

THE DATABASE OF THE PATIENTS WITH DIABETES REGISTERED AT THE CLINICAL CENTER FOR DIABETES, NUTRITION AND METABOLIC DISEASES CLUJ

*Silvia Ștefania Iancu¹, Ioan Andrei Vereșiu^{1,2}, Cosmina Bondor²,
Oana Uzarciuc¹, Mihai Goia*

¹ Clinical Regional Emergency Hospital, Clinical Centre for Diabetes, Nutrition and Metabolic Diseases Cluj

² University of Medicine and Pharmacy "Iuliu Hațieganu" Cluj-Napoca

Collaborators: Crăciun Anca, Ștefan Ramona, Tocan Andreea, Streulea Ioana, Alionescu Anca, Baias Lorena, Bardas Aura, Barcan Ioana, Berinde Adina, Docan Mihaela, Durac Oana, Gligor Mădălina, Kun-Andras Boglarka, Olar Ioana, Olteanu Adriana, Oprean Raluca, Moldovan Claudia, Czirjak Hajnal, Pîrvu Florina, Bejan Cătălina, Deak Monica, Palanciuc Irina

Abstract

A database concerning the treatment and some demographical data requested by the National House of Health Insurance, of the more than 18000 patients attending the Diabetes Centre in Cluj is presented below, with its main advantages, like the flexibility of using the data to get epidemiological information on a great diversity of subgroups, of transferring data to other programs and disadvantages, like the lack of a user friendly interface, errors that may occur when filling in the data.

keywords: *database, flexibility, treatment, epidemiological information*

Motivation of the present application

The data on diabetes treatment and demographic indices are requested periodically by the National House of Health Insurance and the volume of data is increasing every year, reaching in 2010 over 18000 patients registered at the clinic in Cluj. The data are requested per patient, in the form of a statistical report in Excel Microsoft, the medication being mentioned by name in random order and in the same column. In the case of string data in columns, it is impossible

to further use the data for subsequent analysis. We thought that it would be very much time saving to have the same amount of data structured in a database with similar information but as independent variables that can be easily updated for following reports.

The present database uses Excel Microsoft, a most widely known and accessible statistical program. The possibility to identify and update the data for each patient once included in the database is considered the most time saving and efficient resource utilization and also a flexible tool to get

information on prescriptions, efficiency, trends and efficacy of the treatment over time.

being the main reason for the rational use of a database.

Basic theoretical premises

A database is defined as a collection of centralized data, created and maintained on a computer with the aim of data analysis in the context of specific applications.

The advantages of using databases are: (1) centralized control of data through the designated person(s), the administrator(s), (2) high speed of data retrieval and updating of information, (3) databases are compact, the volume is very conveniently reduced when compared to the paper files, (4) flexibility due to the possibility of modifying the structure of the database without modifying the application programs.

The basic operations are: filling in new data, deleting existing data, updating of data and query of the database to get new information according to selection criteria applied to the data, a well structured query may bring very useful information, this in fact

Presentation of the database

The variables defined by us were classified as follows:

(a) Identification data of the patient: name, surname, sex, diagnostic (type of diabetes), personal numeric code,

(b) Data regarding the treatment of the patient coded as numbers: diet, oral treatment introduced as separate variables or subcategories for each treatment option, even the combinations, dose, number of tablets (units)/day,

(c) HbA1c evaluated during the last year,

(d) the report of medication for incretins or tiazolidindiones specifying number, year, month, validity,

(e) cancer diagnostic (where applicable) mentioning the type in numerical code.

Table 1. Prevalence of diabetes by sex and type in the analyzed group

Type of diabetes		Sex		Total
		males	females	
1	Number	264	205	469
	%from type of diabetes	56.3%	43.7%	100.0%
	%from sex	3.1%	2.1%	2.6%
2	Number	8215	9616	17831
	%from type of diabetes	46.1%	53.9%	100.0%
	%from sex	96.7%	97.6%	97.2%
Other types	Number	17	34	51
	%from type of diabetes	33.3%	66.7%	100.0%
	%from sex	.2%	.3%	.3%
Total	Number	8496	9855	18351
	%of sex	46.3%	53.7%	100.0%

The database comprises 18567 entries (patients) with 67 variables for each. The completion of the database was possible thanks to the work and revision of the ambulatory files by the diabetes residents.

Database queries and results of the statistical analysis

The statistical analysis of data can be made in the same program or in other

programs, due to the flexibility and interfaces between Excel and other statistical programs. An important step is to verify the data as the correct filling in of tables of such magnitude may sometimes be very burdensome.

The queries and statistical analysis should be made in a structured way from simple to complicated and we further give examples of epidemiological information that can be obtained from such a database.

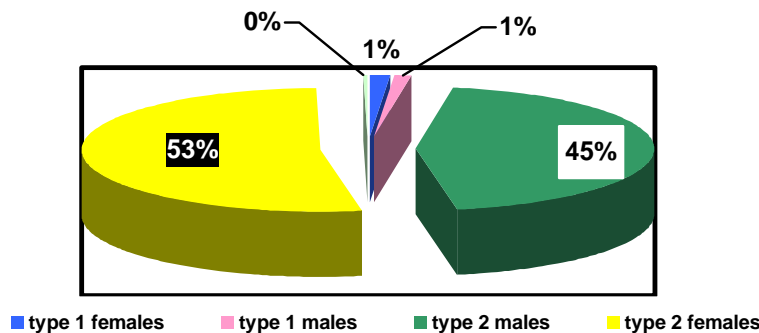


Fig. 1. Prevalence of diabetes by sex and type in the studied population

A first logical question to answer is the one on the sex and type of diabetes structure of the population studied. The results can be obtained as tables or graphics.

2,6% of patients have type 1 diabetes mellitus, of them 3.1% are males and 2.1% are females; 97,2% of all registered patients have type 2 diabetes mellitus, 96,7% are males and 97,6% are females; the remaining have other

types of diabetes reported, in type 2 diabetes group, the increased prevalence of female sex is due to early mortality of males.

The mean age of patients with type 1 diabetes was 51,87 years and that of those with type 2 was 64,74 years. We proceeded to grouping patients by age decades considering the first decade between 10-20 years, as 10 was the minimum age in our database (Table 2).

Table 2. Structure of the population studied by age and type of diabetes

Decades (years) code			Type dm			Total
			1	2	other	
10-20	1	Number	10	12	0	22
		% of decade	45.5%	54.5%	.0%	100.0%
20-30	2	Number	64	80	7	151
		% of decade	42.4%	53.0%	4.6%	100.0%
30-40	3	Number	61	349	11	421
		% of decade	14.5%	82.9%	2.6%	100.0%
40-50	4	Number	79	1293	3	1375
		% of decade	5.7%	94.0%	.2%	100.0%
50-60	5	Number	87	4675	8	4770

60-70	6	% of decade	1.8%	98.0%	.2%	100.0%
		Number	86	5432	11	5529
70-80	7	% of decade	1.6%	98.2%	.2%	100.0%
		Number	60	4554	7	4621
80-90	8	% of decade	1.3%	98.6%	.2%	100.0%
		Number	20	1384	4	1408
90-100	9	% of decade	1.4%	98.3%	.3%	100.0%
		Number	2	58	0	60
Total		% of decade	3.3%	96.7%	.0%	100.0%
		Number	469	17837	51	18357
		% of decade	2.6%	97.2%	.3%	100.0%

The prevalence of type 1 diabetes was quite low, even after taking into consideration that the children are registered at pediatric departments, so we wanted to know the age structure of the population with type 1 diabetes (figure 2).

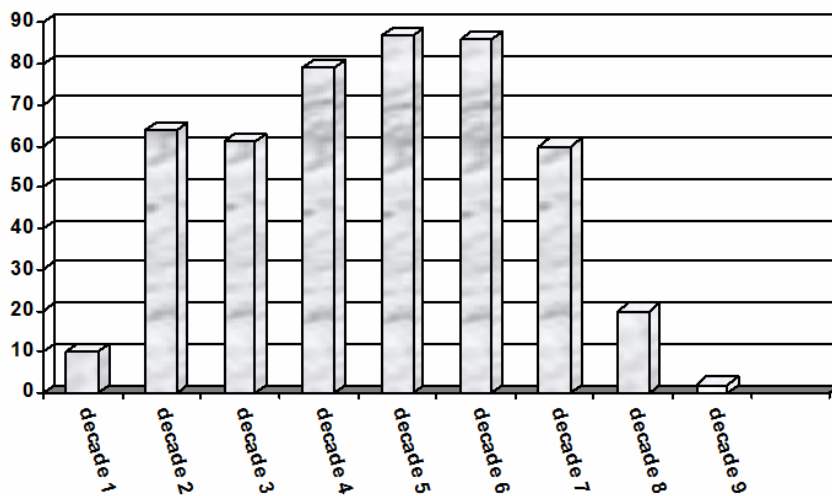


Fig. 2. Decade structure of the population with type 1 diabetes

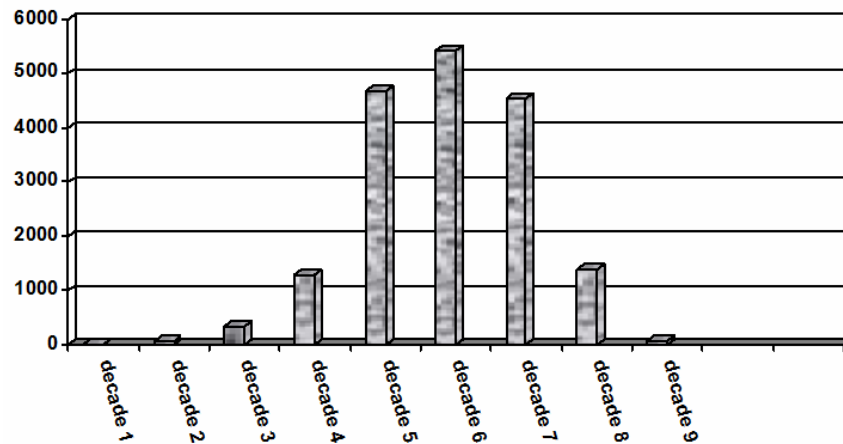


Fig. 3. Age structure of the population with type 2 diabetes

Similarly, we further present the age structure of the group of patients with type 2 diabetes (figure 3).

Mean HbA_{1c} in the patients that had it determined during the last year was 7,87%,

8,53% in patients with type 1 diabetes and 7,82% in those with type 2 diabetes, we also present the means at all decades (table 3, 4).

Table 3. Mean Hba1c by decades in type 1 diabetes patients

Decade	N	Mean	Std Deviation.	Minimum	Maximum
1	7	7.3000	.56569	6.30	8.00
2	31	8.5290	2.11521	4.90	13.80
3	34	10.1962	2.80035	5.40	13.00
4	38	8.1263	1.76477	5.30	14.10
5	33	8.0939	1.84982	5.50	13.70
6	34	8.4882	1.53677	5.50	12.50
7	22	8.0636	1.22028	5.90	10.50
8	5	7.9400	1.51427	5.90	9.60
9	1	6.1000	.	6.10	6.10
Total	205	8.5360	5.05091	4.90	76.00

Table 4. Mean HbA1c in patients with type 2 diabetes by decades

Decade	N	Mean	Std Deviation	Minimum	Maximum
1	2	6.2500	1.06066	5.50	7.00
2	16	7.7438	1.88890	5.70	12.80
3	64	8.3156	2.06453	5.40	14.00
4	238	8.0580	1.91397	5.00	15.60
5	718	7.8089	1.68482	4.20	16.00
6	730	7.7058	1.56580	4.00	15.20
7	502	7.8026	1.79674	4.40	15.90
8	124	8.0121	1.86302	5.00	14.30
9	3	7.3333	.70238	6.60	8.00
Total	2397	7.8226	1.72244	4.00	16.00

We have to note that the number of patients with the HbA_{1c} performed during the last year was quite low.

This database allows for a large spectrum of queries and we further present a few examples of the kind, mainly on the treatment with oral antidiabetic medication, with

incretins or with insulin, an important aspect is the intensive insulin therapy in diabetes mellitus (table 5, 6). Discrepancies less than 1 % are due to the mistakes of filling in the data in the corresponding cells of the Excel database table.

Table 5. Prevalence of intensive insulin therapy (≥ 4 injections/day)

IIT: insulintherapy ≥ 4 shots/day		Type of diabetes			Total
		1	2	Other	
	Number	141	325	3	469
	% of IIT	30.1%	69.3%	.6%	100.0%
Total	Number	141	325	3	469
	% of IIT	30.1%	69.3%	.6%	100.0%

Table 6. Treatment with rapid acting analogs of patients with type 1 and type 2 diabetes

Rapid Analog		Diagnostic (type of diabetes)		Total
		1	2	
Humalog®	Number	106	177	283
	% of rapid analog	37.5%	62.5%	100.0%
	% of diagnostic (type of diabetes)	40.9%	34.2%	36.5%
Novorapid®	Number	82	203	285
	% of rapid analog	28.8%	71.2%	100.0%
	% of diagnostic (type of diabetes)	31.7%	39.3%	36.7%
Apidra®	Number	70	130	200
	% of rapid analog	35.0%	65.0%	100.0%
	% of diagnostic (type of diabetes)	27.0%	25.1%	25.8%
Total	Number	259	517	776
	% of rapid analog	33.4%	66.6%	100.0%
	% of diagnostic (type of diabetes)	100.0%	100.0%	100.0%

Concerning the use of premixed insulins, their use in type 1 and type 2 diabetes mellitus and the controversy on their actual place in therapy, we found the following frequency of (table 7).

Table 7. Treatment with premixed insulin in patients with type 1 and type 2 diabetes mellitus

Premixed Insulins		Type of Diabetes		Total
		1	2	
Mixtard 30/70®	Number	26	626	652
	% of insulin type	4.0%	96.0%	100.0%
	% of diagnostic (type of diabetes)	63.4%	51.2%	51.6%
Insuman Comb25®	Number	10	461	471
	% of insulin type	2.1%	97.9%	100.0%
	% of diagnostic (type of diabetes)	24.4%	37.7%	37.3%
Insuman Comb50®	Number	2	98	100

	% of insulin type	2.0%	98.0%	100.0%
	% of diagnostic (type of diabetes)	4.9%	8.0%	7.9%
Humulin M3®	Number	0	21	21
	% of insulin type	.0%	100.0%	100.0%
	% of diagnostic (type of diabetes)	.0%	1.7%	1.7%
Total	Number	41	1223	1264
	% of insulin type	3.2%	96.8%	100.0%
	% of diagnostic (type of diabetes)	100.0%	100.0%	100.0%

We also evaluated the prescription distribution of patients with type 2 diabetes mellitus (table 8).

Table 8. Treatment of patients with type 2 diabetes mellitus

Treatment	Frequency	Percent
Diet and lifestyle improvement	2751	15.4
metformin	9411	52.8
Acarbose	131	0.7
Glipizide	47	0.3
Glimepiride	2890	16.2
Glibenclamide	676	3.8
Pioglitazone	46	0.3
Rosiglitazone	33	0.2
Sitagliptin	155	0.9
Exenatide	33	0.2
Glibenclamide+metformin	779	4.4
Pioglitazone+metformin	16	0.1
Rosiglitazone+metformin	16	0.1

Data on rosiglitazone were useful, especially when the medicine was taken out of the market and it was possible to establish the appropriate strategy of therapy replacement.

From another perspective, the evaluation of the complexity of treatment showed that 1,89% of all patients with type 2 diabetes are on triple therapy.

Other queries may refer to the number of patients under 30 years of age with type 2 diabetes mellitus and their treatment or the number of patients above 80 years with type 1

diabetes mellitus and their respective treatment: 92 patients out of 166 aged below 30 years have type 2 diabetes mellitus and 22 out of 1462 patients aged above 80 years have type 1 diabetes (table 9 and 10).

Discussions and Conclusions

The database we presented above has some limits concerning mainly the input data which does not inform on chronic complications, anthropometry, demography, from this point of view the use is oriented

towards epidemiological evaluation of treatment and the majority of the reports have a transversal character. These reports should

be easy to get because they refer to minimal statistical analysis and basic epidemiological data.

Table 9. Treatment of patients under 30 years with type 2 diabetes mellitus

Treatment	N	Percent
Diet only	17	18.5%
metformin	41	44.6%
acarbose	2	2.2%
Glipizide	1	1.1%
glimepiride	13	14.1%
gliclazide	9	9.8%
glibenclamide	3	3.3%
sitagliptin	2	2.2%
exenatide	1	1.1%
Insulin	16	17.4%

Table 10. Treatment of patients with type 1 diabetes mellitus aged above 80 years

Treatment	Frequency	Percent of age %
Rapid Acting Insulin	6	27,3
NPH Insulin	5	22.7
Premixed Insulins	3	13.6
Rapid Analogs	8	36.4
Long acting Analogs	11	50
Premixed Analogs	0	0

Moreover, at the time when the data was filled in there was no user friendly interface with fields that reduce the probability of mistakes at filling in the data, although some of these could be corrected afterwards.

We consider that this simple database requires minimal resources and knowledge and can be useful in all diabetes centres in Romania, leading also to a common ground of treatment evaluation, of application of guidelines, of patients with diabetes, of demographic characteristic of the patients and of best strategies for treatment, both at

national and local level. Such a database can be updated or completed yearly and then used for the National House of Health Insurance reporting.

The data on diabetes epidemiology and treatment are for the first time performed on such a large scale in Romania, they comprise over 90% of the patients with diabetes from the Diabetes Centre In Cluj. Moreover, the data can be transferred and analyzed in RODIAB once the program is functional again.

Correspondence Data:

Dr. Silvia Iancu

Clinical Center of Diabetes, Nutrition, Metabolic Diseases, Cluj-Napoca, Romania

Address: 2-4 Clinicilor Street, 4006 Cluj-Napoca, Romania
E-mail: silviaiancu2004@yahoo.es