NeuroHEALIS

A Neurosurgical Health Information System for Integration of Clinical Research and Clinical Care

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Presenter Background Info

- **Education**
  - **BSc CS – MSc AI – PhD Speech Technology**
- **R&D Assistive Technology (10 Years)**
  - **SpandH Group, CS Dept, Univ.Sheffield**
- **HIT Manager (3 Years)**
  - **Neurosurgery Department, Univ. of Athens**
  - **Evangelismos General Hospital**
- **13 Years Experience with Clinicians and Medical Applications**

Medical Staff – The Driving Force

- **Head of Dept. Prof. Damianos Sakas**
  - CIS (Functional Disorders) – Clinical Research
  - Resident M. Themistokleous (Parkinson)
  - Resident V. Konofaou (Spasticity)
  - Resident L. Stavrinou (Dystonia)

- **Assistant Prof. George Stranjalis**
  - EMR – Clinical Care

- **Assistant Prof. Stylianos Gatzonis**
  - EPILEPSY (EPILDA, BIOSIM-NTUA)
  - Clinical Research and Clinical Care

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Lesson 1 – Communication Issues

- **Main obstacles**
  - **Low priority of IT issues**
  - **Lack of coordination and organisation**
  - **Lack of communication**
  - **Lack of planning and clear objectives**
- **Main reasons**
  - **Contradictory priorities and needs**
  - **Overloaded appointment schedule**
  - **OR heavy schedule**

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IT Local Network
Bridge The Gap

- **Dispersed locations**
  - **Site 1 outside the Hospital Network**
    - **The Hellenic Neurosurgical Research Centre**
  - **Site 2 inside hospital without Network**
    - **The Neurosurgery Clinic**
    - **The Operating Room**
    - **The Lecture Amphitheater**
- **Site 1,2 NOT LINKED**
- **Network planning was underestimated**

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IT Infrastructure Solution

- **In the Beginning (2006)**
  - **Site 1, LAN (1 Server, 12 PCs, ADSL)**
  - **Site 2, 9 Standalone PCs, ISDN**
  - **Site 1, Site 2 Do not communicate**
- **Today (2009)**
  - **Site 1 (2 LANs, 1 Local – 1 Webhosting)**
  - **Site 2, 15 PCs on MLS VPN LAN**
  - **3 ADSL Lines (2 MLS VPN, 1 Web VPN)**
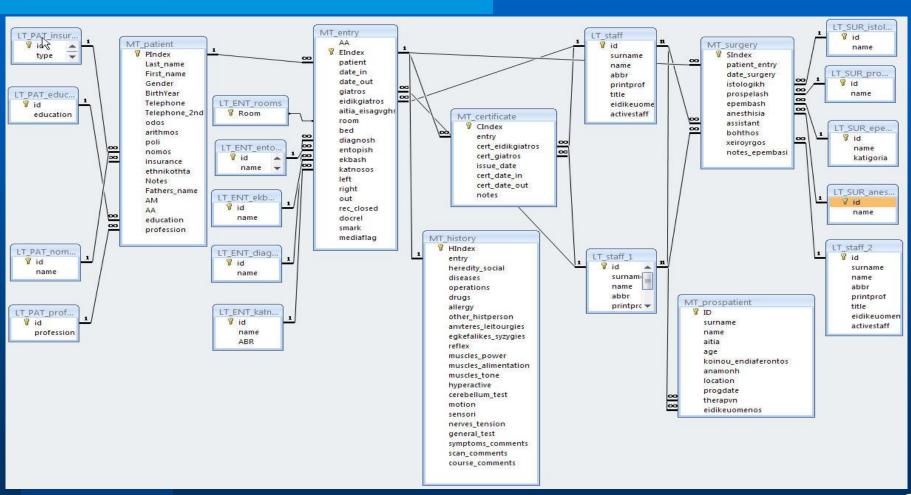 - **Secure Access/Linking inside/outside**

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Lesson 2 – Networking Issues

- **Clinicians - Misunderstanding**
  - **Network Security Policy issues**
  - **Database Availability-Access issues**
  - **No plan and budget for the cost of Networking solutions**
- **Hospital Management – Indifference**
  - **Act "independently", feasible solution**
  - **Private/Departmental Funding**
  - **Informal permission to proceed**

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EMR Phase 2 – Migration

Admission Excel Table Before Processing

CNT	YR CNT	FULL NAME	AGE		MCAT	CLIN. COM.	RAD. COM.	TEL.	DEL.	DEL.	RES.	DOC.	ADATE	DDATE	HISTORY COMMENTS
10070	1090	NAM SURNAM1	62		Σ	Ραχιαλγια	ΑΤ Οστεολυση Θ8	2102631509		Σ	A	ΔΣ	16/11/2005	19/11/2005	
10071	1091	NAM SURNAM2	61		K	Τροχ/GCS 13	ΜΤ Ακουστικο νευρινωμα Α	2108629575	ΜΕΘ	X	E	ΔΣ	16/11/2005	12/12/2005	ΔΧ ΜΙΚΡΟΔΙΑΛΥΣΗ/ΜΧ παρεση
10072	1092	NAM SURNAM3	42		Λ	Κρισεις Ε	ΜΤ ΚΜΔ Α56	2108316768		X	B	ΗΣ	16/11/2005	23/11/2005	

Admission Excel Table After Automated Processing - Ready for import

PID	ADMID	SURNAME	NAME	YB	DUPL.	SEX	MCAT.	CLIN. COM.	RAD. COM.	TEL.		RES.	DOC.	ADATE	DDATE	HISTORY COMMENTS
ΤΔ006374	ΤΔ005895	SURNAM1	NAM1	1951	1	M	101	HH 1	AT Fisher 3 Αγγ (-)	2108950535		2	5006	31/1/2003	12/2/2003	
ΤΔ006490	ΤΔ005895	SURNAM2	NAM2	1949	1	F	101	Πιεση ωλενιου	ΜΤ Ογκος με Δ	2108950535		2	5006	3/3/2003	4/3/2003	
ΤΣ000491	ΤΣ000159	SURNAM3	NAM3	1940	1	M	101	Ημιπαρ Α/Ca Πνευμων	ΑΤ (-)/Αγγειο			2	5005	26/5/1998		ΙΑΤΡΙΚΟ ΚΕΝΤΡΟ ΓΙΑ ΕΜΒΟΛΙ

DOC.	NAME	SURNAME				RES.	DESCRIPTION		MCAT.	DESCRIPTION
5006	RNAM1	RSUR1	Med. Staff Coding	Outcome Coding		0	DEATH	Disorder Category	103	TRAUMATIC BRAIN INJURY
5005	RNAM2	RSUR2				1	IMPROVEMENT	Coding	104	FUNCTIONAL DISORDERS
5004	RNAM3	RSUR3				2	STABLE		105	PERIPHERAL NERVOUS SYSTEM
						3	DETERIORATION		106	SPINE INJURY

Lesson 3 – Migration Issues

- **Another underestimated task**
  - **Cost**
  - **Time**
- **Many stacked/stumbled over**
  - **Residents, Medical Associates**
  - **Other Non-IT Experts**
  - **A small IT company**
  - **Be patient… keep waiting… (1998-2006)**

EMR Phase 3 - Implementation

- **Data Forms**
  - **View/Entry Purpose**
- **Catalogues**
  - **View/Searching/Filtering Purpose**
- **Reports**
  - **Patients IN, Discharge Certificate, etc…**
- **Digital Media Record**
  - **Linking with the Patient Record**
  - **Storage/Retrieval Purpose**

EMR Phase 3 – Data Forms
Free Text, Selection Input Methods

- **Admission Form**
  - **Demographic, Admission Data**
- **EMR Form in three sections**
    - **1) Patient – 2) Admissions – 3) Operations**
      - **History Record**
      - **Physical Examination**
      - **Radiology Comments**
      - **Clinical Course**
      - **Discharge Certificate**
      - **Surgical Operation Form**

EMR Phase 3 – EMR Form

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EMR Phase 3 – Catalogues

- **Pending data (open/closed admissions)**
- **Patients IN Catalogue**
- **All Patients Catalogue**
- **All Admissions Catalogue**
- **All Operations Catalogue**
- **Histology Completion Catalogue**

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EMR Phase 3 – Examples

HM/NIA	ΕΠΕΜΒΑΣ	ΕΠΩΝΥΜΟ	ΟΝΟΜΑ	ΗΛ.	Κατηγορία νό	Διάγνωση	Εντόπιση	ΕΚΒ	ΧΕ	Α.	ΠΡΟΣΠ	ΙΣΤ.	ΑΝ.
08-Ιαν-98	ΚΡΑΝΙΟΠΛΑΣΤΙΚ			27	ΑΛΛΗ ΝΟΣΟΣ			ΒΕΛΤΙ	ΗΣΟ	ΒΒΑ	ΑΛΛΗ		ΓΕΝΙΚ

ΔΙΑΓΝΩΣΗ
Παλια ΚΚ/Οστικ ελειμα μετωπ

ΟΣΤΙΚΗ ΠΡΟΣΠΕΛΑΣΗ
Μετωπιαια

ΚΥΡΙΩΣ ΕΠΕΜΒΑΣΗ – ΑΝΑΓΝΩΡΙΣΗ ΑΝΑΤΟΜΙΚΩΝ ΣΤΟΙΧΕΙΩΝ
Κρανιοπλαστικη Με Δ

06-Ιαν-98	ΑΙΜΑΤΩΜΑ – ΑΦ			64	ΑΓΓΕΙΑΚΗ ΝΟΣΟΣ			ΒΕΛΤΙ	ΗΣΟ	ΒΒΑ	ΑΛΛΗ		ΓΕΝΙΚ

ΔΙΑΓΝΩΣΗ
Αυτοματο ΕΕΑ/Βριν Α

ΟΣΤΙΚΗ ΠΡΟΣΠΕΛΑΣΗ
Κρανιοτομια Βριν Α

ΚΥΡΙΩΣ ΕΠΕΜΒΑΣΗ – ΑΝΑΓΝΩΡΙΣΗ ΑΝΑΤΟΜΙΚΩΝ ΣΤΟΙΧΕΙΩΝ
Αφαιρεση Αιματωματος

05-Ιαν-98	ΑΙΜΑΤΩΜΑ – ΑΦ			76	ΚΑΚΩΣΗ			ΒΕΛΤΙ	ΗΣΟ	ΒΒΑ	ΑΙΜΑΤΩΜ		ΤΟΠΙΚ

ΔΙΑΓΝΩΣΗ
Χρ Υποσκληριδιο Αιματωμα Α

ΟΣΤΙΚΗ ΠΡΟΣΠΕΛΑΣΗ
Κρανιοανατρ χ2

ΚΥΡΙΩΣ ΕΠΕΜΒΑΣΗ – ΑΝΑΓΝΩΡΙΣΗ ΑΝΑΤΟΜΙΚΩΝ ΣΤΟΙΧΕΙΩΝ
Αφαιρεση Αιματωματος

05-Ιαν-98	ΒΑΛΒΙΔΑ – ΕΠΑΝ			34	ΔΙΑΤΑΡΑΧΗ ΚΥΚΛ			ΘΑΝΑ	ΗΣΟ	ΒΒΑ			ΤΟΠΙΚ

ΔΙΑΓΝΩΣΗ
Συγγ Υδροκ/Δυσλειτ βαλβιδας

ΟΣΤΙΚΗ ΠΡΟΣΠΕΛΑΣΗ

ΚΥΡΙΩΣ ΕΠΕΜΒΑΣΗ – ΑΝΑΓΝΩΡΙΣΗ ΑΝΑΤΟΜΙΚΩΝ ΣΤΟΙΧΕΙΩΝ
Απολινωση Περιτον Σκελους

ΣΥΝΟΛΟ : **2604** *ΕΠΕΜΒΑΣΕΙΣ*

Τετάρτη, 15 Ιουλίου 2009

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EMR Phase 3 – Daily Reports

Discharge Certificate

Patients IN List

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EMR – Phase 3
DIGITAL MEDIA RECORD

- **Contents**
  - **Photos of the radiology film**
  - **Photos from the surgical operation**
  - **Video-Clips from surgical operation**
  - **Histology scanned documents**
- **Patient Folder Implementation**
- **-KM12000 (inside folder….)**
  - **090215-KM14567-SURGERY (folder)**
  - **080925-KM12345-HISTOLOGY (folder)**

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CIS Phase 4 - Clinical Research Neurosurgical Databases

- **Spasticity, Parkinson, Dystonia**
- **EPILEPSY (Already Implemented)**
- **Data Completion Method**
  - **Resident completes a printed form**
  - **Secretary fills the data in a digital form**
- **Periodic Use vs. Daily Use**
- **Clinical Research vs. Clinical Practice**
- **It is often not easy to distinguish**

CIS Phase 4 – Spasticity DB

- **Spasticity is a chronic disorder**
- **Surgical treatment with an**
  - **Implanted Pump – Control Device**
- **Data Forms**
  - **Extra Patient Related Fields**
  - **General Comments**
  - **Clinical Evaluation Tests**
  - **Clinical Course**
  - **Operations and Pump tuning**

CIS Phase 4 – Evaluation Form

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CIS Phase 4
Operations/Pumps Tuning

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CIS Phase 4 – Linking with EMR

- **EMR tables were linked on this separate database**
- **Demographic Data**
- **Admission Data**
- **Surgical Operation Data**

CIS Phase 5 – Continuity of Care

- **The continuity of care problem cycle**
  - **Patients with chronic disorders may**
    - **get in different clinics**
    - **see different doctors**
    - **stay at home and get slowly worse**
    - **get seriously ill, go into hospitals**
    - **Discharged and….. Cycle begins again**
  - **Follow-up monitoring plan in the clinic**

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CIS Phase 5
Follow-up Monitoring

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Phase 6 – Database Security

- **Reports are given only with consent form signed by senior medical staff**
- **Physical location of CIS backend in the research center server**
- **Physical location of EMR backend in the clinic/hospital**
- **Restrict user network remote access for CIS from the clinic**
- **Frontend password protected execution**

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Lesson to learn – Security Issues

- **Consent forms signed by the medical staff for exporting data created conflicts among the staff members**

- **Everyone wants to export data without permission, without authorization**

- **DB administrator is exposed to dangerous situations because of uncontrolled release of sensitive data**

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What about IT Staff Support

- **Hospital IT staff – 4 Persons**
  - **not involved with departmental network**
- **Departmental IT staff – 0 Persons !!!**
  - **LANs Support**
  - **Web Sites-Email Support**
  - **Database Administration**
  - **OR Teleconference/Recording Support**
  - **Outsourcing for IT special needs**
- **IT Management, R&D – 1 Person**

What about other staff

- **Departmental Secretaries**
  - **2P Read Access, 1P (R/W All DBs)**
- **Nursing Staff**
  - **Not Involved**
- **Other Departments**
  - **Not Involved**

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Future Plans

- **Hellenic EMR Open Source**
  - **Portable, Working Off-line**
  - **Web or wireless Synchronization**
- **A freeware version of the front end**
- **Participation on a Thematic Network on Neurodegenerative Disorders**
- **Participation on certification authority**
- **IT education, consultation services**

Thank You

- **Enjoy Samos**
- **Enjoy Greece**
- **Enjoy Life**
- **Send me a smile ;-)**

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