Data collection and analysis in Romania and Black Sea region

C. Ionescu-Tirgoviste: dataset for diabetes

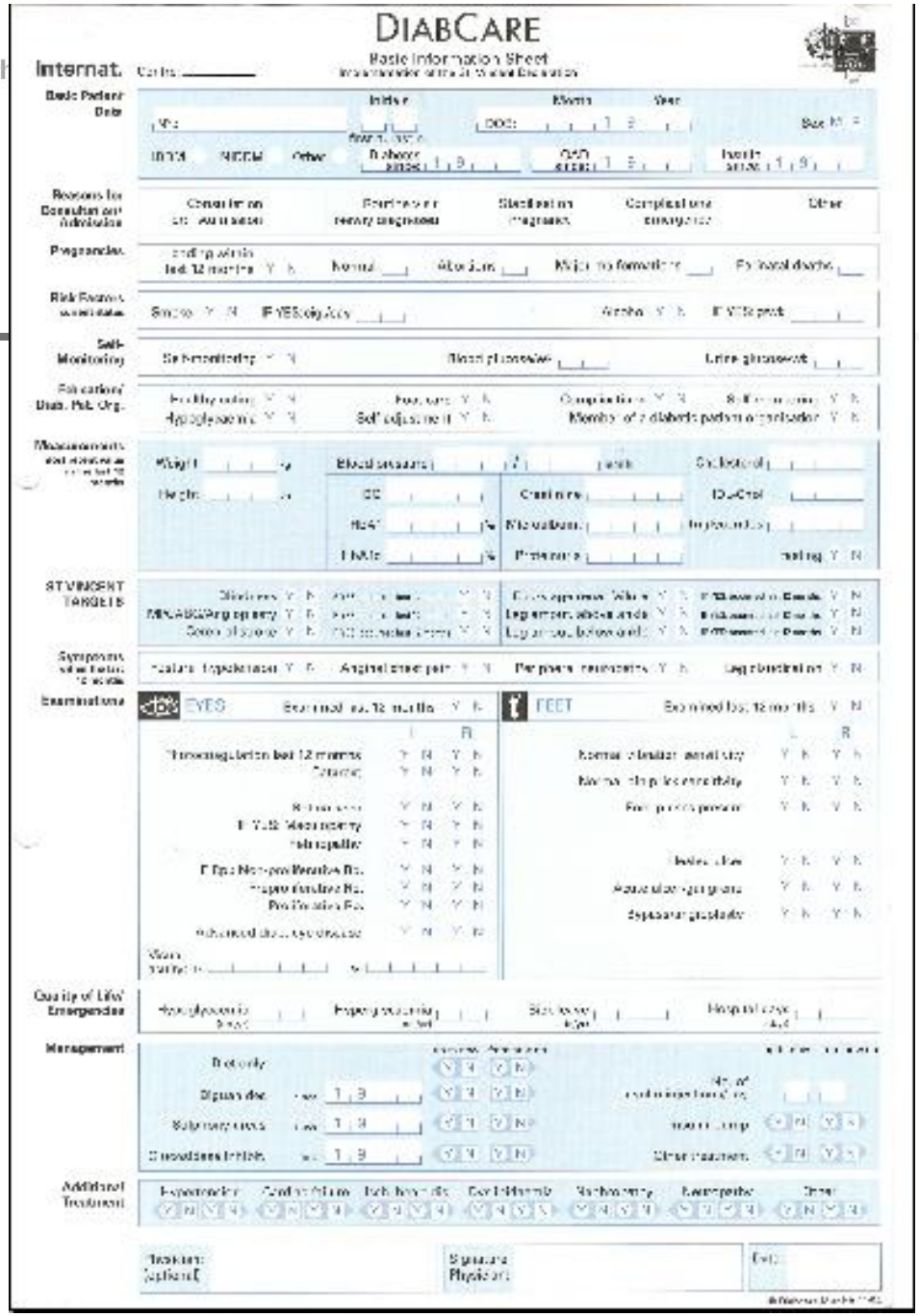
Simion Pruna: technology for data collection & analysis

Data collected in Romania

- Data collected with DiabCare Epi_Info
- Data collected with Black Sea TeleDiab (based on Diabcare dataset)
- Data collected with SincroDiab (based on diabetes national dataset)

Privacy Management

- We will also talk about how a specialized telemedicine software can utilize the services of open source privacy management framework for patient and healthcare providers (OPMFH) to obtain patient and healthcare information.
- In this context, we will talk about TeleDiab and present some of the features of TeleDiab.



DIABCARE

Basic Information Sheet

Internat. Centre

Basic Patient Data

Reasons for Consultation and Admission

Pregnancies

Risk Factors

Self-Monitoring

Education/ Diab. Pat. Org.

Measurements

ST VINCENT TARGETS

Symptoms

Examinations

EYES

FEET

Quality of Life/ Emergencies

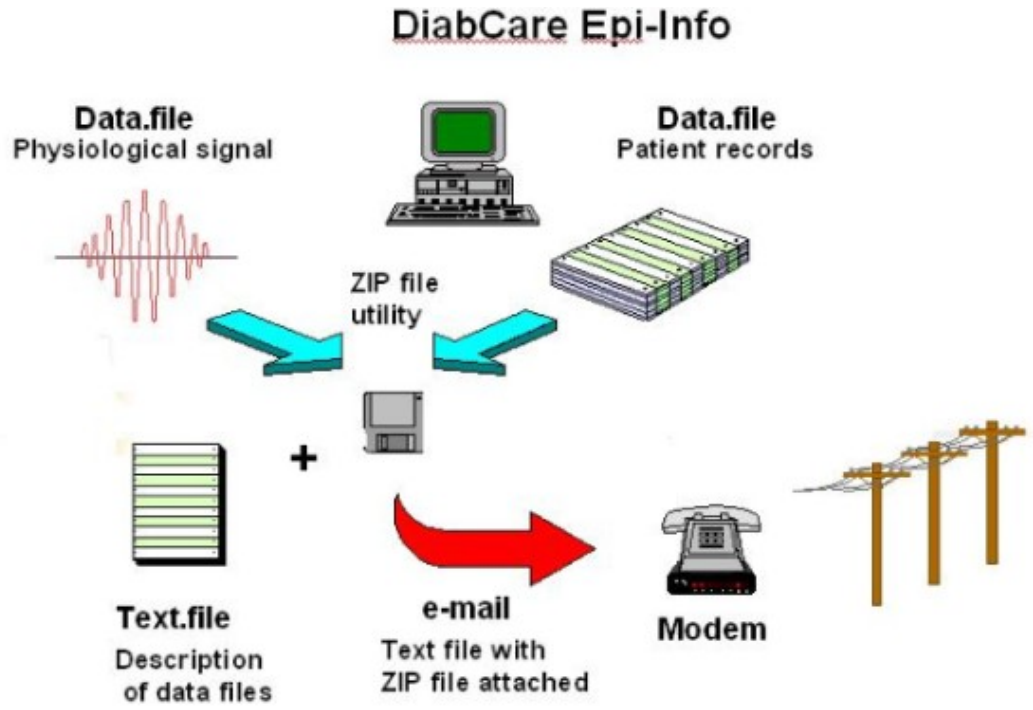
Management

Additional Treatment

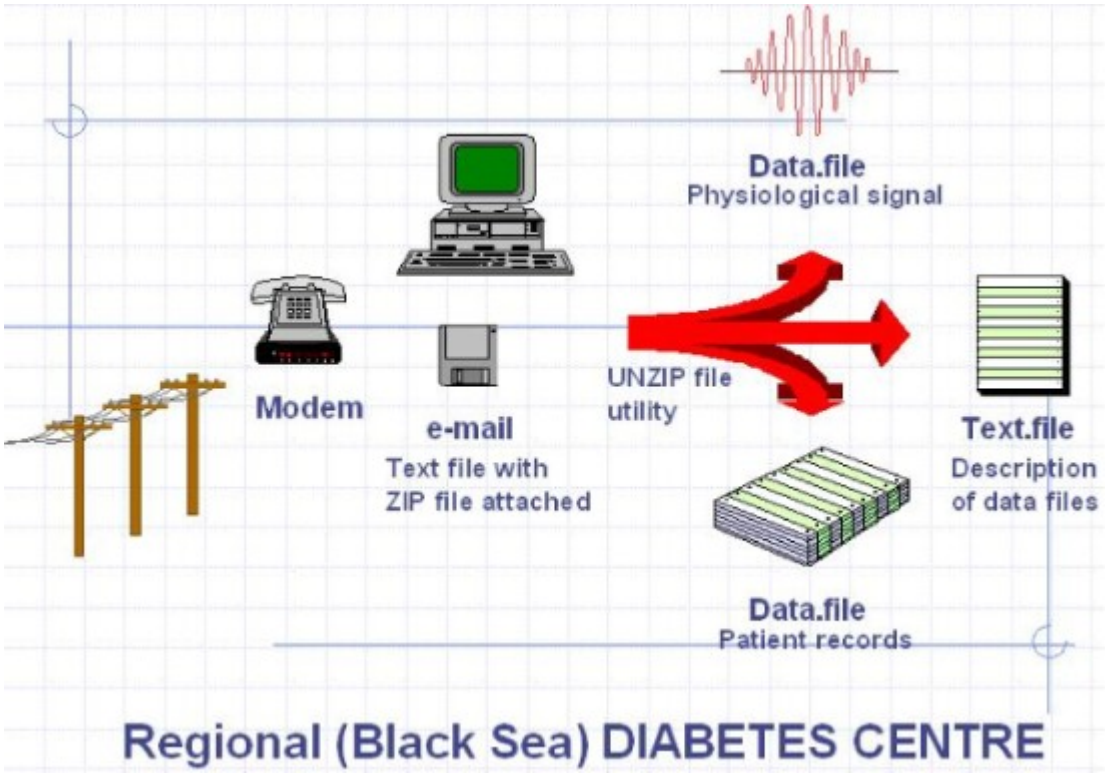
Physician

Date

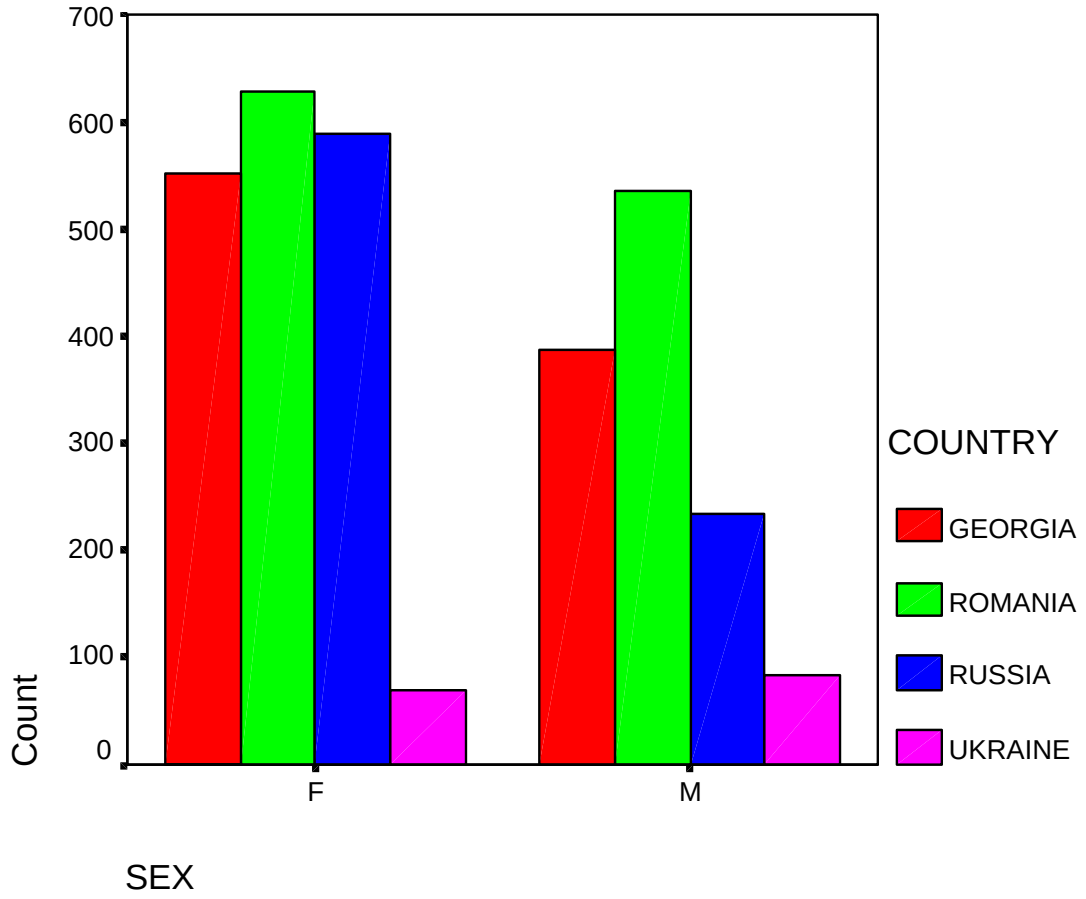
Email transfer



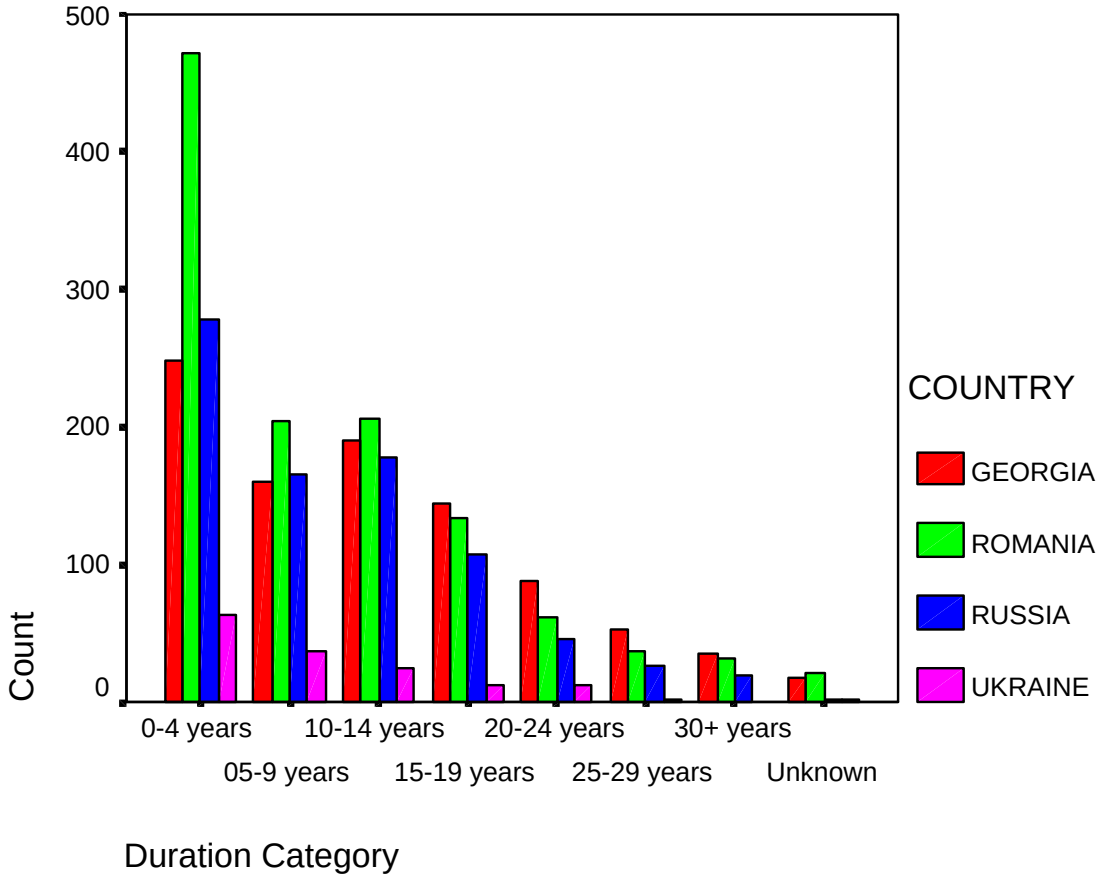
Data aggregation



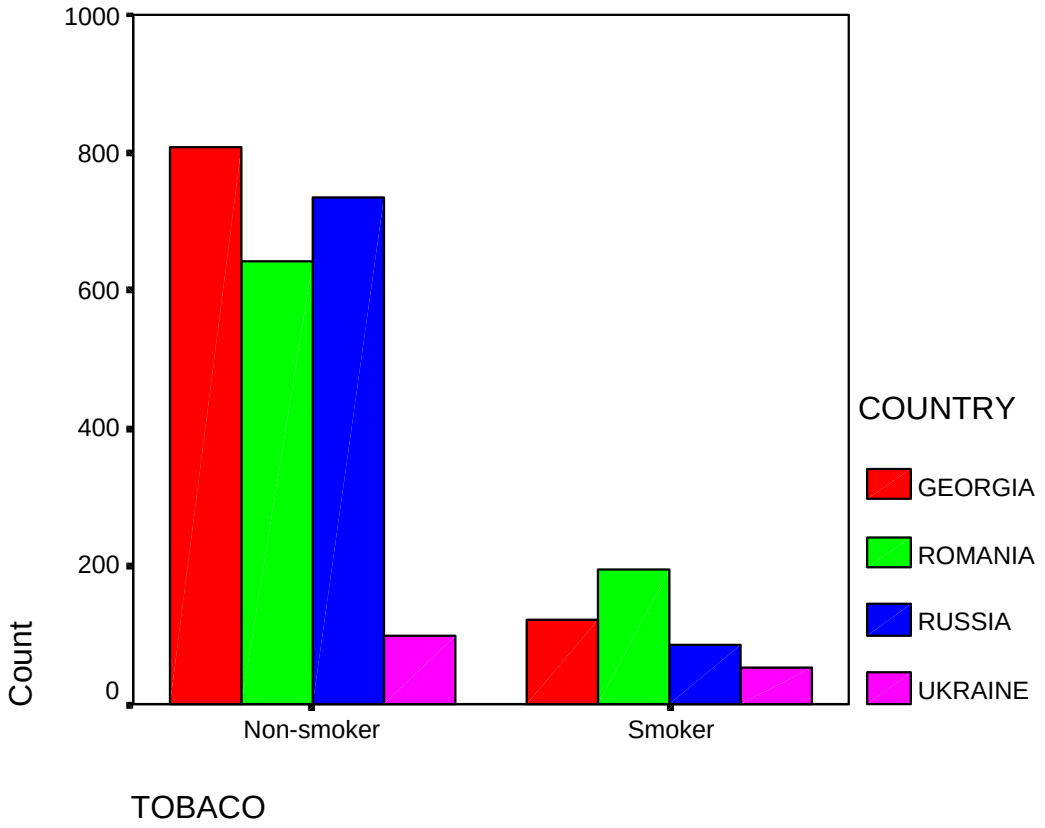
Basic Demographics



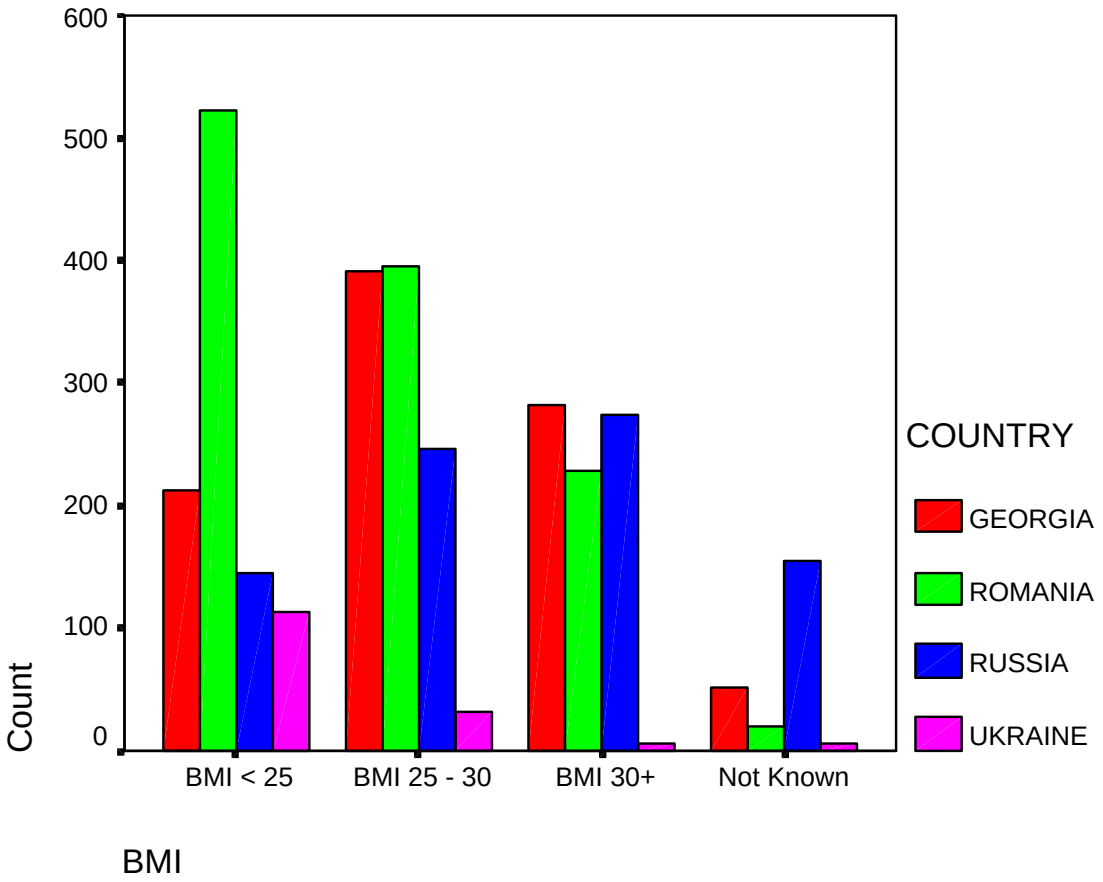
Duration


500
400
300
200
100
0
Count
0-4 years
05-9 years
10-14 years
15-19 years
20-24 years
25-29 years
30+ years
Unknown
Duration Category
COUNTRY
GEORGIA
ROMANIA
RUSSIA
UKRAINE

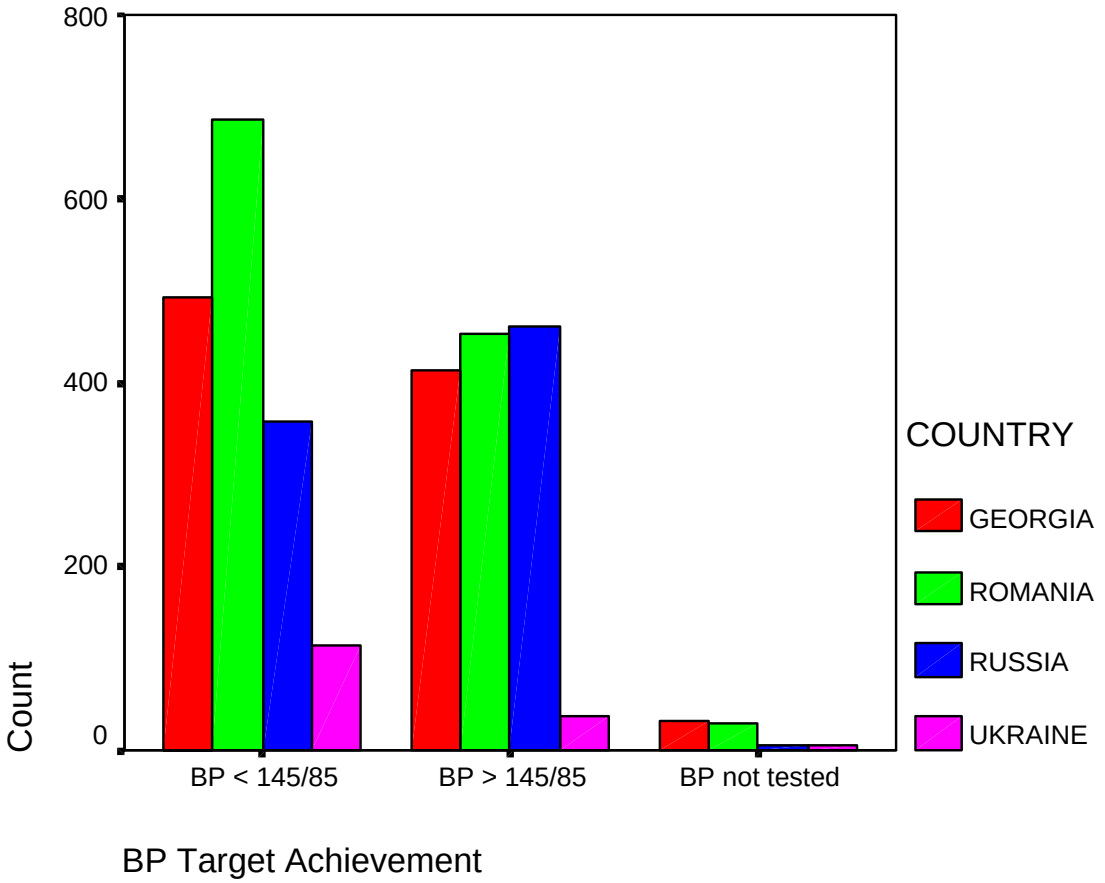
Smoking


1000
800
600
400
200
0
Count
Non-smoker
Smoker
TOBACO
COUNTRY
GEORGIA
ROMANIA
RUSSIA
UKRAINE

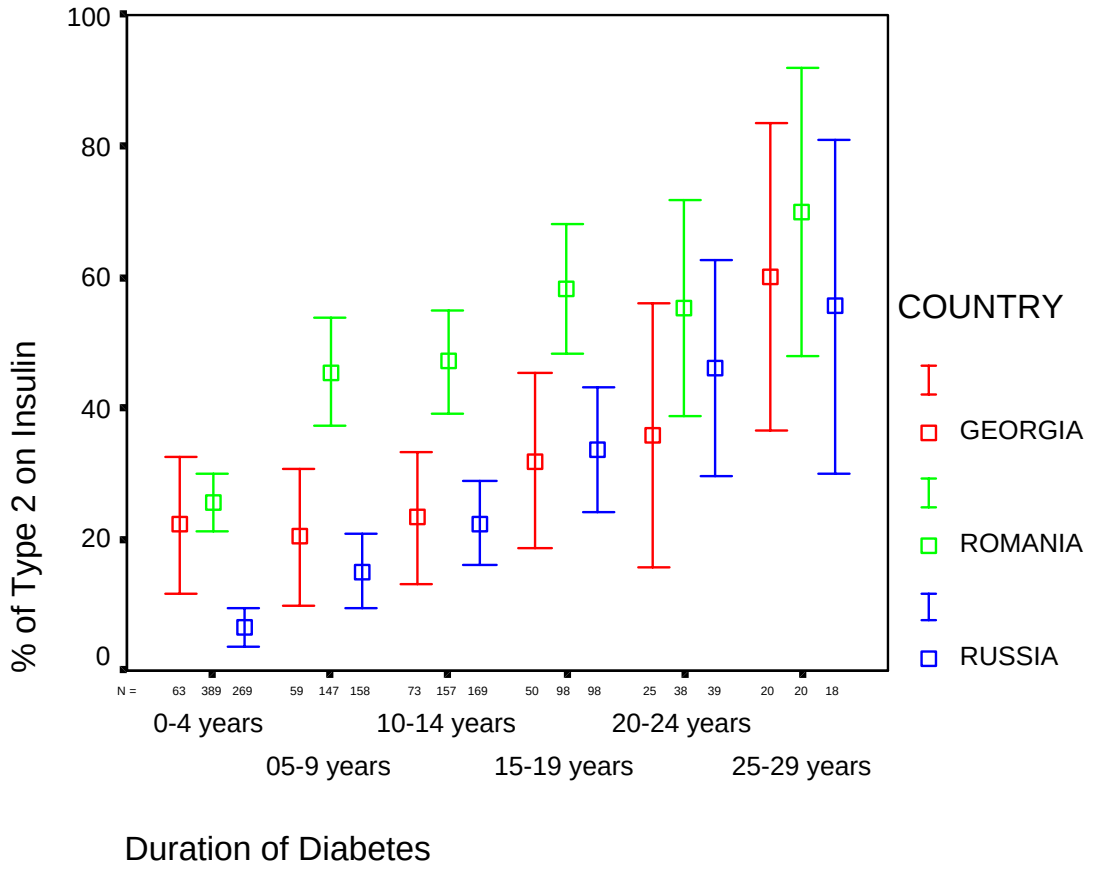
Body Mass Index



Blood Pressure



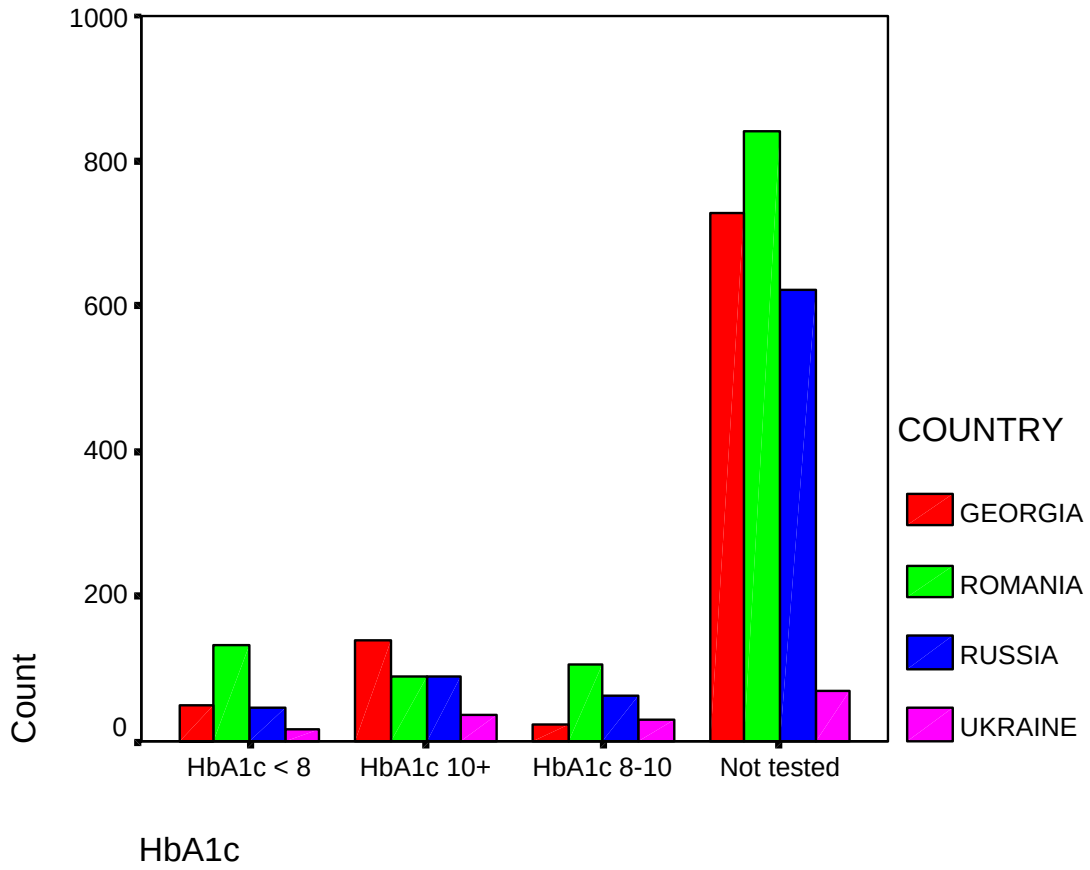
Insulin Prescription to Type 2



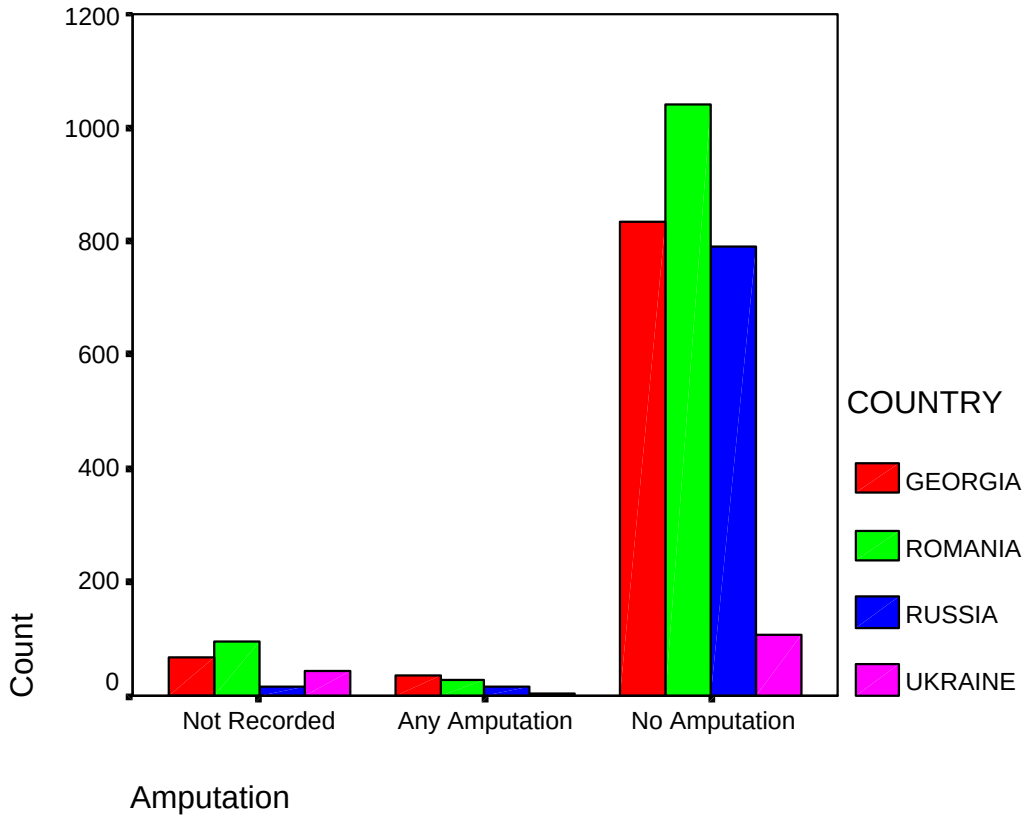
BIRO evaluation of the data

- The aim of this work is to understand and iterpret the results, find whether the new information is novel, and interesting for diabetes care, and check their impact on the diminising diabetes complications, one of the main project goals.

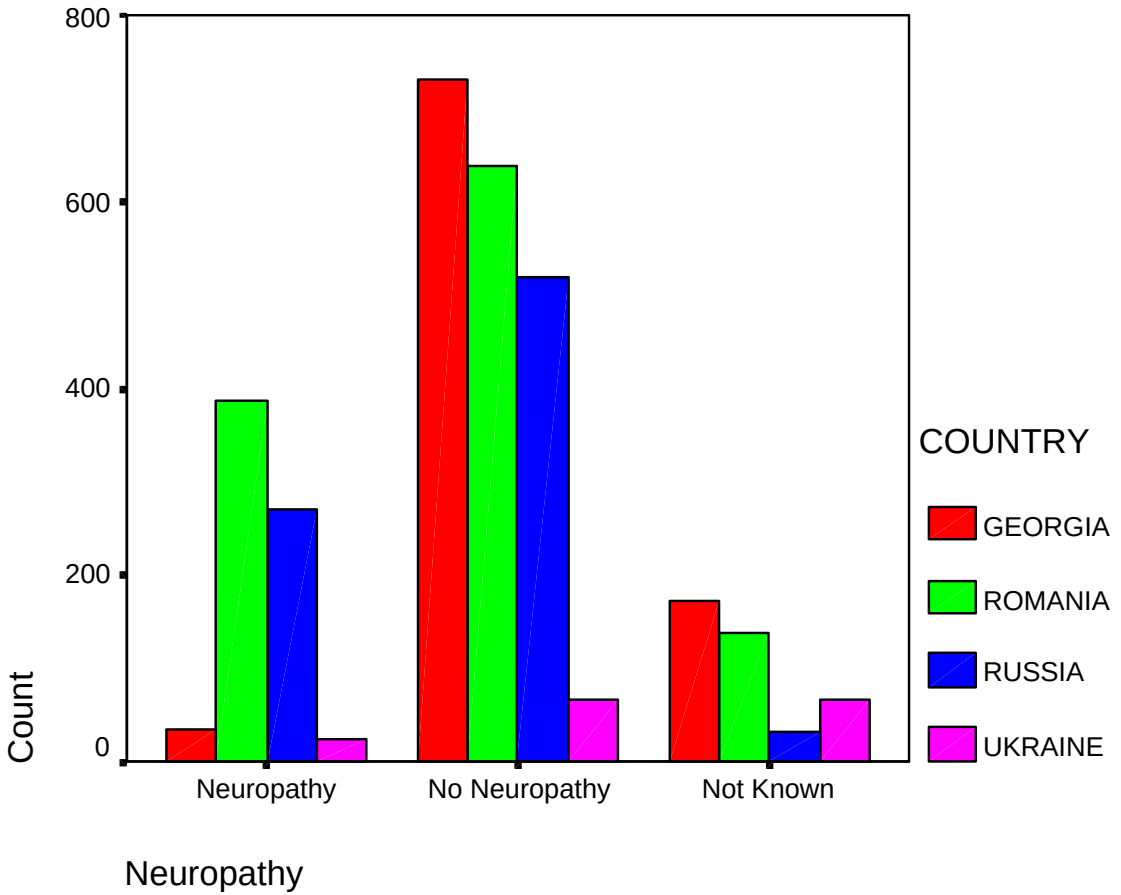
HbA1c


1000
800
600
400
200
0
Count
HbA1c < 8
HbA1c 10+
HbA1c 8-10
Not tested
HbA1c
COUNTRY
GEORGIA
ROMANIA
RUSSIA
UKRAINE

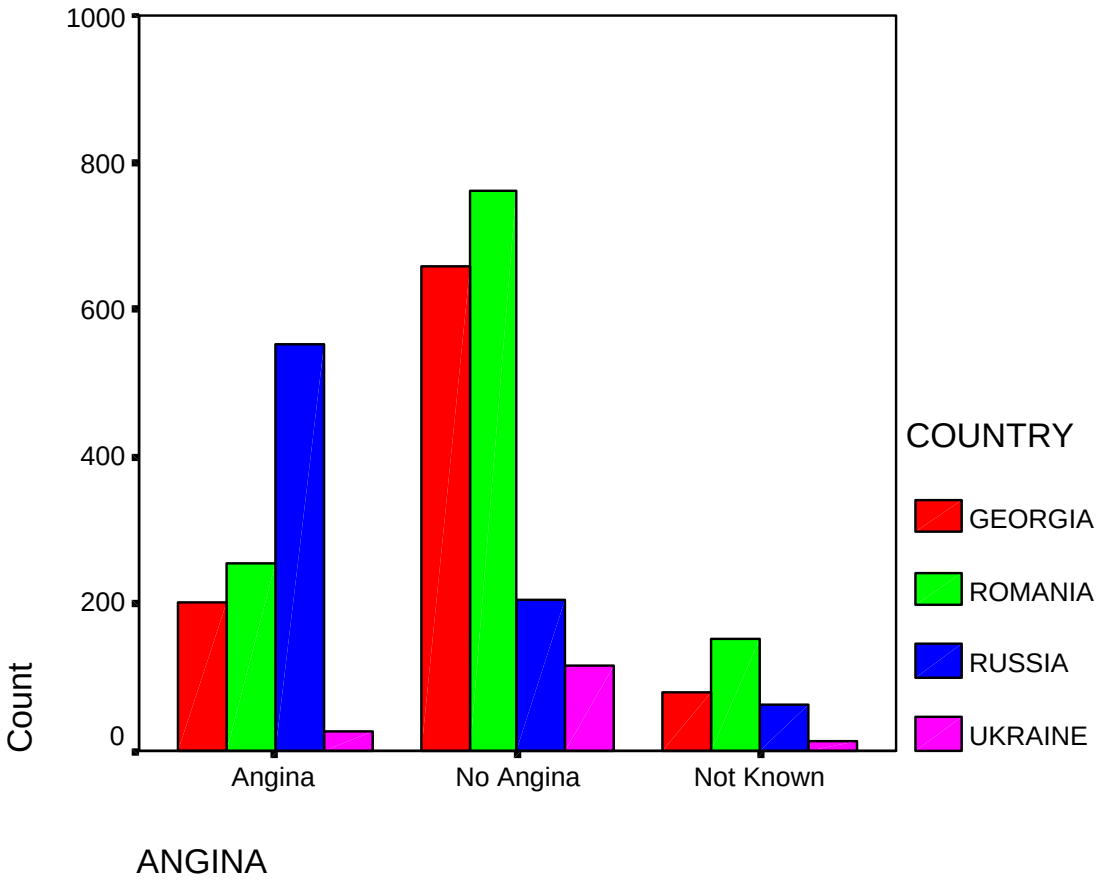
Feet


1200
1000
800
600
400
200
0
Count
Not Recorded
Any Amputation
No Amputation
Amputation
COUNTRY
GEORGIA
ROMANIA
RUSSIA
UKRAINE

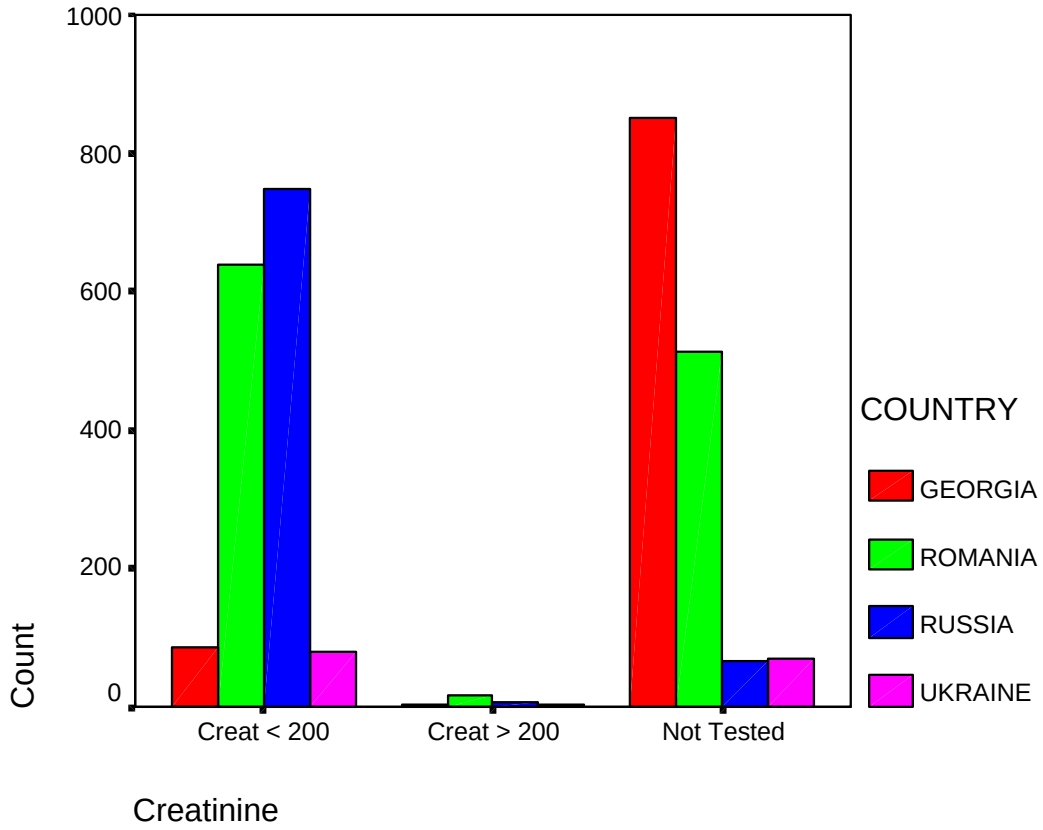
Neuropathy


800
600
400
200
0
Count
Neuropathy
No Neuropathy
Not Known
Neuropathy
COUNTRY
GEORGIA
ROMANIA
RUSSIA
UKRAINE

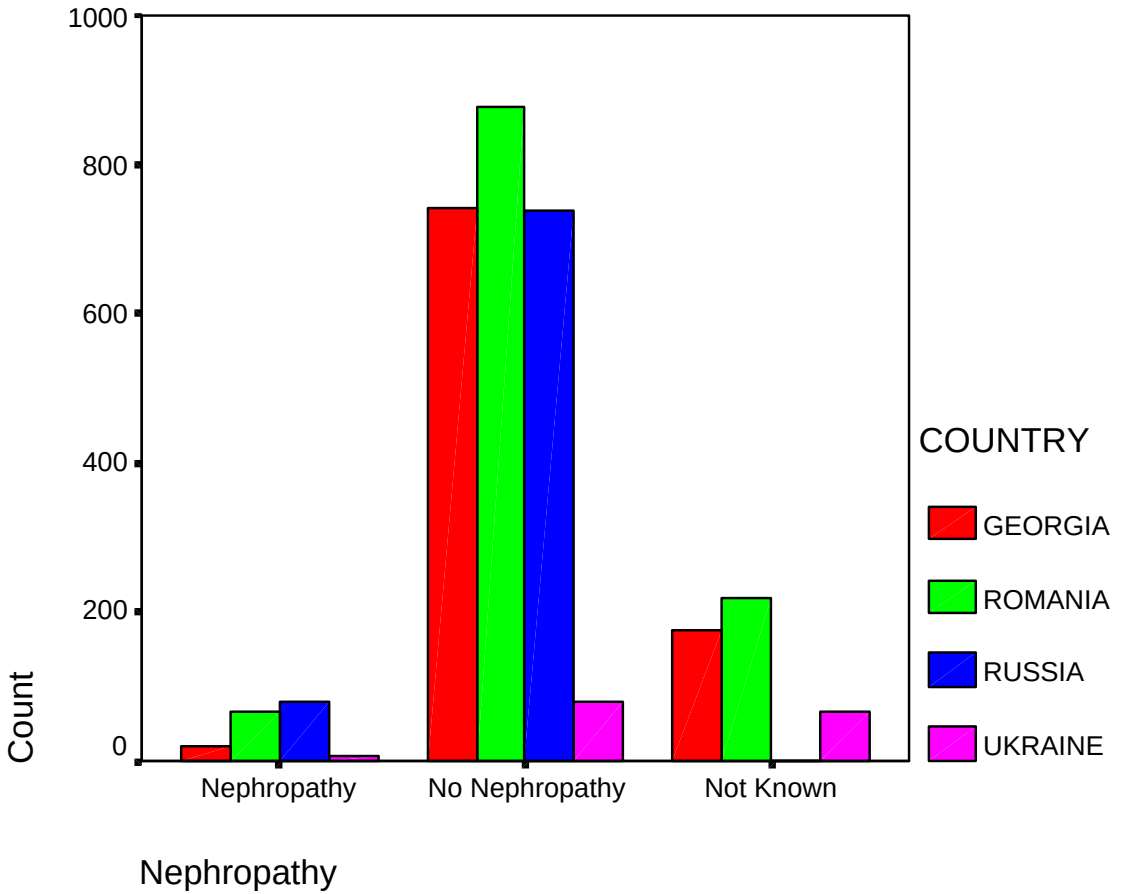
Cardiovascular



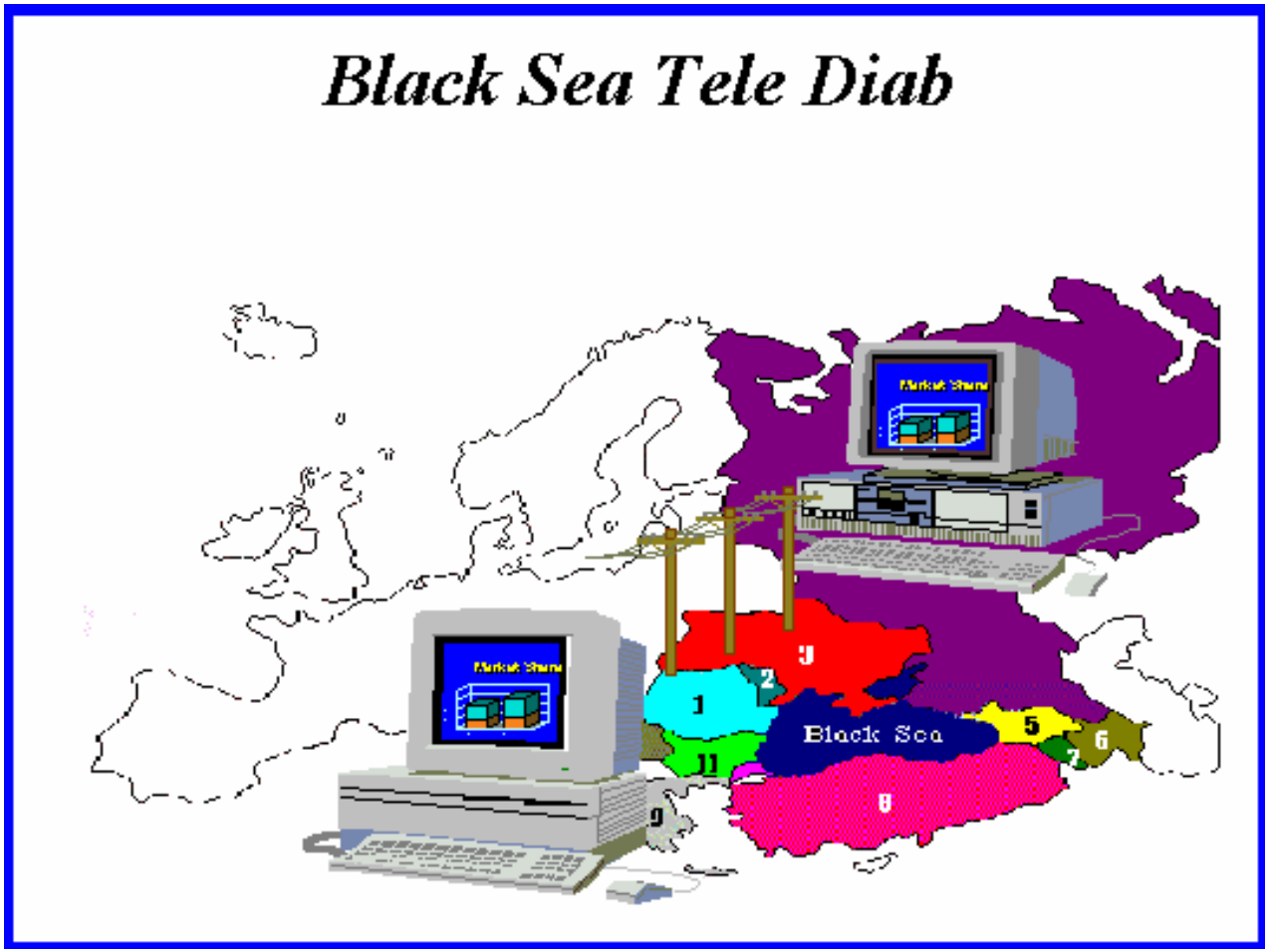
Renal


1000
800
600
400
200
0
Count
Creat < 200
Creat > 200
Not Tested
Creatinine
COUNTRY
GEORGIA
ROMANIA
RUSSIA
UKRAINE

Nephropathy

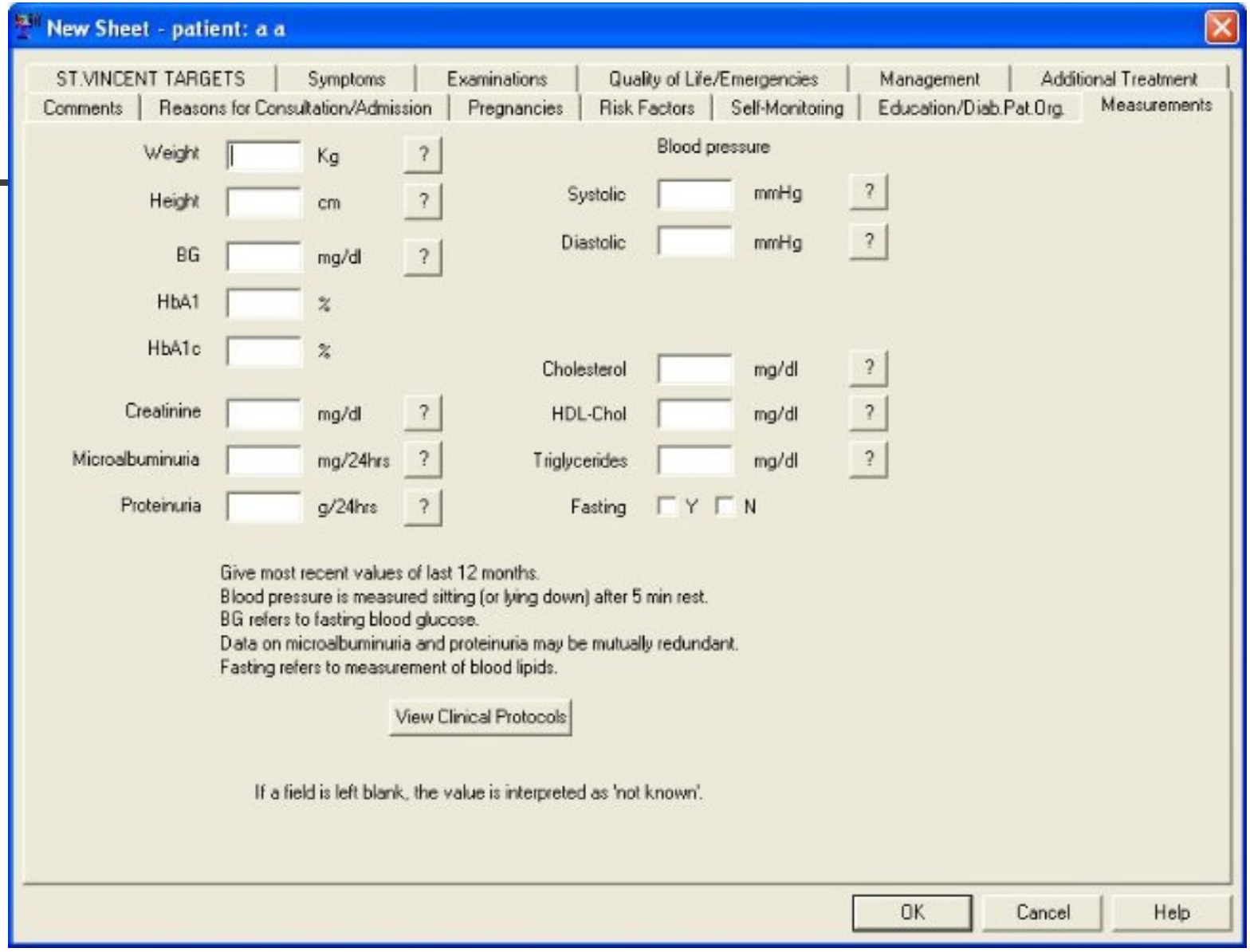


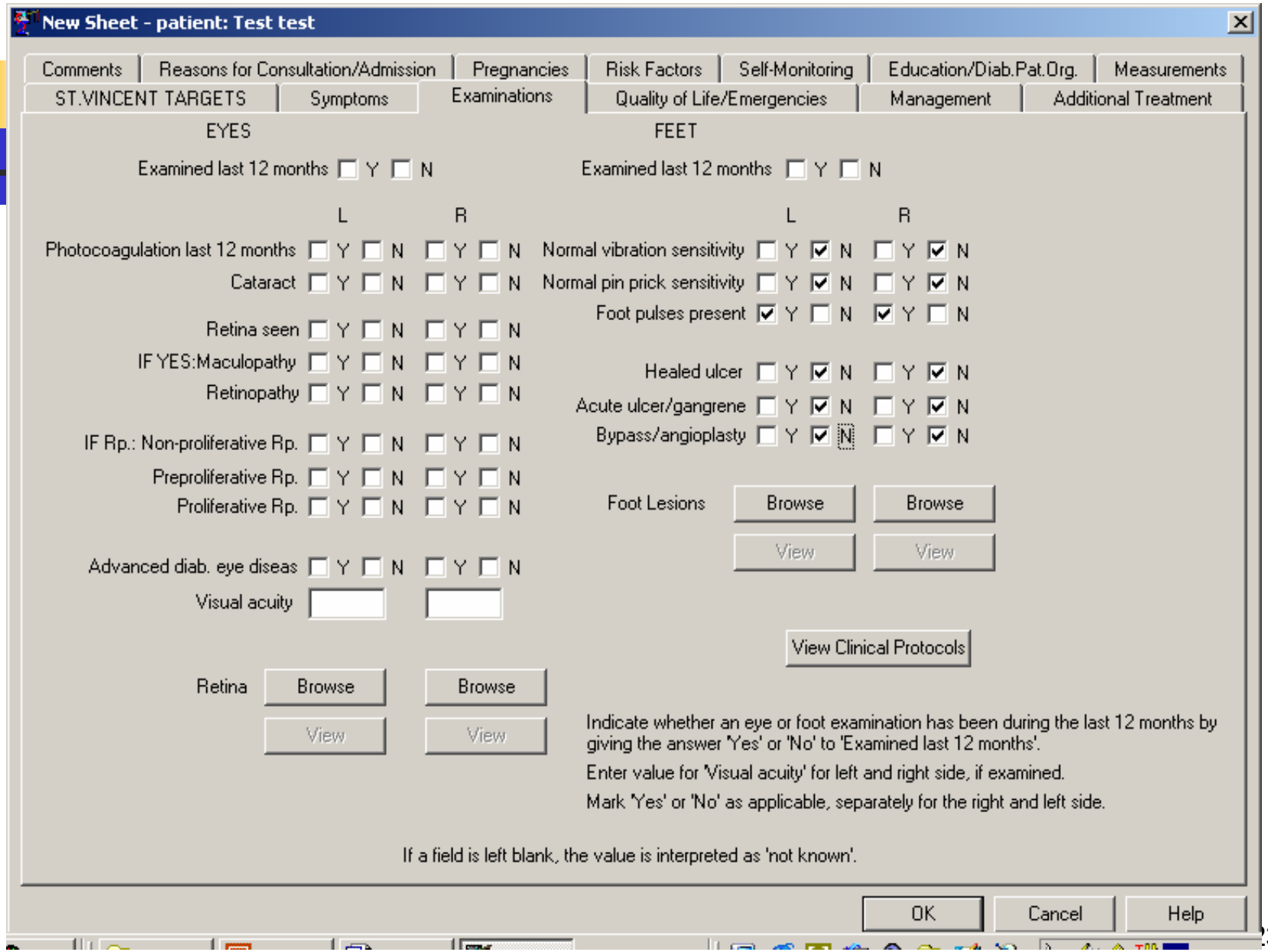
Clinical software for Managing the Epidemic in diabetes



BSTD


BSTD - [BSTD1]
File
Patient Records
View
Window
Help
Recorder: Pruna Simion
DAD
Administration
Configuration
Non Patients
Users
Units
Limits
Fields Configuration
Unlock Patients Records
Patient Records
New Patient
New Sheet
View
Corrections
Deceased Patient
Void Death Patient Recording
Security
Exit


New Sheet - patient: a a
ST.VINCENT TARGETS
Symptoms
Examinations
Quality of Life/Emergencies
Management
Additional Treatment
Comments
Reasons for Consultation/Admission
Pregnancies
Risk Factors
Self-Monitoring
Education/Diab.Pat.Org.
Measurements
Weight
Kg
Height
cm
BG
mg/dl
HbA1
%
HbA1c
%
Creatinine
mg/dl
Microalbuminuria
mg/24hrs
Proteinuria
g/24hrs
Blood pressure
Systolic
mmHg
Diastolic
mmHg
Cholesterol
mg/dl
HDL-Chol
mg/dl
Triglycerides
mg/dl
Fasting
Y
N
Give most recent values of last 12 months.
Blood pressure is measured sitting (or lying down) after 5 min rest.
BG refers to fasting blood glucose.
Data on microalbuminuria and proteinuria may be mutually redundant.
Fasting refers to measurement of blood lipids.
View Clinical Protocols
If a field is left blank, the value is interpreted as 'not known'.
OK
Cancel
Help

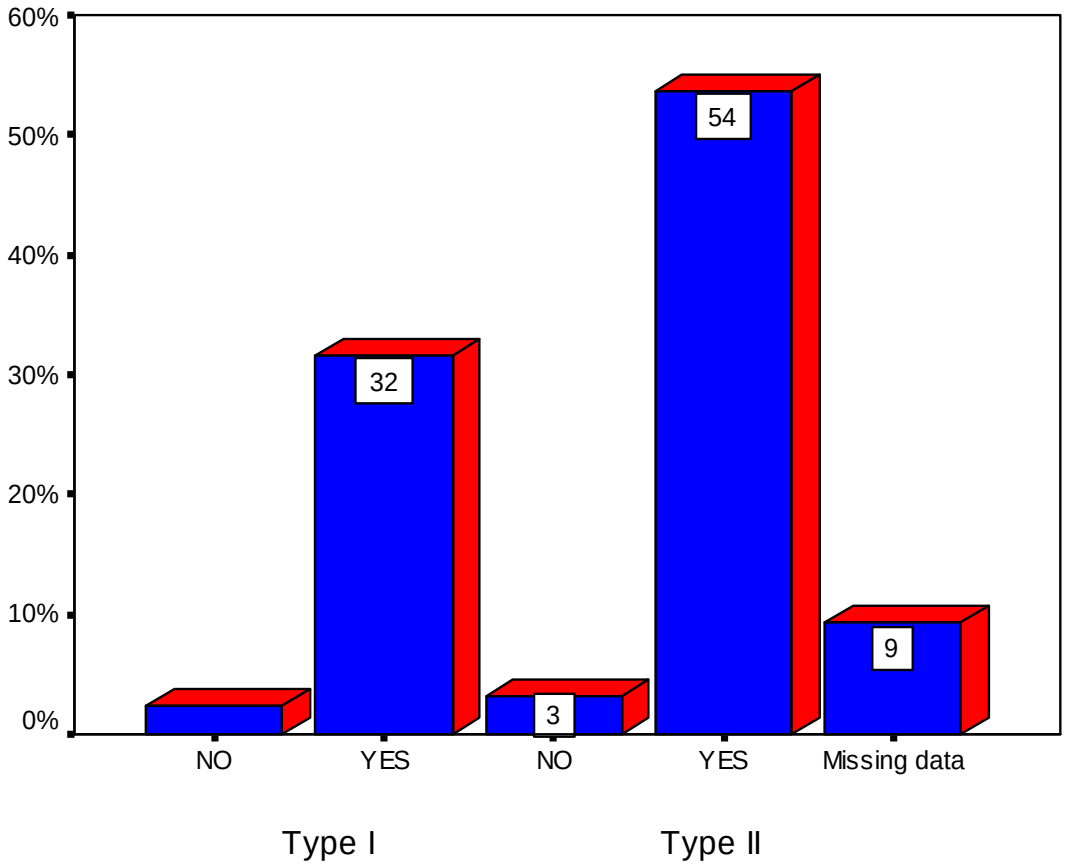

New Sheet - patient: Test test
Comments
Reasons for Consultation/Admission
Pregnancies
Risk Factors
Self-Monitoring
Education/Diab.Pat.Org.
Measurements
ST.VINCENT TARGETS
Symptoms
Examinations
Quality of Life/Emergencies
Management
Additional Treatment
EYES
Examined last 12 months Y N
L R
Photocoagulation last 12 months Y N Y N
Cataract Y N Y N
Retina seen Y N Y N
IF YES:Maculopathy Y N Y N
Retinopathy Y N Y N
IF Rp.: Non-proliferative Rp. Y N Y N
Preproliferative Rp. Y N Y N
Proliferative Rp. Y N Y N
Advanced diab. eye diseas Y N Y N
Visual acuity
Retina
Browse
Browse
View
View
FEET
Examined last 12 months Y N
L R
Normal vibration sensitivity Y N Y N
Normal pin prick sensitivity Y N Y N
Foot pulses present Y N Y N
Healed ulcer Y N Y N
Acute ulcer/gangrene Y N Y N
Bypass/angioplasty Y N Y N
Foot Lesions
Browse
Browse
View
View
View Clinical Protocols
Indicate whether an eye or foot examination has been during the last 12 months by giving the answer 'Yes' or 'No' to 'Examined last 12 months'.
Enter value for 'Visual acuity' for left and right side, if examined.
Mark 'Yes' or 'No' as applicable, separately for the right and left side.
If a field is left blank, the value is interpreted as 'not known'.
OK
Cancel
Help

Clinical Protocols

Diabetic Nephropathy	Diabetic Retinopathy	Diabetic Neuropathy
		

Regular inspection of foot

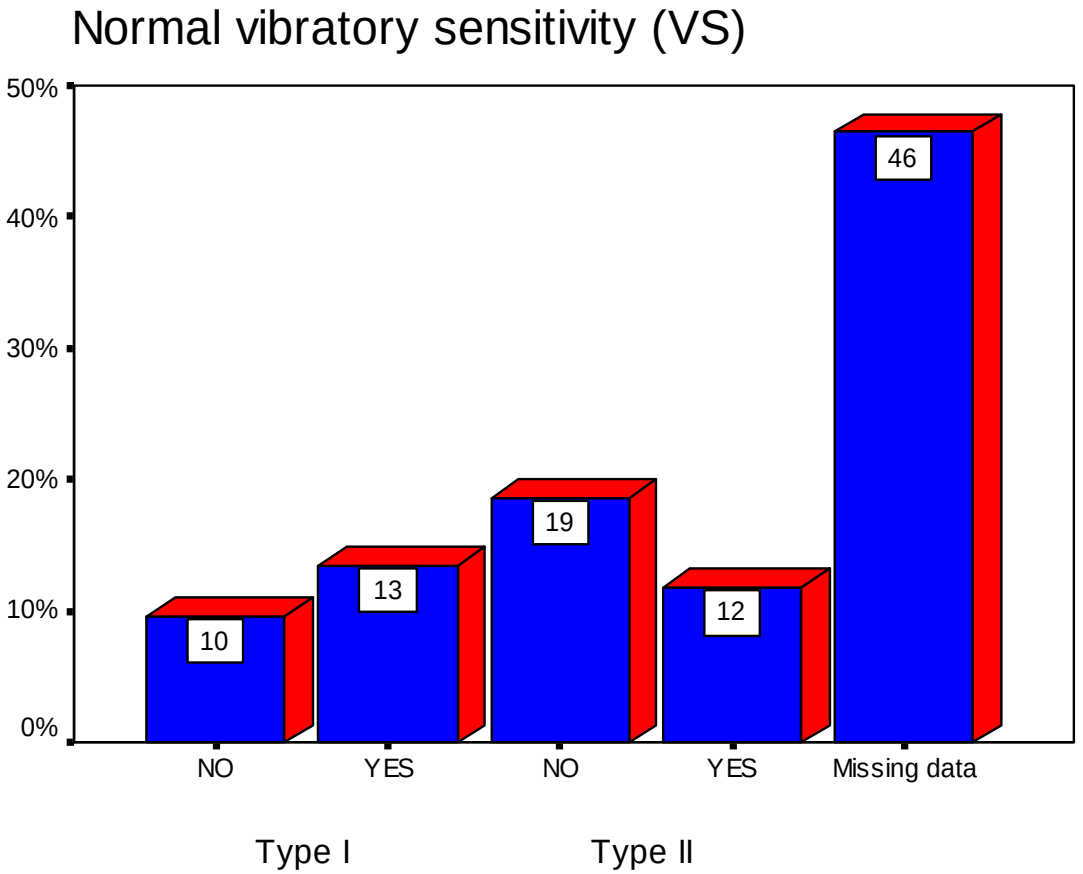
86% of annual patient summaries contain a foot record which is significantly higher than the 50.5% reported in the UKDIABS Study



Normal vibratory sensitivity

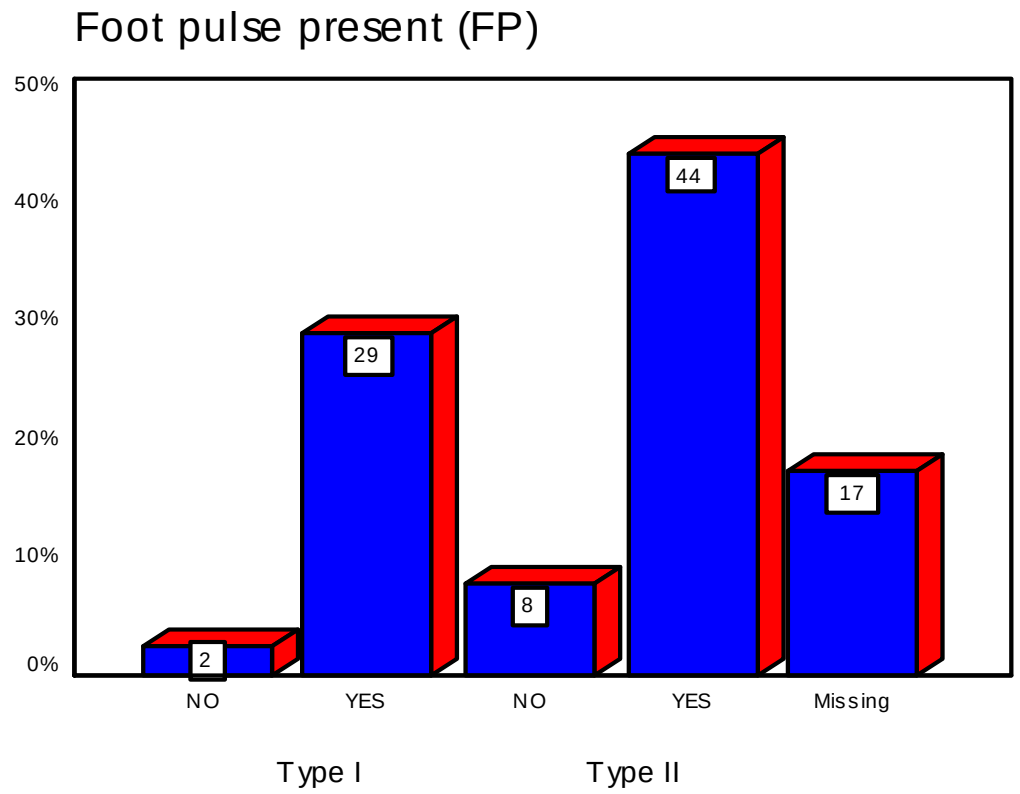
10% of Type 1 and 19% of Type 2 have impaired vibration threshold

11% of Type 1 and 14% of Type 2 have impaired vibration threshold reported in the UKDIABS study



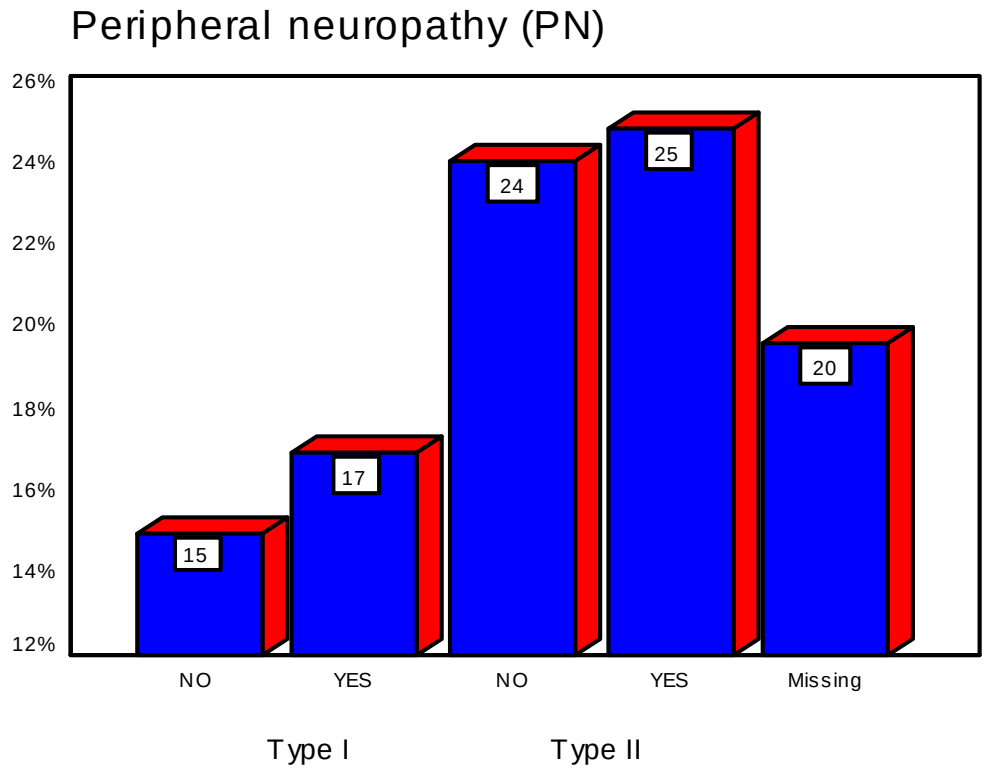
Foot Pulse

2% of Type 1 and 8% of Type 2 have impaired foot pulse



Type 1 and Type 2 Neuropathy

17% of Type 1 and 25% of Type 2 have neuropathy, which is significantly higher than 7% of Type 1 and 6.5% of Type 2 have neuropathy, reported by UKDIABS



BSTD at MEDIFON 2001

- MEDIFON 2001 boot in London was a great success with substantial audience for our software demo
- Success in delivering and implementing BSTD was due two experience in the software development combined with the comprehensive knowledge of the users requirements

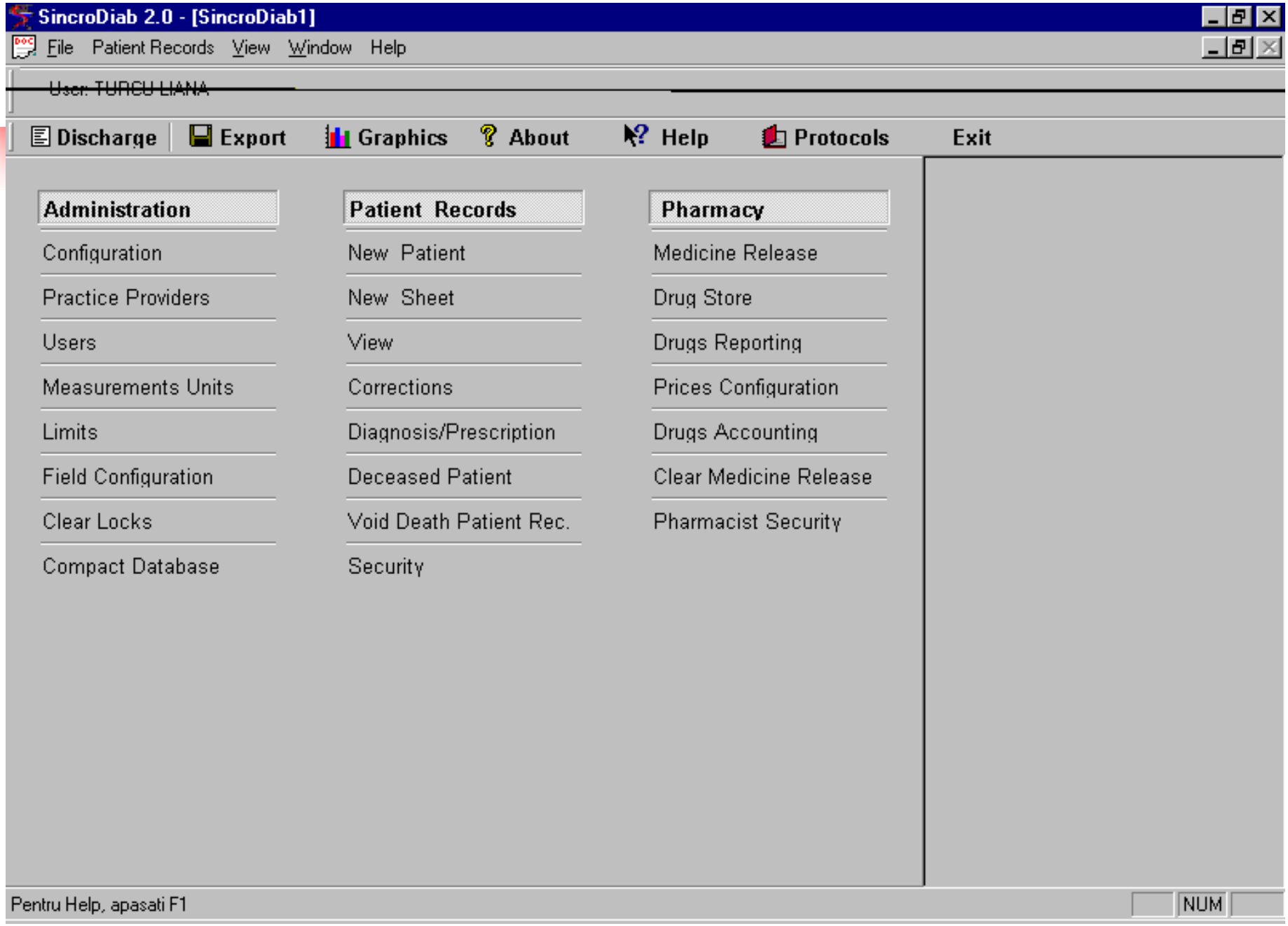
IT in medicine = hardware, software, training and management

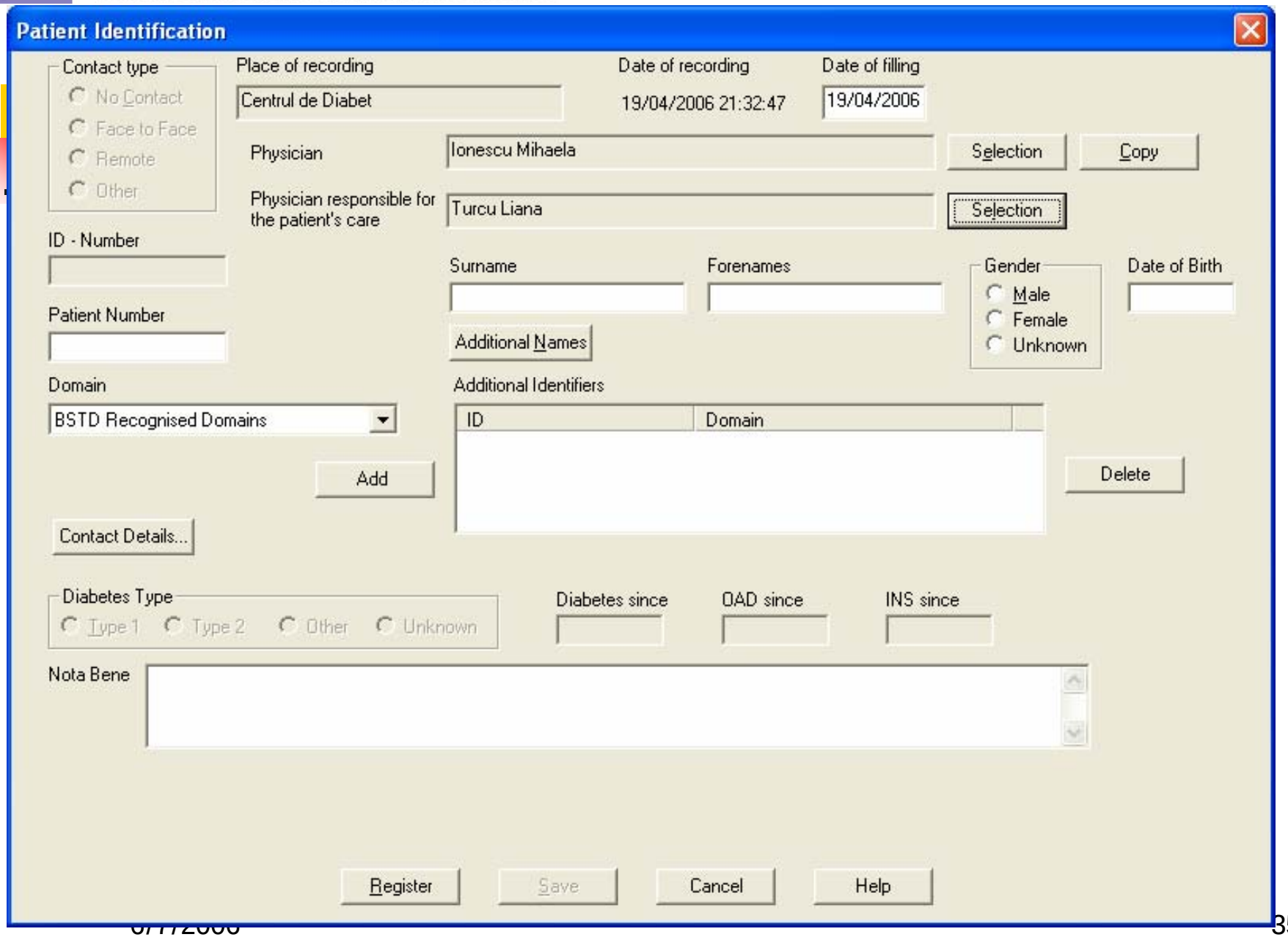
EHCR in Romania

- We will talk about a complete EHCR system SincroDiab, based on the diabetes national dataset
- It has been developed, tested and implemented at Ambulatory Centre, Inst. “Paulescu”, Stationary Centre and Diabetes Eye Centre.
- Has ability to incorporate a wide range of data types i.e. laboratory data and clinical observations on various aspects of diabetes care.

EHCR system SincroDiab

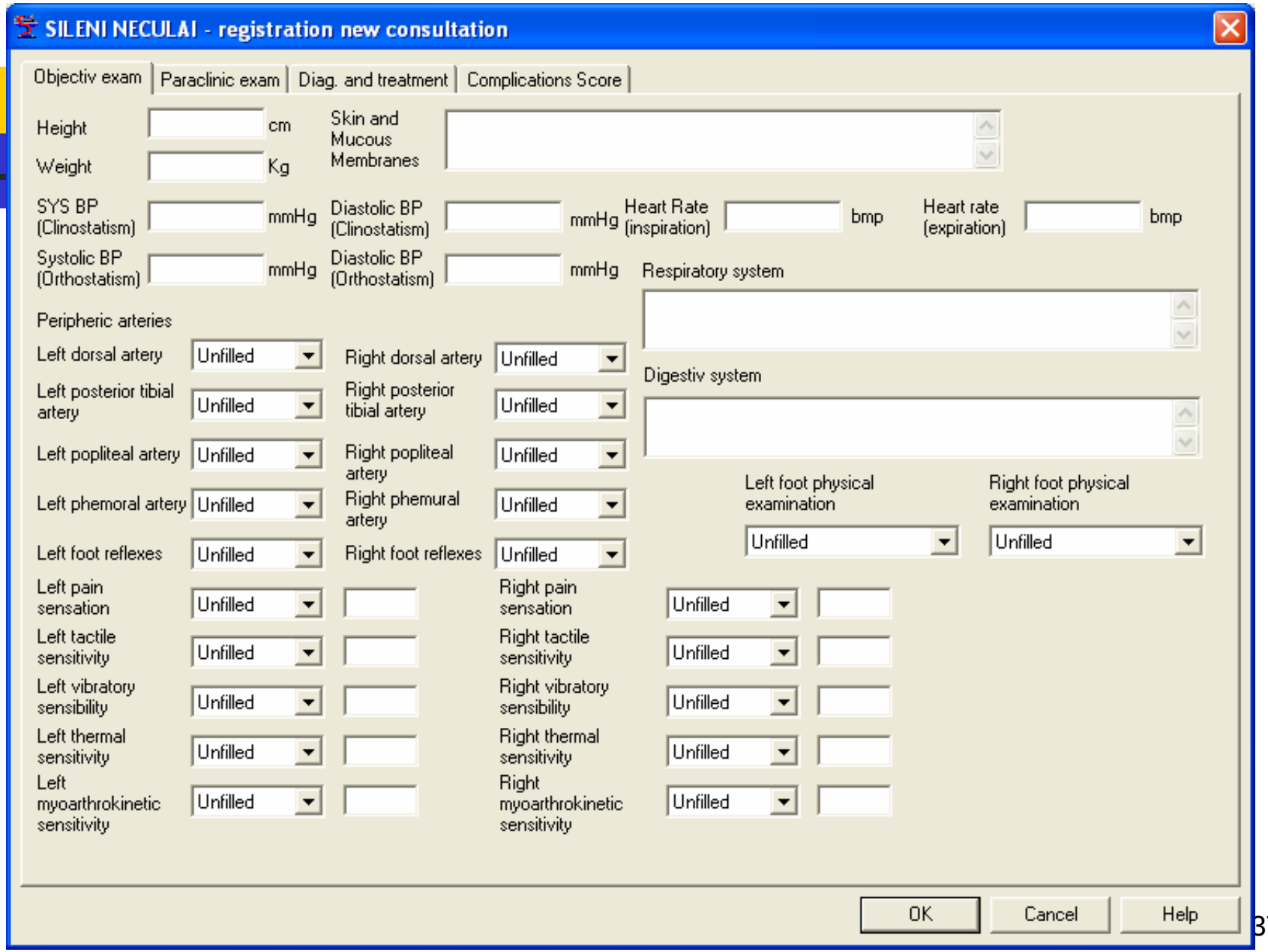
SincroDiab is highly structured electronic patient record designed for use as an extension of traditional, manually operated medical records.

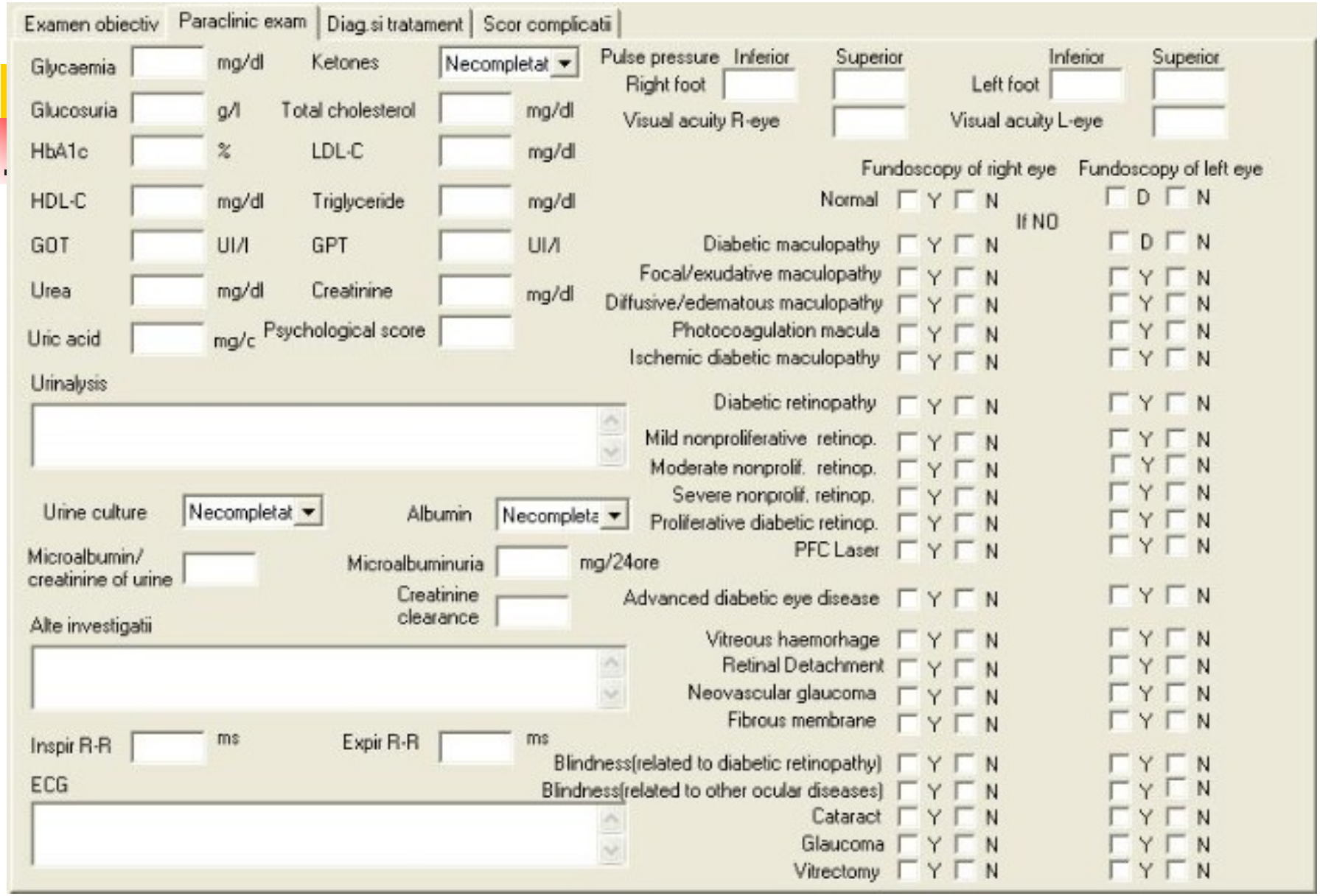

SincroDiab 2.0 - [SincroDiab1]
File
Patient Records
View
Window
Help
User: TURCU LIANA
Discharge
Export
Graphics
About
Help
Protocols
Exit
Administration
Configuration
Practice Providers
Users
Measurements Units
Limits
Field Configuration
Clear Locks
Compact Database
Patient Records
New Patient
New Sheet
View
Corrections
Diagnosis/Prescription
Deceased Patient
Void Death Patient Rec.
Security
Pharmacy
Medicine Release
Drug Store
Drugs Reporting
Prices Configuration
Drugs Accounting
Clear Medicine Release
Pharmacist Security
Pentru Help, apasati F1
NUM

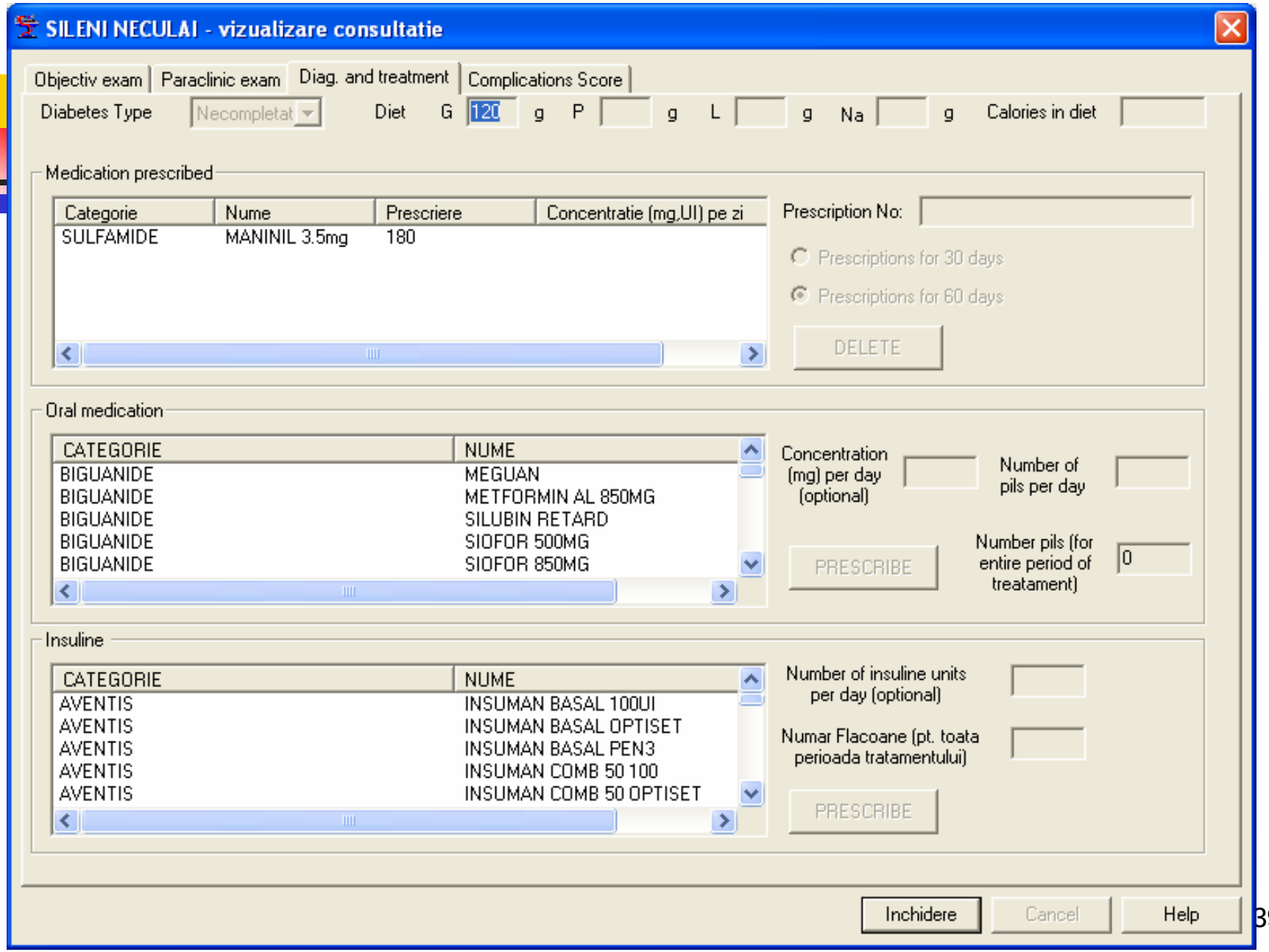

Patient Identification
Contact type
No Contact
Face to Face
Remote
Other
Place of recording
Centrul de Diabet
Date of recording
19/04/2006 21:32:47
Date of filling
19/04/2006
Physician
Ionescu Mihaela
Selection
Copy
Physician responsible for the patient's care
Turcu Liana
Selection
ID - Number
Patient Number
Surname
Forenames
Gender
Male
Female
Unknown
Date of Birth
Additional Names
Domain
BSTD Recognised Domains
Additional Identifiers
ID
Domain
Add
Delete
Contact Details...
Diabetes Type
Type 1
Type 2
Other
Unknown
Diabetes since
OAD since
INS since
Nota Bene
Register
Save
Cancel
Help

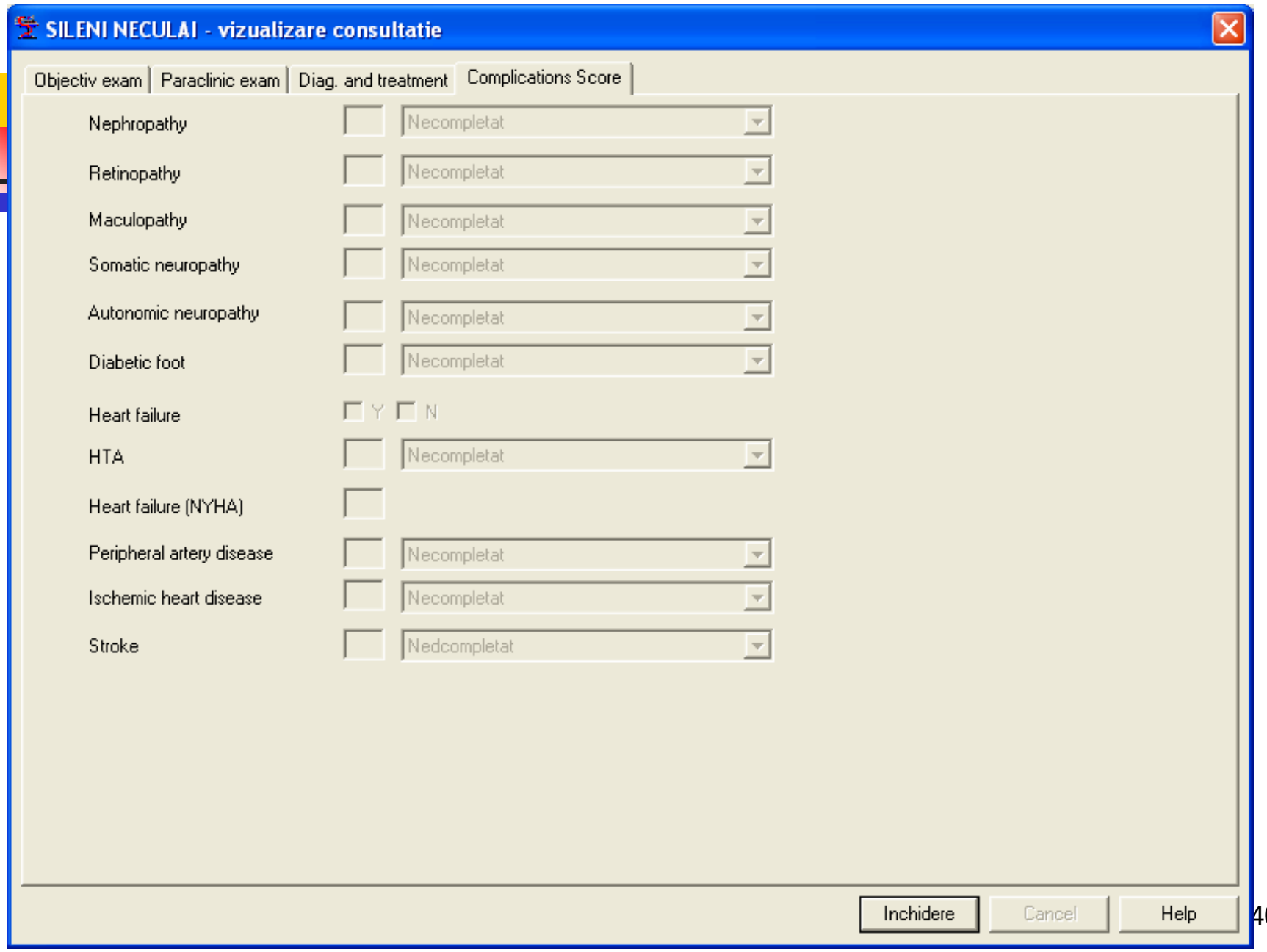
Authentication, Authorisation

- The main issue here is verification of authenticity of digital data entry.
- GEHR- conformance: Measures which ensure that every contribution to the record must be attested by a responsible person
- There must be some mechanism to ensure that every entry placed in the EHR must be authenticated by the signatory, even if the entry is made by a nurse, a secretary or a transcriptionist.
- The value of the signed hard copy is authenticity, not content. It was this issue that we need to address.
- Authentication must be ensured in spite of the complexity. There is no alternate recourse.
- What is more important is 'write access' authentication, by best means as commensurate with available technology.
- No doctor should be in a position to deny that 'this medicine was not prescribed by me' or 'this is not my report' at any stage.

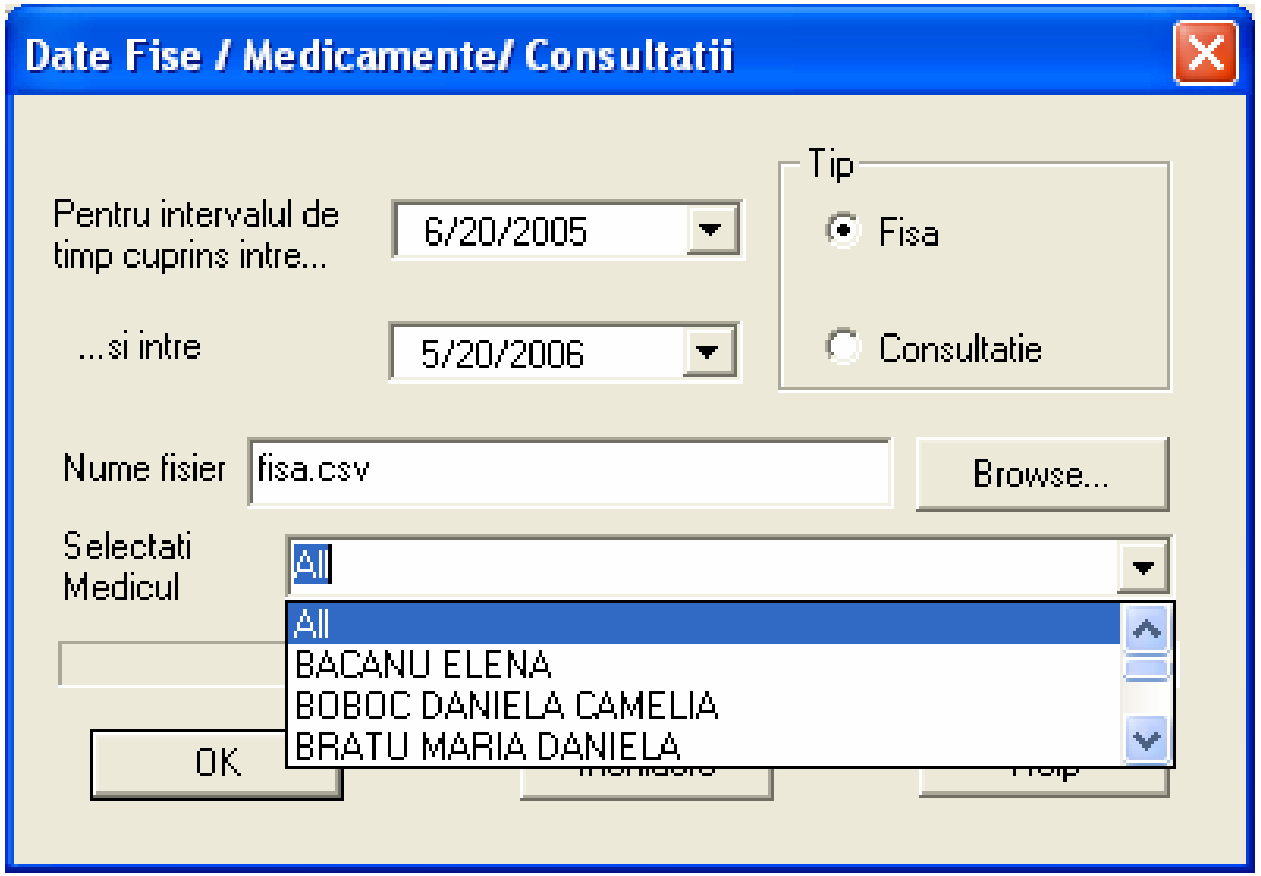

SILENI NECULAI - registration new consultation
Objectiv exam
Paraclinic exam
Diag. and treatment
Complications Score
Height
cm
Weight
Kg
Skin and Mucous Membranes
SYS BP (Clinostatism)
mmHg
Diastolic BP (Clinostatism)
mmHg
Heart Rate (inspiration)
bmp
Heart rate (expiration)
bmp
Systolic BP (Orthostatism)
mmHg
Diastolic BP (Orthostatism)
mmHg
Respiratory system
Peripheric arteries
Left dorsal artery
Unfilled
Right dorsal artery
Unfilled
Digestiv system
Left posterior tibial artery
Unfilled
Right posterior tibial artery
Unfilled
Left popliteal artery
Unfilled
Right popliteal artery
Unfilled
Left phemoral artery
Unfilled
Right phemural artery
Unfilled
Left foot physical examination
Unfilled
Right foot physical examination
Unfilled
Left foot reflexes
Unfilled
Right foot reflexes
Unfilled
Left pain sensation
Unfilled
Right pain sensation
Unfilled
Left tactile sensitivity
Unfilled
Right tactile sensitivity
Unfilled
Left vibratory sensibility
Unfilled
Right vibratory sensibility
Unfilled
Left thermal sensitivity
Unfilled
Right thermal sensitivity
Unfilled
Left myoarthrokinetic sensitivity
Unfilled
Right myoarthrokinetic sensitivity
Unfilled
OK
Cancel
Help


Examen obiectiv
Paraclinic exam
Diag.si tratament
Scor complicatii
Glycaemia mg/dl
Ketones Necompletat
Glucosuria g/l
Total cholesterol mg/dl
HbA1c %
LDL-C mg/dl
HDL-C mg/dl
Triglyceride mg/dl
GOT UI/l
GPT UI/l
Urea mg/dl
Creatinine mg/dl
Uric acid mg/c
Psychological score
Urinalysis
Urine culture Necompletat
Albumin Necomplete
Microalbumin/ creatinine of urine
Microalbuminuria mg/24ore
Creatinine clearance
Alte investigatii
Inspir R-R ms
Expir R-R ms
ECG
Pulse pressure Inferior Superior
Right foot
Visual acuity R-eye
Left foot Inferior Superior
Visual acuity L-eye
Fundoscopy of right eye
Fundoscopy of left eye
Normal Y N
If NO
D N
Diabetic maculopathy Y N
Focal/exudative maculopathy Y N
Diffusive/edematous maculopathy Y N
Photocoagulation macula Y N
Ischemic diabetic maculopathy Y N
Diabetic retinopathy Y N
Mild nonproliferative retinop. Y N
Moderate nonprolif. retinop. Y N
Severe nonprolif. retinop. Y N
Proliferative diabetic retinop. Y N
PFC Laser Y N
Advanced diabetic eye disease Y N
Vitreous haemorhage Y N
Retinal Detachment Y N
Neovascular glaucoma Y N
Fibrous membrane Y N
Blindness(related to diabetic retinopathy) Y N
Blindness(related to other ocular diseases) Y N
Cataract Y N
Glaucoma Y N
Vitrectomy Y N


SILENI NECULAI - vizualizare consultatie
Objectiv exam
Paraclinic exam
Diag. and treatment
Complications Score
Diabetes Type
Necompletat
Diet
G
120
g
P
g
L
g
Na
g
Calories in diet
Medication prescribed
Categorie
Nume
Prescriere
Concentratie (mg,UI) pe zi
SULFAMIDE
MANINIL 3.5mg
180
Prescription No:
Prescriptions for 30 days
Prescriptions for 60 days
DELETE
Oral medication
CATEGORIE
NUME
BIGUANIDE
MEGUAN
BIGUANIDE
METFORMIN AL 850MG
BIGUANIDE
SILUBIN RETARD
BIGUANIDE
SIOFOR 500MG
BIGUANIDE
SIOFOR 850MG
Concentration (mg) per day (optional)
Number of pils per day
PRESCRIBE
Number pils (for entire period of treatament)
0
Insuline
CATEGORIE
NUME
AVENTIS
INSUMAN BASAL 100UI
AVENTIS
INSUMAN BASAL OPTISET
AVENTIS
INSUMAN BASAL PEN3
AVENTIS
INSUMAN COMB 50 100
AVENTIS
INSUMAN COMB 50 OPTISET
Number of insuline units per day (optional)
Numar Flacoane (pt. toata perioada tratamentului)
PRESCRIBE
Inchidere
Cancel
Help


SILENI NECULAI - vizualizare consultatie
Objectiv exam
Paraclinic exam
Diag. and treatment
Complications Score
Nephropathy
Necompletat
Retinopathy
Necompletat
Maculopathy
Necompletat
Somatic neuropathy
Necompletat
Autonomic neuropathy
Necompletat
Diabetic foot
Necompletat
Heart failure
Y
N
HTA
Necompletat
Heart failure (NYHA)
Peripheral artery disease
Necompletat
Ischemic heart disease
Necompletat
Stroke
Nedcompletat
Inchidere
Cancel
Help

EXPORT data and convert in XML



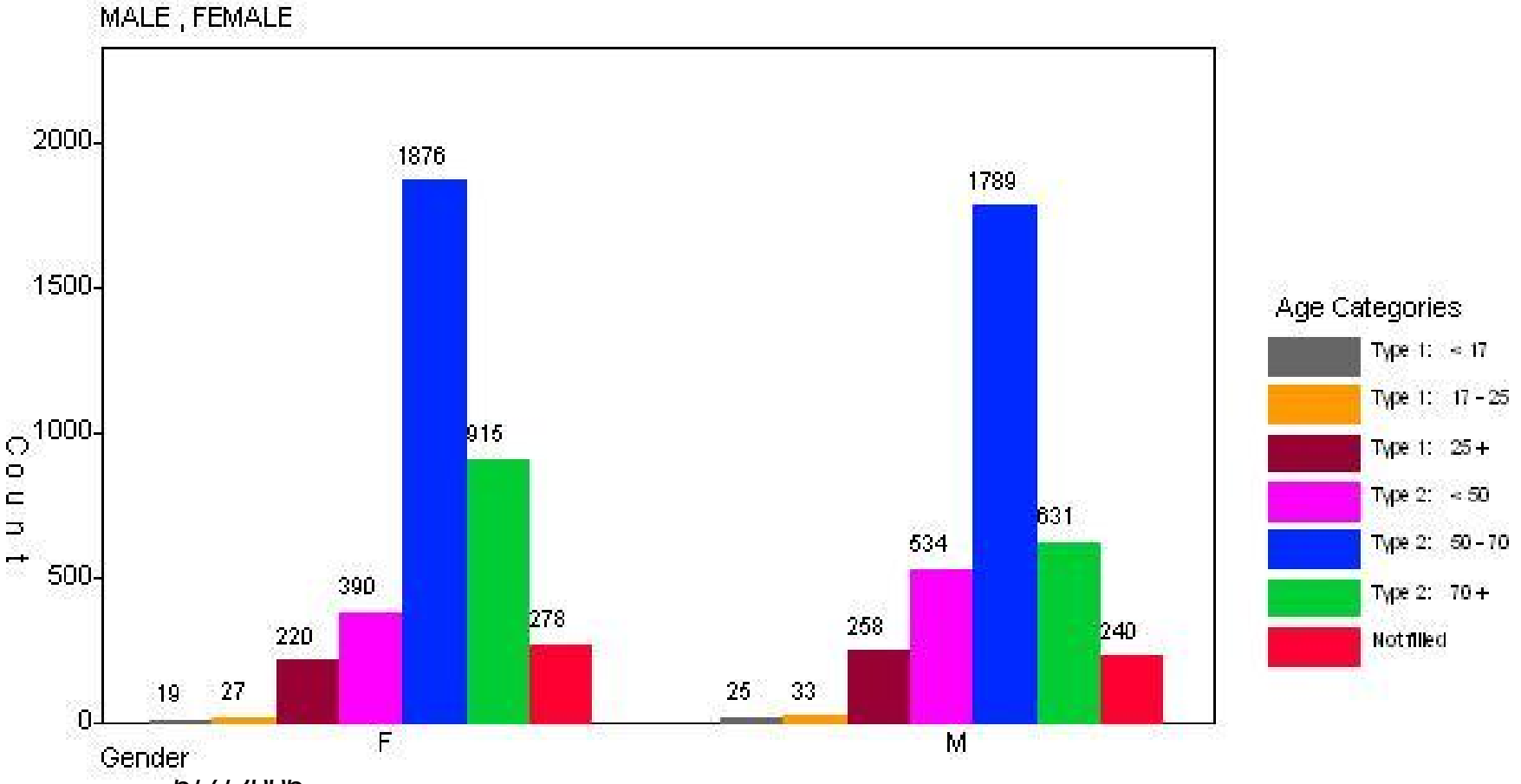
SincroDiab

- Professional-quality graphic presentations (automatic converts numeric data into charts)

B.I.R.O.

Best Information through Regional Outcomes

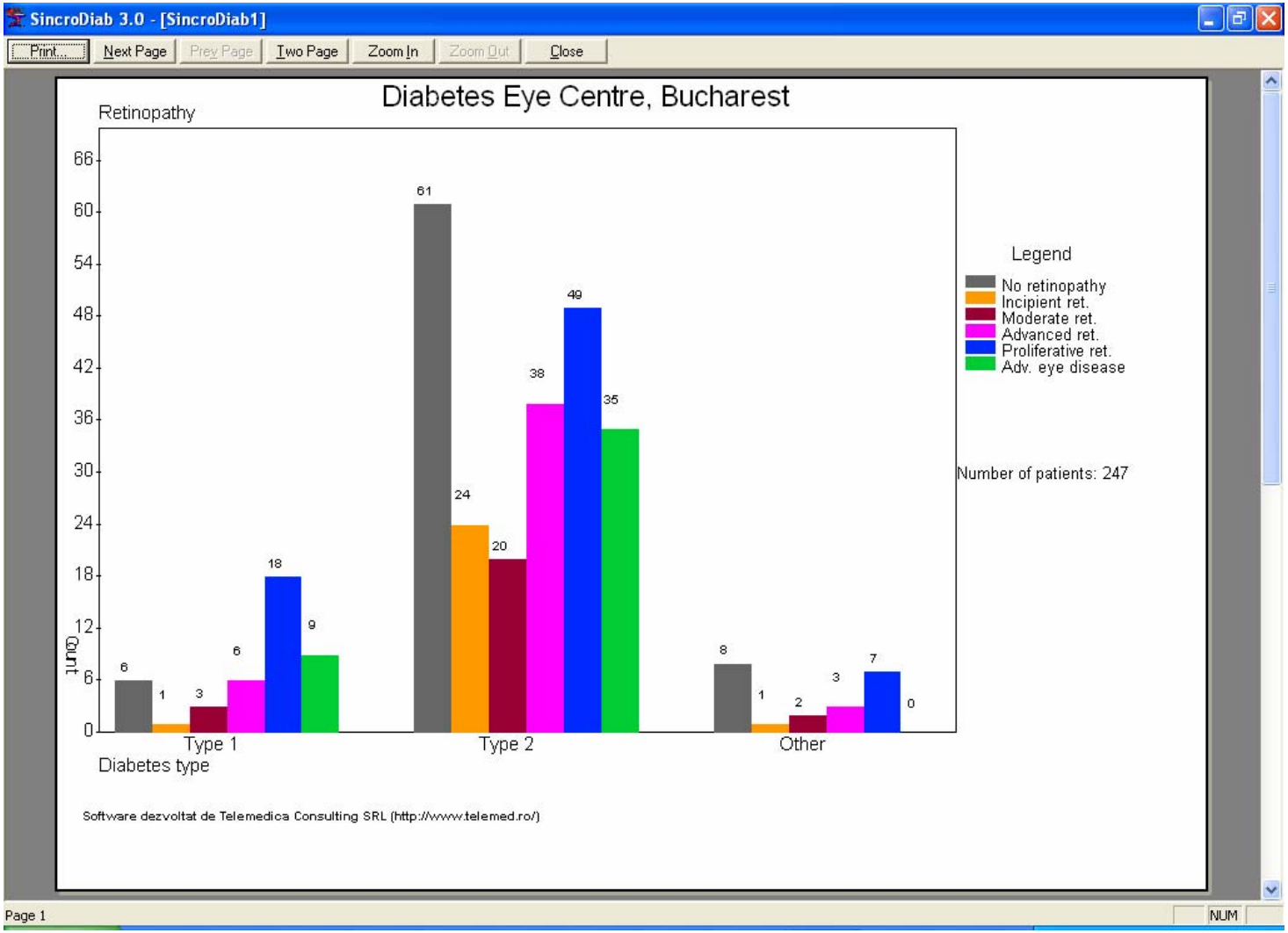
Gender-age distribution among patients



B.I.R.O.

Best Information through Regional Outcomes

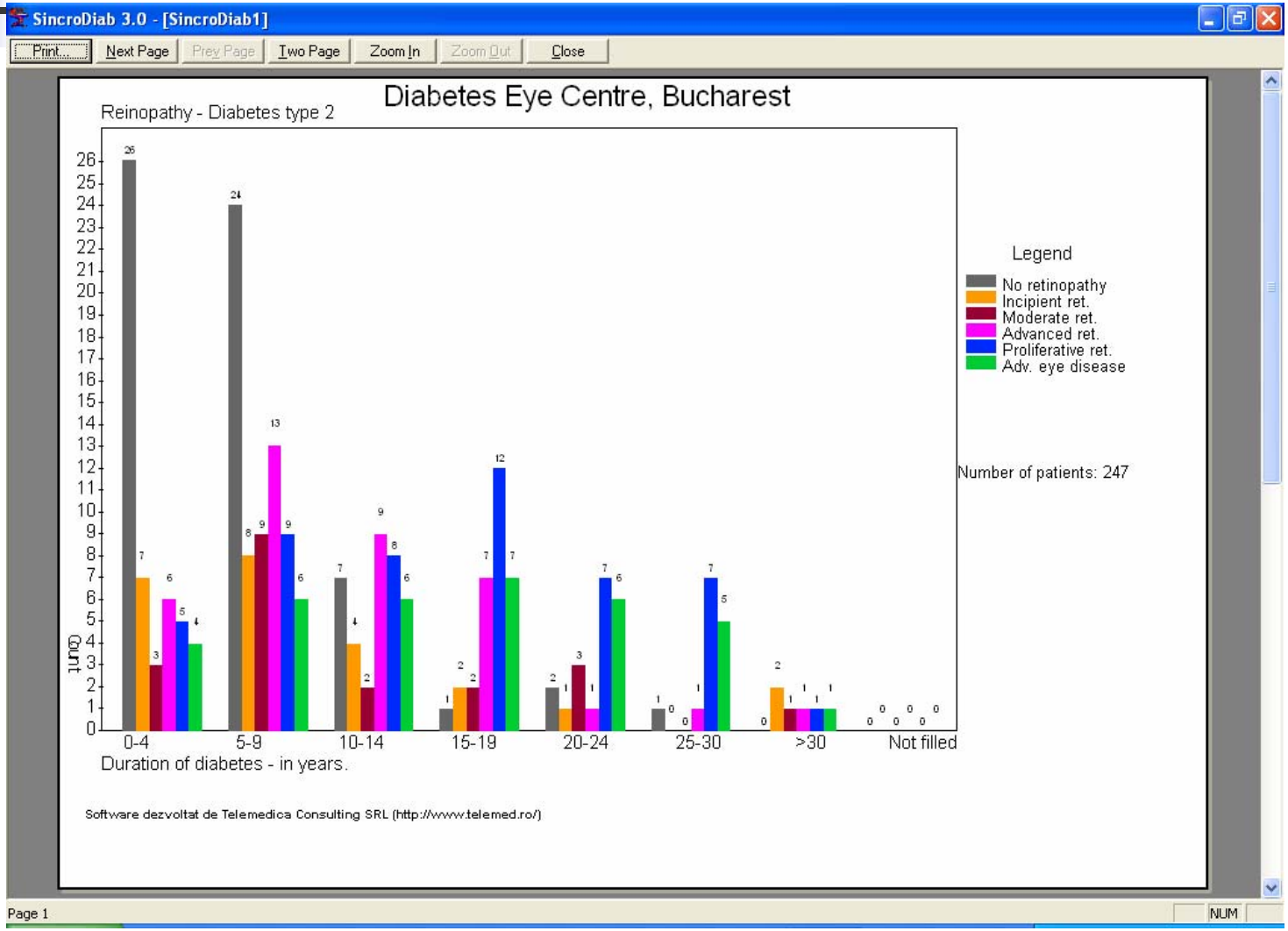
Retinopathy vs. diabetes type



B.I.R.O.

Best Information through Regional Outcomes

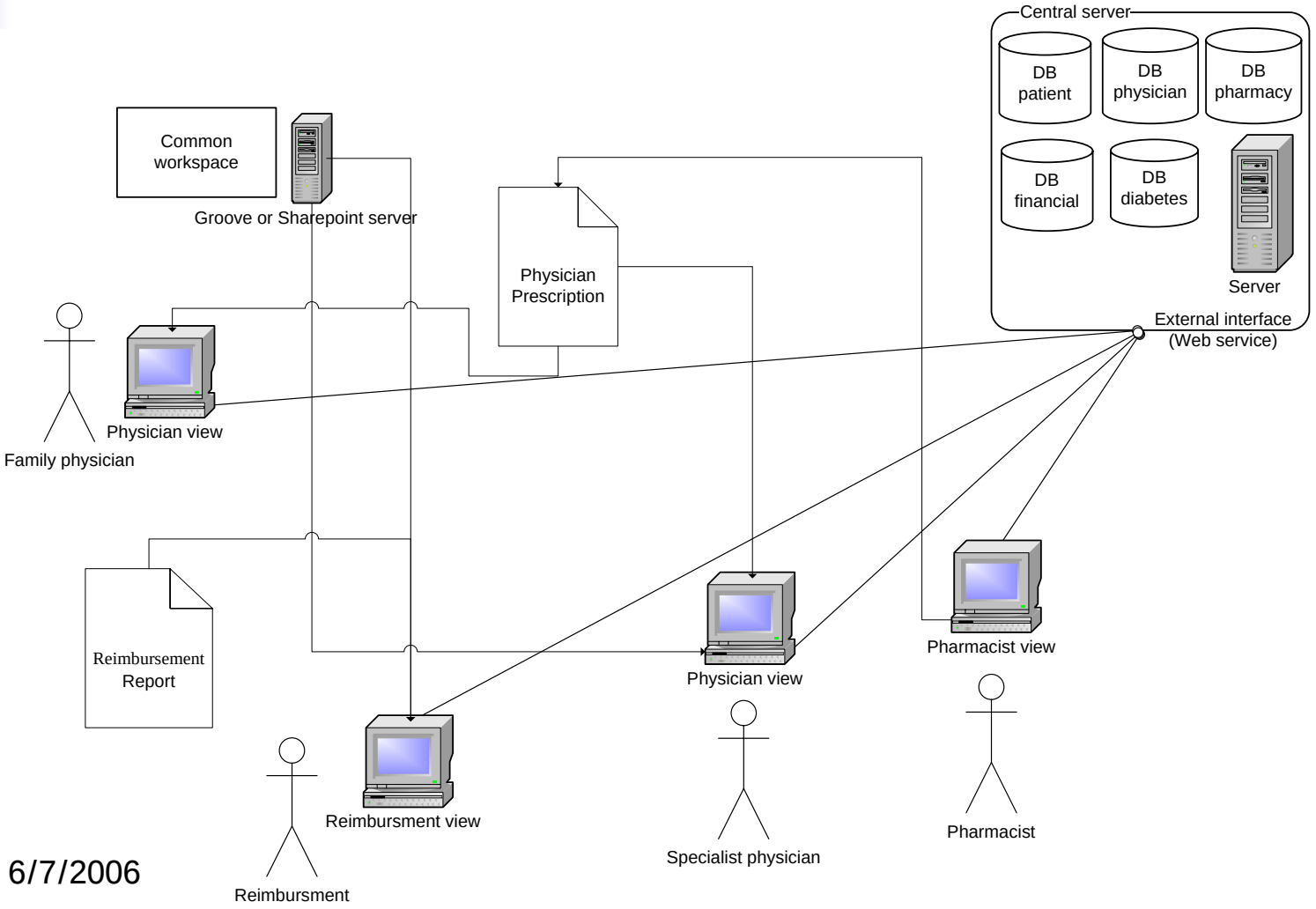
Retinopathy Type 2



Programming interoperability

- Data interoperability is only one side of the integration and open equation. Programming interoperability is the other.
- Applications Able to deliver Access to Anyone Authorized Anytime, Anyplace on Any Device (8A's).

What the Ministry of Health in Romania wish as Web services



TeleDiab

- Patients and healthcare providers can manage the access to their data using this system.
- We are calling this framework - Open Privacy Management Framework for Healthcare (OPMFH).
- Of course, a better name can definitely be chosen.

Tele Diab Project

Objectives:

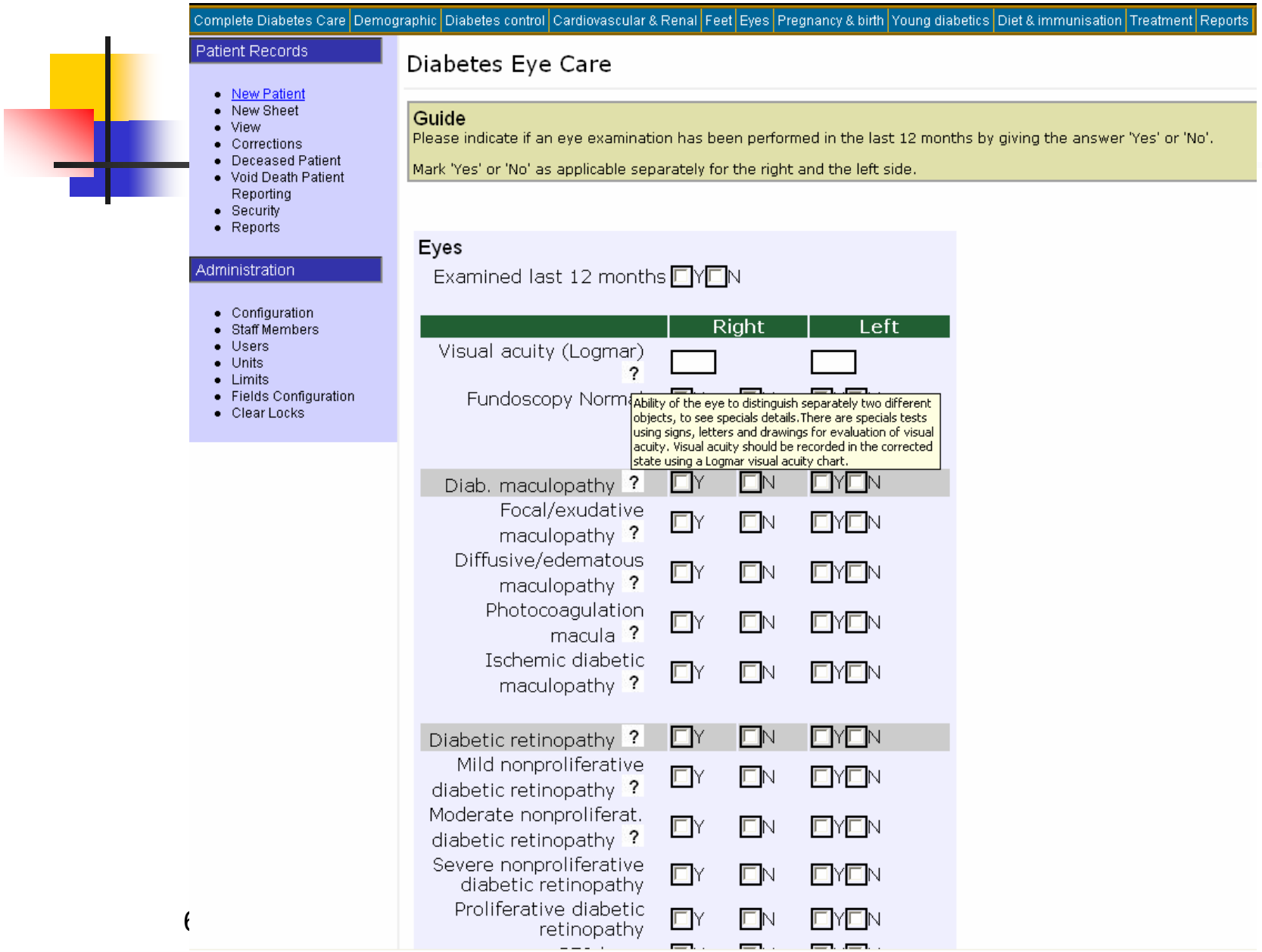
- Improve patients self monitoring of glycemic control and prevention of complications
- Provide relevant clinical information in a comprehensive format for the care providers
- Collect important clinical parameters as a database which could be used for data mining, pattern recognition and research

A single layer and display

- A single interface for all care providers: Electronic Health Record
- Easy referrals between the care providers
- Comprehensive display of information based on login

B.I.R.O.

Best Information through Regional Outcomes

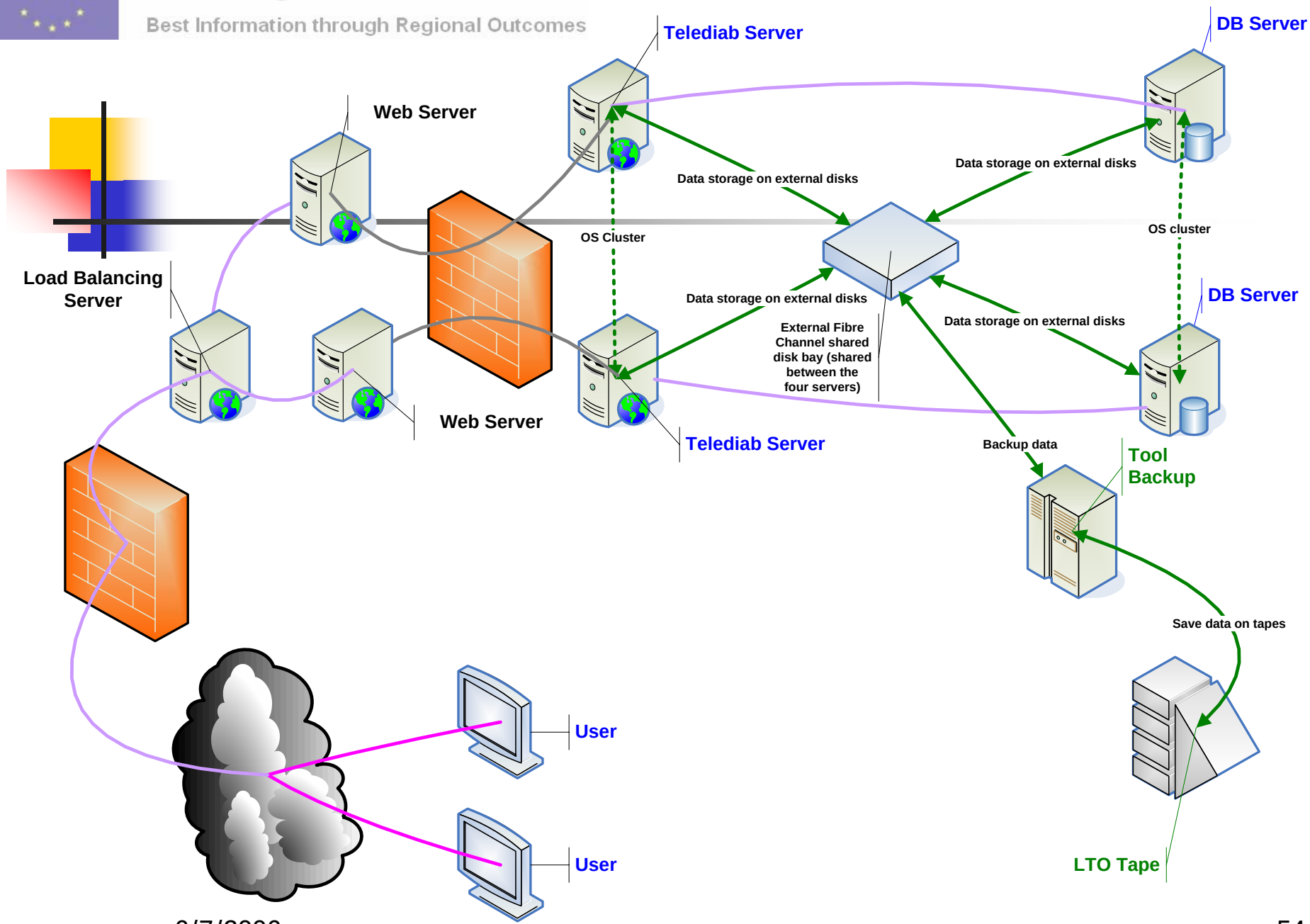


Technologies: Software

Area	Technology
Operating System	Linux / FreeBSD / Solaris
Database	Any suitable RDBMS can be used. PostgreSQL is recommended. GEHR standards will be followed for the schema design as well as in the sharing of data.
Web and Application Server	Any J2EE 1.4 compatible server can be used. Apache Geronimo is recommended. Alternatively JBOSS or JoNas can be used.
Presentation Logic	Apache Tapestry is recommended for the development
Web Service	Apache Axis
Object Relational Mapping	Hibernate

Hardware

- It may be premature to present the hardware recommendations at this stage since we need a better grasp of figures such as the total load on the system (which is dependent on the number of separate entities requiring access to the system).
- Based on load, we may decide to have a single or multiple servers for each type of service (database, application, website etc).


Telediab Server
DB Server
Web Server
Data storage on external disks
Data storage on external disks
OS Cluster
OS cluster
Load Balancing Server
Data storage on external disks
DB Server
External Fibre Channel shared disk bay (shared between the four servers)
Data storage on external disks
Web Server
Telediab Server
Backup data
Tool Backup
Save data on tapes
User
User
LTO Tape

Data privacy

- This system can be made customizable and easily manageable since different countries will have different set of legislation governing privacy and these rules change over time.
- Therefore the system must allow for changes in these rules easily.

TeleDiab

- **Overview**
- The Telediab system comprises of the following modules:
- Central Server – Telediab is implemented as a set of web services on the Central Server.
- Common Workspace – This is a area which is shared by Physicians, Pharmacists, and the Reimbursement officials.
- Front-Ends – Each type of user can access the functionality of the system via a website which integrates with the webservices running on the Telediab Central Server.

Central Server

The Central Server hosts the Telediab web services. The Telediab webservice will access the following databases:

- Patient Information
- Physician Information
- Pharmacy Information
- Financial Information
- Diabetes Information

Common Workspace

- The Common Workspace is the area where the various users of the system can store reports which must be shared between themselves in the system.

Self Monitoring

- Patients is registered into Tele Diab by care provider or caring clinical unit
- Login based access into Tele Diab Website
- A summary of health record available to the patient user
- Interactive features: Calorie Calculator based on dietary intake, insulin dosages adjusted based on prevailing blood glucose (predictive dosing)
- Scheduling of follow ups: Three monthly HbA1C (Glycosylated hemoglobin), fundus examination, urine, Lipids etc..
- Reminders / Alerts for missed schedules
- Protocol driven home based care
- Send queries to care provider and adjust treatment regimens as per feedback
- Requests for prescriptions / Care provider authorized prescriptions issue

Electronic Diabetic Health Record

- Demographic details
- Clinical history: Onset / clinical course / current complaints
- Clinical Findings: examination system wise
- Complications: Microvascular / Macrovascular
- Treatment history: OHAs / Insulin type, dose, route
- Risk Factors: Hypertension / dyslipidemia / degree relative with CAD
- Procedures: Laser / CABG
- Protocols
- Decision support

Research

- Demographic profiling of Diabetes based on Type 1 / Type 2
- Risk factor profiling
- Evaluate early interventions for prevention / arrest of complications
- Geo-positioning of Cases / Care providers / health care institutions
- Abnormal pattern recognition / AI

Romanian Team

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Conclusion

- Romania, Malta and Cyprus involvement in the adaptation, implementation, set - up and use of the BIRO Health Information System through continuous integration of the WPs.

Thank you!