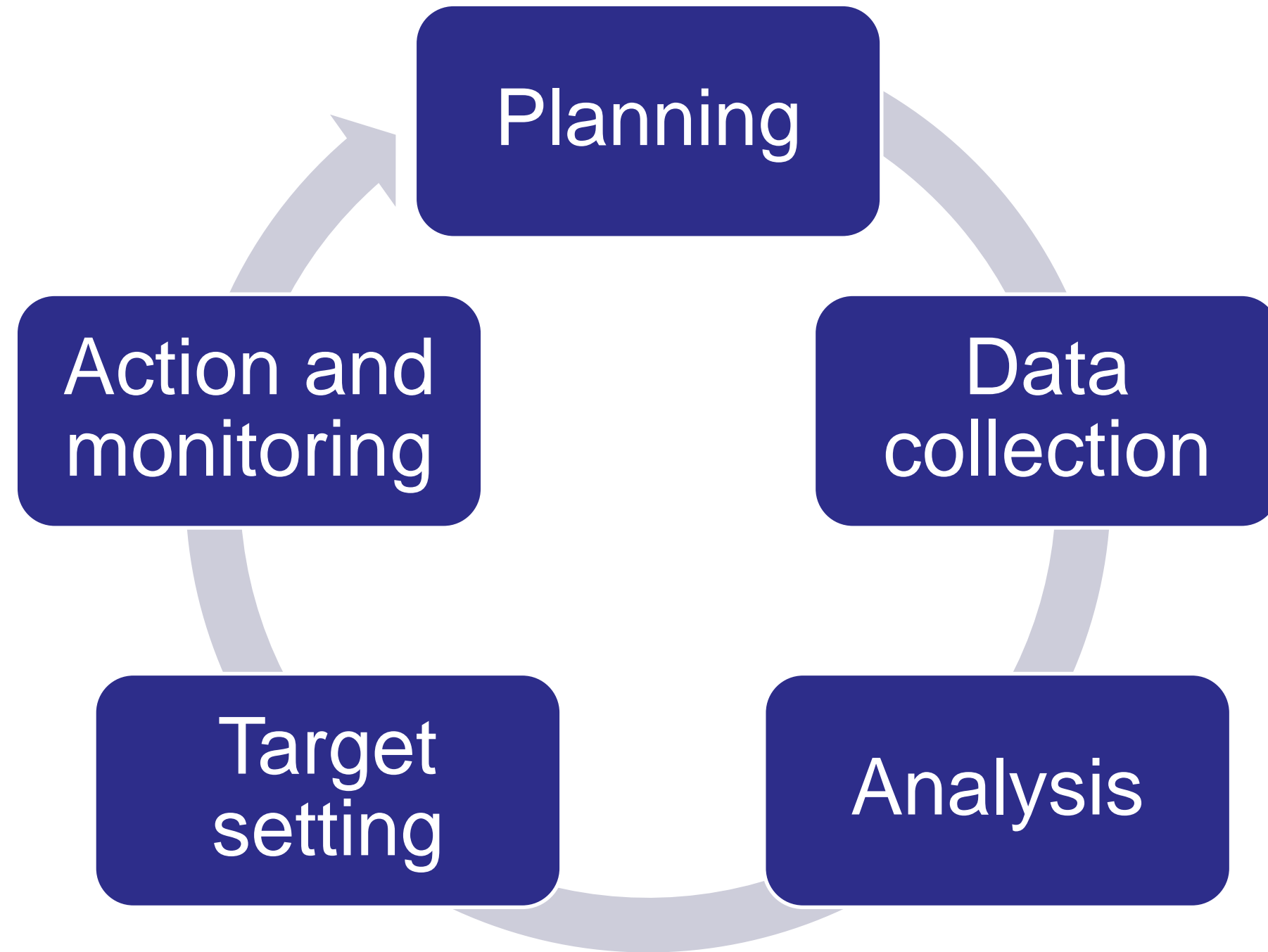
**Bench-  
marking**

**Peer  
Review**

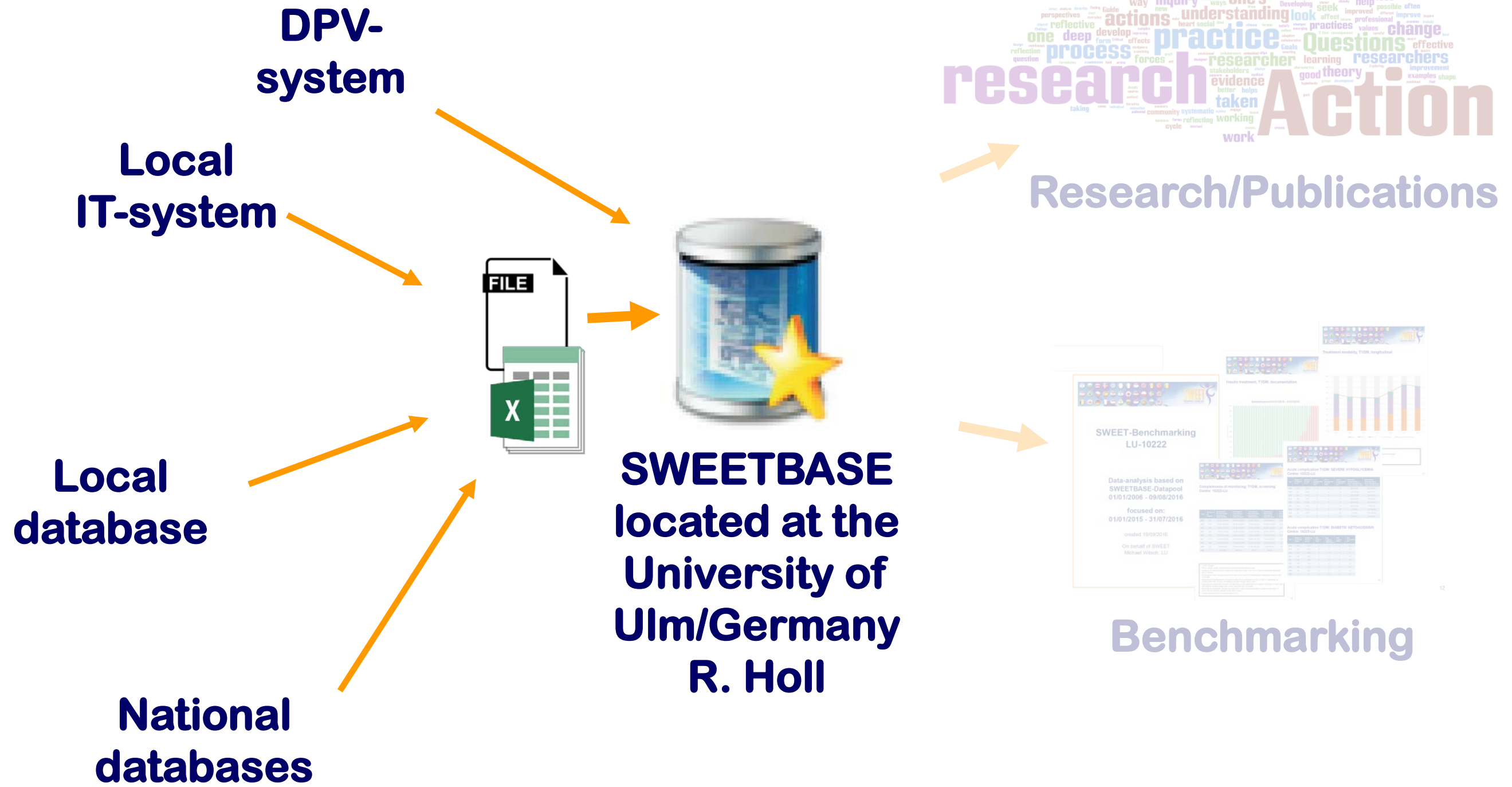
**Research**

**Data management**

# SWEET Benchmarking



# Data management





## Data management: SWEET data set

category	items
centre related data	name, location, number of treated patients, laboratory method of measuring HbA1c, unit of HbA1c testing, mean of the HbA1c reference value for healthy subjects
patient's core data	patient-ID, sex, date of birth (month/year), date of onset (month/year), presentation at onset (DKA +/- coma, ketosis, hyperglycemia, by screening), type of diabetes, if "other type of diabetes" the most appropriate classification, celiac disease yes/no, chronic comorbidity (ICD-10 code), date of death, cause of death
patient's visit data	date of visit
basic physical parameters	height, weight, blood pressure
laboratory tests	HbA1c, cholesterol, HDL-cholesterol, LDL-cholesterol, triglyceride, TSH, free T4, thyroid peroxidase antibodies, antithyroglobulin antibodies, coeliac antibodies
treatment parameters	type of treatment (use of insulin pump, use of closed loop, raw data or summarized data from CGM/FGM-meters, frequency of injections, daily insulin dose (basal and prandial), number of SMGB/day, use of CGM/FGM, type of basal insulin, type of prandial insulin, use of oral antidiabetics, use of injectable (non-insulin) antidiabetics, lipid lowering agents, antihypertensive agents
acute complications	severe hypoglycemias defined as coma or seizures diabetic ketoacidosis leading to hospitalisation
(screening of )microvascular complications	albuminuria, nephropathy retinopathy



# DPV system

The DPV system covers all the functionality of an electronic health record – adapted to our needs.

Available in English, French, German, Greek, Portuguese, Polish ... easy to translate

69 of 117 centers in SWEET are using the DPV-software which is free of charge for SWEET members



name:	DEMO, DENNIS born 02/04/1999				
data for control visit: 07/10/2015					
			total meal insulin	correction factor	long acting insulin
06:00	1 500 U	8	12 000 AR	± 1U / 50 mg/dl	- U NOS
12:00	2 000 U	5	10 000 AR	± 1U / 50 mg/dl	- U NOS
16:00	1 500 U	10	15 000 ASP	± 1U / 50 mg/dl	- U —
19:30	1 500 U	8	12 000 ASP	± 1U / 50 mg/dl	- U NOS
22:30		0	—	± 1U / 50 mg/dl	27 000 U DET



**“Good data management =  
good data quality  
at center level is the  
foundation of all data-related  
activities in Sweet”**

**how many  
minutes in a day**



**... per WEEK –  
do you spend  
with your team for  
data-management?**

## SWEET-Project

### Validation report

Data summary and inconsistent / missing data

Luxembourg, Centre Hospitalier de Luxembourg (centre\_id: 10222)

Date:  
29SEP23

Program:  
Sweet-ValidationReport-2022-09-12.sas

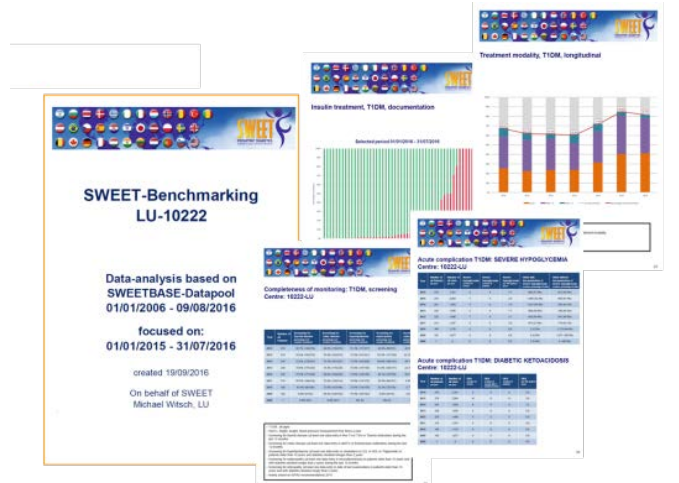
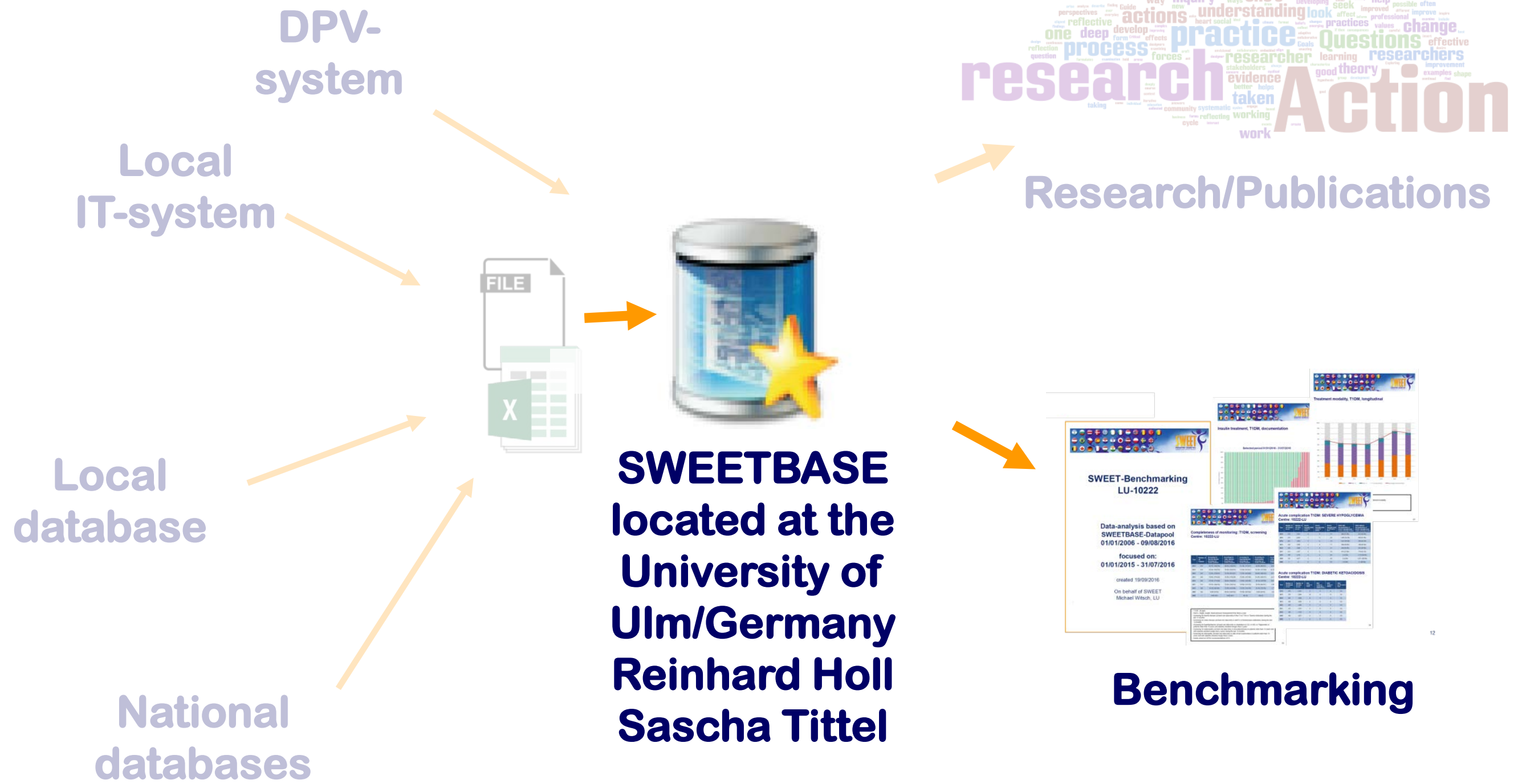
Contact:  
Sascha R. Tittel and Prof. Reinhard W. Holl  
Ulm University, Institute of Epidemiology and medical Biometry, ZIBMT  
Albert-Einstein-Allee 41, 89081 Ulm, Germany  
Phone: ++49-731-502-5314  
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E-mail: reinhard.holl@uni-ulm.de





- **I have 10 minutes every week in our staff meeting to discuss data related issues**
- **twice a year one hour at our strategic day – the reports are shown to the whole team AND to the parents/patients**
- **our work is data-driven**

# Data management





# Benchmarking Report

- 2 reports per year
- 87 pages in 2021, now 164 pages
  - 93 concerning the whole group
  - 71 focussing on your centre
- 2 different designs
- Sent as pdf and powerpoint for direct use in your presentation
- 7 regional reports :
  - Australia-New Zealand, Canada, Greece, India, Italy, Poland USA
  - open and closed



## SWEET-Benchmarking

Report: corporate members, all centres  
Data-analysis based on SWEETBASE-Datapool  
focused on : 01/01/2018 - 31/07/2018

Created 26/09/2018



## SWEET-Benchmarking

Center: 10222-LU, Pediatric Clinic CH de Luxembourg

Data analysis based on SWEETBASE datapool  
focused on : 01/01/2023 - 30/06/2023  
Starting year of the analysis: 2010

Created 16/10/2023





**All results which you will see  
are directly copied from the  
SWEET Benchmarking Report**





## Number of patients

all centers with data, 01/01/2023 - 30/06/2023



<b><i>Number of all centers with data in SWEET-Base (overall)</i></b>	<b>138</b>
<b><i>Number of active centers in SWEET-Base</i></b>	<b>118</b>
<b><i>Number of all patients in SWEET-Base (overall)</i></b>	<b>113,502</b>
<b><i>Number of all visits in SWEET-Base (overall)</i></b>	<b>1,352,231</b>
<b><i>Number of patients in selected period</i></b>	<b>40,913</b>
<b><i>Number of visits in selected period</i></b>	<b>140,221</b>

## Basic statistics all centers with data

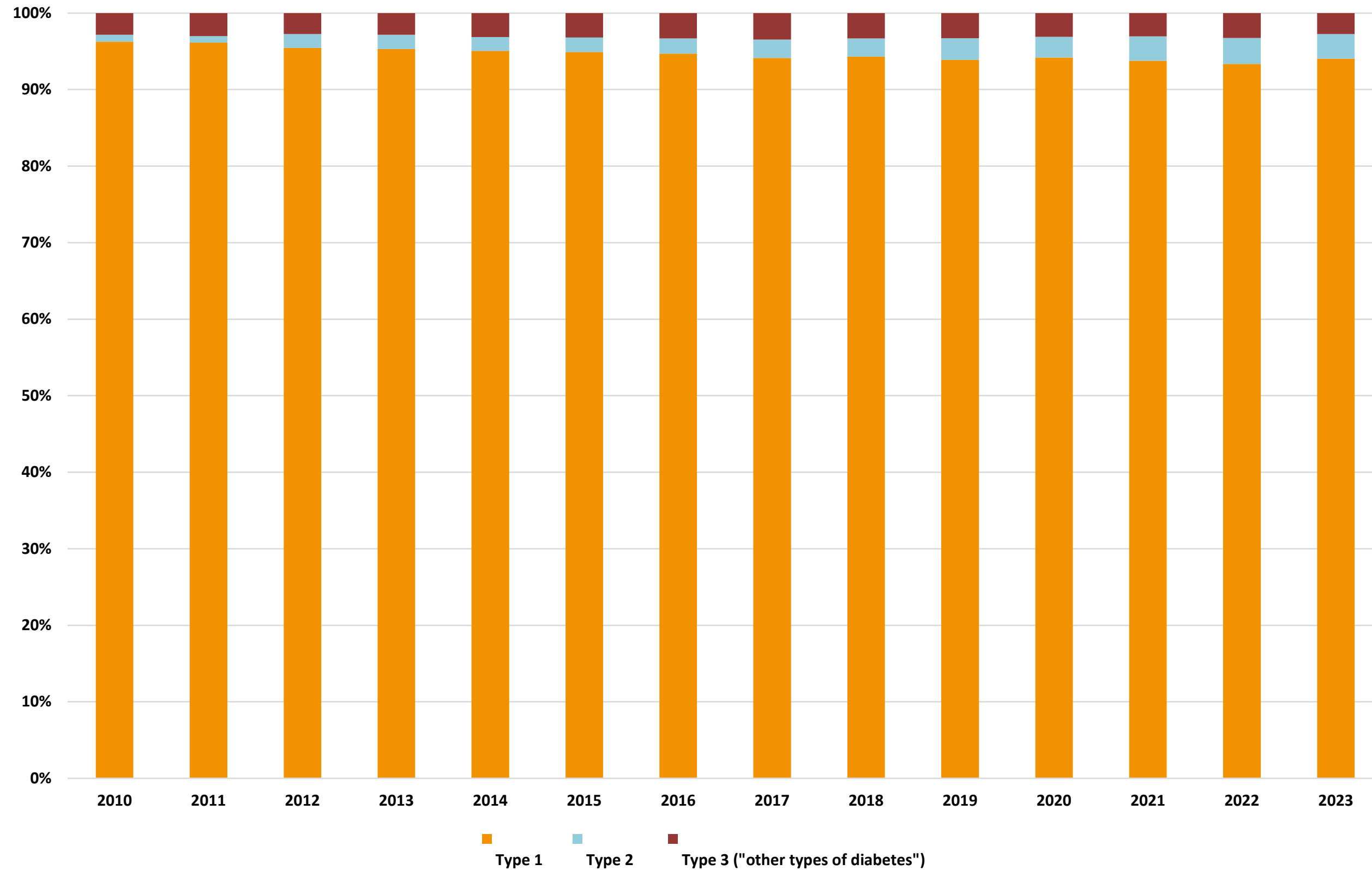
	current upload					previous upload				
<b>number of patients (n)</b>	113,502					106,325				
<b>number of visits (n)</b>	1,352,231					1,249,978				
	total number datasets	mean	sd	number of lower range outliers	number of upper range outliers	total number datasets	mean	sd	number of lower range outliers	number of upper range outliers
<b>age (years)</b>	1,352,077	13.53	5.80	49	40	1,249,910	13.54	5.86	44	40
<b>height (cm)</b>	1,069,526	153.10	22.16	3	0	1,000,731	153.03	22.18	2	0
<b>weight (kg)</b>	1,086,022	51.61	21.73	0	33	1,014,920	51.45	21.61	0	31
<b>BMI-SDS</b>	1,055,239	0.60	1.19	403	89	987,445	0.60	1.18	395	76
<b>blood pressure systolic (mmHg)</b>	745,643	112.65	13.86	5	9	690,734	112.60	13.93	2	10
<b>blood pressure diastolic (mmHg)</b>	744,980	67.23	9.78	42	5	690,095	67.16	9.81	37	5
<b>HbA1c (%)</b>	1,041,586	8.13	1.80	30	72	967,046	8.14	1.79	28	26
<b>total dose of insulin (units per day)</b>	835,192	41.06	27.90	8,629	832	781,276	40.99	28.02	8,003	755
<b>cholesterol (mg/dl)</b>	206,341	168.87	37.33	40	108	191,767	169.07	37.32	36	109
<b>HDL cholesterol (mg/dl)</b>	194,464	57.84	15.95	58	101	179,034	57.93	16.05	56	98
<b>LDL cholesterol (mg/dl)</b>	172,309	94.34	34.31	800	175	159,801	94.33	22.18	757	167
<b>triglycerides (mg/dl)</b>	197,987	100.48	95.90	2,272	865	182,078	100.86	98.00	2,030	807
<b>TSH (mIU/ml)</b>	221,939	2.95	28.23	1,771	19	206,166	2.92	28.39	1,755	9

Outliers are defined as:

age <0 or >80 years	blood pressure systolic <50 or >200 mmHg	cholesterol <40 or >400 mg/d	TSH <0.1 or >500 mIU/ml
height <40 or >220cm	blood pressure diastolic <30 or >130 mmHg	HDL <10 or >150 mg/dl	
weight <1 or >200kg	HbA1c <3 or >20 %	LDL <30 or >300 mg/dl	
BMI-SDS <-5 or >6	total dose of insulin <0.5 or >200 units	triglycerides <30 or >600 mg/d	

## Demographic characteristics: patients <18 years

all centers with data



## Other types of diabetes

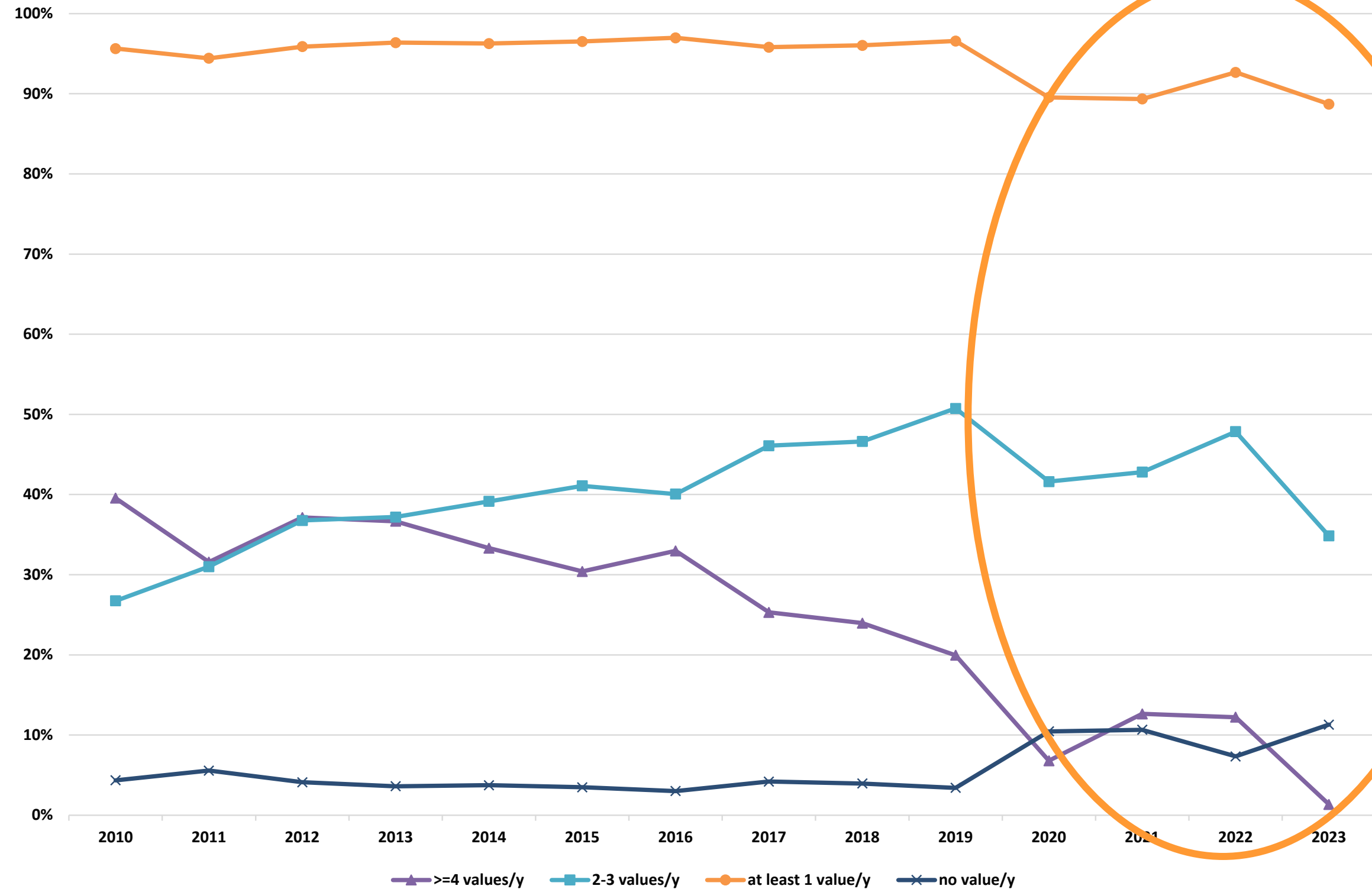
all centers with data



other types of diabetes	Number of patients	other types of diabetes	Number of patients
Unknown	761	permanent neonatal diabetes (cause undetermined)	12
CFRD	707	T1D autoimmunity (>= 2 antibodies)	12
Congenital diabetes mellitus (manifested within the first 6 months of life)	602	Haemochromatosis	11
Genetic defects of beta-cell fct: others	551	Type A insulin resistance	11
MODY2	507	Alstrom syndrome, ALMS1 gene on chromosome 2p13	10
Glucose intolerance	186	Pancreatic agenesis	8
Trauma - pancreatectomy	143	Past history of glucose intolerance/diabetes	7
MODY3	142	Neoplasia	7
Glucocorticoids	119	Genetic defects in insulin action: others	7
Drug- or chemical induced: others	109	Endocrinopathies: others	7
Diseases of exocrine pancreas: others	94	Uncommon forms: others	6
Down syndrome	87	PLAGL1/HYMAI Imprinting defect on 6q24	6
Post transplantation (excludes patients with CF)	82	EIF2AK3 mutation- Wolcott-Rallison	5
Wolfram syndrome	73	Congenital rubella	5
Fibrocalculous pancreatopathy	63	Laurence-Moon-Biedl syndrome	<5
MODY5	49	Rabson-Mendenhall syndrome	<5
MODY1	39	permanent neonatal diabetes other causes	<5
Other genetic syndroms: others	39	MODY7	<5
Prader-Willi syndrome	33	Friedreichs ataxia	<5
Pancreatitis	31	MODY8	<5
Chromosome 11, KCNJ11 (Kir6.2)	30	Chromosome 8, BLK	<5
INS gene mutation	30	Genetic risk of Type 1 diabetes	<5
Haemosiderosis (tranfusion related)	25	transient neonatal diabetes (cause undetermined)	<5
Chromosome 11, ABCC8 (SUR1)	19	Klinefelter syndrome	<5
Mitochondrial DNA mutation	17	Dilantin	<5
Turner syndrome	16	Myotonic dystrophy	<5
MODY9	13	Atypical anti-psychotic agents	<5
Lipoatrophic diabetes	13	Polyendocrine autoimmune deficiencies APS I and II	<5
Rogers syndrome	13		
		<b>Total</b>	<b>4739</b>

## Completeness of monitoring: HbA1c

all centers with data



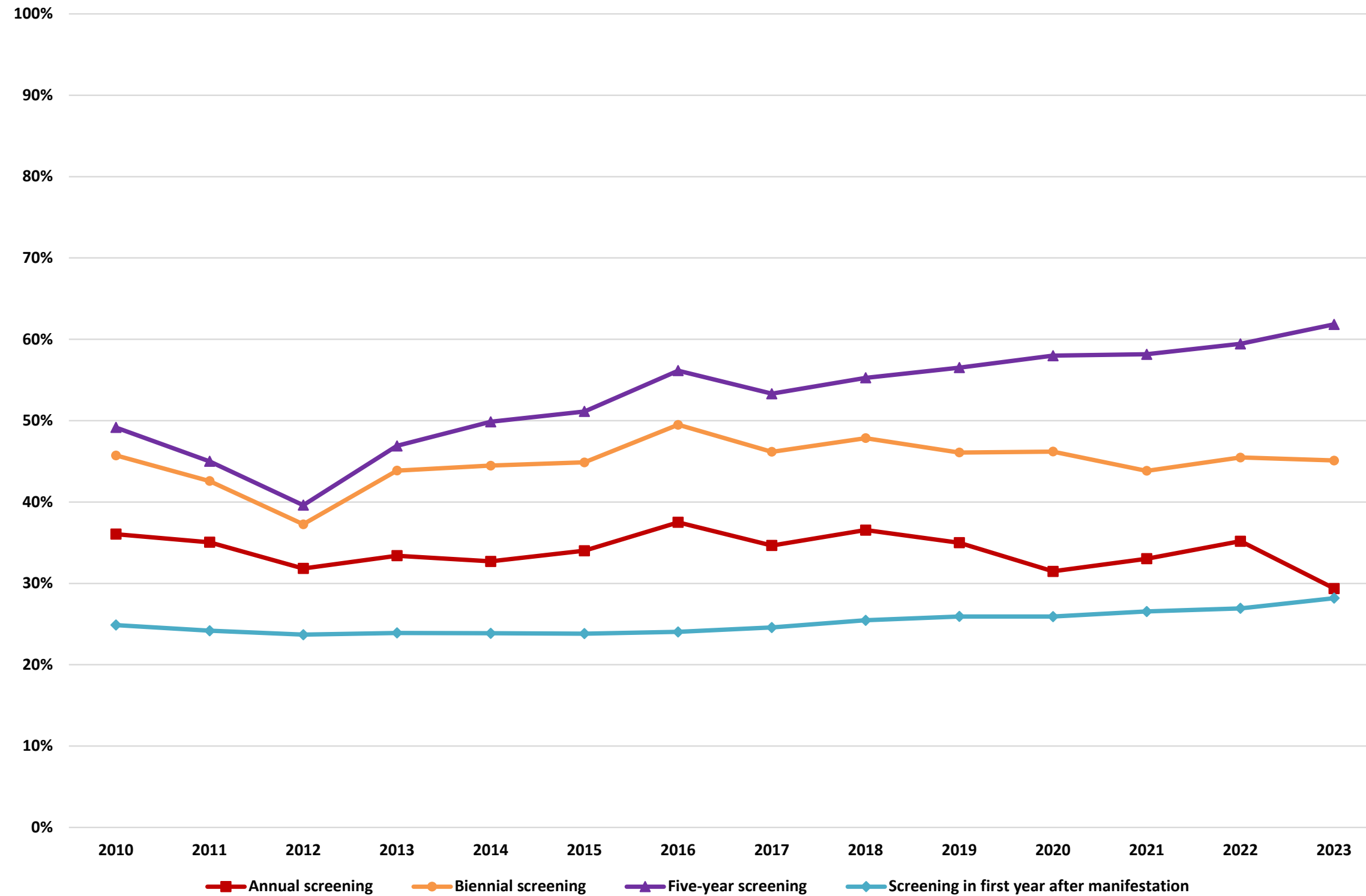
- T1DM, all ages
- HbA1c: how many controls per year (no, 1, 2-3 or >=4 controls)

Less measured?  
 Less documented?  
 Shift to Time in range?!



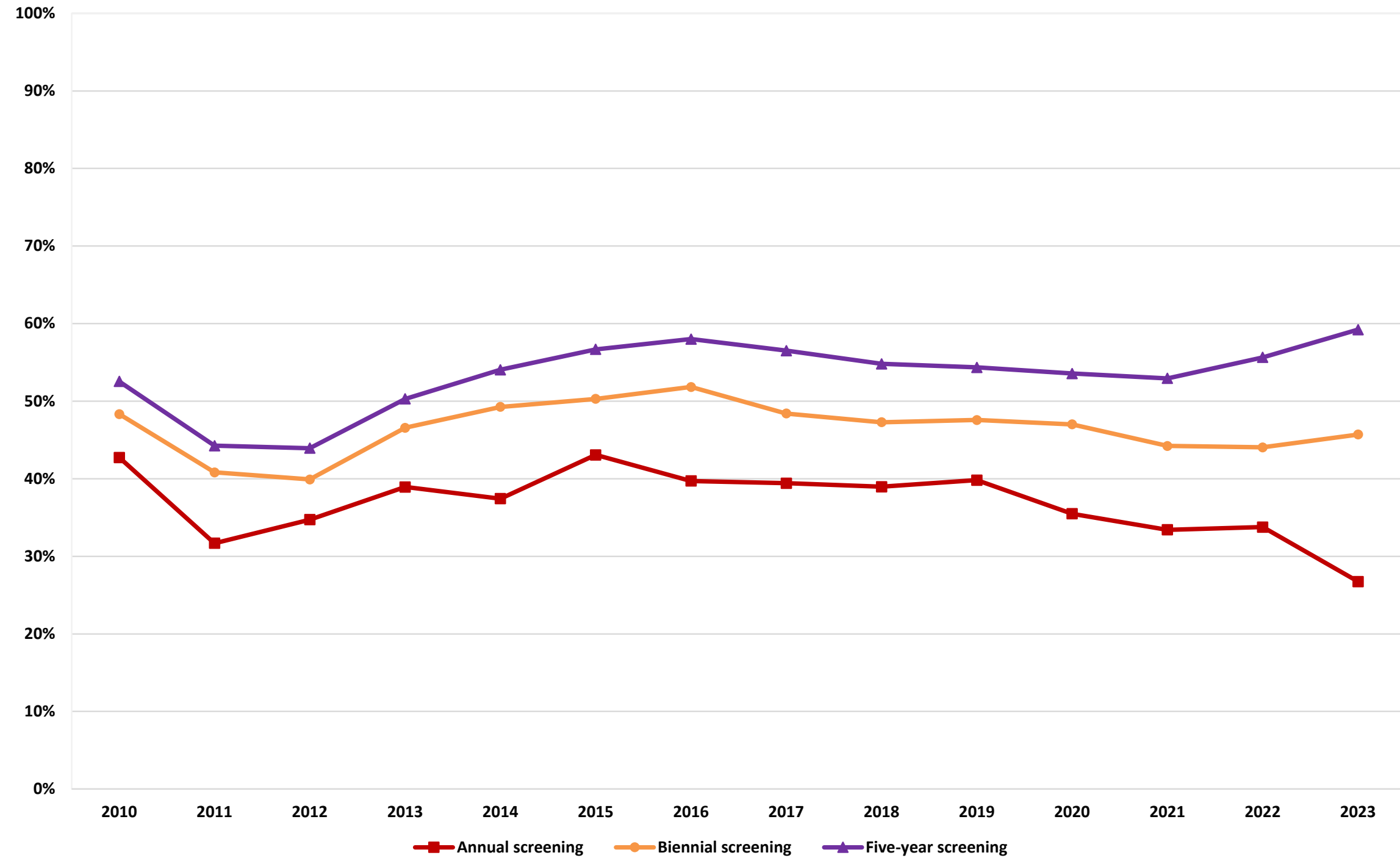
## Completeness of monitoring: screening lipid disorders

all centers with data



## Completeness of monitoring: screening nephropathy

all centers with data





**“More data with less errors in almost all categories”**

**GREAT WORK TEAM**

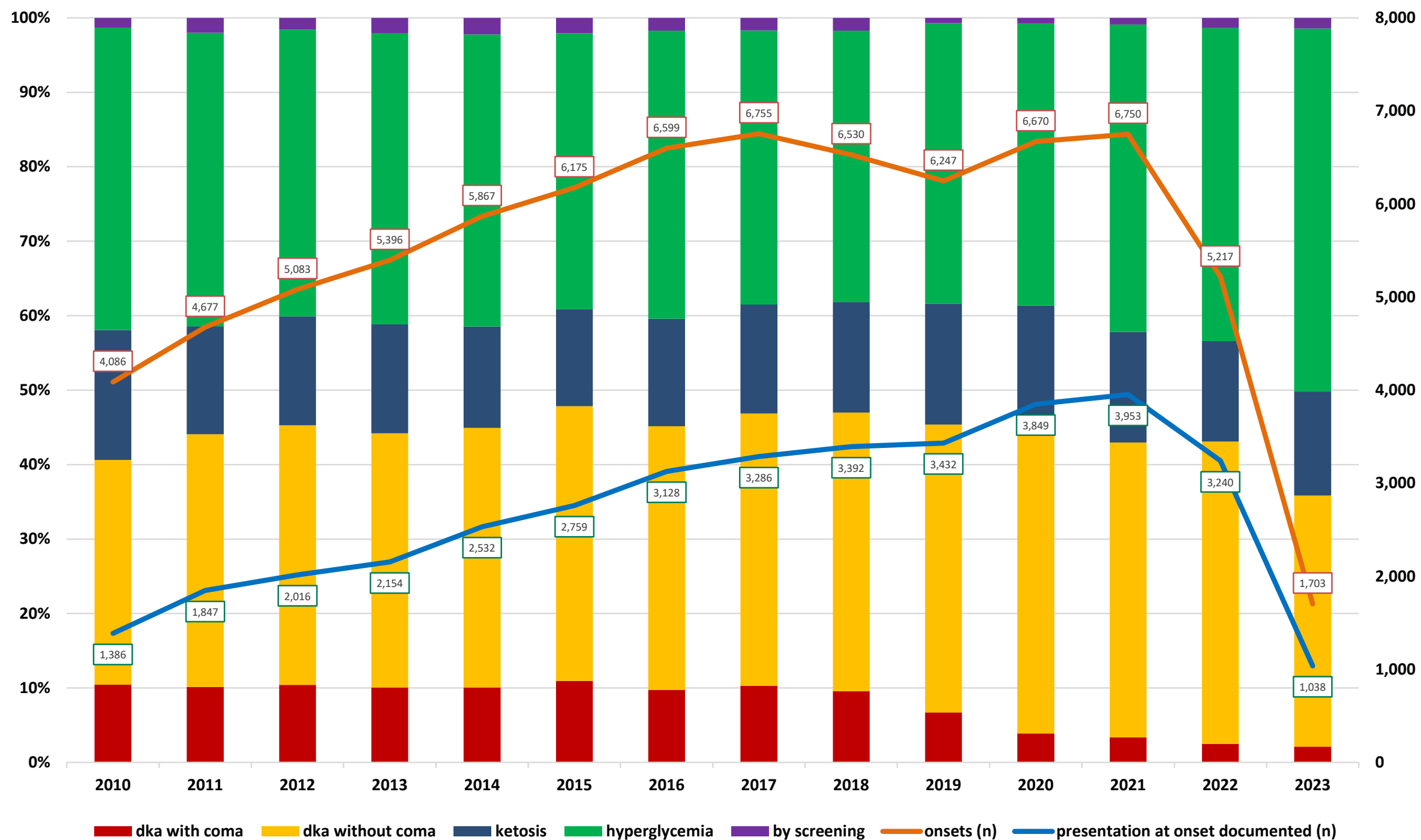






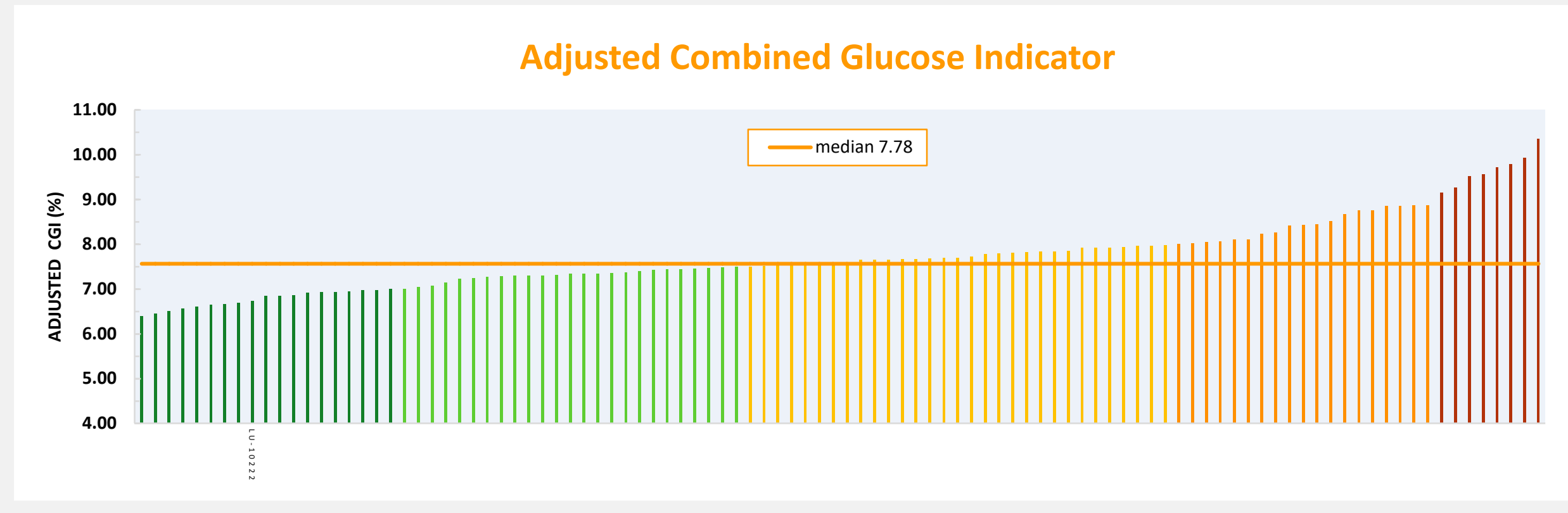
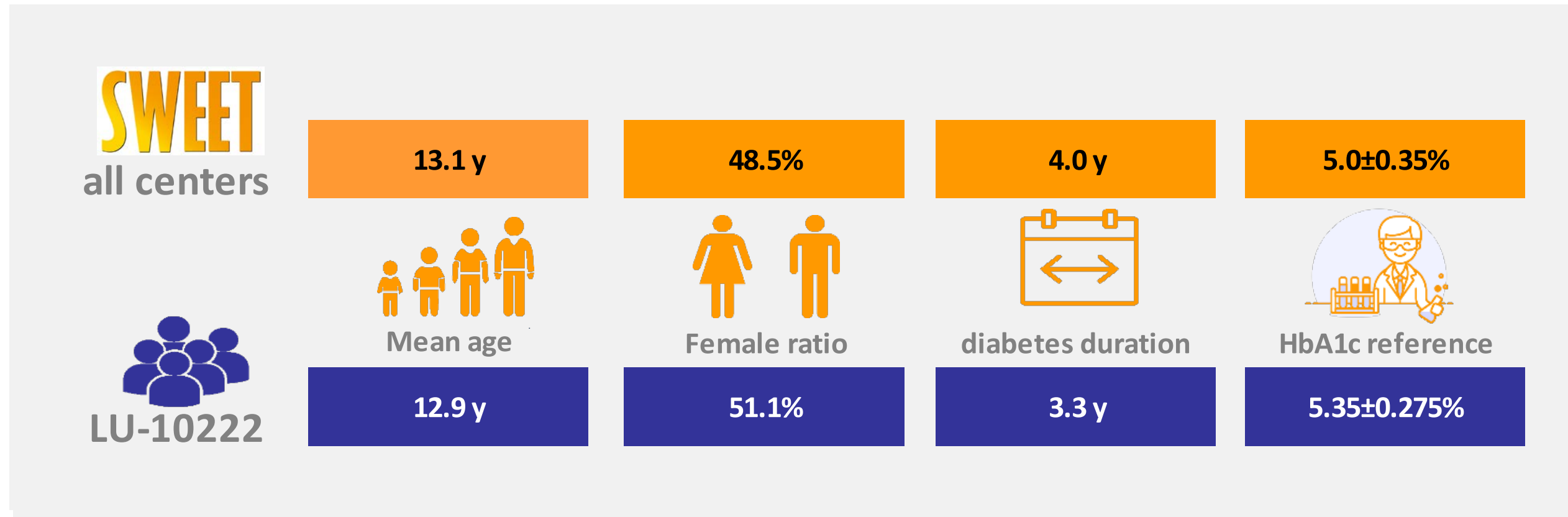
## Presentation at onset: T1DM, longitudinal all centers with data

**“As said... in almost all categories”**



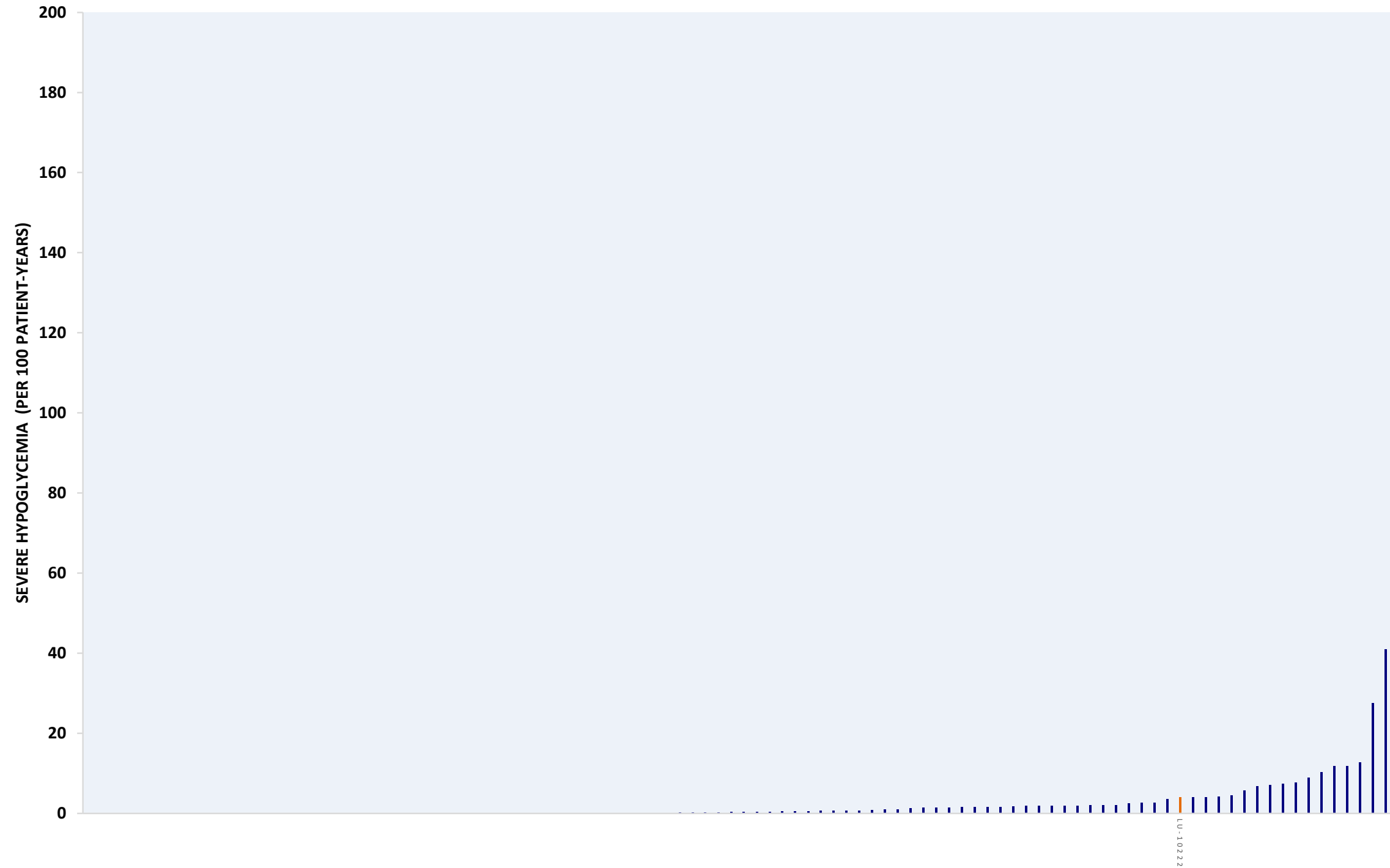
# SWEET dashboard **adjusted CGI (adjusted Combined Glucose Indicator)**

all centers with data, 01/01/2023 - 30/06/2023



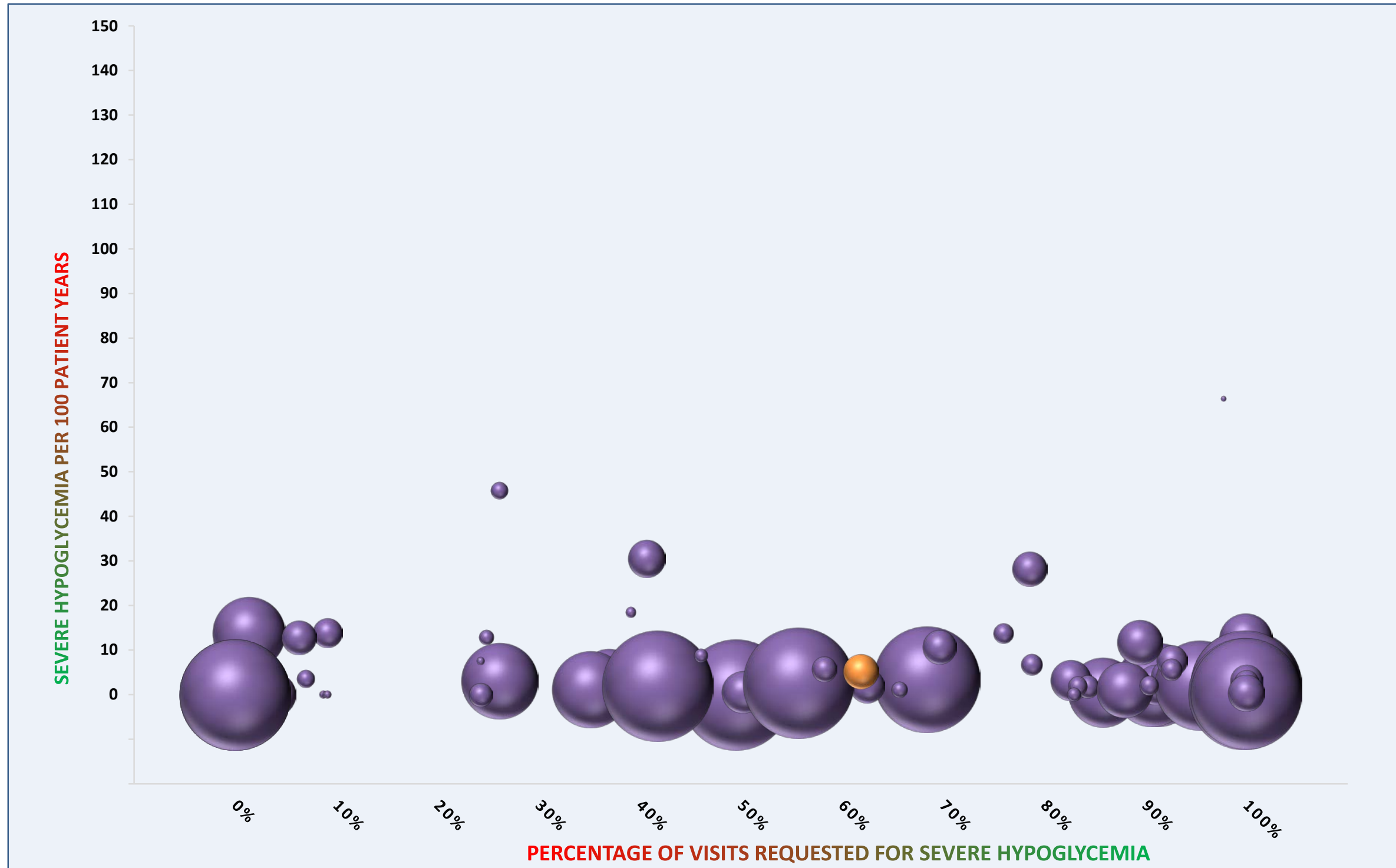
# Acute complication T1DM: severe hypoglycemia

01/01/2023 - 30/06/2023



# Acute complication T1DM: severe hypoglycemia (bubble chart)

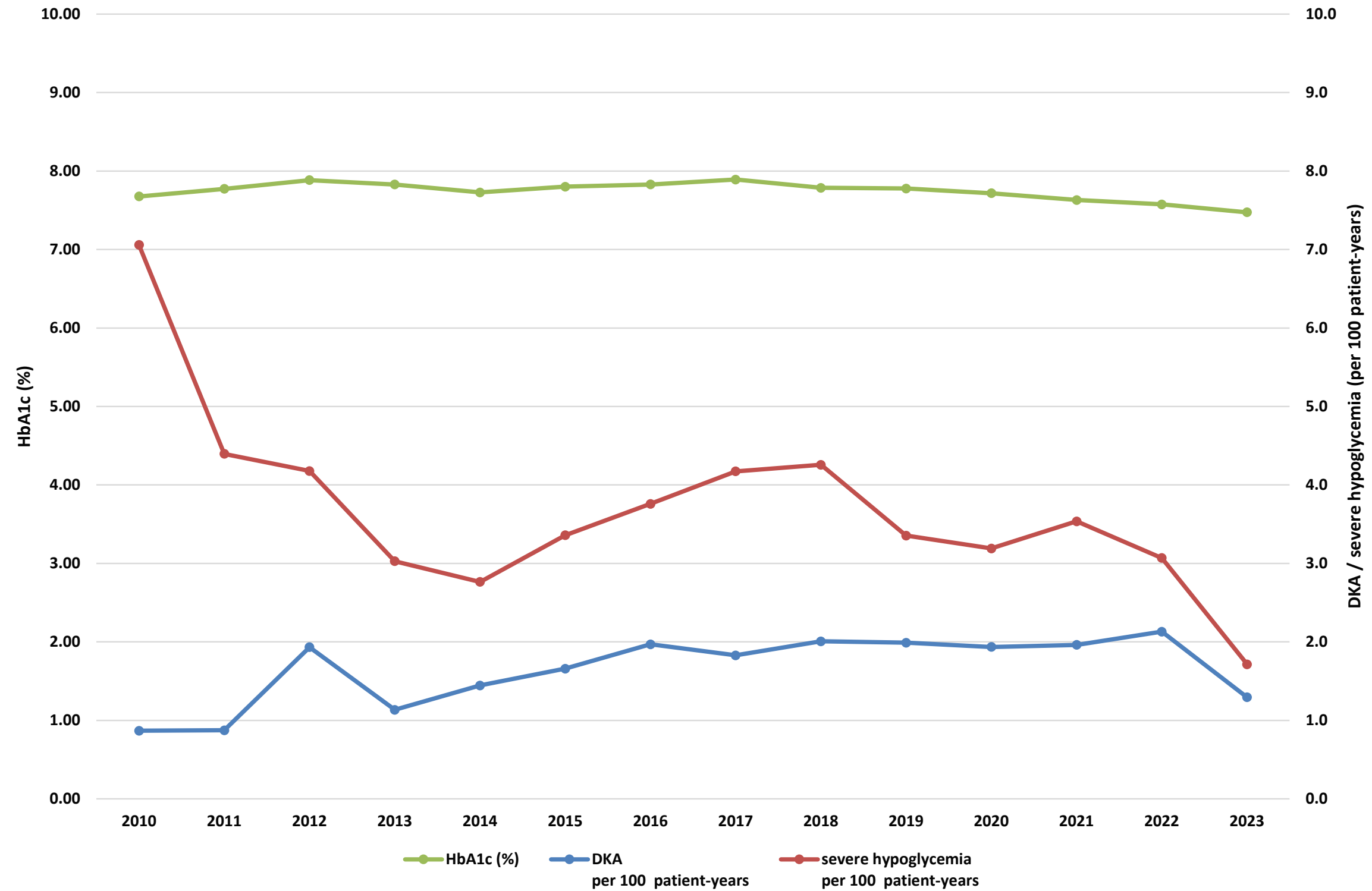
01/01/2023 - 30/06/2023



- the width of the bubble represents the number of patient to screen per center, over 1000 patients have the same size of bubble
- yellow bubble: your center

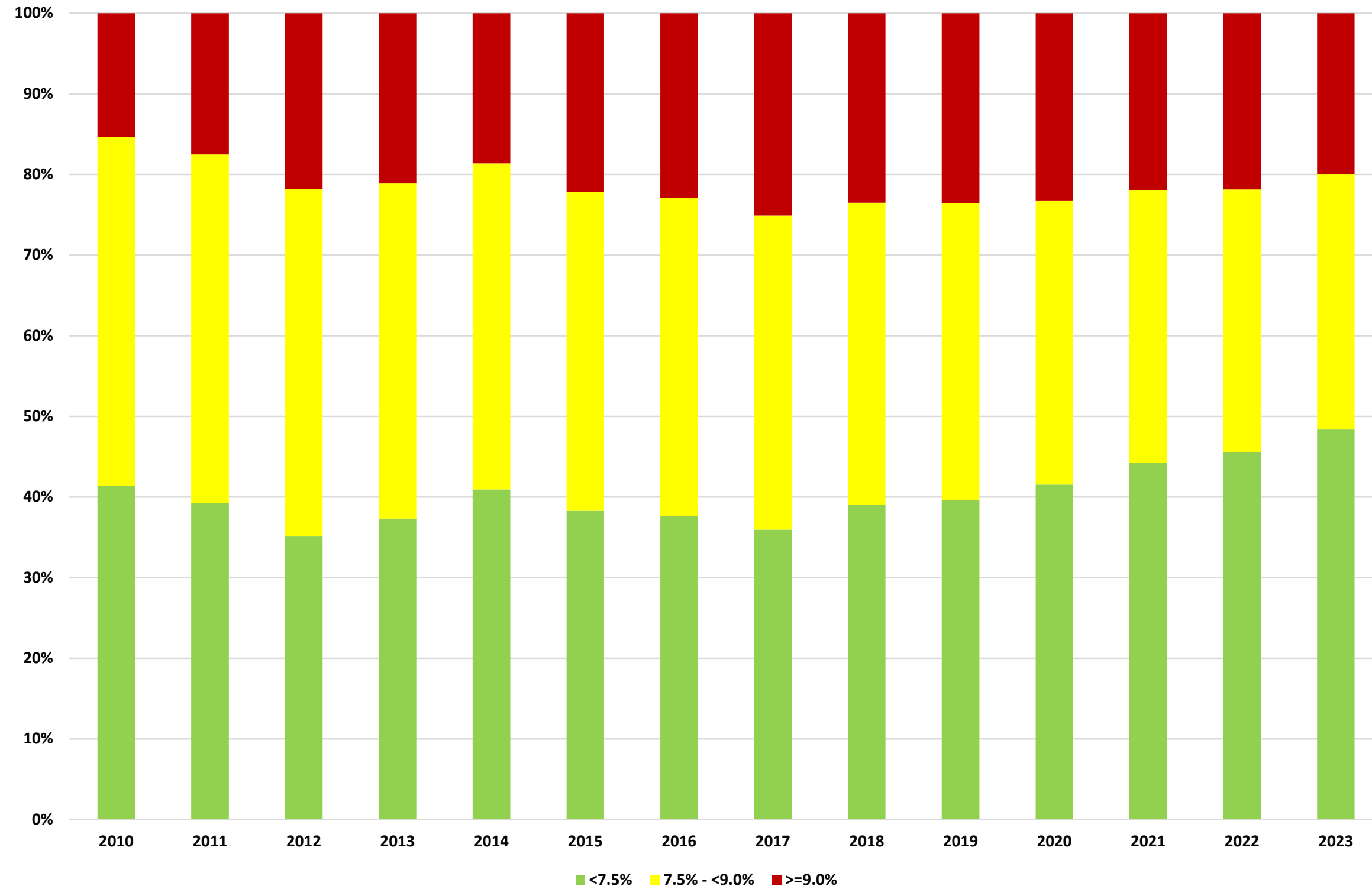
# T1DM: HbA1c, diabetic ketoacidosis and severe hypoglycemia

all centers with data



## Metabolic outcome: T1DM, CGI (target <7.5%)

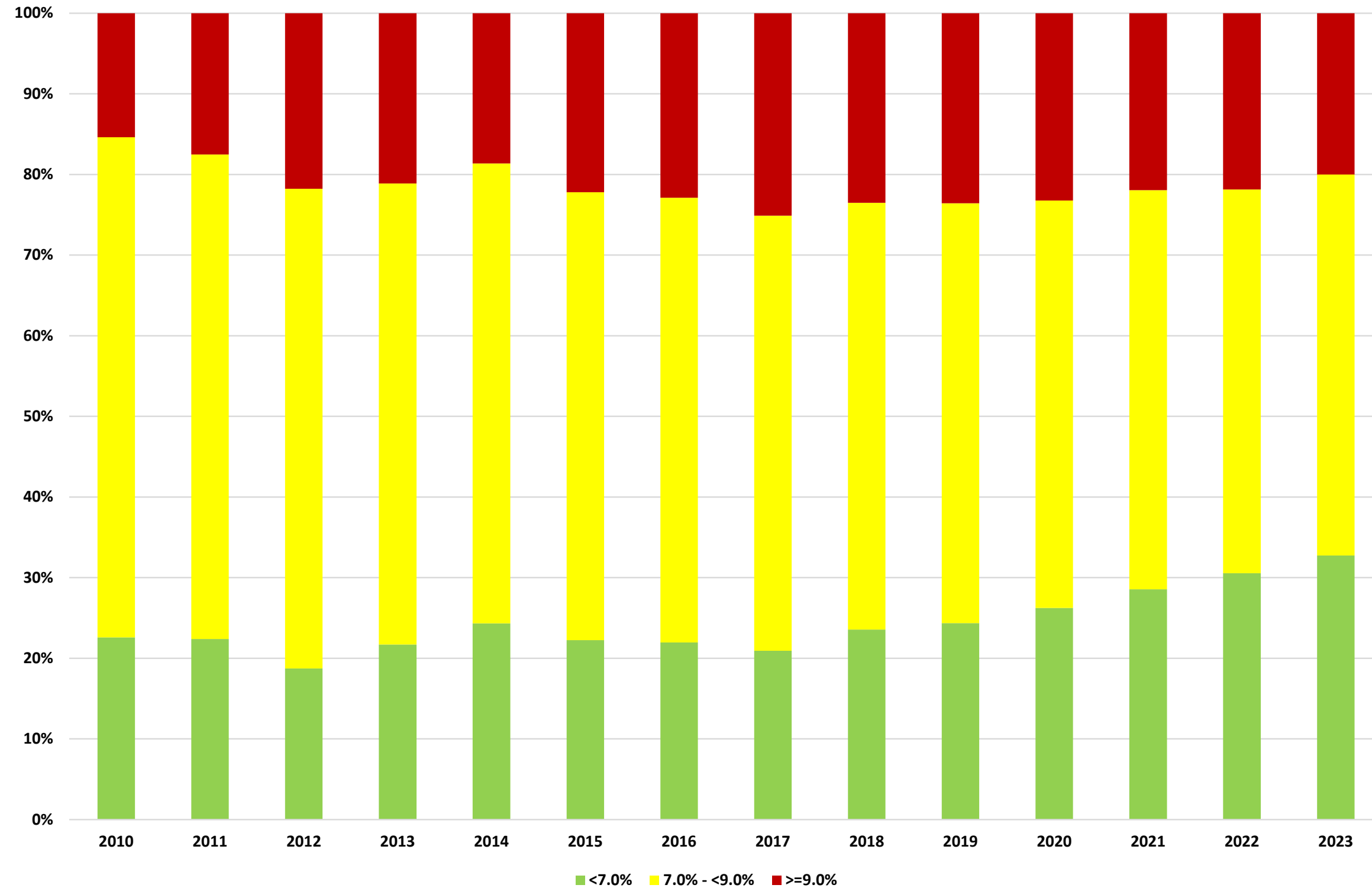
all centers with data, 01/01/2023 - 30/06/2023



• based on CGI (combined glucose indicator)

## Metabolic outcome: T1DM, CGI (target <7.0%)

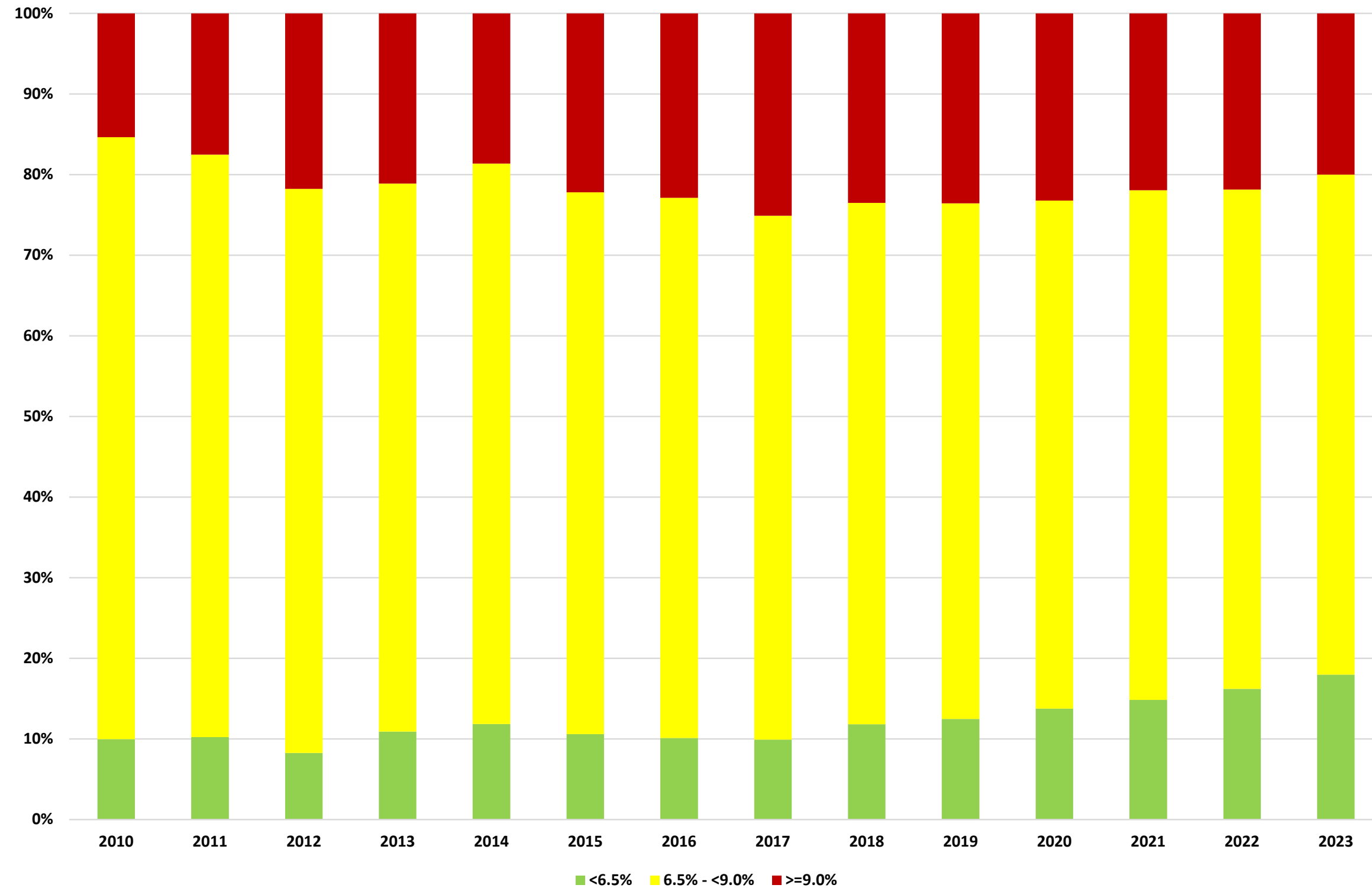
all centers with data, 01/01/2023 - 30/06/2023



• based on CGI (combined glucose indicator)

## Metabolic outcome: T1DM, CGI (target <6.5%)

all centers with data, 01/01/2023 - 30/06/2023



• based on CGI (combined glucose indicator)





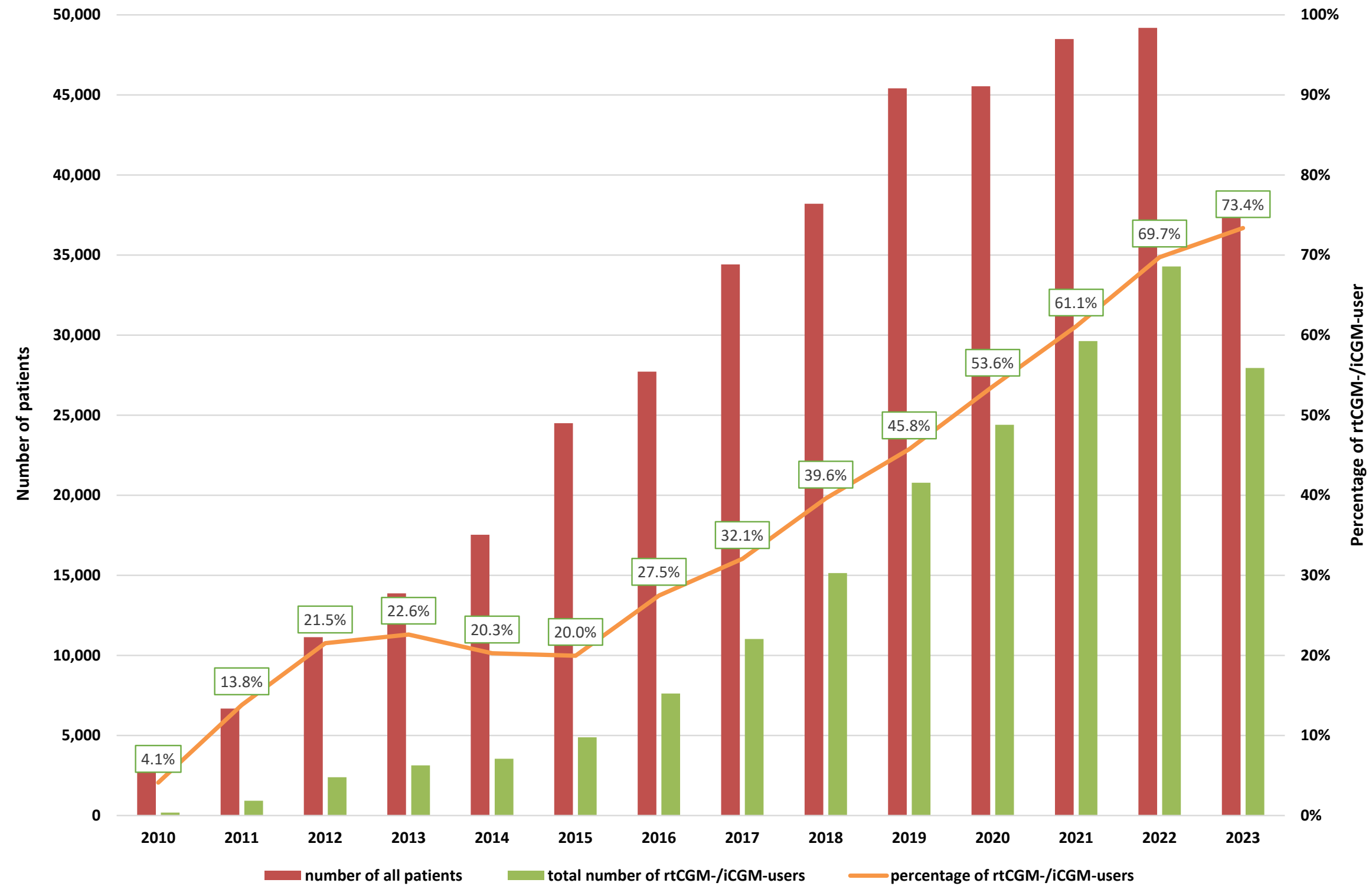
**“BETTER OUTCOME!”**

**GREAT WORK TEAM**



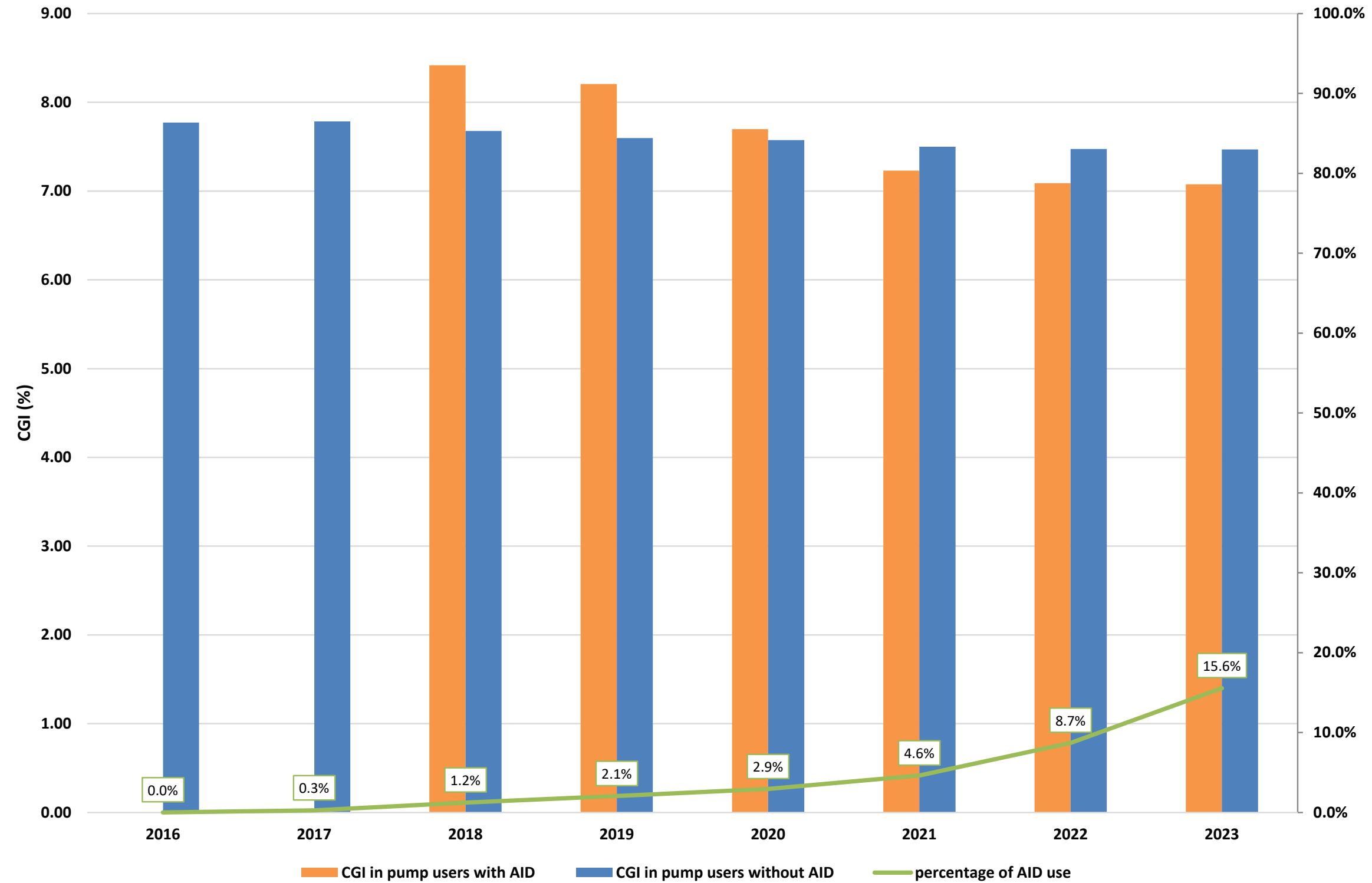
# Continuous glucose monitoring, T1DM

all centers with data



# Automated Insulin Delivery (AID): usage and metabolic results

all centers with data



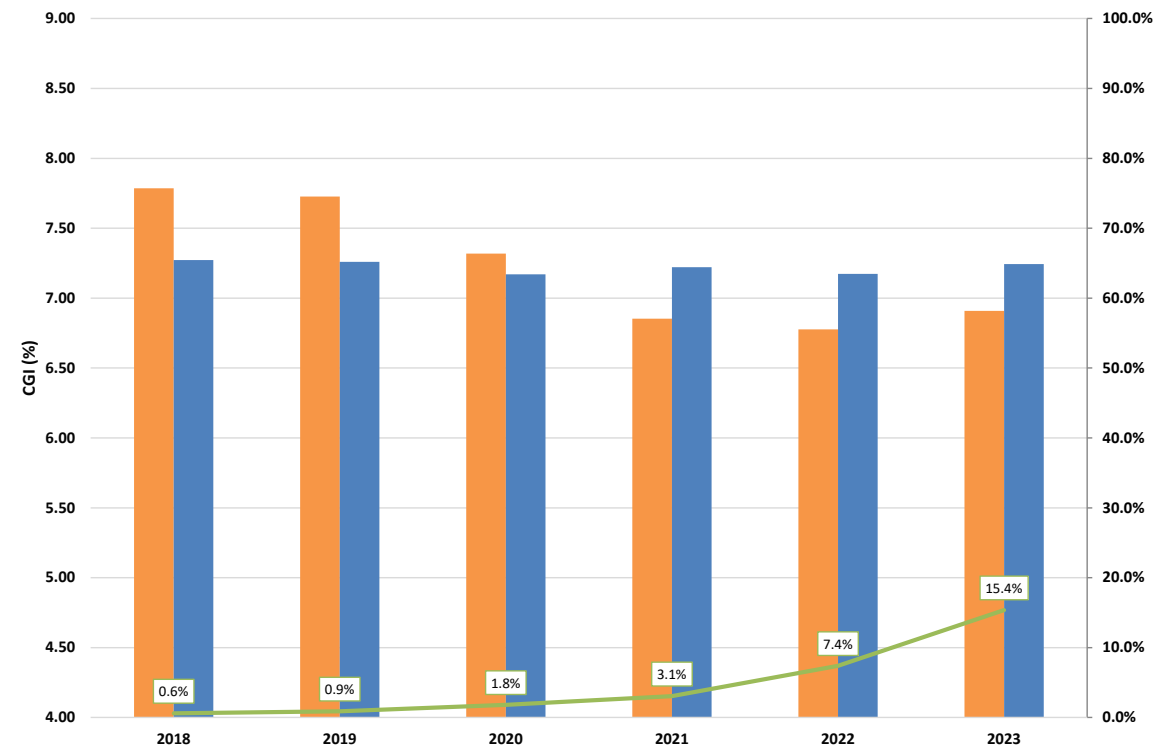
- CGI (Combined Glucose Indicator): measured HbA1c values combined with HbA1c values calculated based on Time In Range
- Percentage of AID use: Automated Insulin Delivery use in relation to all pump users

# Automated Insulin Delivery (AID): usage and metabolic results

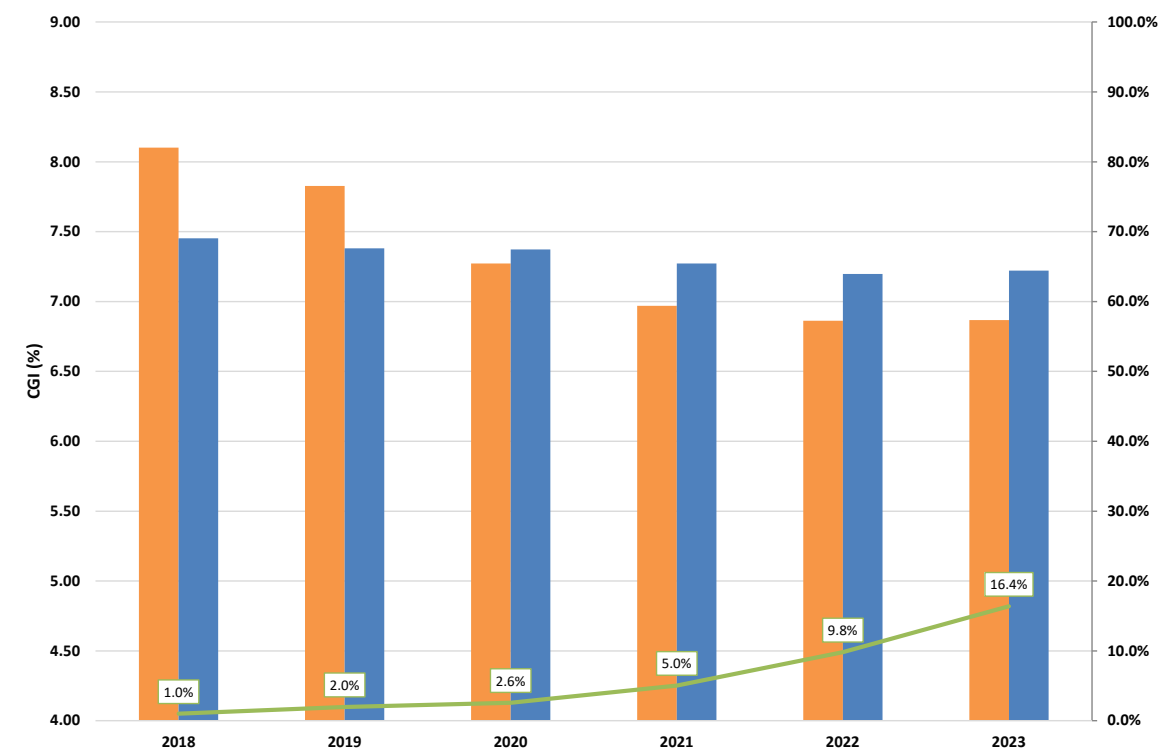
## all centers with data



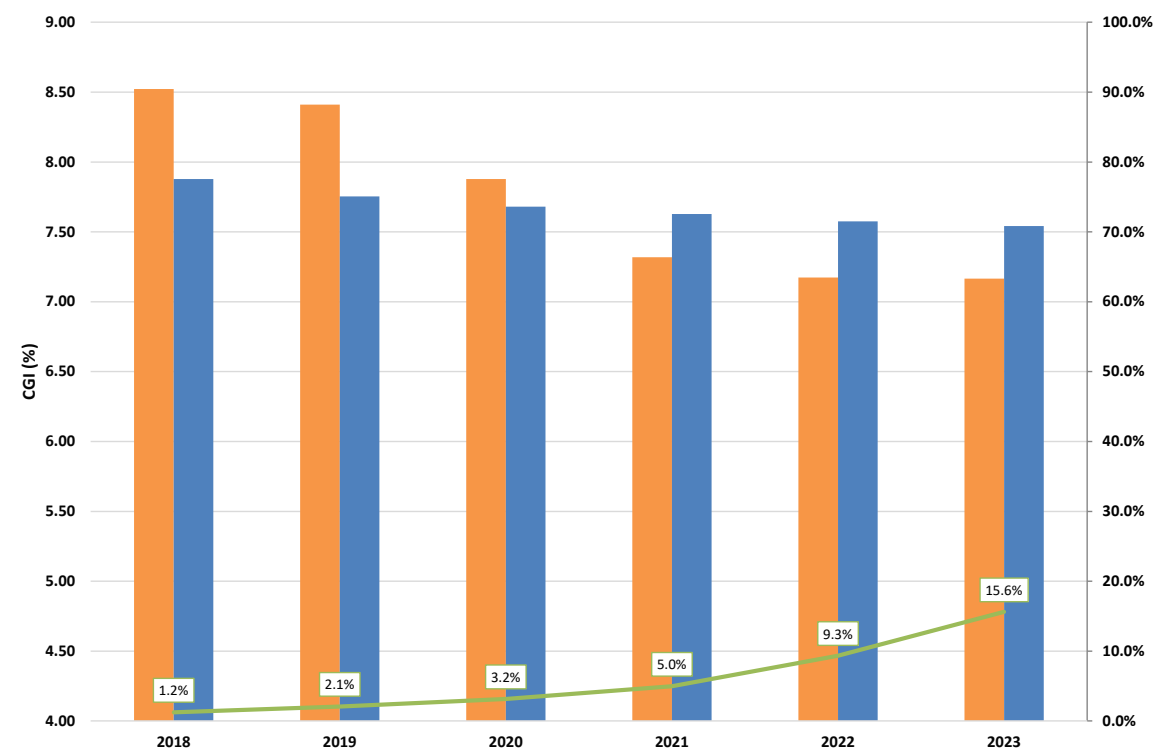
age: 0 - 6 y



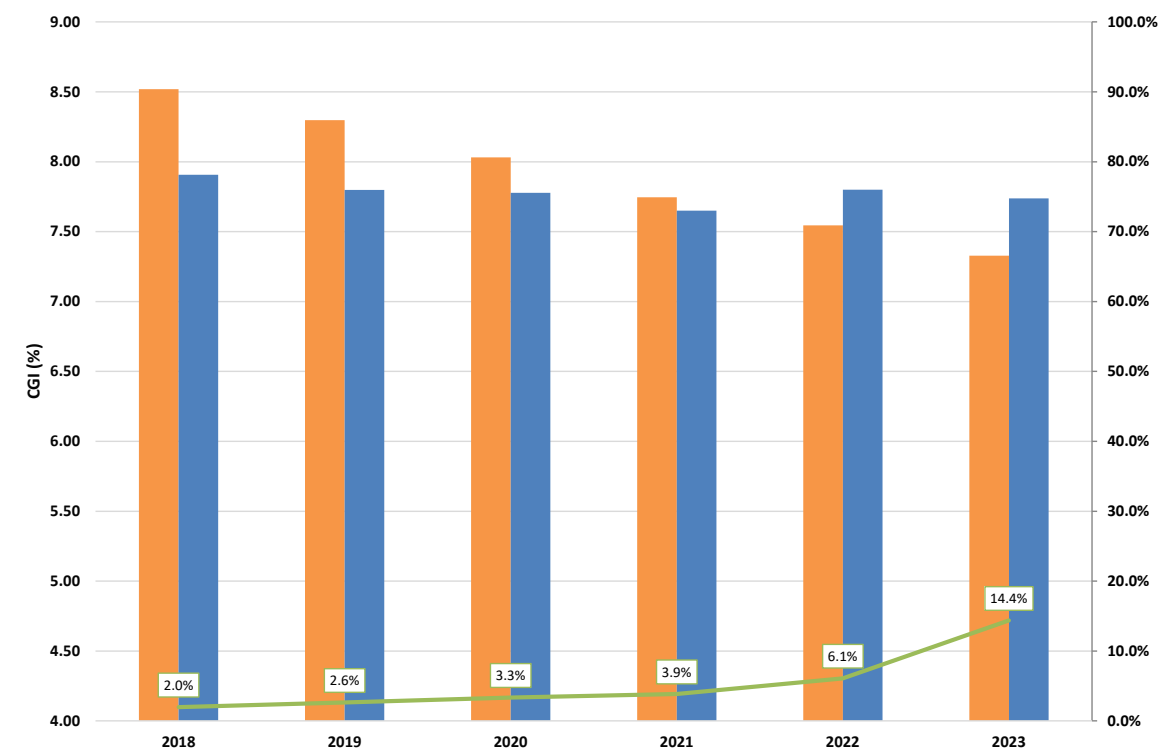
age: >6 - 12 y



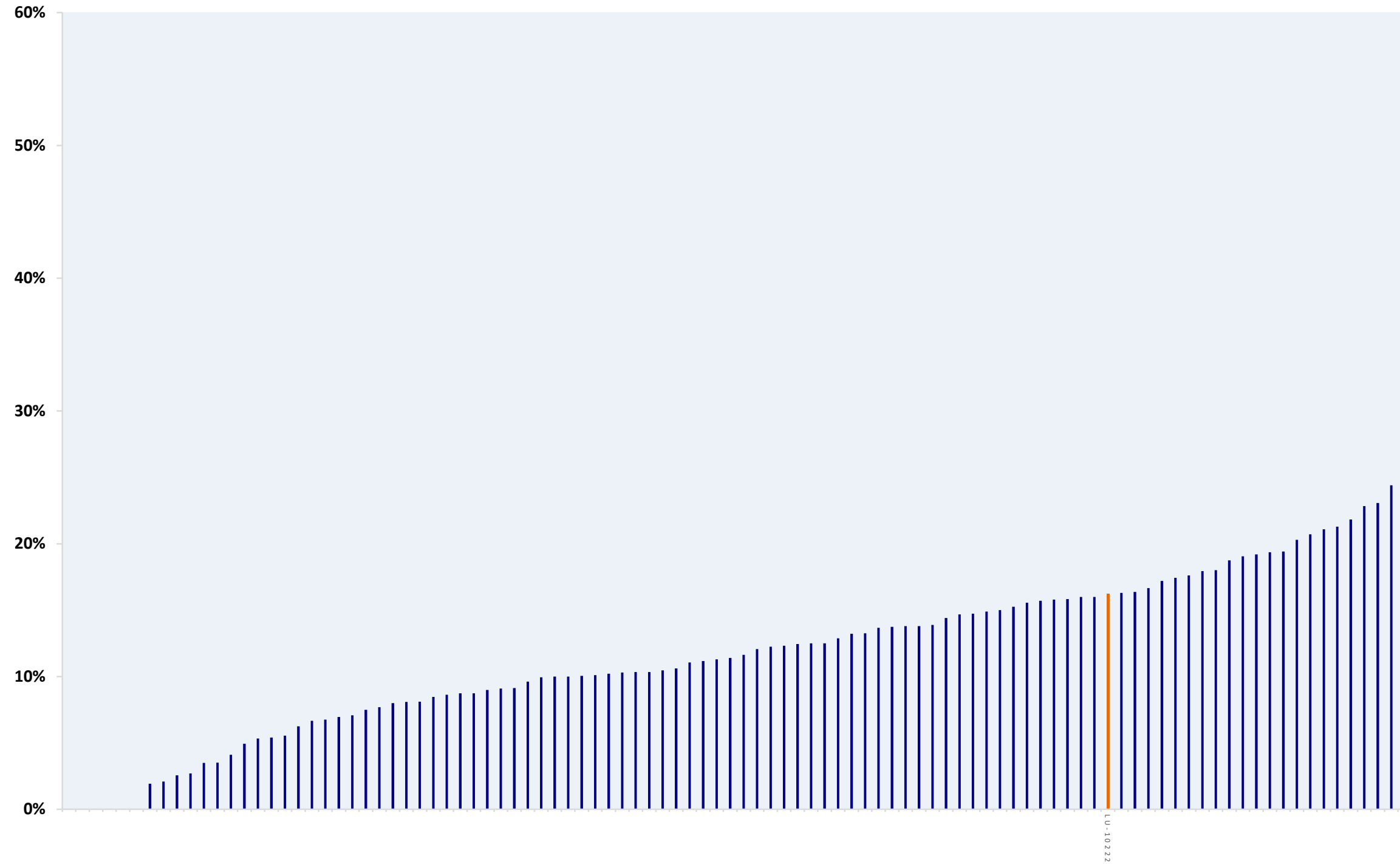
age: >12 - 18 y



age: >18 y

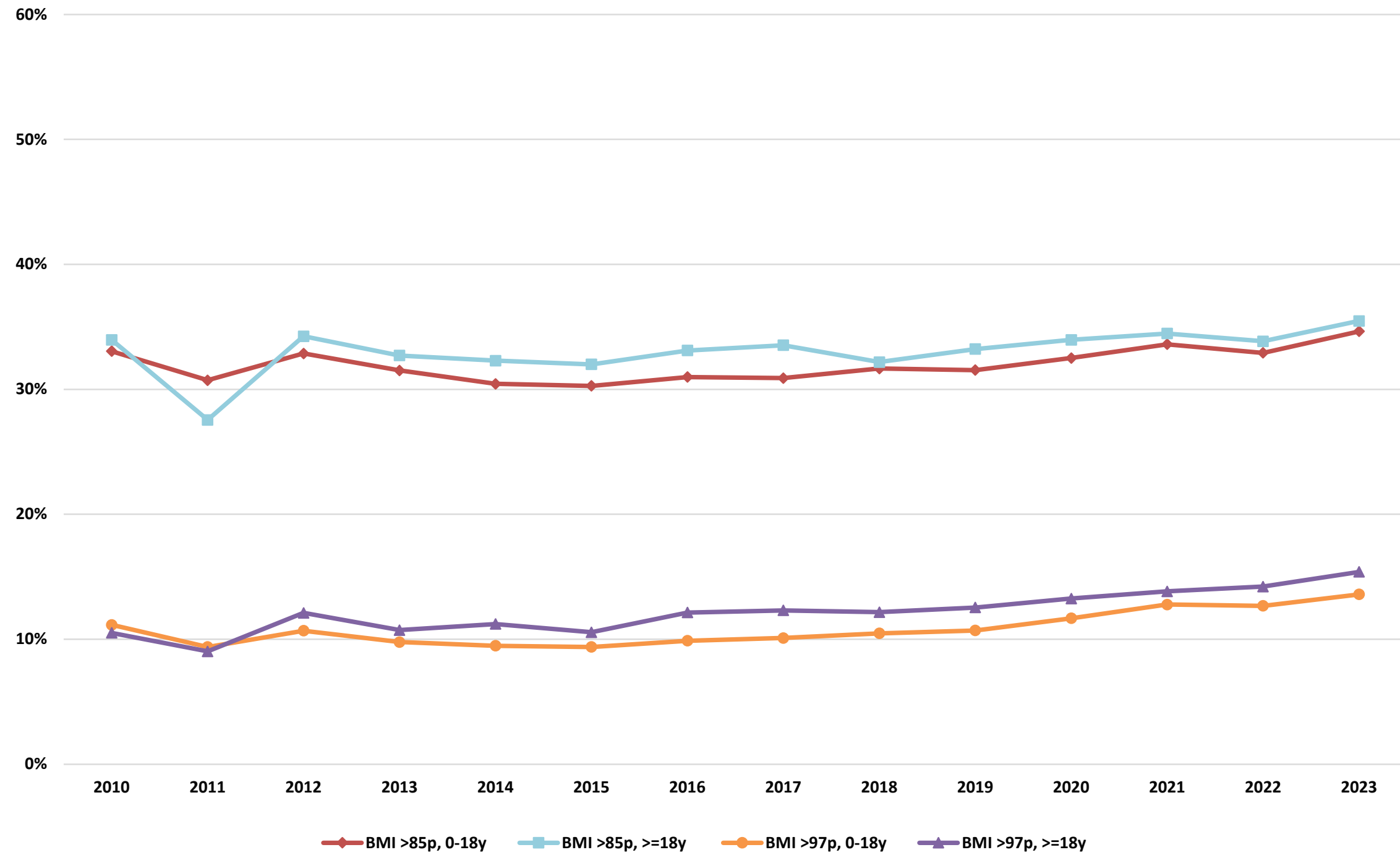


## BMI: percentage of patients with BMI >97th percentile, T1DM patients 0-18y, WHO 2007 reference, 01/01/2023 - 30/06/2023



- percentage of patients with a BMI >97th percentile ( $\geq 1.645$  SD)
- to be taken into account the total number of patients with a calculated BMI-percentile must be at least 10

# Overweight and obesity – longitudinal all patients



- **overweight** is defined as BMI between 85th-97th percentile, reference WHO 2007
- **obesity** is defined as BMI >97th, reference WHO 2007



# SWEET dashboard

Center: 10222-LU

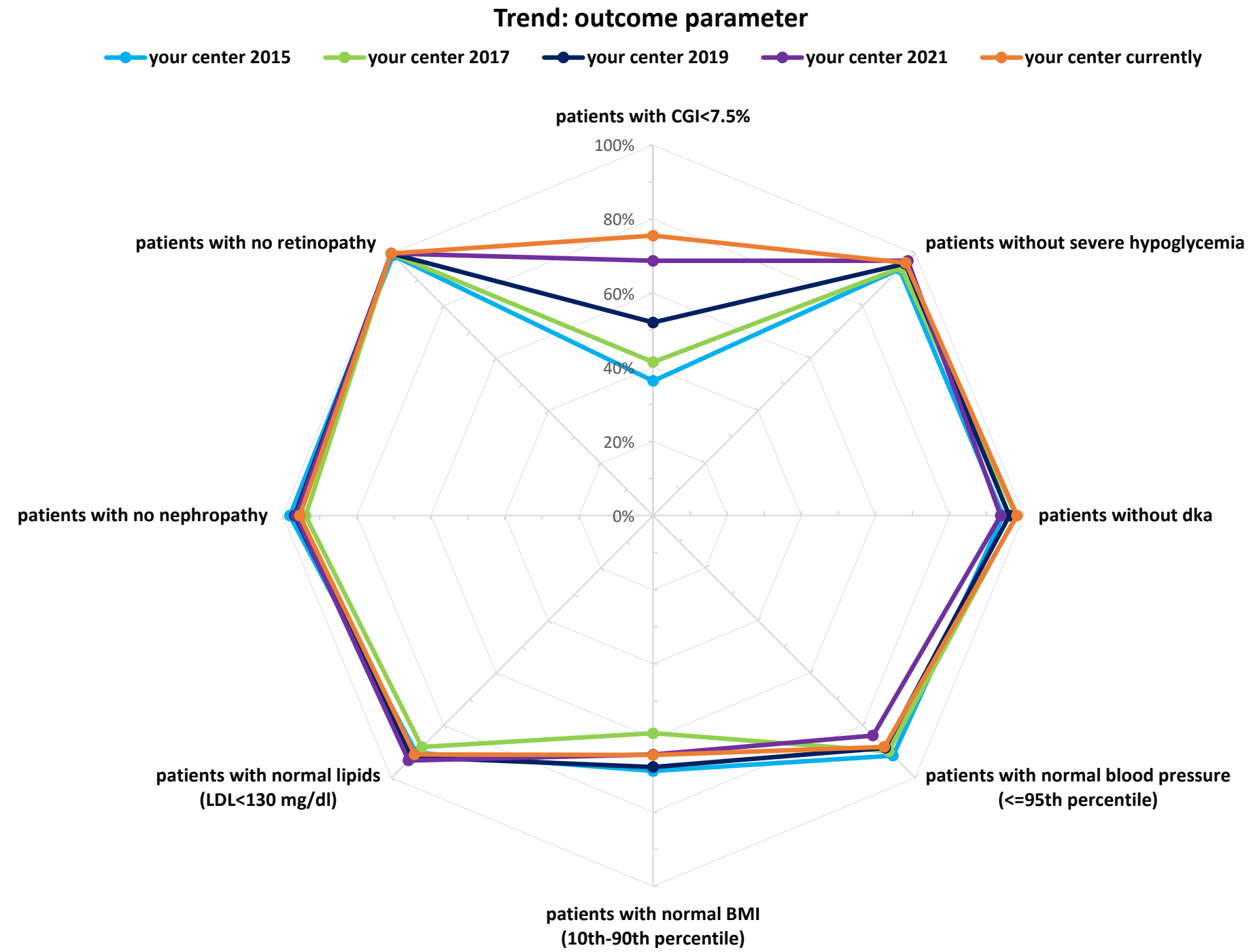


Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Trend 2010 - 2023
Number of patients	225	249	257	277	302	317	337	330	334	348	338	366	388	372	
Percentage of female patients	53.8%	52.6%	54.5%	53.8%	50.7%	49.8%	47.5%	49.7%	47.9%	47.1%	48.8%	49.7%	48.7%	48.9%	
Median age (years)	14.3	14.6	14.8	14.1	13.9	14.3	14.6	14.8	15.2	15.1	15.4	14.8	14.8	14.9	
Median diabetes duration (years)	4.7	5.0	5.1	5.1	4.5	4.6	4.7	4.9	5.0	5.2	5.2	5.3	4.9	4.8	
Percentage of type 1 diabetes	94.7%	93.2%	91.8%	91.0%	88.7%	90.5%	91.1%	89.7%	90.7%	89.7%	90.2%	88.5%	88.9%	90.3%	
Percentage of type 2 diabetes	1.3%	2.0%	1.6%	2.5%	3.0%	1.9%	1.2%	2.4%	2.1%	2.6%	2.7%	2.7%	2.8%	3.0%	
Percentage of other types of diabetes	4.0%	4.8%	6.6%	6.5%	8.3%	7.6%	7.7%	7.9%	7.2%	7.8%	7.1%	8.7%	8.2%	6.7%	
Body mass index (BMI): at least 1 control/year	1.9%	72.8%	73.3%	88.5%	85.8%	88.5%	89.6%	94.9%	93.4%	93.6%	92.8%	92.9%	95.1%	94.9%	
Blood pressure: at least 1 control/year	0.9%	72.4%	72.9%	88.9%	85.4%	87.5%	90.2%	94.3%	93.1%	93.6%	91.5%	91.0%	93.6%	91.1%	
HbA1c: at least 1 value/year	92.0%	91.8%	94.1%	92.9%	88.8%	91.3%	91.9%	95.3%	95.0%	95.2%	93.8%	92.9%	94.5%	95.8%	
Screening for thyroid disease (biennial)	90.6%	87.9%	90.7%	90.9%	87.7%	86.1%	88.9%	85.8%	88.4%	90.1%	91.8%	92.0%	89.9%	90.2%	
Screening for celiac disease (biennial)	86.4%	83.6%	86.9%	88.5%	85.4%	84.0%	86.0%	81.8%	85.5%	87.8%	88.9%	87.7%	87.2%	87.5%	
Screening for dyslipidemia (biennial)	93.3%	91.4%	91.9%	87.5%	86.1%	82.8%	84.1%	79.2%	84.9%	88.2%	92.6%	86.9%	80.7%	83.3%	
Screening for nephropathy (biennial)	51.9%	82.1%	76.1%	85.7%	92.4%	85.7%	85.1%	89.5%	89.0%	86.9%	88.9%	89.4%	82.5%	86.7%	
Screening for retinopathy (biennial)	0.8%	11.0%	35.5%	44.1%	56.7%	77.5%	82.6%	81.0%	83.8%	74.8%	72.0%	60.6%	52.2%	54.2%	
Percentage of visits with documentation of hypoglycemia	0.2%	37.5%	55.6%	54.5%	54.4%	52.2%	45.5%	50.1%	56.2%	61.9%	66.1%	67.0%	70.8%	66.4%	
Percentage of documented treatment modality	0.0%	57.8%	65.3%	90.9%	89.6%	88.9%	91.9%	93.6%	94.4%	95.8%	95.4%	95.4%	96.8%	97.6%	
Percentage of documented total daily insulin dose	0.0%	56.5%	65.3%	90.9%	89.6%	88.5%	91.9%	93.6%	94.4%	95.8%	95.1%	94.1%	96.8%	97.3%	
Percentage of documented type of insulin	0.0%	41.4%	40.7%	88.1%	89.6%	88.5%	91.5%	93.2%	94.1%	95.5%	94.8%	93.2%	95.7%	97.3%	
HbA1c median (%)	7.73	7.78	7.88	7.89	7.88	7.78	7.63	7.75	7.37	7.43	7.17	6.99	6.82	6.70	
of patients' medians (mmol/mol)	61.0	61.5	62.6	62.7	62.6	61.5	59.9	61.2	57.0	57.7	54.9	52.9	51.0	49.7	
Total daily insulin (IU/d)		19.98	22.38	37.68	43.29	45.57	46.87	45.34	50.81	50.42	49.09	47.52	45.65	45.28	
(IU/kg/d)		(0.44)	(0.46)	(0.7)	(0.8)	(0.84)	(0.85)	(0.8)	(0.87)	(0.87)	(0.87)	(0.84)	(0.79)	(0.78)	
Severe hypoglycemia: per 100 patient-years	0.0	5.1	11.4	6.5	5.2	9.3	8.0	7.1	5.9	5.2	4.1	4.1	8.5	4.0	
Diabetic ketoacidosis: per 100 patient-years	1.4	1.9	0.9	5.8	2.5	5.2	6.8	1.8	4.8	1.9	0.5	0.6	2.3	1.0	
Nephropathy: percentage of affected patients	10.1%	7.6%	3.4%	4.3%	1.4%	1.9%	3.6%	6.1%	3.7%	3.2%	3.8%	3.6%	4.8%	4.6%	
Retinopathy: percentage of affected patients	0.0%	0.0%	0.0%	0.0%	1.1%	0.7%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Percentage of pump-users	0.0%	6.9%	17.4%	45.2%	45.9%	54.0%	58.3%	64.2%	67.0%	71.2%	70.2%	75.3%	78.8%	81.0%	
Percentage of rtCGM-/iCGM-users	0.0%	5.6%	6.4%	5.2%	6.0%	23.0%	63.5%	86.8%	87.1%	86.9%	88.2%	90.7%	93.6%	95.5%	



# SWEET radar: longitudinal

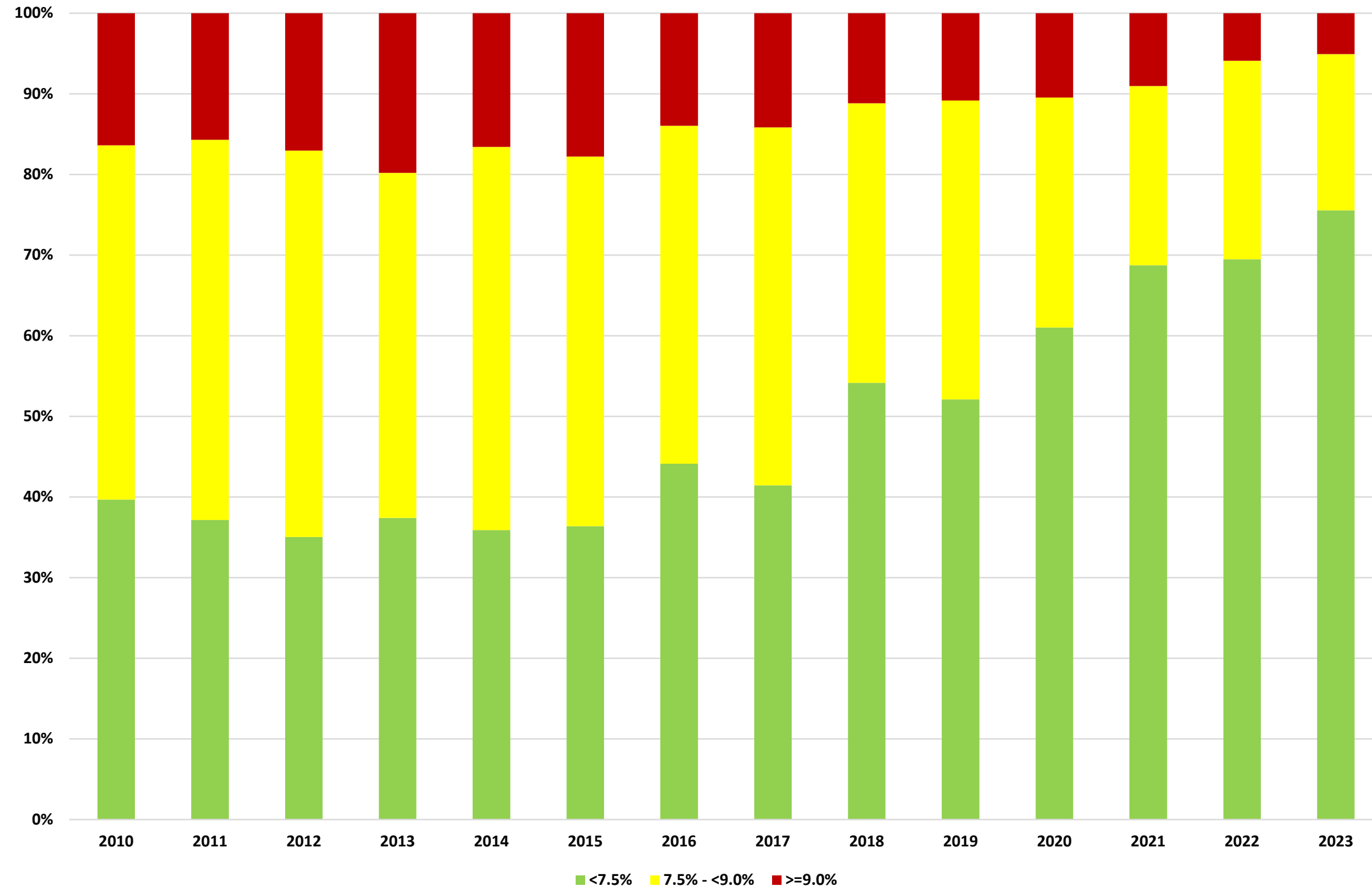
Center: 10222-LU





## Metabolic outcome: T1DM, CGI (target <7.5%)

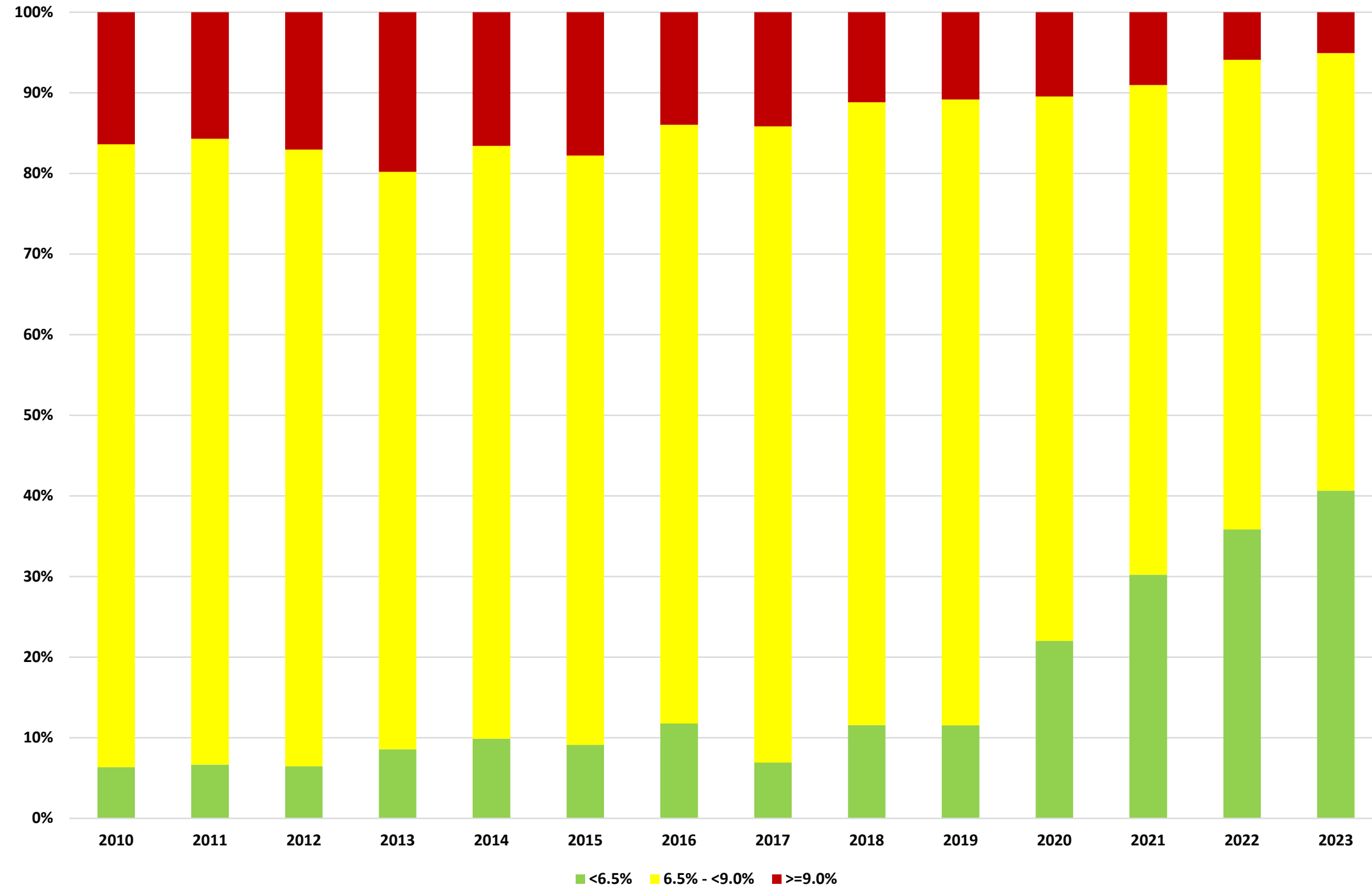
Center: 10222-LU, 01/01/2023 - 30/06/2023



• based on CGI (combined glucose indicator)

# Metabolic outcome: T1DM, CGI (target <6.5%)

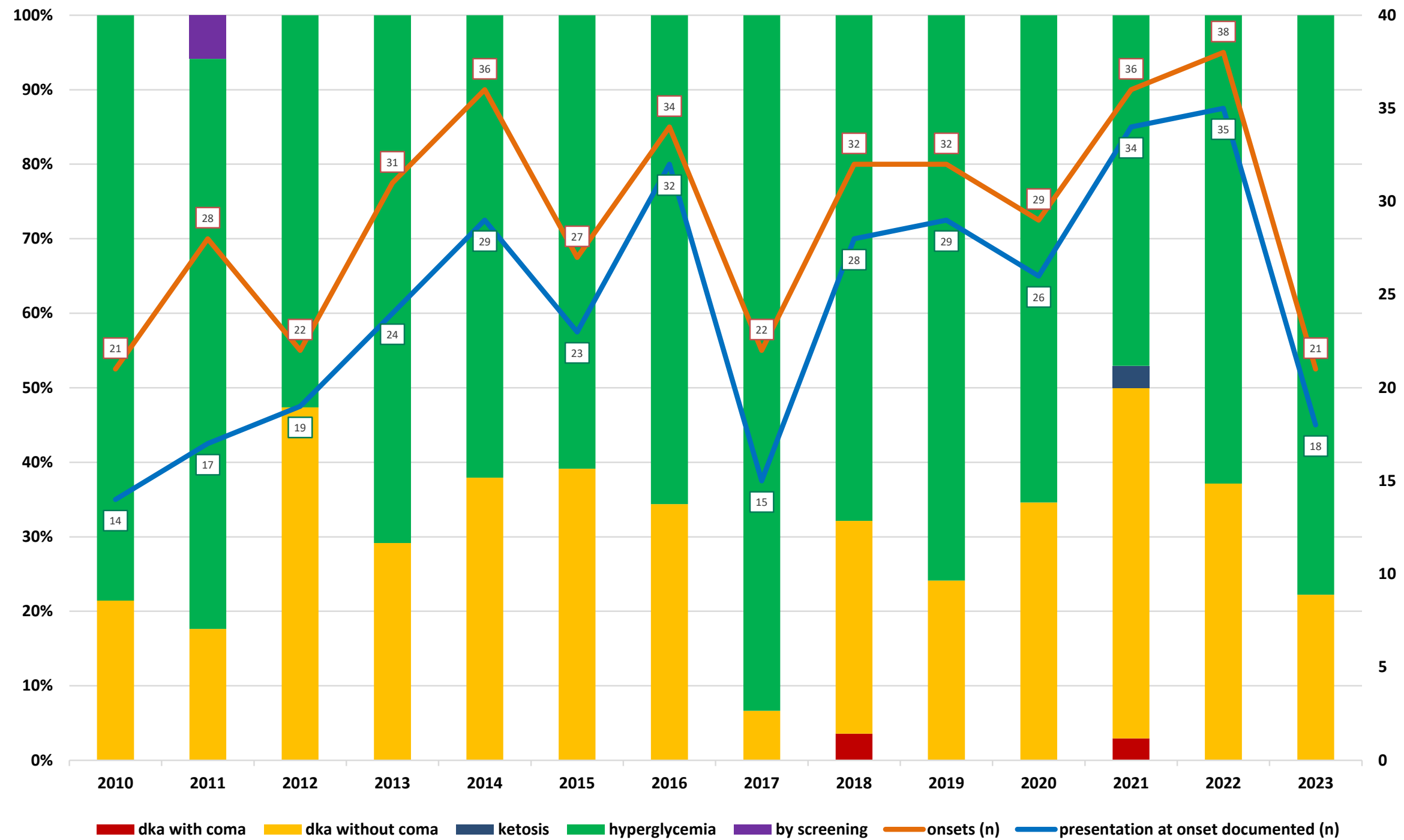
Center: 10222-LU, 01/01/2023 - 30/06/2023



• based on CGI (combined glucose indicator)

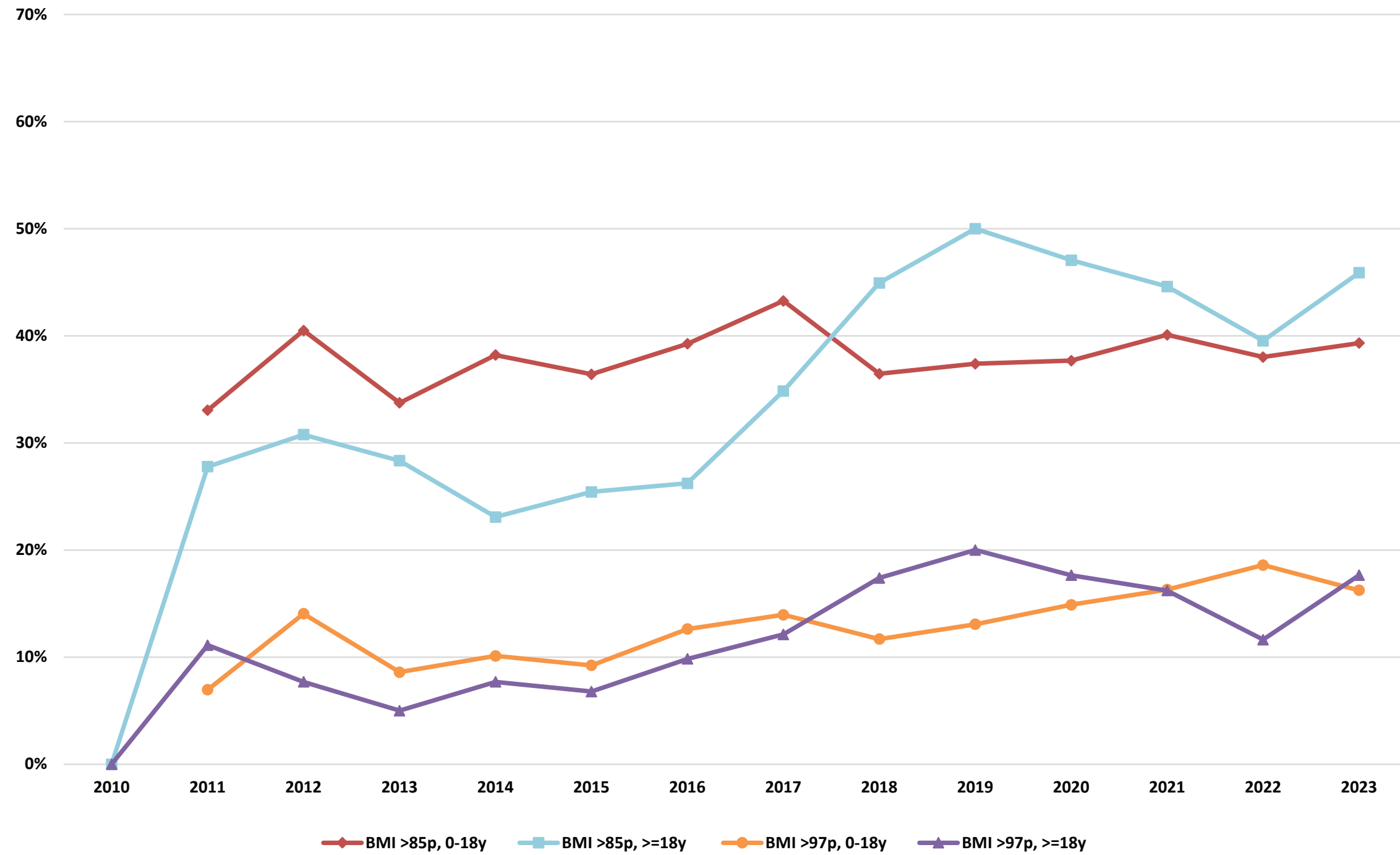
# Presentation at onset: T1DM, longitudinal

Center: 10222-LU



# Overweight and obesity – longitudinal, all patients

Center: 10222-LU



- **overweight** is defined as BMI between 85th-97th percentile, reference WHO 2007
- **obesity** is defined as BMI >97th, reference WHO 2007

# Targeting as part of the SWEET benchmarking

Received: 22 July 2018 | Accepted: 27 July 2018








DOI: 10.1111/pedi.12737



WILEY 

## ISPAD CLINICAL PRACTICE CONSENSUS GUIDELINES

### ISPAD Clinical Practice Consensus Guidelines 2018: Glycemic control targets and glucose monitoring for children, adolescents, and young adults with diabetes

Linda A. DiMeglio<sup>1</sup>  | Carlo L. Acerini<sup>2</sup>  | Ethel Codner<sup>3</sup>  | Maria E. Craig<sup>4</sup>  |  
Sabine E. Hofer<sup>5</sup>  | Kubendran Pillay<sup>6</sup>  | David M. Maahs<sup>7</sup> 

#### 1 | WHAT'S NEW?

- Emphasis on individualizing blood glucose and glycemic targets for children, adolescents, and young adults aged <25 years.
- Discussion of the impact of increased use of continuous glucose monitoring (CGM) and intermittently scanned CGM (isCGM) technology.
- Target hemoglobin A1c (HbA1c) <53 mmol/mol (<7.0%) for children, adolescents, and young adults who have access to comprehensive care.

- The ISPAD recommendation HbA1c < 7.0% has not changed in the 2022 guideline
- Interestingly, almost all SWEET centers with very good metabolic control base their work on 6.5% as the achievable HbA1c value

# Targeting as part of the SWEET benchmarking

Diabetes Care Volume 42, August 2019

1593



## Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range

Diabetes Care 2019;42:1593–1603 | <https://doi.org/10.2337/dci19-0028>

Tadej Battelino,<sup>1</sup> Thomas Danne,<sup>2</sup> Richard M. Bergenstal,<sup>3</sup> Stephanie A. Amiel,<sup>4</sup> Roy Beck,<sup>5</sup> Torben Biester,<sup>2</sup> Emanuele Bosi,<sup>6</sup> Bruce A. Buckingham,<sup>7</sup> William T. Cefalu,<sup>8</sup> Kelly L. Close,<sup>9</sup> Claudio Cobelli,<sup>10</sup> Eyal Dassau,<sup>11</sup> J. Hans DeVries,<sup>12,13</sup> Kim C. Donaghue,<sup>14</sup> Klemen Dovc,<sup>1</sup> Francis J. Doyle III,<sup>11</sup> Satish Garg,<sup>15</sup> George Grunberger,<sup>16</sup> Simon Heller,<sup>17</sup> Lutz Heinemann,<sup>18</sup> Irl B. Hirsch,<sup>19</sup> Roman Hovorka,<sup>20</sup> Weiping Jia,<sup>21</sup> Olga Kordonouri,<sup>2</sup> Boris Kovatchev,<sup>22</sup> Aaron Kowalski,<sup>23</sup> Lori Laffel,<sup>24</sup> Brian Levine,<sup>9</sup> Alexander Mayorov,<sup>25</sup> Chantal Mathieu,<sup>26</sup> Helen R. Murphy,<sup>27</sup> Revital Nimri,<sup>28</sup> Kirsten Nørgaard,<sup>29</sup> Christopher G. Parkin,<sup>30</sup> Eric Renard,<sup>31</sup> David Rodbard,<sup>32</sup> Banshi Saboo,<sup>33</sup> Desmond Schatz,<sup>34</sup> Keaton Stoner,<sup>35</sup> Tatsuiko Urakami,<sup>36</sup> Stuart A. Weinzimer,<sup>37</sup> and Moshe Phillip<sup>28,38</sup>

Improvements in sensor accuracy, greater convenience and ease of use, and expanding reimbursement have led to growing adoption of continuous glucose monitoring (CGM). However, successful utilization of CGM technology in routine clinical practice remains relatively low. This may be due in part to the lack of clear and agreed-upon glycemic targets that both diabetes teams and people with diabetes can work toward. Although unified recommendations for use of key CGM metrics have been established in three separate peer-reviewed articles, formal adoption by diabetes professional organizations and guidance in the practical application of these metrics in clinical practice have been lacking. In February 2019, the Advanced Technologies & Treatments for Diabetes (ATTD) Congress convened an international panel of physicians, researchers, and individuals with diabetes who are expert in CGM technologies to address this issue. This article summarizes the ATTD consensus recommendations for relevant aspects of CGM data utilization and reporting among the various diabetes populations.

This international consensus report has been endorsed by the American Diabetes Association, American Association of Clinical Endocrinologists, American Association of Diabetes Educators, European Association for the Study of Diabetes, Foundation of European Nurses in Diabetes, International Society for Pediatric and Adolescent Diabetes, JDRF, and Pediatric Endocrine Society.

INTERNATIONAL CONSENSUS REPORT

➤ **Time In Range (TIR):**  
defined as glucose 3.9 to 10 mmol/l (70-180 mg/dl)

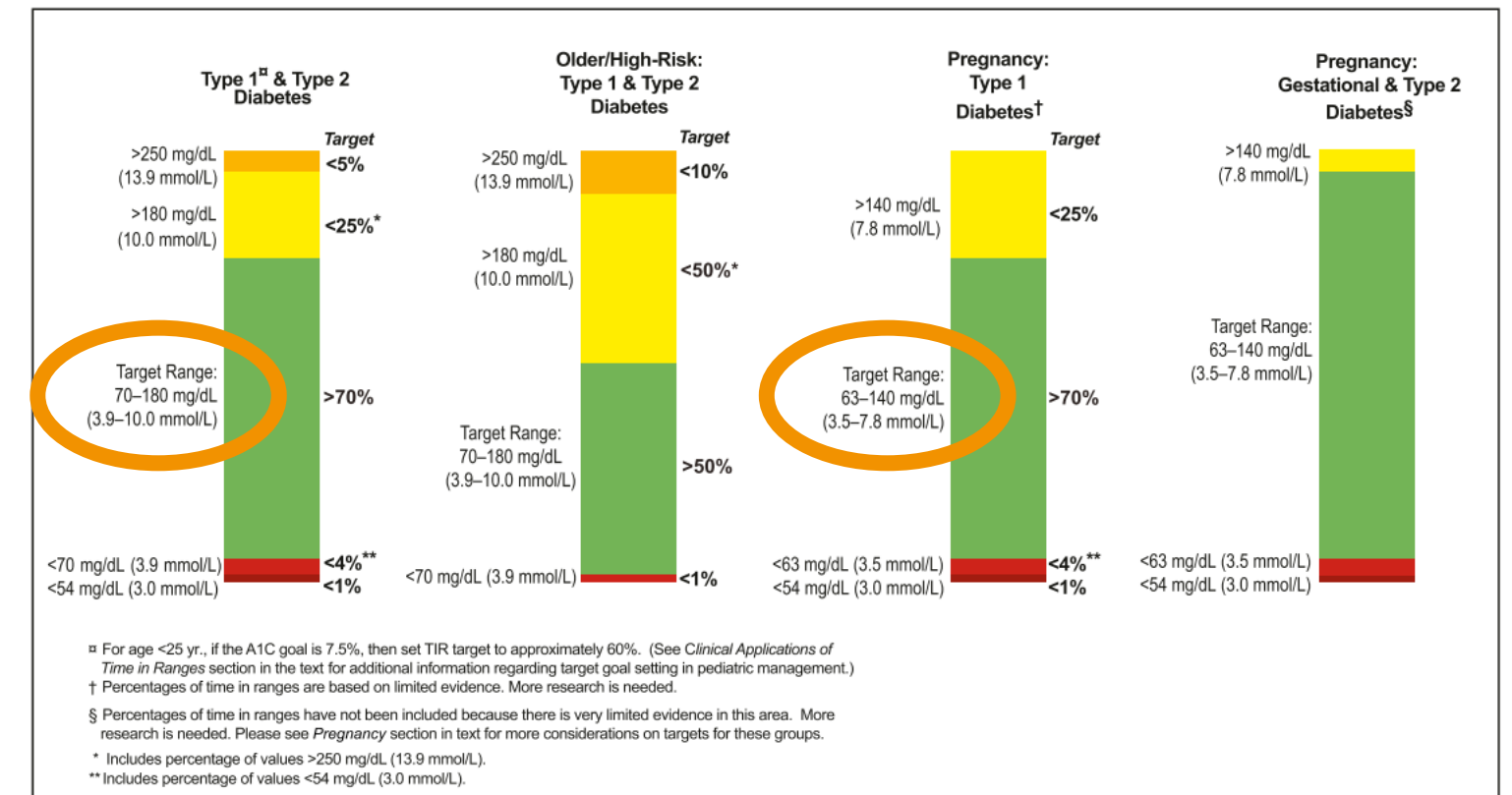


Figure 1—CGM-based targets for different diabetes populations.



# SWEET dashboard **CGM I, raw data (sensor profiles) transmitted** all centers with data

**Time in Range**  
*in 2022*



**66.3%**

Year	Number of contributing centers	Number of patients for whom CGM raw data are available (n)	Number of profiles per year	Time Above Range (TAR)	Time In Range (TIR)	Time In TIGHT Range (TITR)	Time Below Range (TBR)
2022	29	4,751	192,343	30.3%	66.3%	43.8%	3.4%
2021	34	3,667	309,726	31.8%	64.5%	42.4%	3.7%
2020	30	3,207	358,953	35.4%	60.8%	39.3%	3.8%
2019	22	1,717	200,093	39.5%	56.1%	35.6%	4.4%
2018	12	318	41,506	41.2%	54.3%	34.1%	4.4%
2017	10	142	11,911	41.0%	53.5%	34.2%	5.5%

Time In Range (TIR) is the percentage of time that a person spends with their blood glucose levels in the range of 70 to 180 mg/dl (3.9–10.0 mmol/l)

Time In Tight Range (TITR) is the percentage of time that a person spends with their blood glucose levels in the range of 70 to 140 mg/dl (3.9–7.8 mmol/l)





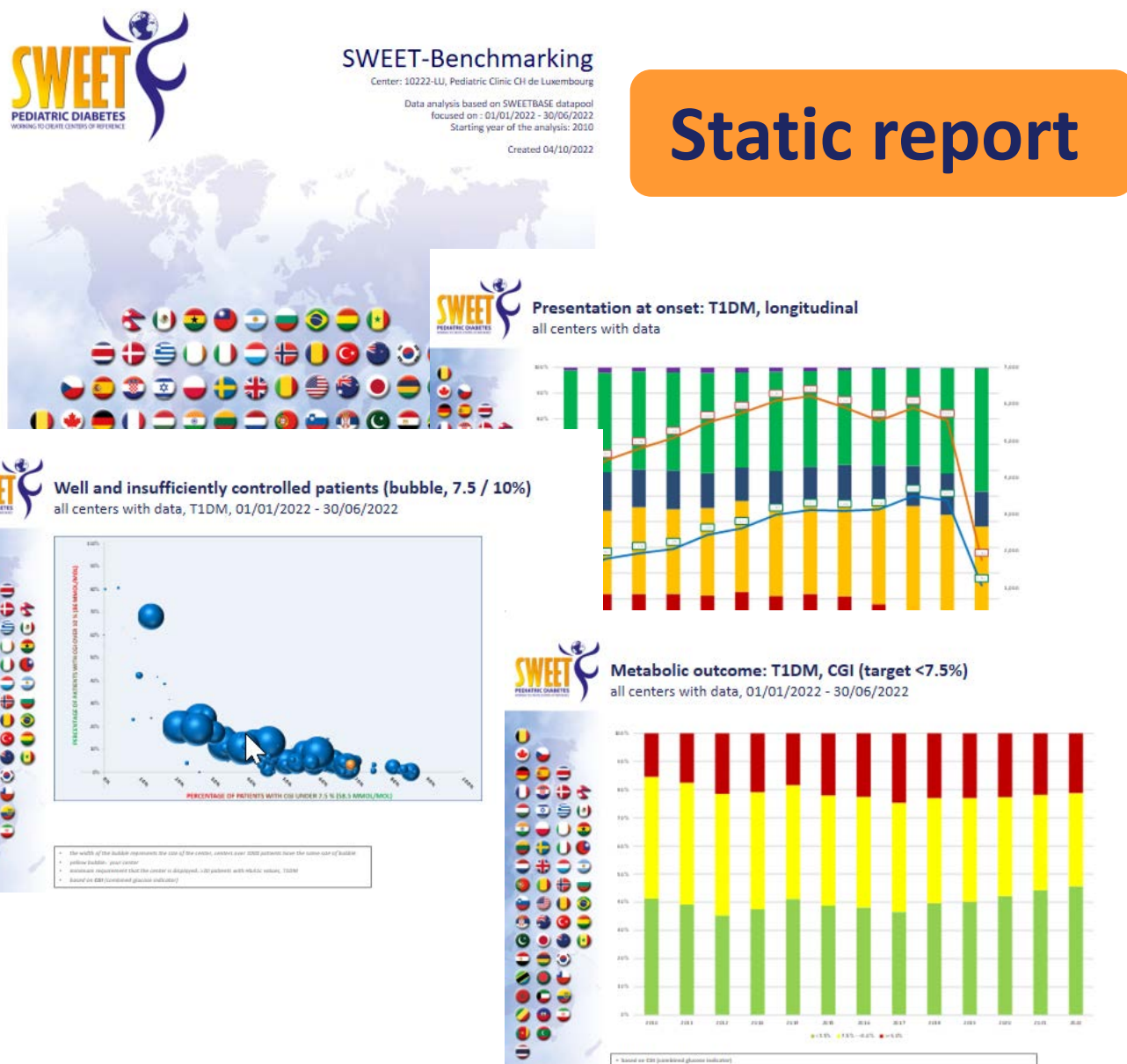
# SWEET pushes forward new developments and strategies

- on data exchange
- on HbA1c alternatives
- on low glucose targets (“Time in Tight Range”)
- on presenting data



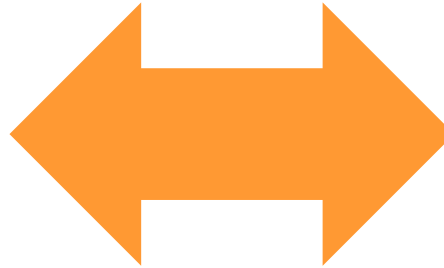


What do you want the future to look like?  
 What do you think about interactive benchmarking reports?



Static report

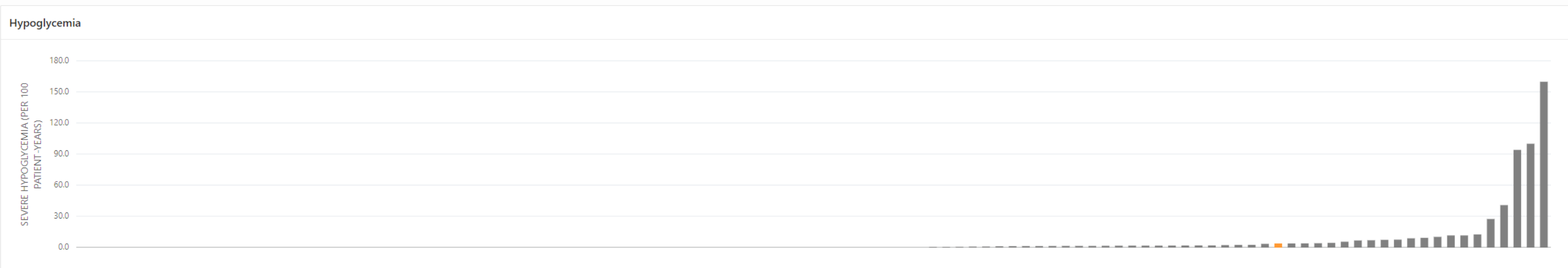
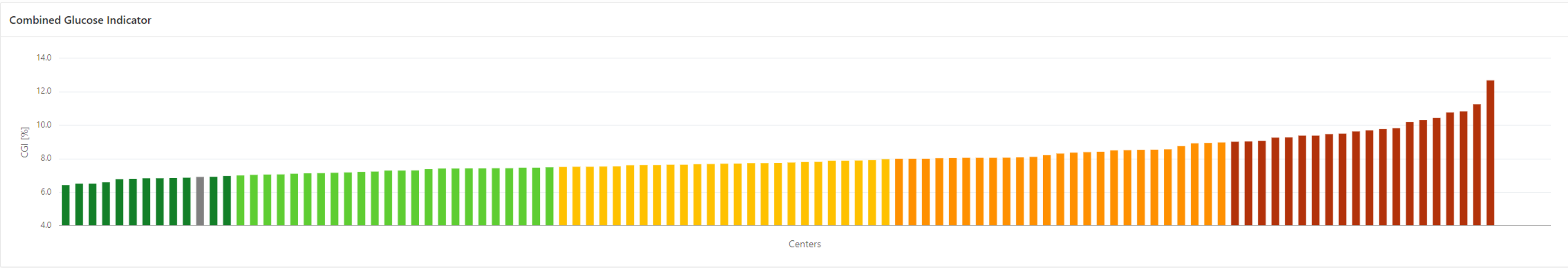
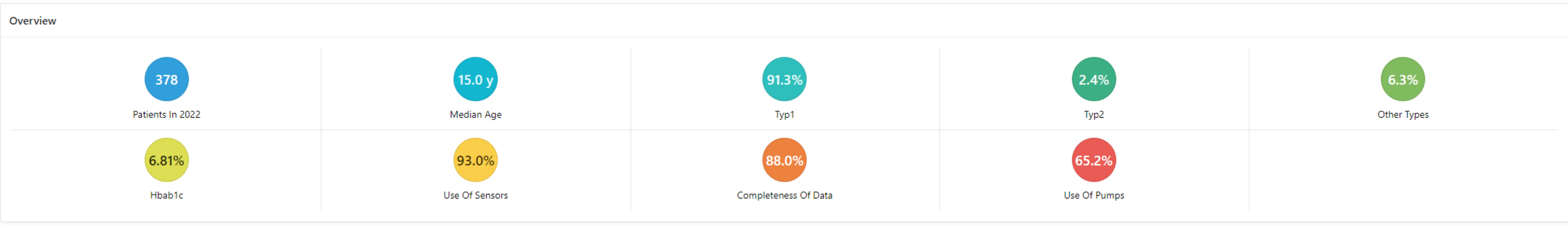
Interactive report





# What do you want the future to look like? What do you think about interactive benchmarking reports?

- Home
- Map
- Map - Other type of diabetes
- Dashboard - Centers
- Dashboard - Center**
- Search Centers
- Centers Overview
- User management
- Centers Grid
- Administration



# The SWEDISH model

**SWEDIABKIDS**  
Nationella Diabetesregistret, barn- och ungdomsdiabetes  
ÅRSRAPPORT 2020 ÅRS RESULTAT

Målet är att alla barn och ungdomar ska vara fysiskt aktiva minst 60 minuter per dag!  
BEHÖVS DET MER FOKUS PÅ FYSISK AKTIVITET? SE SID 29-30

**NDR** NATIONELLA DIABETESREGISTRET

Start Statistik För dig med diabetes Förbättringsprojekt Forskning Om NDR

**About NDR**

**Contact**  
Questions about NDR and research? Visit the website of Centre of Registers Västra Götaland <https://registercentrum.se> or send an e-mail: [ndrinfo@registercentrum.se](mailto:ndrinfo@registercentrum.se)

**The Swedish National Diabetes Register (NDR) serves as a useful tool for providers of everyday care**

Chronic diseases place a heavy burden not only on patients and their families, but on healthcare systems around the world. Such pressure on the infrastructure and organisation of the systems often leads to poor management of chronic conditions. The resulting complications reduce quality of life and dramatically increase healthcare costs. The personal and social repercussions are enormous. Diabetes management has a number of dimensions, each of which is multifaceted in itself. Thus, patients should receive advice from a wide range of skilled professionals who are working together. A diabetes centre is an important resource that permits a multidisciplinary team to communicate effectively while providing consistent, reliable counselling. In addition, an individual care plan should be set up on the basis of the patient's particular needs and circumstances. A clinical, practice-based population register can be used to support structural care and identify patients who may not be complying with their medication regimen, exposing them to risk of inadequate diabetes control.

The NDR was launched in 1996 for the purpose of promoting evidence-based development of diabetes care by offering up-to-date information about changes in the treatment of glycaemia and other risk factors, as well as diabetic complications. Another aim is to support improvement in the quality of care provided by participating units at hospitals and primary care clinics. The overall objective is to reduce morbidity and mortality, as well as to maximise the cost-effectiveness of diabetes care. The NDR is maintained by the Swedish Society for Diabetology on behalf, and with the financial support, of the Swedish Association of Local Authorities and Regions. The Swedish Diabetes Association, a patient advocacy group, actively uses the NDR as well. The NDR has been online since April 2002 ([www.ndr.nu](http://www.ndr.nu)), allowing individual clinics to quickly monitor their activities on a regular basis by virtue of immediate access to their own results, as well as national statistics for purposes of comparison.

The NDR, which has been an integral part of Swedish diabetes care for the past 18 years, has engaged the participation of both hospitals and primary care clinics. The register offers a unique opportunity to monitor the quality of care in terms of risk factors and the potential complications of diabetes, as well as the evolution of treatment methods. The results generated by the register have been presented at many international meetings and conferences. To our knowledge, the NDR is the largest diabetes register in the world.

Because the course of diabetes is complex and lifelong, both clinical practice and quality control of treatment measures must reflect systematic adherence to various guidelines. The NDR is an instrument to facilitate such monitoring and to disseminate findings in an accessible, transparent, comparable and timely manner. The register is both a repository of results and an educational tool for improving local quality assessment efforts. The register enables a focus on national quality indicators while following various process measures that are

**Reports**

- Nationwide results 1996 – 2020
- 20 years of successful improvements
- Swediabkids Annual Report 2020

**Address**  
Registercentrum Västra Götaland  
413 45 Göteborg  
010 - 441 29 29

Stockholm ▾

Primärvårdsenhet ▾

**people**  
with diabetes in the last 12 months

**care units**

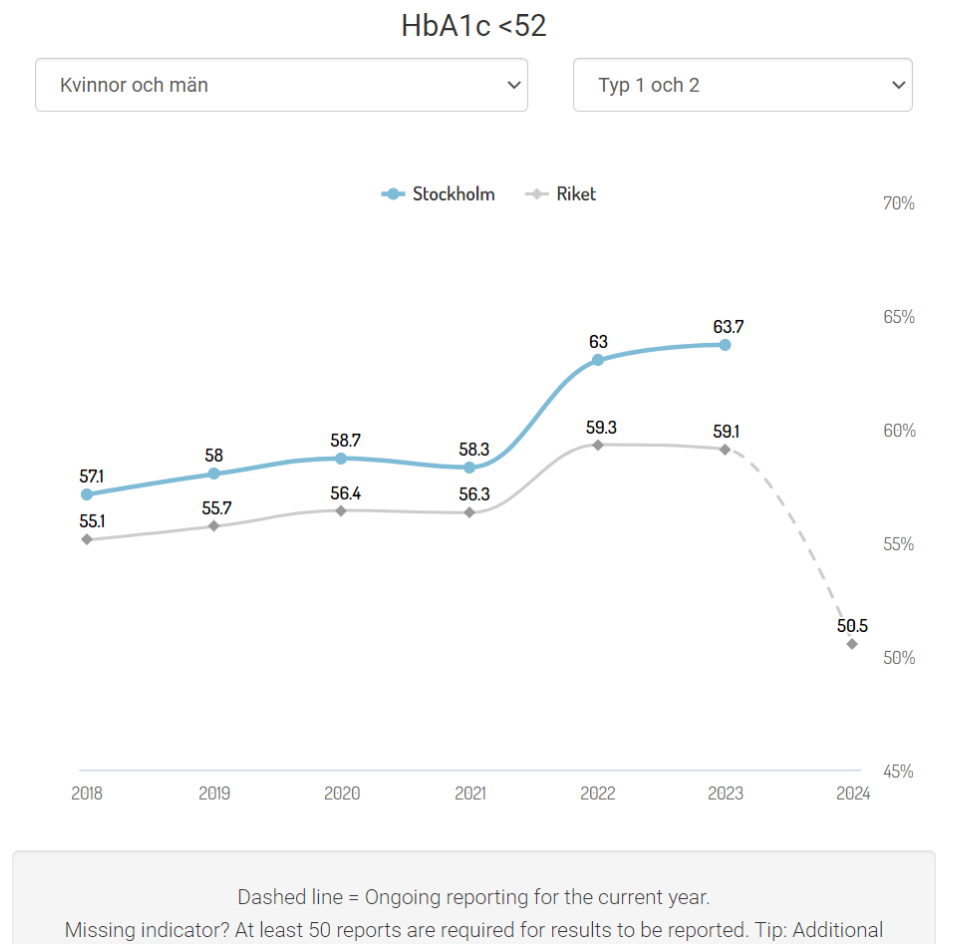
Primary care units	233
Medical clinics	9
Children's clinics	4

**The region's average value for HbA1c**

**Comparison between regions for HbA1c**

## Results overview for Primary Care Units i

Indicator (proportion with)	Stockholm 2022	Kingdom 2022
HbA1c <52	63%	59.3%
HbA1c >70	7.6%	7.8%
Blood pressure ≤130/80	45.3%	43.4%
Blood pressure <140/85	60.1%	59.2%
LDL <2.5	62%	66.2%
Lipid-lowering drugs	61.9%	69.7%
Presence of albuminuria	23.1%	23.3%
Foot examination last year	72.5%	75.5%
Conducted eye examination according to guidelines	76.4%	70.3%
Incidence of diabetic retinopathy	16.8%	25.4%
Smoker	12.9%	12%
Proportion of physically inactive	17.2%	27%





# The SWEDISH model



**NDR NATIONELLA DIABETESREGISTRET** In Svenska The Risk Engine

Start Statistics For you with diabetes Improvement project Research About NDR

**Knappen 2.0** One push of a button for improvement work

Type of diabetes: ALL, TYPE 1, TYPE 2

Indicator: HbA1c

Hide filter...

Diabetes treatment: All (click here to filter)

Insulin method: All (selected), Injection, Insulin pump

Continuous glucose monitoring (CGM/FGM): All (click here to filter)

Diabetes duration: 0 to 17

Age: 0 to 17

Sex: All (click here to filter)

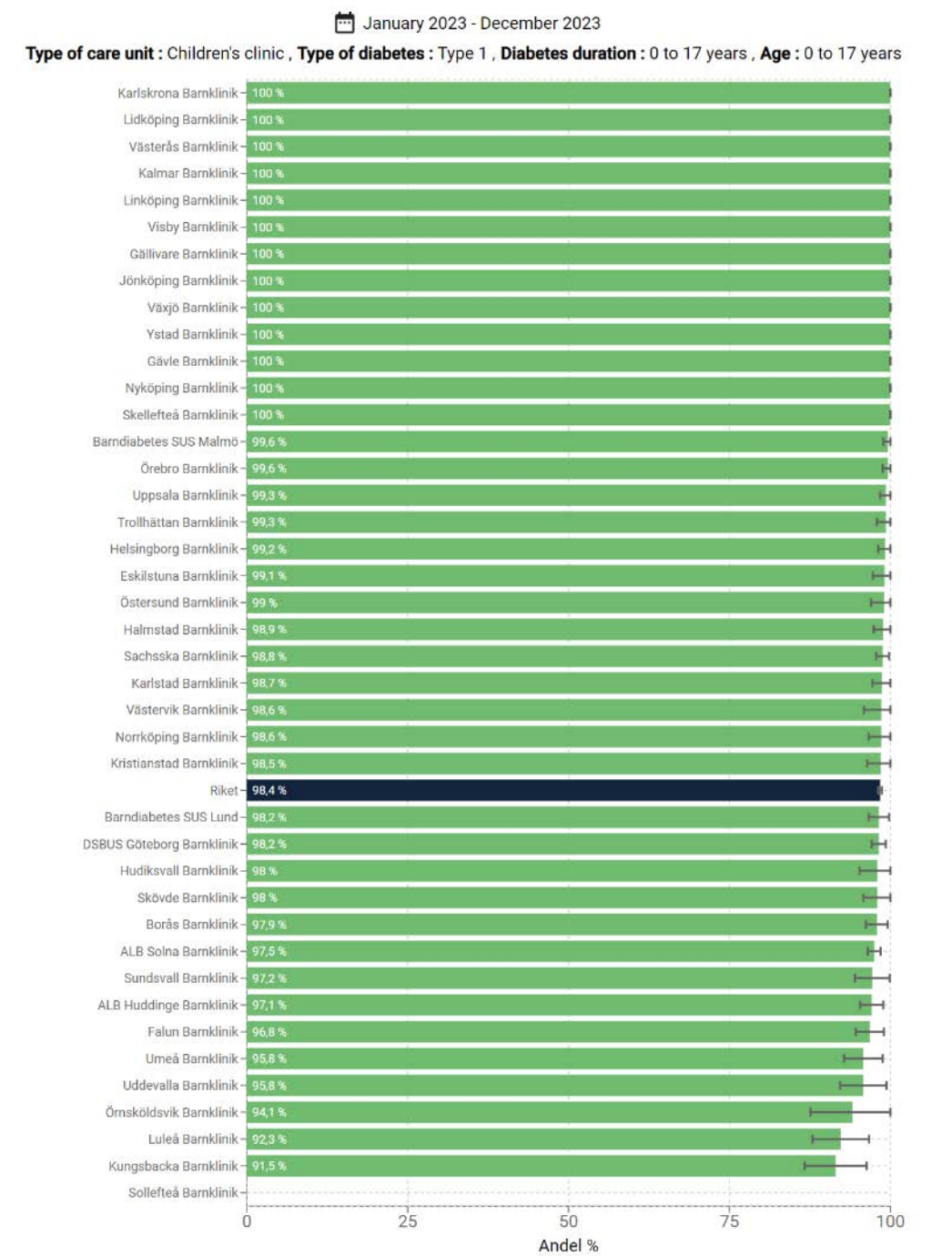
PERFORM SEARCH

**Knappen med resultat från hela Sveriges diabetesvård**

## Percentage of HbA1c >78



## Reporting rate HbA1c

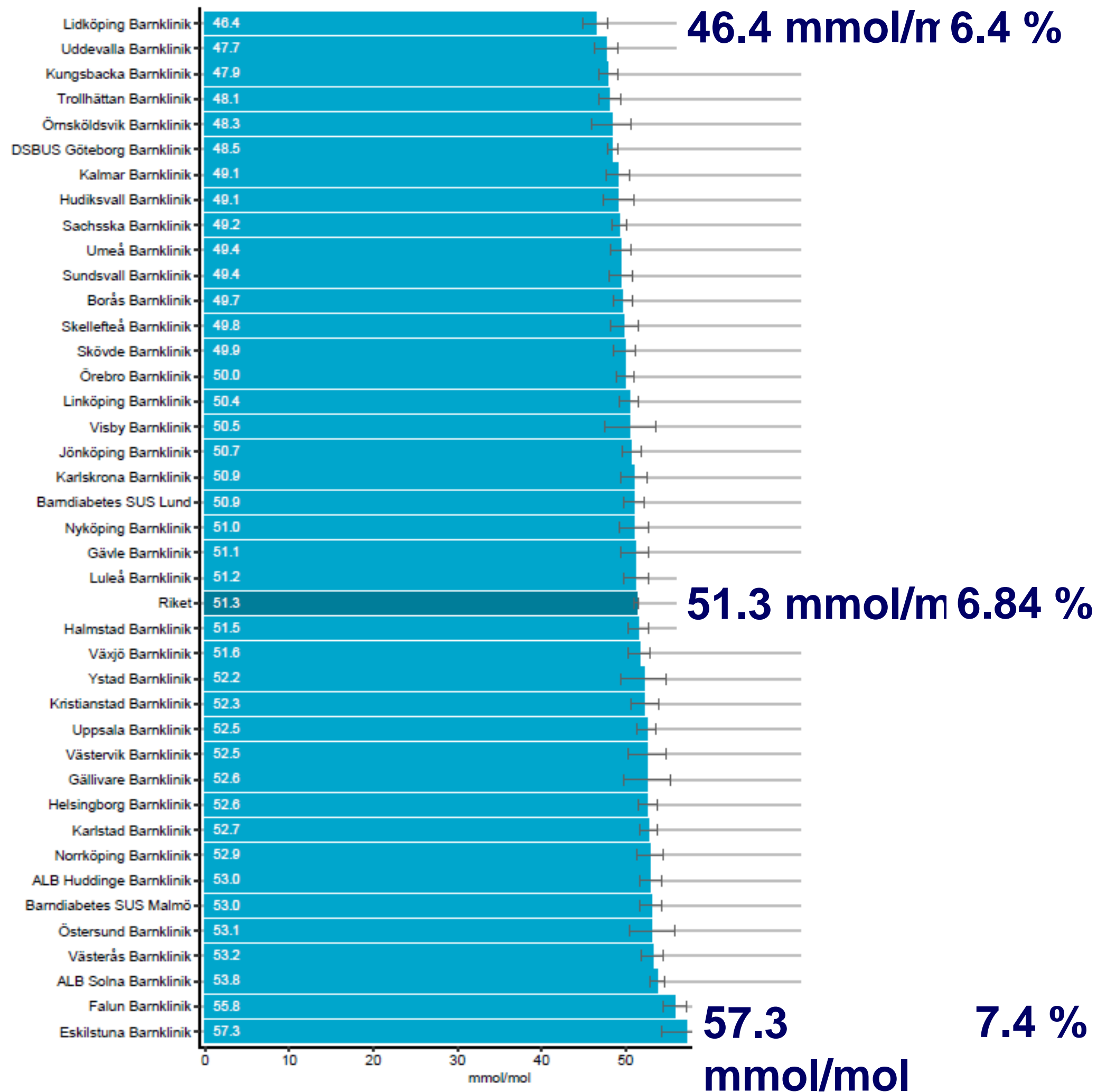




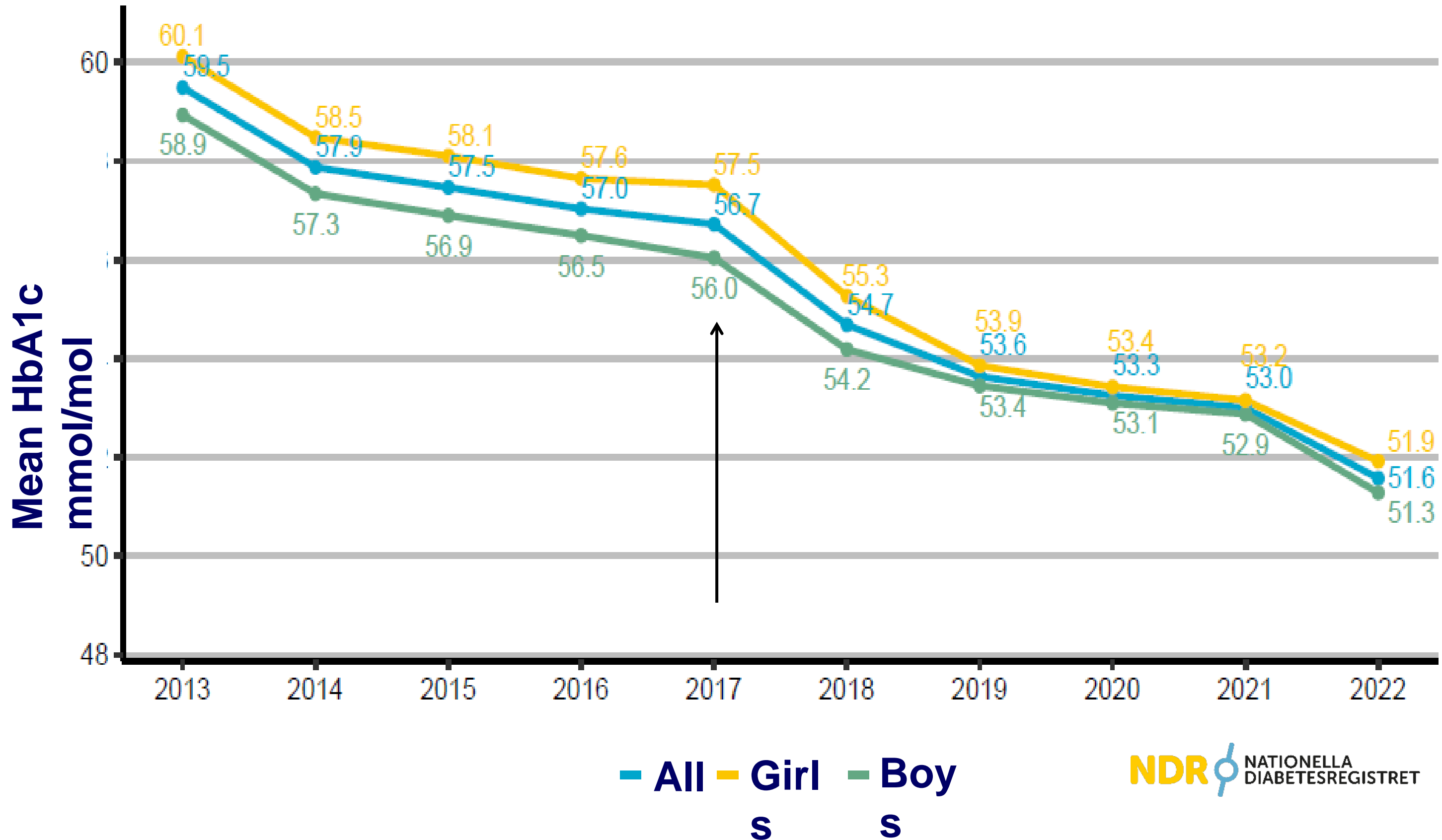
# Mean HbA1c, 2022



SWEDEN



# The SWEDISH model: low glucose target



## The SWEDISH model

- Open public benchmarking published by reports and webpage
- combined with quality initiatives to harmonize care in Sweden
- low glucose targets
- impressive progress in outcome AND harmonization



Do you need any more arguments for open benchmarking? Are you convinced?

Let's summarize:

- define a workflow for integration clinical work and benchmarking
- consider benchmarking as integrated part in daily work
- see open benchmarking as chance for faster and better improvement and not as a burden or control
- find peers to share your challenges and solutions
- define realistic targets for your center and your patients







**Thank you very much for your attention!**

