EUBIROD

EUropean Best Information through Regional Outcomes in Diabetes

Materials, Methods and Data Analysis of Diabetes Registers

The Diabetes Register of Croatia

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"Coordinated Information Delivery from Diabetes Registers to improve quality and outcomes in Europe"
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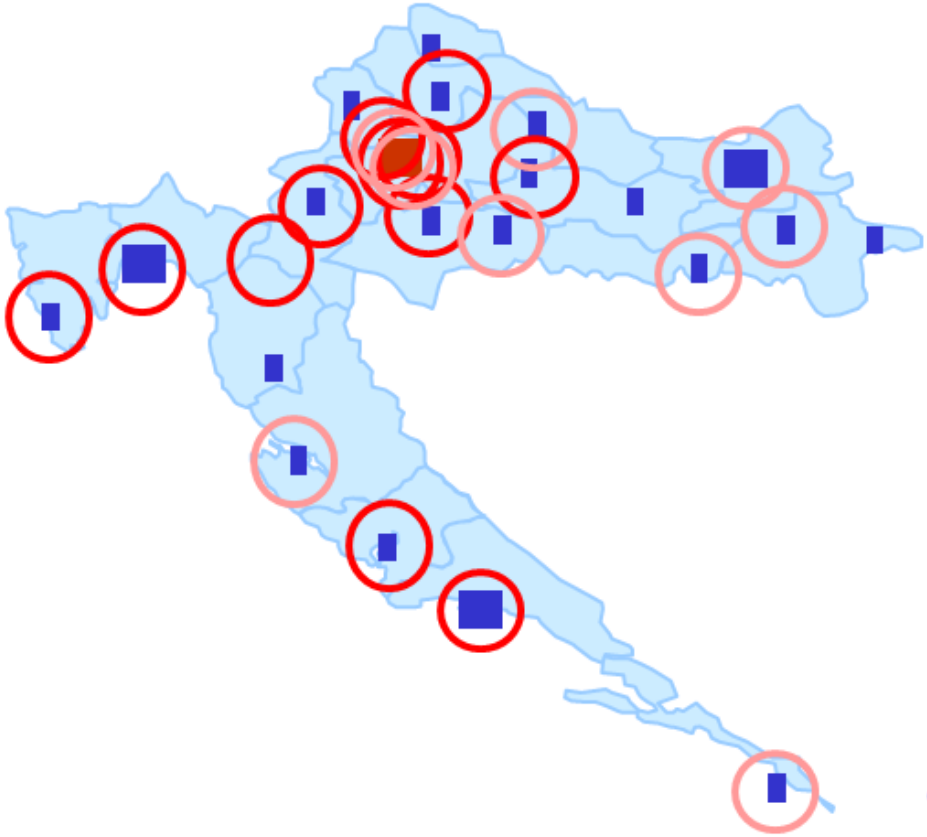
Directorate-General for Health & Consumers

Executive Agency for Health and Consumers

Croatia
Reference Population



Country: Croatia
Total Population: 4,4 mill.
Diabetes Prevalence: 14.57/1000 (type 2)
1.32/1000 (type 1)
- BIRO-
Total Adult Population: 3,6 mill.
Diabetes Prevalence (20-79): 8,9%
Type of Data Sources:
GP + hospitals (Diabetic Centres)

No.Participating Centres:
GP – 350
hospitals - 20

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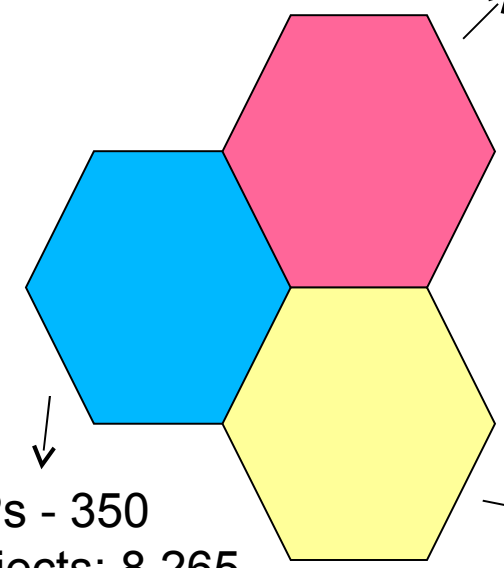
Reference Diabetes Data



Regional centers - 4
No subjects: 18.498
T1: 7.98%
T2: 87.45%

County centers - 16
No subjects: 15.663
T1: 3.92%
T2: 95.49%

GPs - 350
No subjects: 8.265
T1: 6.18%
T2: 93.68%

Year: **2009**

Region: all

Total No. Subjects: 41.248

Total No. Episodes: 61.492

•T1: 2.461(6%)

•T2: 37.514(91%)

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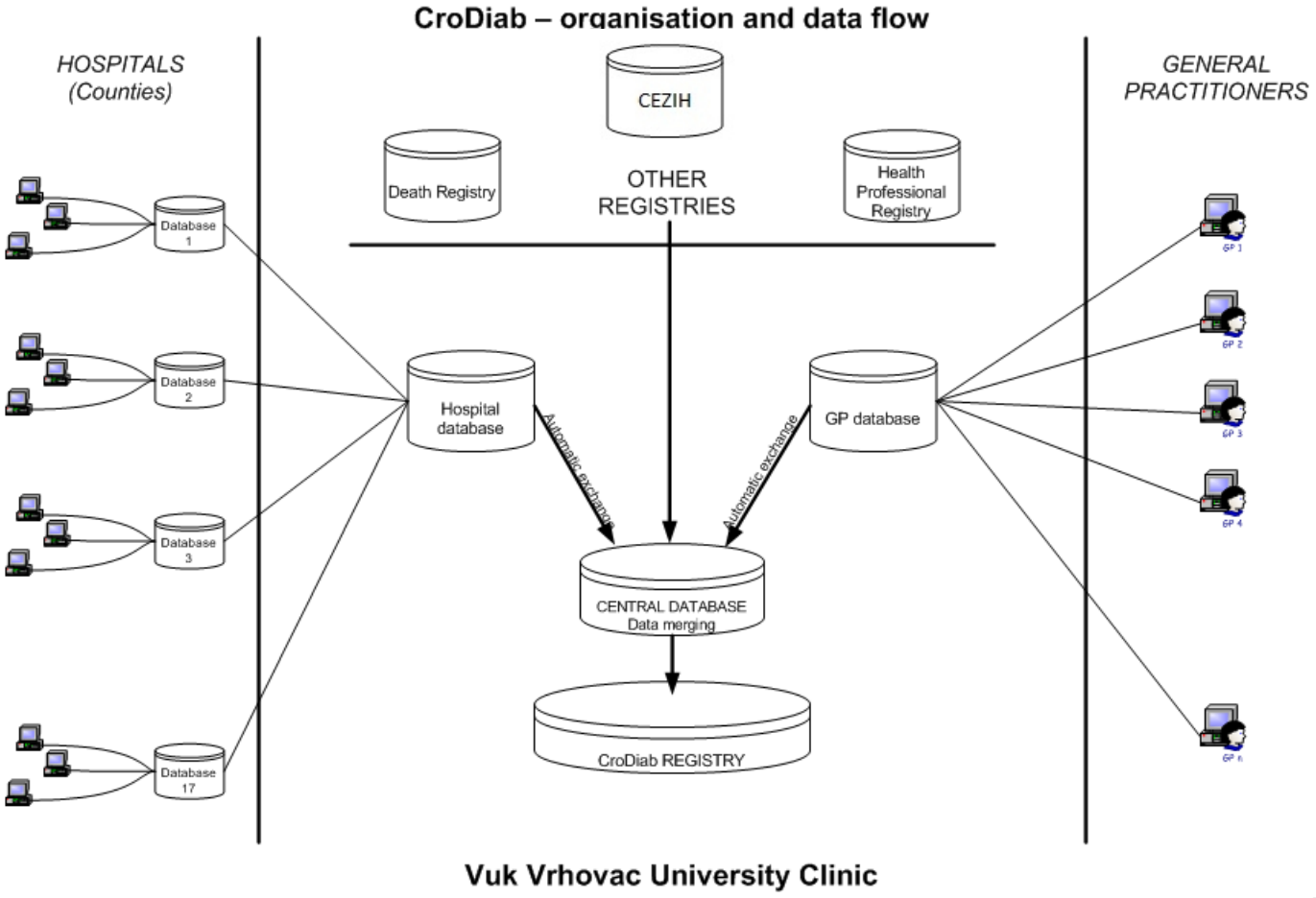
Local Database Structure



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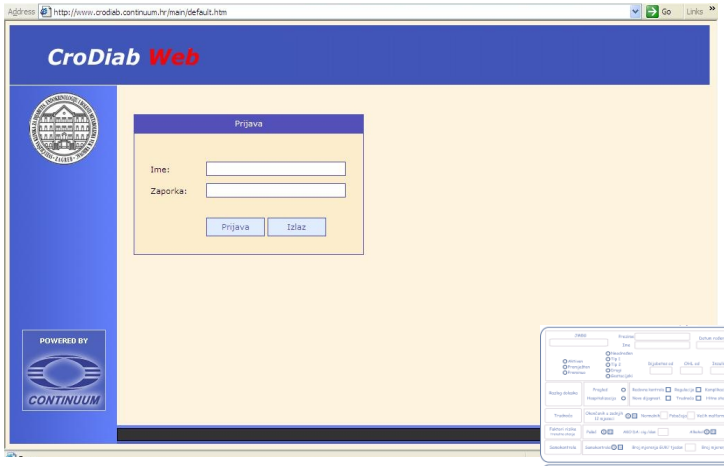
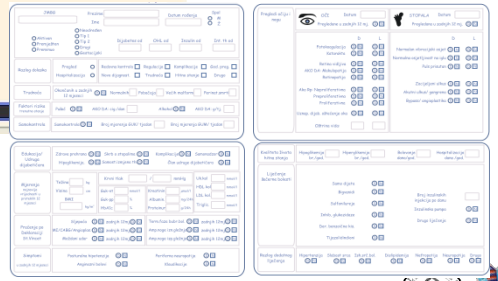
Local Database Structure: IT





Croatia
Local Database Structure: IT

- Protection measures:
  - Protected data transfer by the Internet
    - Transfer of data between the provider and user of the system by means of SSL and 128-bit encryption
    - User authentication
  - User security
    - Users can access only the functions they need to do their work in the system
    - Access to data is limited to personal data available from official records
  - Database security
    - Data accessible only to authorized users of the system via a program solution
    - Database provider is physically accessible only to administrative personnel
    - Daily creation of database back-up copy
    - Back-up data encrypted by a 128-bit key

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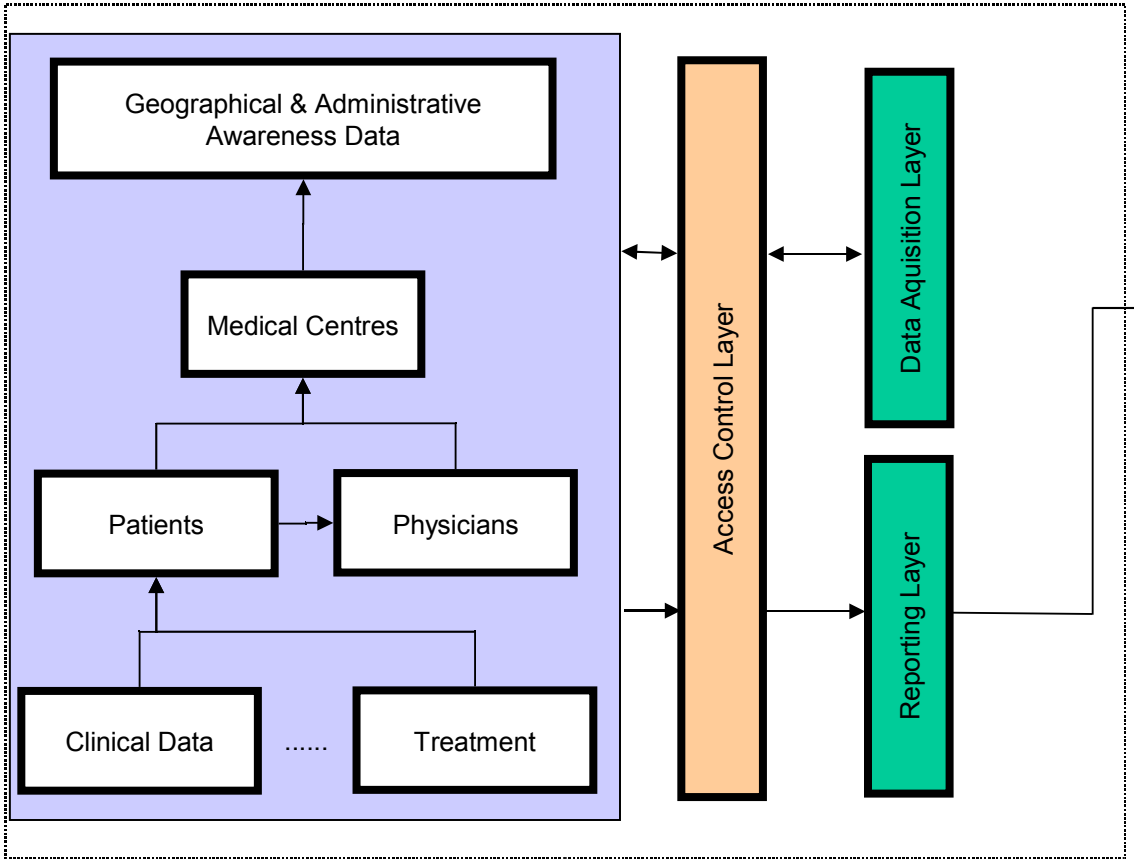
Local Database Structure and the BIRO Merge Table



Croatia
Using BIRO

- Problems/Weaknesses
  - Local PC setup/security
  - Decimal separator - . or ,
  - Separator in database – l or , or ;
  - New manual
  - Some improvements
  - Whole population (adult population, paediatric population)

- Strengths
  - User friendly, intuitive
  - Capability of running an exhaustive analysis on large data sets

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Mapping to BIRO European Standard

- Problems/Weaknesses?
  - Eye Examination, Retinopathy Status, Maculopathy Status - 1
  - Foot Examination, Foot Pulses, Foot Sensation – 1
  - Amputation above and under the ankle – 1
  - Diabetes Specific Education - 1

- Strengths
  - User friendly, intuitive
  - Good field description provided
  - Easy to change databases with the same definition and names of variables

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Merge Table Contents

Patient ID
Data Source ID
Type Of Diabetes
Sex
Date of Birth
Date of Diagnosis
Episode Date
Smoking Status
Cigarettes per day
Alcohol Intake
Weight
Height
Body Mass Index
Systolic Blood Pressure
Diastolic Blood Pressure
HbA1c
Creatinine
Microalbumin

Total Cholesterol
HDL
Triglycerides
Eye Examination
Retinopathy Status
Maculopathy Status
Foot Examination
Foot Pulses
Foot Sensation
Nasal Therapy
Average Injections
Self Monitoring
Diabetes Specific Education
Lipid Lowering Therapy
Anti-platelet Therapy
Patient Enrolment in DMP

End Stage Renal Therapy
Renal Dialysis
Renal Transplant
Stroke
Active Foot Ulcer
Myocardial Infarction
Laser
Hypertension
Blindness
Amputation
Antihypertensive Medication
Hypoglycemic Drug Therapy
Oral Drug Therapy
Pump Therapy

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Additional Data

Activity Table:

Not tested

Population Table:

Age bands - 8 and 9 – merge?

(report – 75+)

year	ageband	popM	popF	morM	morF
2009	1	350077	333345	181	113
2009	2	284857	272369	256	66
2009	3	314031	305383	341	101
2009	4	304667	303687	721	284
2009	5	328285	334413	2299	866
2009	6	257580	279576	4074	1790
2009	7	193000	257122	7288	4620
2009	8	93088	173415	8357	11164
2009	9	12437	37176	2701	6916

Diabetic Population Table:

Not tested

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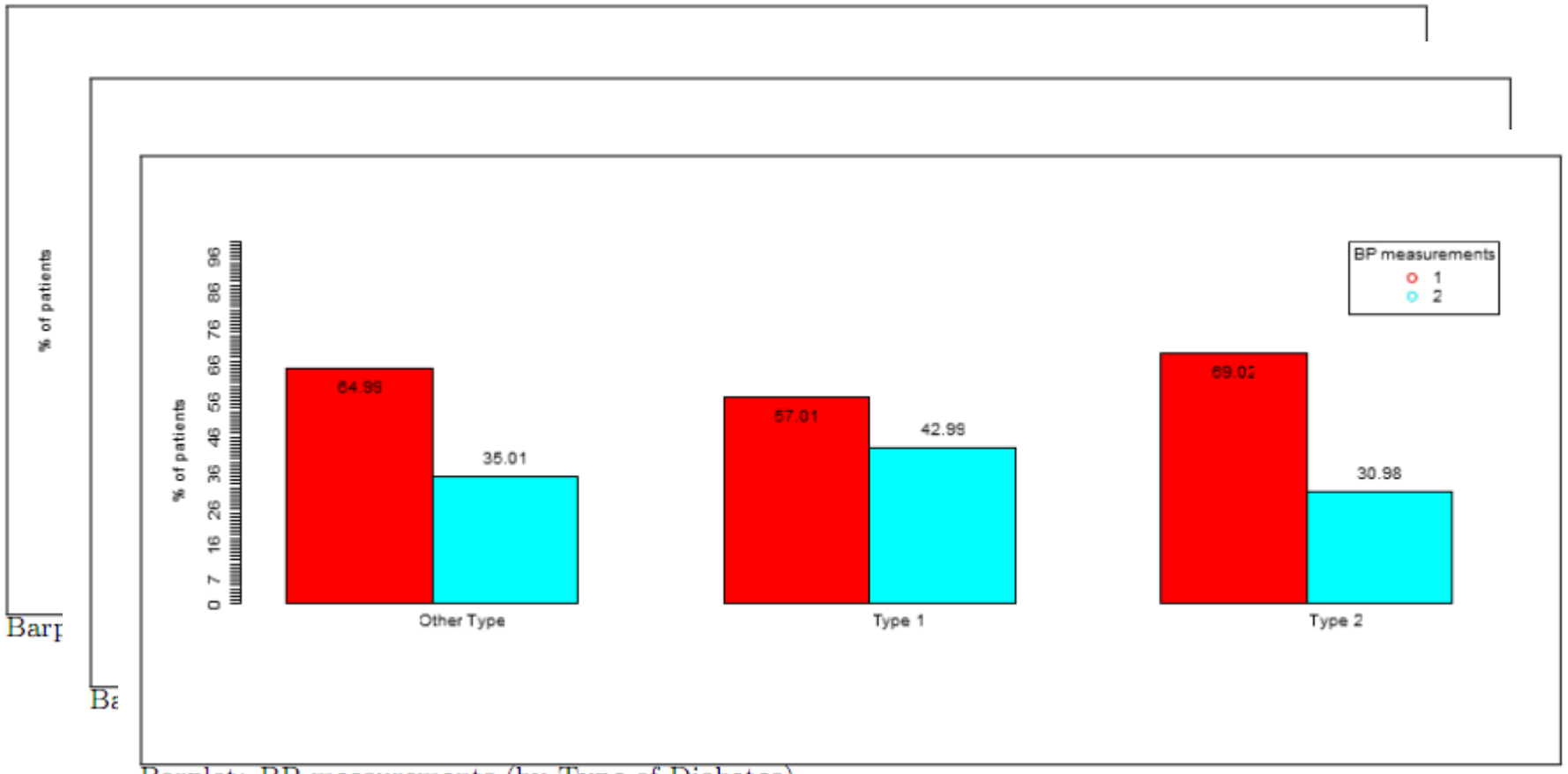
Running BIRO: Data Quality Results



Barplot: BP measurements (by Type of Diabetes)

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Running BIRO: Data Quality Results

Tablica deskriptivne statistike za 2009. godinu												
	broj	prosječna vrijednost	medijan	minimum	maksimum	donji kvartil	gornji kvartil	varijanca	standardna devijacija	broj bolesnika	broj pregleda	popunjenost
BMI	34956	29,6979	29,0698	15,2038	72,8738	26,2878	32,4661	25,507	5,0504	41359	61639	0,84518
dijastolički krvni tlak	28112	83,5263	80	30	140	80	90	91,521	9,5667	41359	61639	0,67971
sistolički krvni tlak	28106	140,7798	140	80	240	130	150	351,465	18,7474	41359	61639	0,67956
Albumin	6021	67,1394	20	0,0005	998	11	54	17065,456	130,6348	41359	61639	0,14558
Guk - nt	32750	9,1255	8,5	2,5	33,8	7	10,5	9,694	3,1134	41359	61639	0,79185
Guk - pp	23392	11,4784	11	2,5	34,5	8,5	13,9	16,545	4,0675	41359	61639	0,56558
HbA1c	30562	7,1033	6,8	3,6	15,9	6,1	7,8	2,154	1,4676	41359	61639	0,73894
HDL	23515	1,3999	1,34	0,13	5	1,14	1,6	0,151	0,3892	41359	61639	0,56856
Kolesterol	29110	5,3335	5,1	1,05	50	4,4	5,9	6,036	2,4569	41359	61639	0,70384
LDL	23322	2,9525	2,85	0,13	25	2,23	3,51	1,4	1,1833	41359	61639	0,56389
Triglyceridi	28750	2,1827	1,68	0,19	50	1,18	2,42	6,298	2,5096	41359	61639	0,69513

* deskriptivna analiza provedena je samo za varijable sa 3 ili više unesenih rezultata

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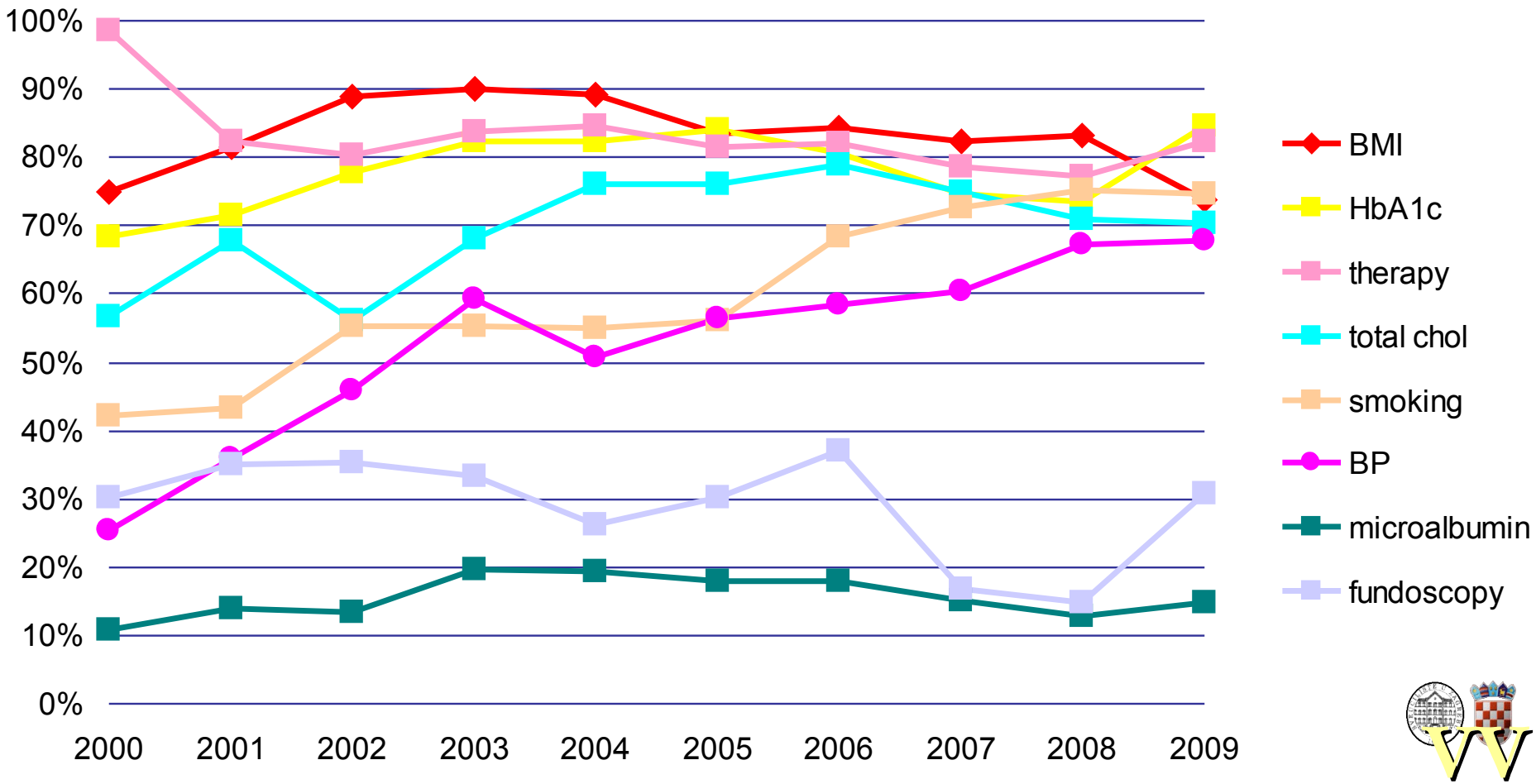
Running BIRO: Data Quality Results



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Statistical Report: General Characteristics (Tables)

Demographic characteristic – 1.1

Clinical characteristics – 2.1. – Diabetes status

Duration of diabetes	Type 1				
	with hba1c		without hba1c		
	Male	Female	Male	Female	
0 - 9	309 (34.37 %)	236 (26.82 %)	95 (25.20 %)	74 (24.26 %)	714 (29.01 %)
10 - 19	265 (29.48 %)	261 (29.66 %)	97 (25.73 %)	78 (25.57 %)	701 (28.48 %)
20 +	247 (27.47 %)	301 (34.20 %)	112 (29.71 %)	93 (30.49 %)	753 (30.6 %)
missing	78 (8.68 %)	82 (9.32 %)	73 (19.36 %)	60 (19.67 %)	293 (11.91 %)
	899 (36.53 %)	880 (35.76 %)	377 (15.32 %)	305 (12.39 %)	2461 (100 %)

Chi-Squared	p.value	df
881.1016	0.0000	15

Parameter: 1.1. Age (Classes)

Age	Male	Female	
0 - 34	617 (2.87 %)	608 (3.08 %)	1225 (2.97 %)
35 - 54	4958 (23.07 %)	2700 (13.66 %)	7658 (18.56 %)
55 - 74	13137 (61.13 %)	11937 (60.41 %)	25074 (60.79 %)
75 +	2777 (12.92 %)	4514 (22.84 %)	7291 (17.68 %)
missing	1 (0.00 %)	1 (0.01 %)	2 (0 %)
	21490 (52.1 %)	19760 (47.9 %)	41250 (100 %)

Duration of diabetes	Type 2				
	with hba1c		without hba1c		
	Male	Female	Male	Female	
0 - 9	6591 (45.41 %)	5609 (42.11 %)	2112 (42.61 %)	1969 (41.66 %)	16281 (43.4 %)
10 - 19	4011 (27.64 %)	3815 (28.64 %)	935 (18.86 %)	974 (20.61 %)	9735 (25.95 %)
20 +	1582 (10.90 %)	1700 (12.76 %)	429 (8.65 %)	433 (9.16 %)	4144 (11.05 %)
missing	2329 (16.05 %)	2195 (16.48 %)	1481 (29.88 %)	1350 (28.57 %)	7355 (19.61 %)
	14513 (38.69 %)	13319 (35.5 %)	4957 (13.21 %)	4726 (12.6 %)	37515 (100 %)

Chi-Squared	p.value	df
20372.1577	0.0000	15

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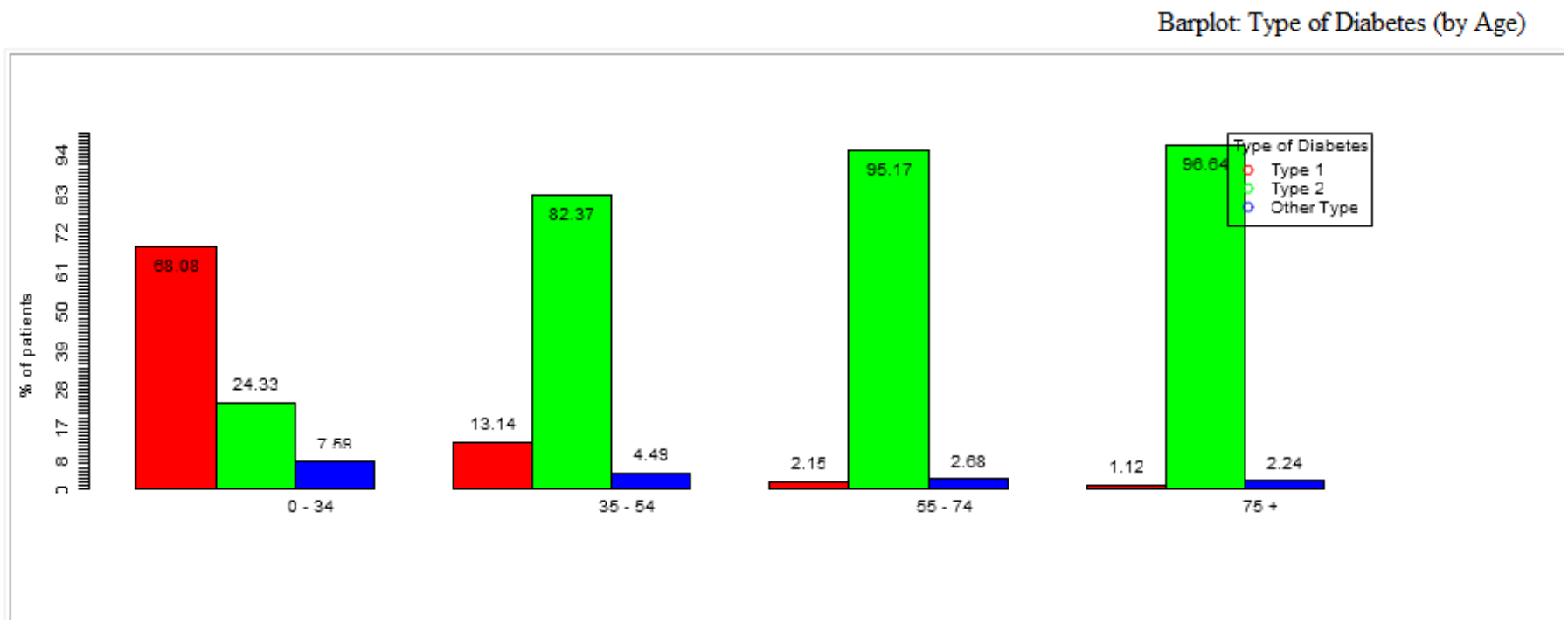
Statistical Report: General Characteristics (Figures)

Clinical characteristics – 2.1. – Diabetes status – 2.1.1. Type of diabetes



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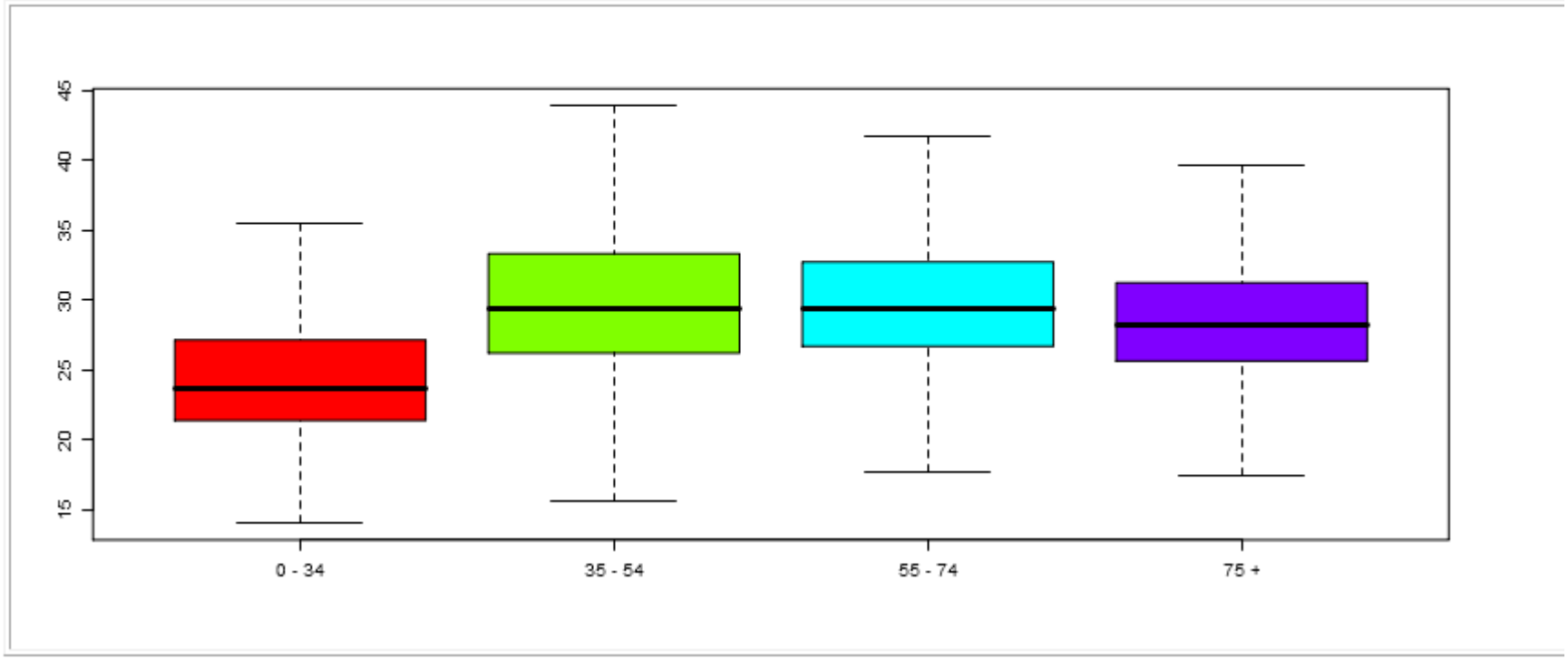
Statistical Report: General Characteristics (Figures)

Clinical characteristics – 2.2. – Risk Factors– 2.2.1. Obesity



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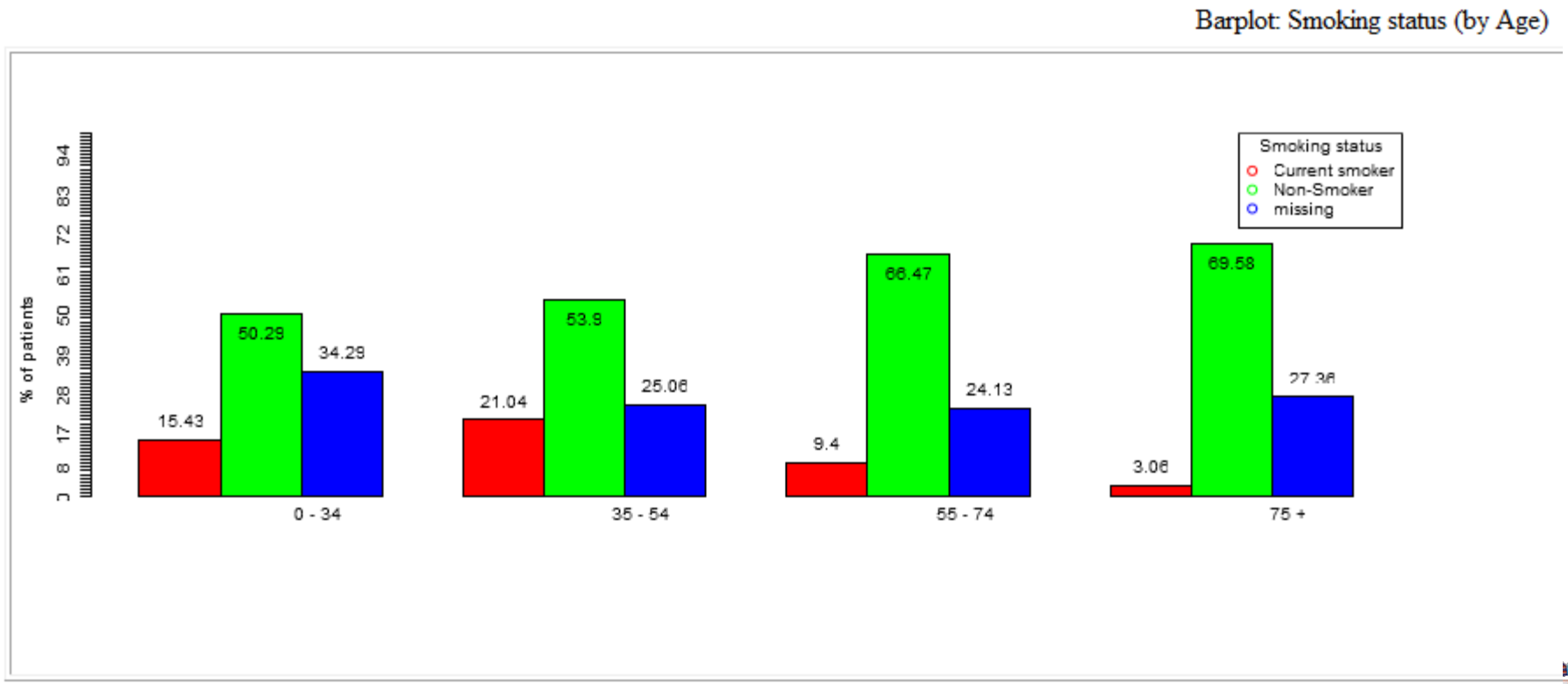
Statistical Report: General Characteristics (Figures)

Clinical characteristics – 2.2. – Risk Factors– 2.2.2. Lifestyle



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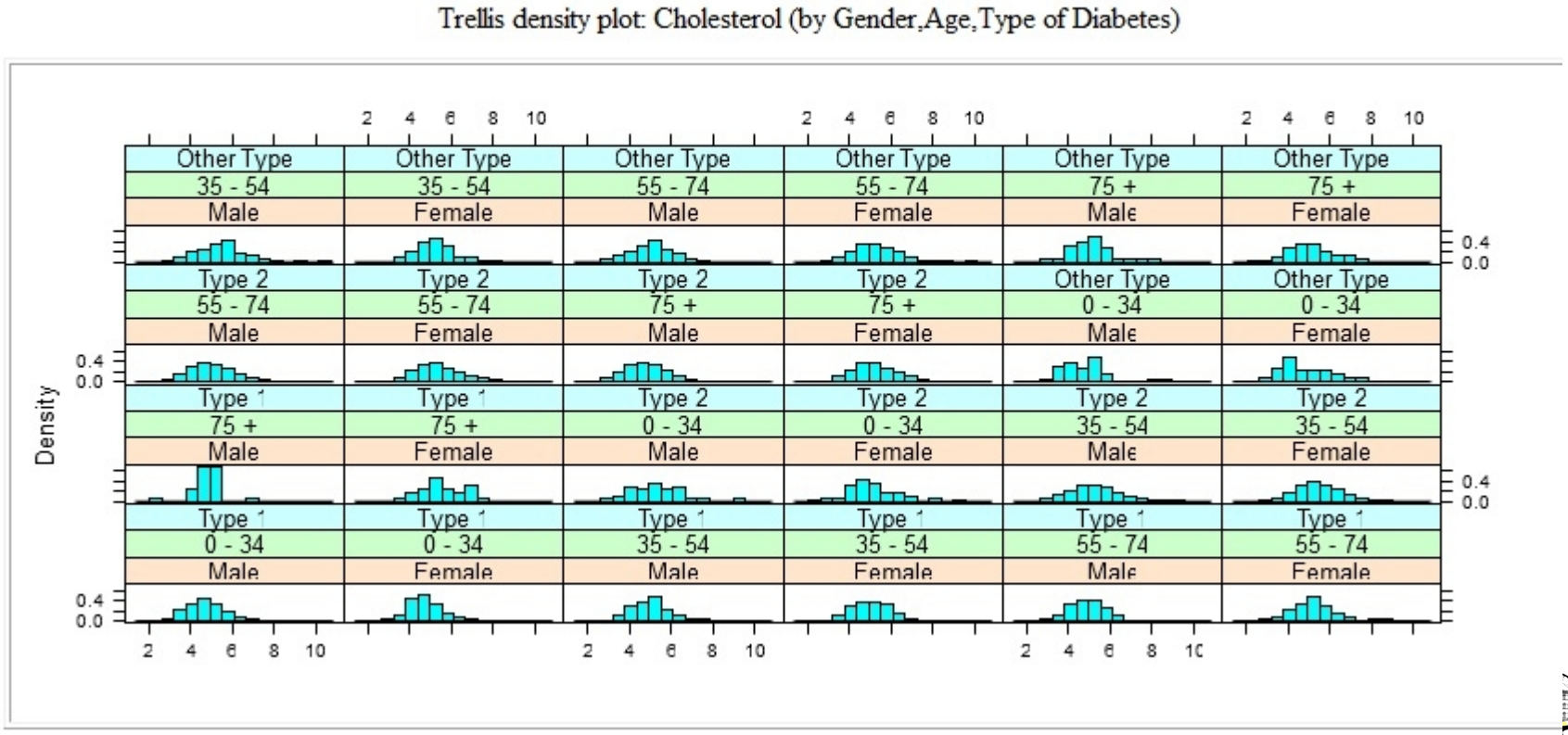
Statistical Report: General Characteristics (Figures)

Clinical characteristics – 2.2. – Risk Factors– 2.2.3. Clinical measurements



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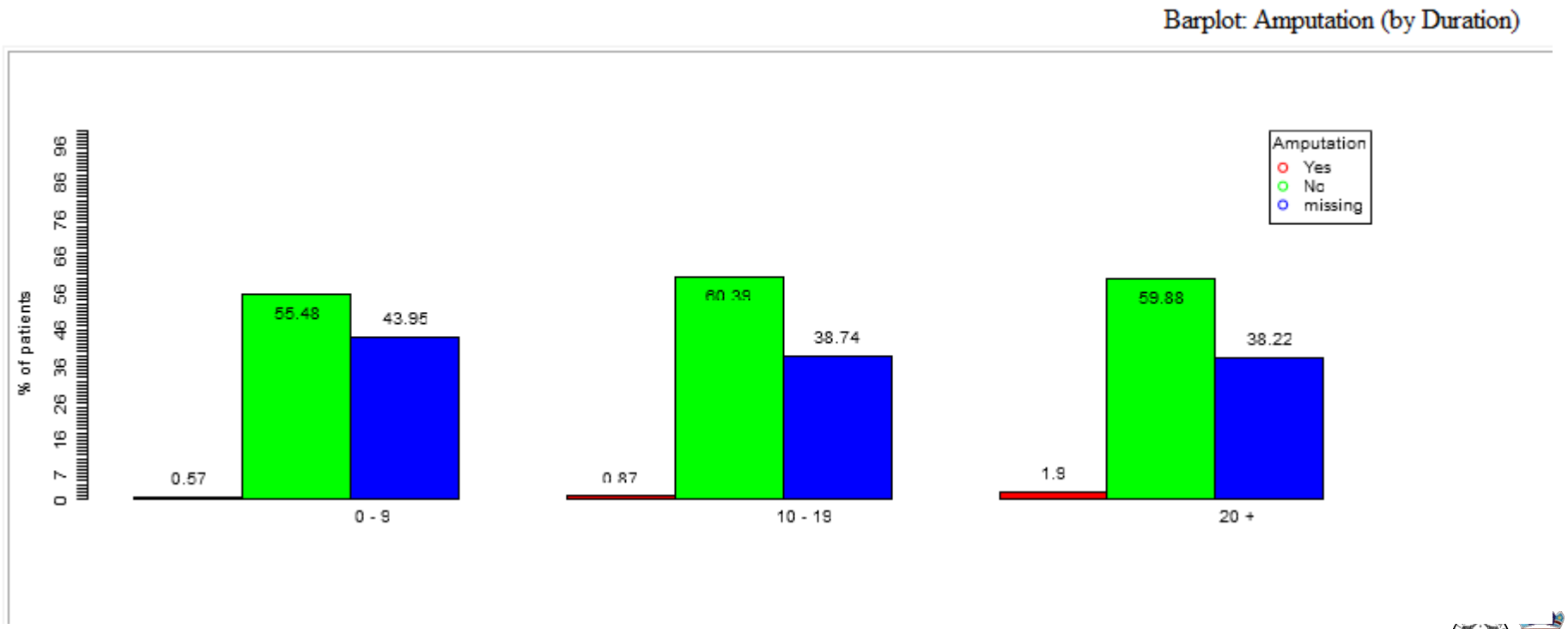
Statistical Report: General Characteristics (Figures)

Clinical characteristics – 2.3. Diabetes complications



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Statistical Results: BIRO Indicators (Tables)

Risk Adjusted Indicators - 5.1. Epidemiology

Parameter: 5.1.2. Age at diagnosis by 10 year age bands (incidence)

Age	Type 1	Type 2	
0 - 9	252 (10.24 %)	25 (0.07 %)	277 (0.69 %)
10 - 19	518 (21.05 %)	93 (0.25 %)	611 (1.53 %)
20 - 29	560 (22.75 %)	400 (1.07 %)	960 (2.4 %)
30 - 39	412 (16.74 %)	2547 (6.79 %)	2959 (7.4 %)
40 - 49	229 (9.31 %)	7694 (20.51 %)	7923 (19.82 %)
50 - 59	143 (5.81 %)	10376 (27.66 %)	10519 (26.31 %)
60 - 69	45 (1.83 %)	6677 (17.80 %)	6722 (16.82 %)
70 - 79	10 (0.41 %)	2138 (5.70 %)	2148 (5.37 %)
80 +	0 (0.00 %)	217 (0.58 %)	217 (0.54 %)
missing	292 (11.87 %)	7348 (19.59 %)	7640 (19.11 %)
	2461 (6.16 %)	37515 (93.84 %)	39976 (100 %)

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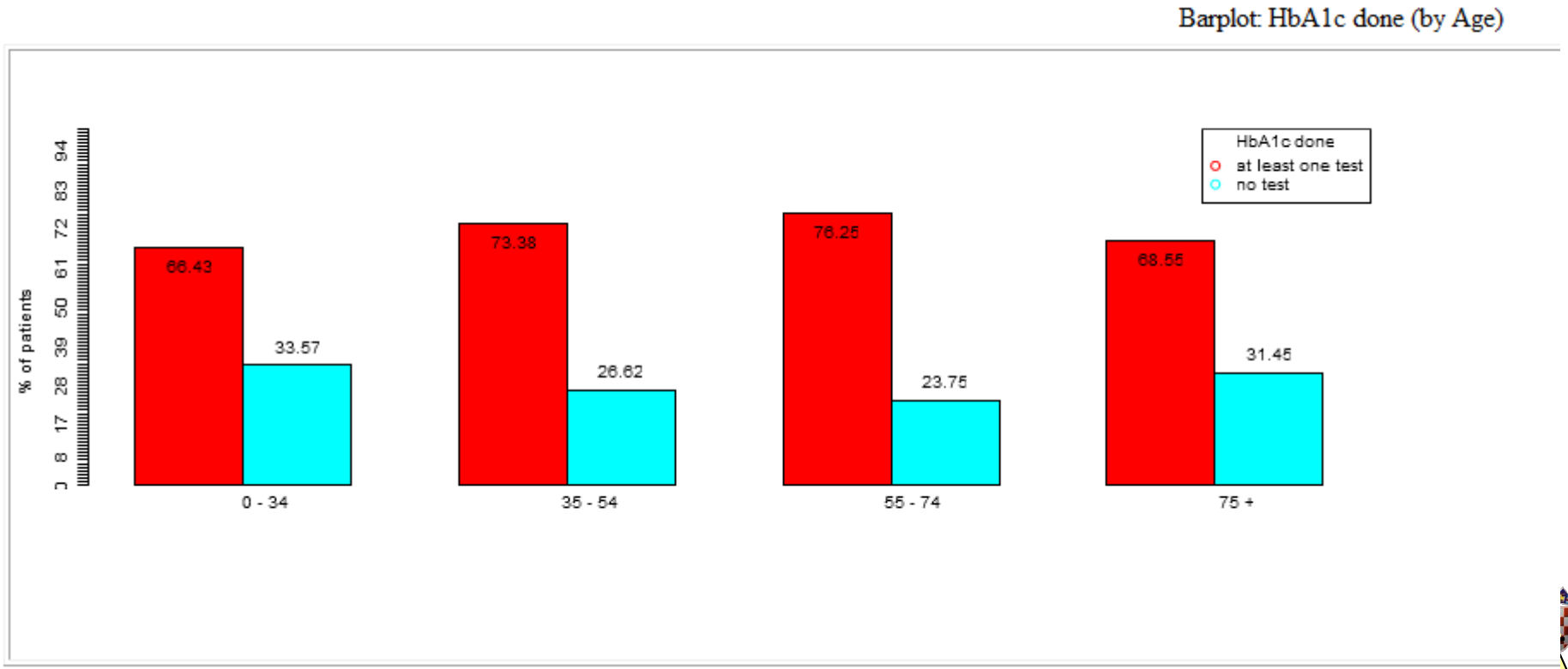
Statistical Report: BIRO Indicators (Figures)

Risk Adjusted Indicators - 5.2. Process Quality



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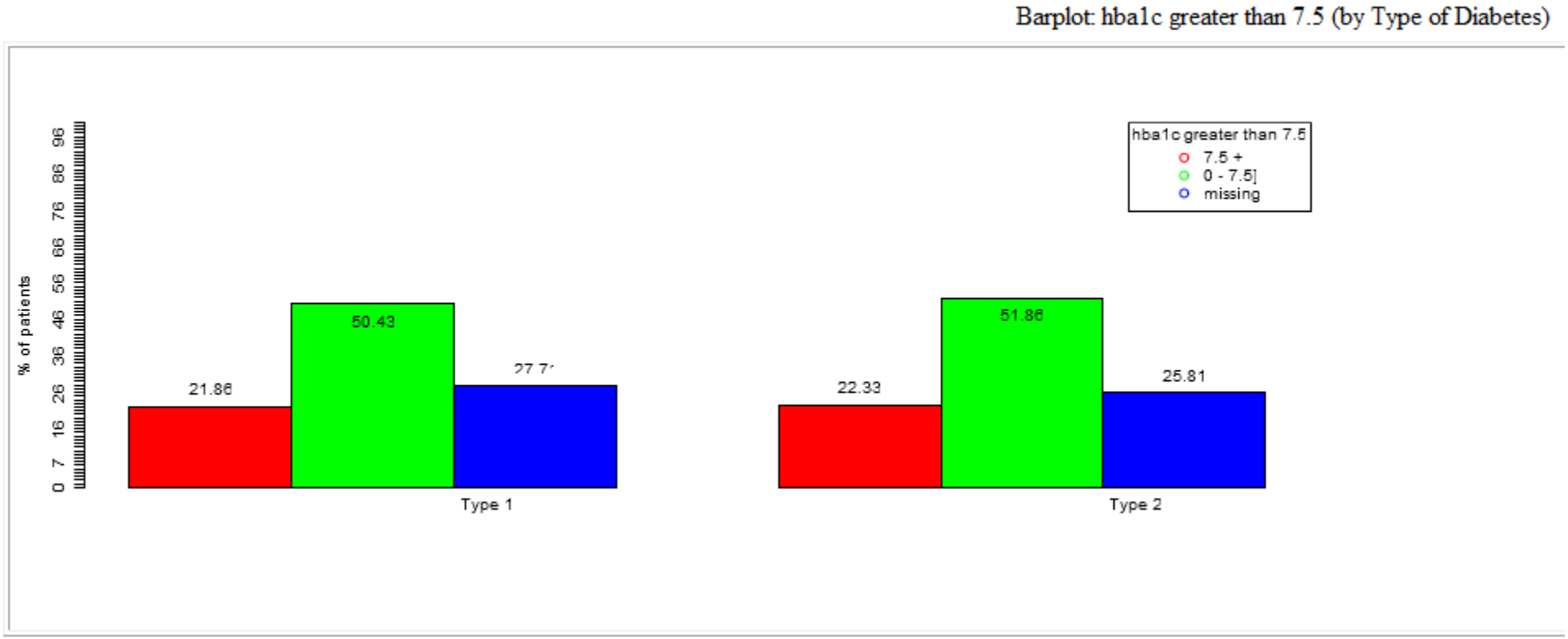
Statistical Report: BIRO Indicators (Figures)

Risk Adjusted Indicators - 5.3. Outcome quality - intermediate outcomes



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Conclusions (1): Statistical Results

- Data quality
  - Nationally representative sample
  - Sample representative of hospital health care
  - Inadequate availability of some parameters

- Possible improvements in data collection
  - Inclusion of additional data sources (CEZIH, paediatrics data)
  - Empowering physicians to perform tests
  - Enabling physicians to perform tests

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Conclusions (2): Diabetes Care

- Possible improvements in diabetes care quality
  - Achieving target values
    - HbA1c, lipids, blood pressure, …
  - Performing essential tests
    - regular eye and foot examinations, microalbuminuria, …

Croatia
Conclusions (3):BIRO usage

- BIRO
  - User friendly, intuitive
  - Capability of running the exhaustive analysis on large data sets
  - Good preparation of local data and resources are essential

- Coordination Centre
  - Excellent support

Croatia
Future LOCAL Perspectives

- *Compliance with BIRO standards*
  - *Tool for automatic export and adaptation of data*
    - *(current activity)*

- *Additional data sources*
  - *Integration of CEZIH data (unique identifier, age, sex, type of DM)*
  - *Integration of paediatrics data*

Croatia
Future BIRO Perspectives

- *Flexibility of input data (age, ….)*
  - *If f(cell)=0 → chi test Ø*
- *Flexibility of data categorization*
    - *(BMI > 40 + age – 75+ - ?) → f(cell)=0 → chi test Ø*
- *Clinically relevant categories in report*
  - *Categorization of continuous variables*
    - *Total cholesterol – 0-2.58, 2.59-5.17, …*
      - *instead of 4.5 as one of cut-off points*
    - *HbA1c – 0-5.9, 6-7.9, 8+*
      - *instead of 6.5 or 7 as one of cut-off points*
- *Manual*

Croatia

Thanks for the attention!