La e-Prescription : exemple du cas d'usage grec

The Greek ePrescription System

An **eHealth suite** for the Primary Health Care Sector

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Gnomon Informatics

ΗΛΕΚΤΡΟΝΙΚΗ ΣΥΝΤΑΓΟΓΡΑΦΗΣΗ
ΕΞΟΙΚΟΝΟΜΗΣΗ ΠΟΡΩΝ – ΔΙΑΣΦΑΛΙΣΗ ΥΓΕΙΑΣ

Operated by: ΗΔΙΚΑ
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Overview of IDIKA Information Systems

- National **e-Prescription system**
  - National coverage >98%
    - 43.000 Physicians and 11.900 Pharmacies *Online*
    - 6 M e-prescriptions per month (98,5%),
    - 2,4 M e-referrals per month (92%)
  - e-Dispensation services, Health Voucher (for the destitutes)
  - Standards based and interoperable (compatible HL7 CDA)
  - Additional components
    - National Appointment Management System (e-RDV) for Primary & Secondary Healthcare
    - Primary HealthCare Medical Record (PHMR) integrated to the e-Prescription
    - Chronic Patients' Registry, integrated to the e-Prescription
    - Patient Summary Pilot (epSOS based - SOHealth Project)
    - mHealth Pilot = openDecipher approach

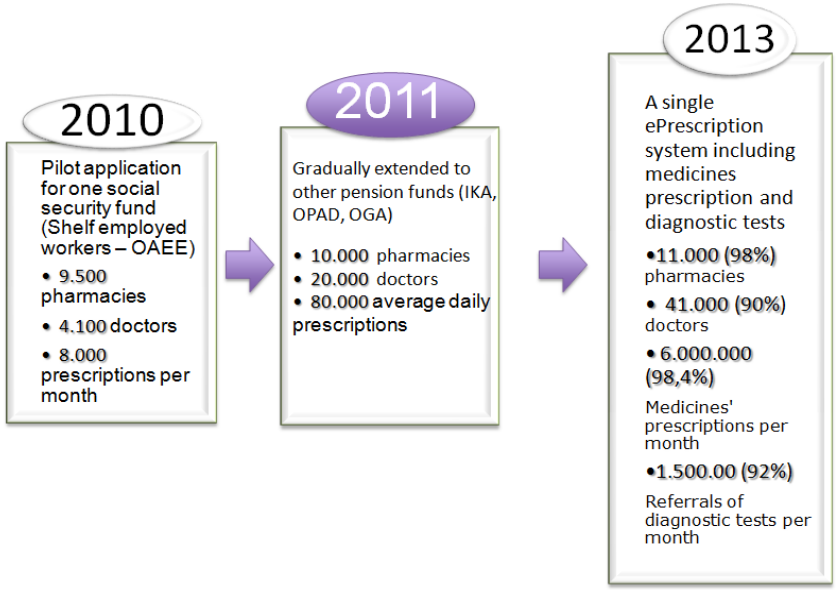
- Hospital Information System (HIS) – "**ASKLEPIOS**"
  - Installed in 14 Hospitals in Greece
- New **Web Based HIS**/LIS/RIS to be installed in 31 Hospitals all over Greece
- Citizen/**Patient Unique Identification Registry** – **AMKA** (similar to US SSN)
  - Over 10M records cleared up and related to Police ID or Passport Number and Taxis (VAT Number)

The ePrescription System - eHealth suite

- HDIKA completed during 2015 a big national project that provides an **eHealth suite** with a wide range of tools and services that upgraded the already successful ePrescription system at a national level (National eAppointment, etc).
- All these tools and services are accessible
  - by Medical experts (physicians/pharmacists etc) via a **single secure account** (the mature user management of the ePrescription system). Single sign on (SSO)
  - by citizens/patients via the **TaxisNet credentials** and the use of AMKA
- Integrated modules offer the user the ability to access all services under a common framework
  - easier to adopt and integrate a new procedure in his daily workflow.
- The types of indicators (KPIs) that could be generated is key to help a practice actively manage patients, track operational indicators, and meet meaningful use, and regulatory requirements.

The ePrescription System in Greece

- The implementation of an integrated electronic prescribing system was established by law
  - **3892/2010** (FEK A΄ 189/04.11.2010) Electronic, entry and execution, of prescriptions and orders for medical tests.
  - In conjunction with the data protection law 2472/1997 (ΦΕΚ A'50 10.4.1997)



Stakeholders – Intervenants

The successful operation of the ePrescription system is based on the effective cooperation and contribution of the following stakeholders:

- Ministry of Health
- National Organization for Medicines (EOF)
- National Organization of Health Services (EOPYY)
- Mutual Health Fund of National Bank of Greece Personnel (TYPET)
- Athens Water Supply and Sewerage Company (EYDAP S.A.)
- Auditing Institutions
- Patients
- Medical Community
- Pharmaceutical Community
- IT Market
- IDIKA SA

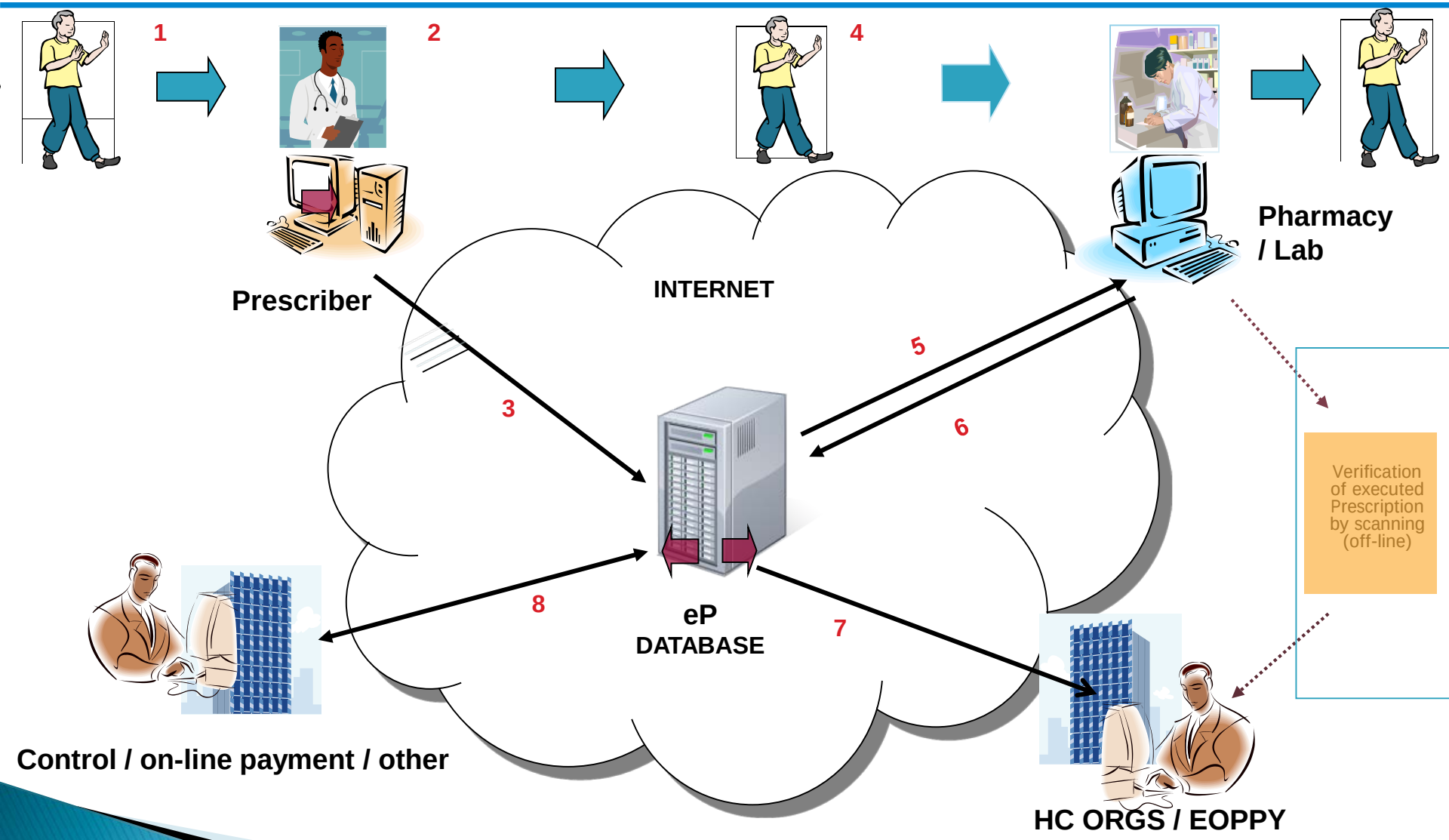
Description of the Greek ePrescription System

- The Greek ePrescription System is a nationwide widespread **web based application** for the *creation, transmission, dispensing and monitoring of*
  - ***medicine prescriptions*** *and*
  - ***diagnostic referrals***.
- The most important e-health initiative in Greece and the biggest e-government application with up to 850.000 transactions per day.
- Prescription based on **active substance** supported for the first time - patients can choose for the first time the drug they wish (from a list of equivalent – including generics)
- Recommendation of **generic medicine** from doctors while prescribing by INN (Patients decide which medicine to acquire)
- Recommendation of medicine from doctors while prescribing by INN for chronic diseases (Patients decide which medicine to acquire)

Description of the Greek ePrescription System

- Target setting for **generic** medicines prescribing
- Prescription limitations per patient (monthly **quotas**)
- Ability of prescriptions for **European** citizens, European Health Insurance Card holders
- Ability of prescribing and dispensing Magistral preparations (Galenics), Consumables and Vaccines desensitization

The Greek eP system. (EU compatible architecture)



Rationale and Objectives

Functional Architecture

Portal

-Secure & Authorized Access

-Communication & forums

Patient Data

-**Demographic data**

-**Patient Summary**

-EHR

-Social Security Coverage

Patient transactions

-**Medical Visits**

-**Prescriptions**

-**Referrals or clinical tests**

-*Access Rights*

-**Patient Consent**

-**Patient Access**

Health Professionals' transactions

-Physicians

-Pharmacists

-Laboratories

Good Practices

-**Theraupeutical Protocols**

-Diagnostic Protocols

-SPC filters

Business Intelligence

-**BI Reporting**

-Data Analysis

-Risk Management

-Fraud Detection.

Financials

-Clearance

-ePayments

-Access to financial data

Interoperability

- Medicine National Database
- National Social Security Registry
- Doctor, pharmacist, & Lab software
- Hospital's ERP's
- **EPSOS Standards**

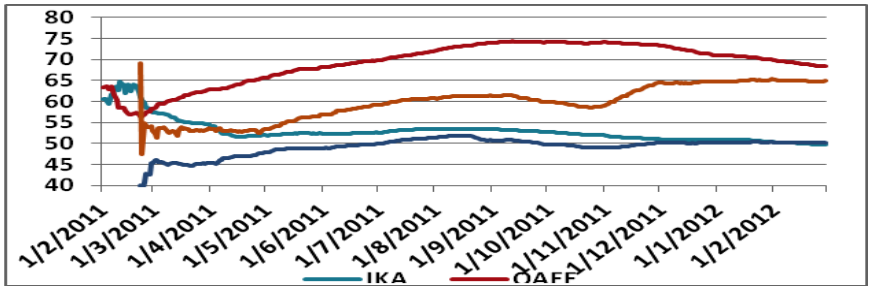
ePrescription Benefits

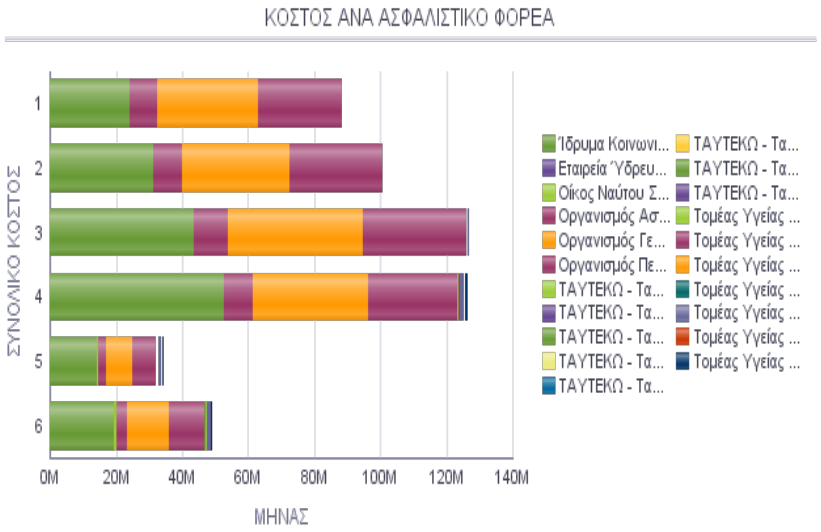
- **Ruled based** prescription and referrals validation
- Compatibility between **diagnosis and drug** prescribed
- Direct prescription execution and **expenditure control**
- **Reduction of medication errors**
- Patient **Medication Summary**
- Monitoring of **prescribing behavior** (prescription patterns)
- Electronic **drug validation** and control of the validity, legality of drug movement to the supply chain
- Accurate **statistical data** ensuring complete transparency and important contribution to the decision making policy

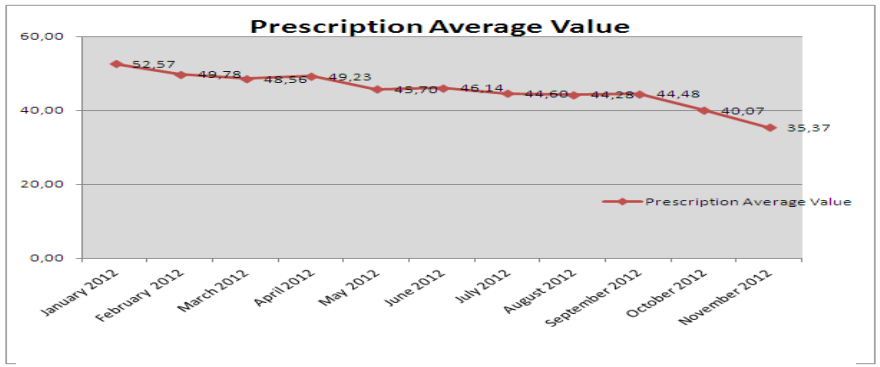
Business intelligence (BI) Reporting

- Produces reports categorized
  - per organization
  - per information category (Drug - Diagnostic examination - General)
- Provides standard & dynamic administrative reports for Ministries, SSFs etc.

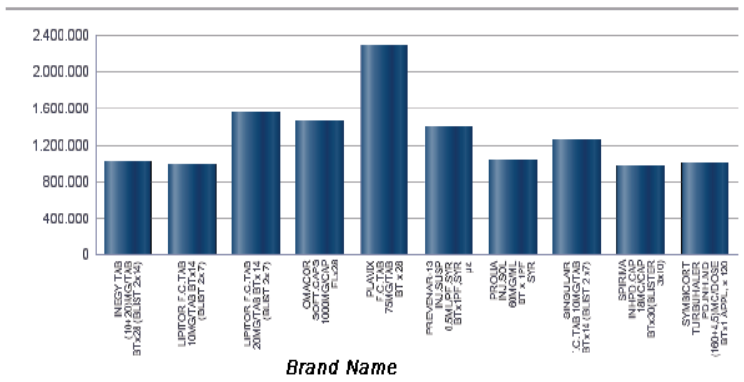
Provides a wealth of data for more efficient running and better administrative control

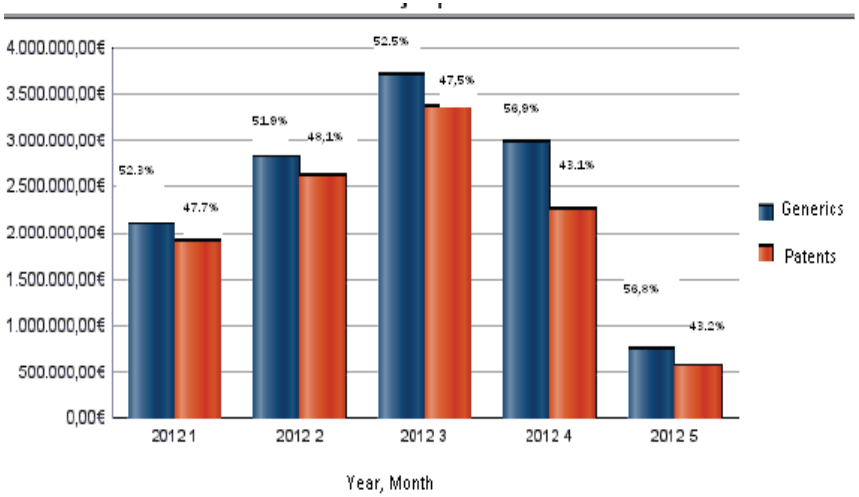






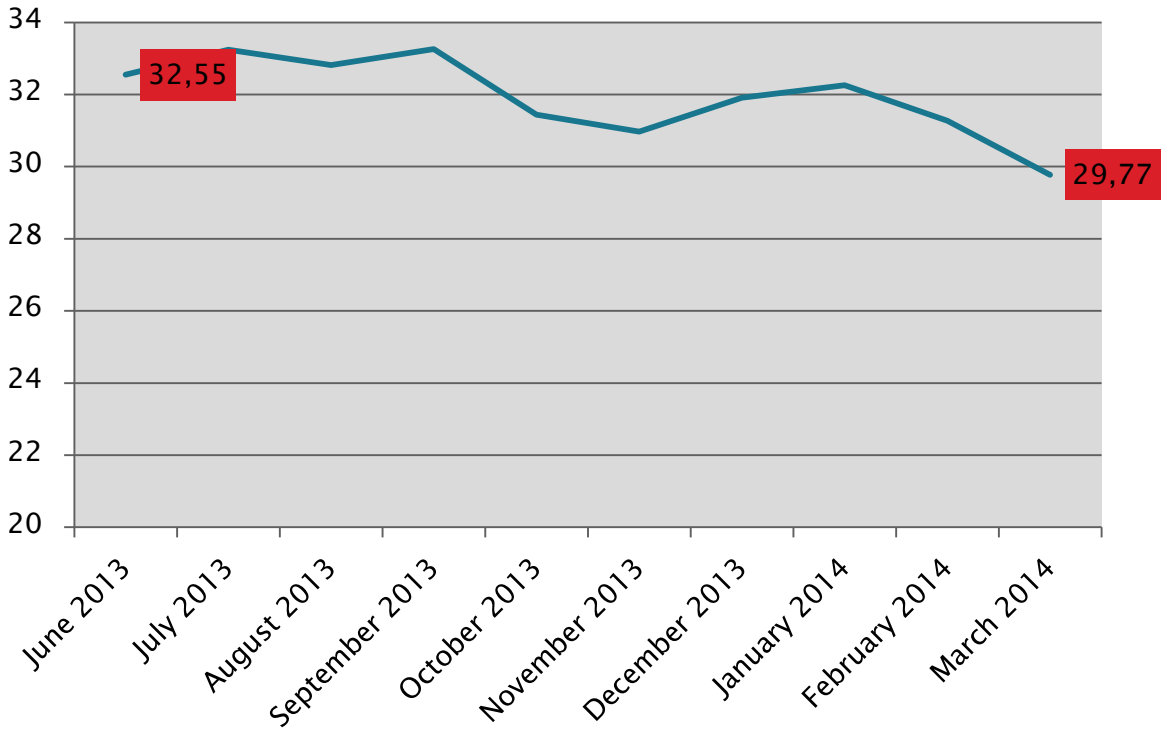
April 2012





Helps contain medication costs

- The eP system already helped identify several administrative problems and abuses, that helped improve services and contain medication costs
- The overall savings achieved have been estimated by the supervising ministry to several million Euros per month.



Existing BI reports

- Basic prescription parameters for the period (national / region / local level)
- Average Price Per Prescription & trends
- Prescription expenditure per Social Security Fund
- Issued/Executed Prescriptions per Day / Month
- Number of Beneficiaries served by the ePrescription System
- Number of Doctors and Pharmacists who prescribe electronically per day
- Prescribing Doctor’s Profile
- The Top drugs (by quantity and expenditure)
- Generics and of Patents Drug’s Cost
- Average Time for prescribing/executing a prescription
- Dynamic reports on demand

Anti-Fraud subsystem

- Detection, prediction and prevention of fraud
  - use of ePrescription system data
  - implementation model identifying potential delinquent behavior
  - implementation of specific operational statistical models
  - quick research and resolution of cases through user-friendly and smart information tools
  - assistance at the collection of evidence
  - improved results in attempting to minimize fraud
  - reducing the overall costs associated with fraud and other types of undesirable behavior

Extensions of the system

- Prescription Protocol incorporation
  - Law N.3697/2008, art35 on clinical guidelines
  - 40 TPP defined by the Medical Societies responsible for 50% of overall primary care costs
  - Treatment duration control
  - Prescribed quantity control
- E-appointments
- Future components
  - *SMS/email Patient (and/or Physician)*
  - *Patient Access – Patient Consent*
  - *Patient Summary – Primary Healthcare Record*
  - *Chronic Disease Registries*

Prescription Protocols Examples

#	Protocol Name
1	Dementia
2	Early Parkinson's disease
3	Advanced Parkinson's disease
4	Epilepsy
5	Chronic Obstructive Pulmonary Disease
6	Exacerbation of Chronic Obstructive Pulmonary Disease
7	Bronchitis
8	Psoriasis early
9	Psoriasis installed
10	Thromboembolic disease
11	Dyslipidemia

Therapeutic Prescription Protocols on the ePrescription system

- Prescription Guidelines have been integrated on the ePrescription system:

  Dyslipidaemias, Osteoporosis (5 protocols), Rheumatoid Diseases (rheumatoid arthritis, osteoarthritis, gout, etc), hypertension, etc

- Prescriptions that are related to the above-mentioned protocols are automatically routed via the patient treatment protocol tool
- The development of the **eTPP** has the following objectives and benefits:
  - Common form and common coding and nomenclature for all protocols
  - Usable and easily accessible and searchable
  - Information-rich content combining ICD-10 codes for diagnoses and standard EOF ATC4/ATC5 coding for Medicines

Development of eTPP for medicines

- The **eTPP for medicines** developed by medical societies with the coordination of the Athens Medical Society,
- Fully adapted guidelines and prescription protocols based on the up-to-day evidence.
- Have already been developed Prescription Protocols for thirteen therapeutic categories (a total of 40 protocols).
- To make the use of Prescription Protocols **mandatory**, they are incorporated into the e-prescription application. Appropriate **"controls"** can be activated at any stage to limit the prescription according to various criteria, such as:
  - proper medical practice
  - cost
  - negative & positive list of medicines
  - use of generics
  - etc.

Electronic-TPP

Textual Data

Κατευθυντήριες Οδηγίες της Ελληνικής Εταιρείας Αθηροσκλήρωσης για τη Διάγνωση και Αντιμετώπιση των Δυσλιπιδαιμιών

Μουσης Ελισαφ[1], Χριστος Παπαδοσ[2], Ευαγγελος Λυμπεροπουλος[3], Βασιλειος Αθυρος[4]
για το ΔΣ της Ελληνικησ Εταιρειας Αθηροσκληρωσησ
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Ιπποκράτειο Νοσοκομείο Θεσσαλονίκης

Τα λιπίδια του ανθρώπινου οργανισμού είναι η χοληστερόλη (χρησιμεύει για τη σύνθεση των κυτταρικών μεμβρανών, των ορμονών των επινεφριδίων και των γονάδων και αποτελεί συστατικό της χολής που εκκρίνει το ήπαρ) και τα τριγλυκερίδια (χρησιμεύουν ως καυσιμη ύλη και ως αποθήκη ενέργειας στο λιπώδη ιστό).

Οι δυσλιπιδαιμίες είναι οι διαταραχές (ποσοτικές ή ποιοτικές) του μεταβολισμού των λιποπρωτεϊνικών σωματιδίων (LDL, χυλομικρά, HDL, VLDL) που μεταφέρουν τα λιπίδια στον οργανισμό.

Κατηγορίες δυσλιπιδαιμιών

Α. Πρωτοπαθείς δυσλιπιδαιμίες

Οι πιο σημαντικές πρωτοπαθείς διαταραχές των λιπιδίων είναι οι παρακάτω:

1. Χυλομικροναιμία (κληρονομική ή επίκτητη): ↑↑↑↑ TRG ⟹ κίνδυνος οξείας παγκρεατίτιδας
2. Οικογενής υπερχοληστερολαιμία
3. α. Ομόζυγη (1/1.000.000 άτομα): ↑↑↑↑↑ LDL CHOL
   β. Ετερόζυγη (1/500 άτομα): ↑↑↑↑ LDL CHOL
4. Μικτή υπερλιπιδαιμία
5. Οικογενής μικτή (1/300 άτομα): ↑ LDL CHOL, ↑↑ TRG, ↓↓HDL CHOL
6. Οικογενής υπερτριγλυκεριδαιμία (1/2.000 άτομα): ↑↑ TRG
7. Οικογενής μείωση της HDL CHOL: ↓↓ HDL CHOL

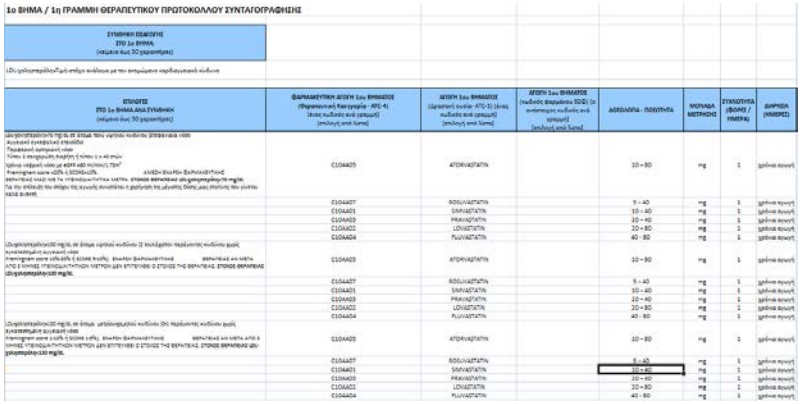
Κατά κανόνα σε ασθενείς με πρωτοπαθείς δυσλιπιδαιμίες απαιτείται φαρμακευτική αγωγή.

Β. Δευτεροπαθείς δυσλιπιδαιμίες

Σε ασθενείς με παθολογικές τιμές των λιπιδαιμικών παραμέτρων πρέπει να αποκλεισθούν οι δευτεροπαθείς δυσλιπιδαιμίες δηλαδή οι διαταραχές του μεταβολισμού των λιπιδίων που οφείλονται σε άλλα νοσήματα ή φάρμακα:

1. Σακχαρώδης Διαβήτης
2. Υποθυρεοειδισμός
3. Αποφρακτική Ηπατική Νόσος
4. Χρόνια Νεφρική Νόσος - Νεφρωσικό Σύνδρομο
5. Παχυσαρκία
6. Κατάχρηση Οινοπνεύματος
7. Φάρμακα που Προκαλούν Δυσλιπιδαιμία
   α. προγεστερινοειδή
   β. αναβολικά στεροειδή
   γ. κορτικοστεροειδή
   δ. διουρητικά σε μεγάλες δόσεις
   ε. β-αποκλεισπές
   στ. αντιρετροϊικά φάρμακα
   ζ. ιντερφερόνη
   η. οιστρογόνα

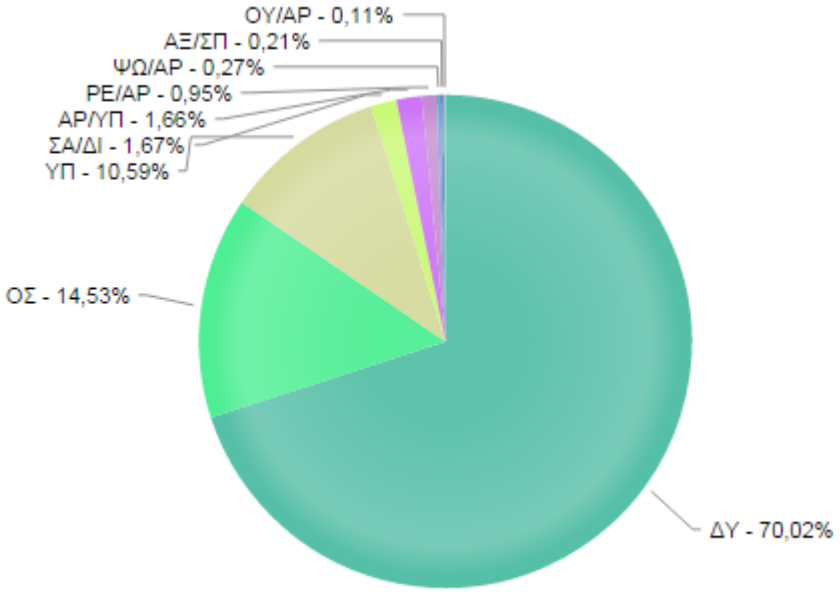
Machine processable Information



The representation model of eTPP includes five upper levels of information:

- General Information of Protocol
- Treatment steps
- Sub-conditions at each step
- Treatment at active substance level
- Treatment at medicine product level

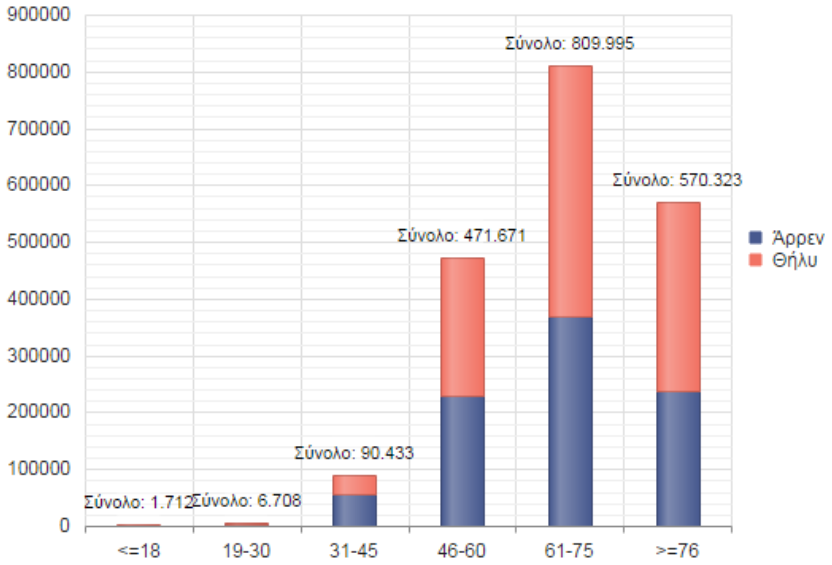
Statistical examples of Patients with prescriptions via eTPP



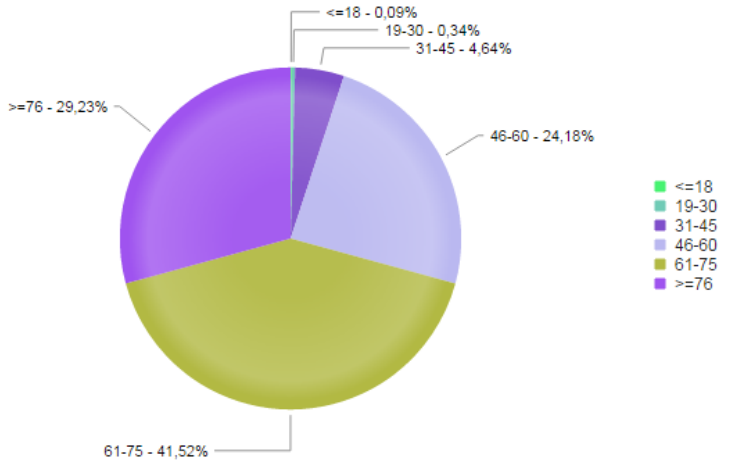
Συντομογραφία	Χρόνια Πάθηση	Ασθενείς ενταγμένοι σε Θεραπευτικο Πρωτόκολλο
ΔΥ	ΔΥΣΛΙΠΙΔΑΙΜΙΑ	1.900.536
ΟΣ	ΟΣΤΕΟΠΟΡΩΣΗ	394.274
ΥΠ	ΥΠΕΡΟΥΡΙΧΑΙΜΙΑ	287.497
ΣΑ/ΔΙ	ΣΑΚΧΑΡΩΔΗΣ ΔΙΑΒΗΤΗΣ	45.374
ΑΡ/ΥΠ	ΑΡΤΗΡΙΑΚΗ ΥΠΕΡΤΑΣΗ	45.019
ΡΕ/ΑΡ	ΡΕΥΜΑΤΟΕΙΔΗΣ ΑΡΘΡΙΤΙΣ	25.759
ΨΩ/ΑΡ	ΨΩΡΙΑΣΙΚΗ ΑΡΘΡΙΤΙΔΑ	7.323
ΑΞ/ΣΠ	ΑΞΟΝΙΚΗ ΣΠΟΝΔΥΛΑΡΘΡΙΤΙΔΑ	5.705
ΟΥ/ΑΡ	ΟΥΡΙΚΗ ΑΡΘΡΙΤΙΔΑ	2.887

Dyslipidemia Statistics

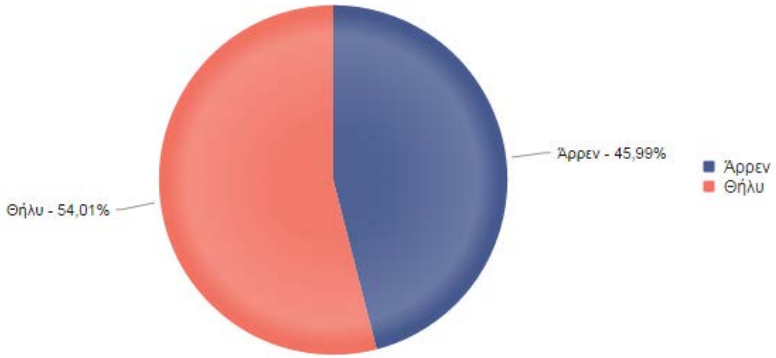
Patient versus age and sex



Age



Female/Male



Cost monitoring for Dyslipidemia TPP

		09/2013 - 11/2013			09/2014 - 11/2014		
ATC05	Δραστική ουσία	Ποσότητα	Συνολικό Κόστος	Δαπάνη Φορέα	Ποσότητα	Συνολικό Κόστος	Δαπάνη Φορέα
C10AA01	SIMVASTATIN	1,014,952	15,774,081	12,016,791	979,682	12,720,863	9,436,223
C10AA02	LOVASTATIN	2,535	22,288	17,097	2,129	17,408	15,365
C10AA03	PRAVASTATIN	156,421	2,197,660	1,612,963	152,763	1,822,942	1,135,253
C10AA04	FLUVASTATIN	28,745	234,745	179,768	25,894	190,893	151,131
C10AA05	ATORVASTATIN	2,501,835	32,003,873	22,009,892	2,394,029	26,513,082	13,172,524
C10AA07	ROSUVASTATIN	810,402	10,643,340	7,433,227	717,877	10,225,067	5,788,547
C10AX09	EZETIMIBE	167,725	5,071,200	3,858,505	163,841	3,558,561	2,682,037
C10AC04	COLESEVELAM	515	74,852	57,092	376	48,333	36,482
C10BA02	EZETIMIBE,SIMVASTATIN	264,228	13,159,162	9,955,807	242,636	11,530,530	8,857,037
	Σύνολα:	4,947,358	79,181,202	57,141,143	4,679,227	66,627,679	41,274,599

5,5% reductions in quantity of prescriptions

16% reductions in overall cost for the healthcare system

28% reductions in the cost for the national insurance fund

16M euros net gain only from Dyslipidemia TPP =

1.5 times the cost of implementation of the ePrescritioon system

Patient's medical appointments

The system supports for the first time a single database which record all medical appointments and in which all citizens have access free of charge (Health Service Market Place)

Concerns all health providers:

- Health Centers
- Hospitals
- Doctors

Addressed to:

- Citizens
- Health providers
- 5-digit support telephone numbers
- Disability Certification Centers (KEPA)
- Citizen Service Center (KEP)

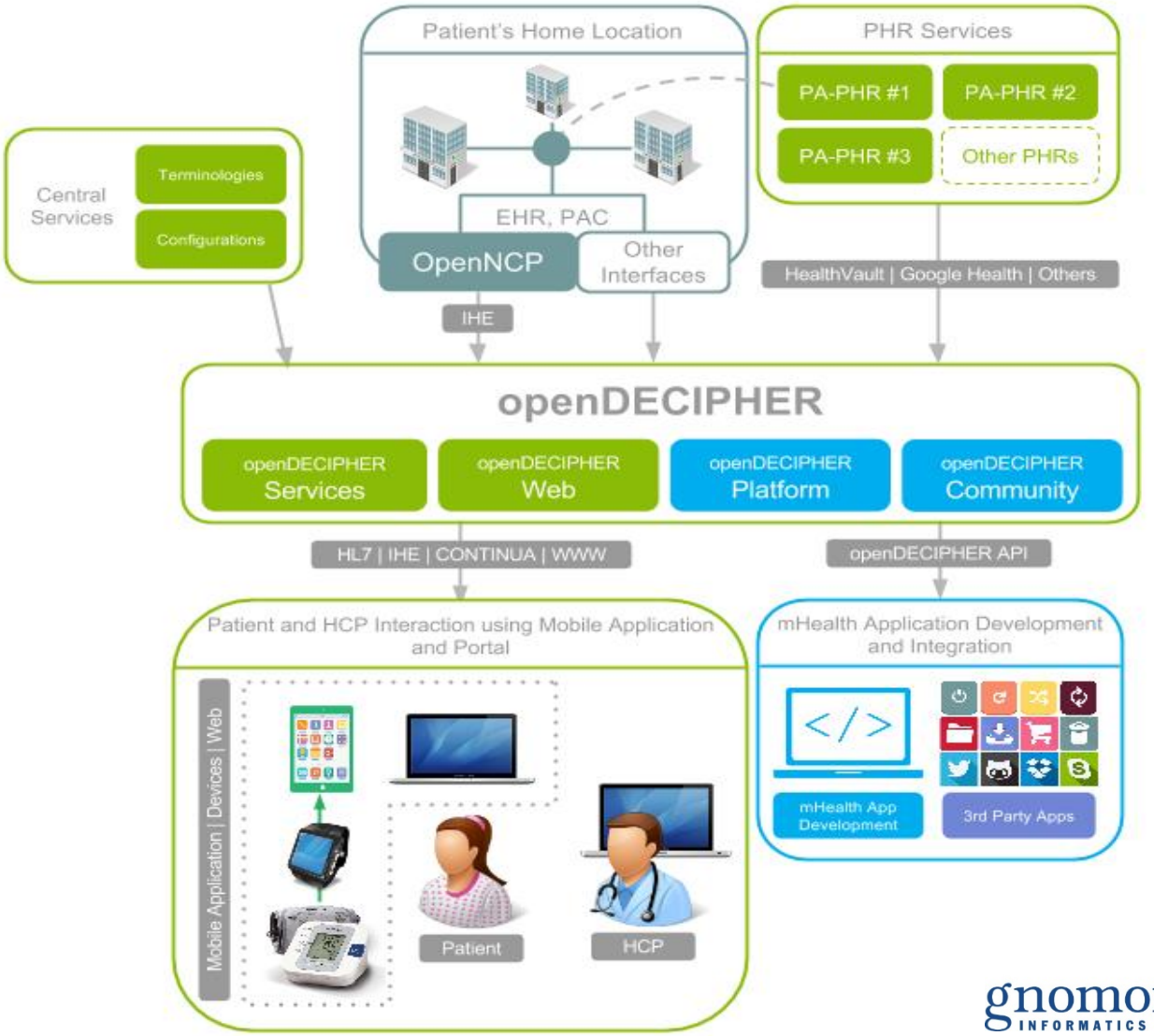
- Total appointments during operation (7/12/15 till today) **173.0000**
- About **20.000** appointments per day (Scheduled+ rescheduled).
- Weekly data (weekend included)
  - 01/03/2016 15425
  - 02/03/2016 15186
  - 03/03/2016 13340
  - 04/03/2016 14714
  - 05/03/2016 912
  - 06/03/2016 595
  - 07/03/2016 27893
  - 23/02/2016 13053
  - 24/02/2016 12172
  - 25/02/2016 12366
  - 26/02/2016 10998
  - 27/02/2016 618
  - 28/02/2016 490
  - 29/02/2016 17779

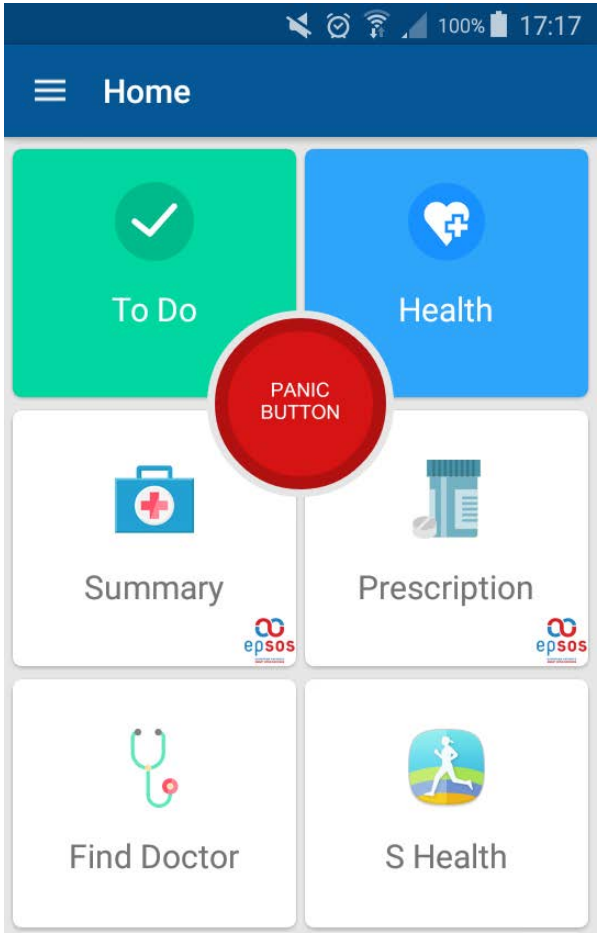
Compatibility with international standards

- Internationally standards for the exchange of medical data were followed.
- Data exchange between the hospital sending discharge notes, and also between Patient Summary and Electronic Prescribing Service, is performed using the **CDA (Clinical Document Architecture)** format, which is one of the most widely used standards of HL7. **The CDAs exchanged is formatted in XML format and the structure is modeled following epsos standard** (http://www.epsos.eu/home/about-epsos.html), so as to ensure maximum interoperability with other European information health systems.
- Coding Standards included are:
  - ICD-10 (diagnosis)
  - ICPC2 (diagnosis for primary care)
  - ATC5 (Medicines-Drugs)
  - Lab tests (National Codification – KEOKE)

Integrating treatment plans

- Modeling patient –healthcare professional interaction





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The Greek ePrescription interoperability framework

- Based on new architecture paradigms (RESTful API)
- Simple to implement
- 11.000 pharmacies are connected to the central eP system
- 14 different Pharmacy Information Systems
- 6 different Doctor Information Systems
- More than 300.000 prescriptions dispensed every day
- Drug List updates online via the API
- Medication authenticity validated online via the API
- Prescription protocols information transferred via the API
- It can process epSOS friendly prescriptions for cross border healthcare
- It is based on international standards (HL7 CDA)
- It has enhanced security features (IHE ATNA, RFC 2104)
- It is designed to operate with multiple repositories of data
- It is expandable to other e-health scenarios (patient summary, e-prescription, e-referral, etc)

Merci Beaucoup

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ΗΔΙΚΑ
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