Teaching Medical Informatics to medical students using open source software

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Medical Informatics for medical students

- In many countries, Informatics is being taught to medical students mainly as basic computer science
  - with some practical session to develop generic computer skills.
- Medical Informatics is not on the plans
- In Italy: Informatics officially taught since 3 years
  - most universities still give statistics/physics courses called "informatics" (due to lack of teachers)

MI teaching guidelines

- General: Recommendations of the International Medical Informatics Association (IMIA) on Education in Health and Medical Informatics (Methods of Information in Medicine 39(2000), 267-277);
- Medicine: Association of American Medical Colleges (AAMC), Contemporary issues in Medicine: Medical Informatics and Population health, (Medical Schools Objectives Project)

Learning MI

- During the degree, finding medical informatics courses, is more rare and difficult
  - because practical activities are not easy to be carried out,
  - yet they are useful to better understand the topics.
- In fact, where real medical information systems are available, they cannot be used just for students exercises
  - for security problems
  - privacy policy

MI at the University of Udine

- Basic Computer Science, Medical Informatics
  - Degree in Medicine and Surgery, Faculty of Medicine at the University of Udine:
    - 1st year; Basic CS: 3 credits, MI: 3 credits
  - Degree in Biomedical Laboratory Techniques:
    - Basic CS: 3 credits, 1st year; MI: 2.5 credits, 3rd year
- special attention has been posed on practice related to medical informatics
  - scarce real systems in the University Hospital,
  - a "virtual" laboratory of Medical Informatics has been developed as a web site hosting instances of some medical open source software, to which students have free access.

LAVIM

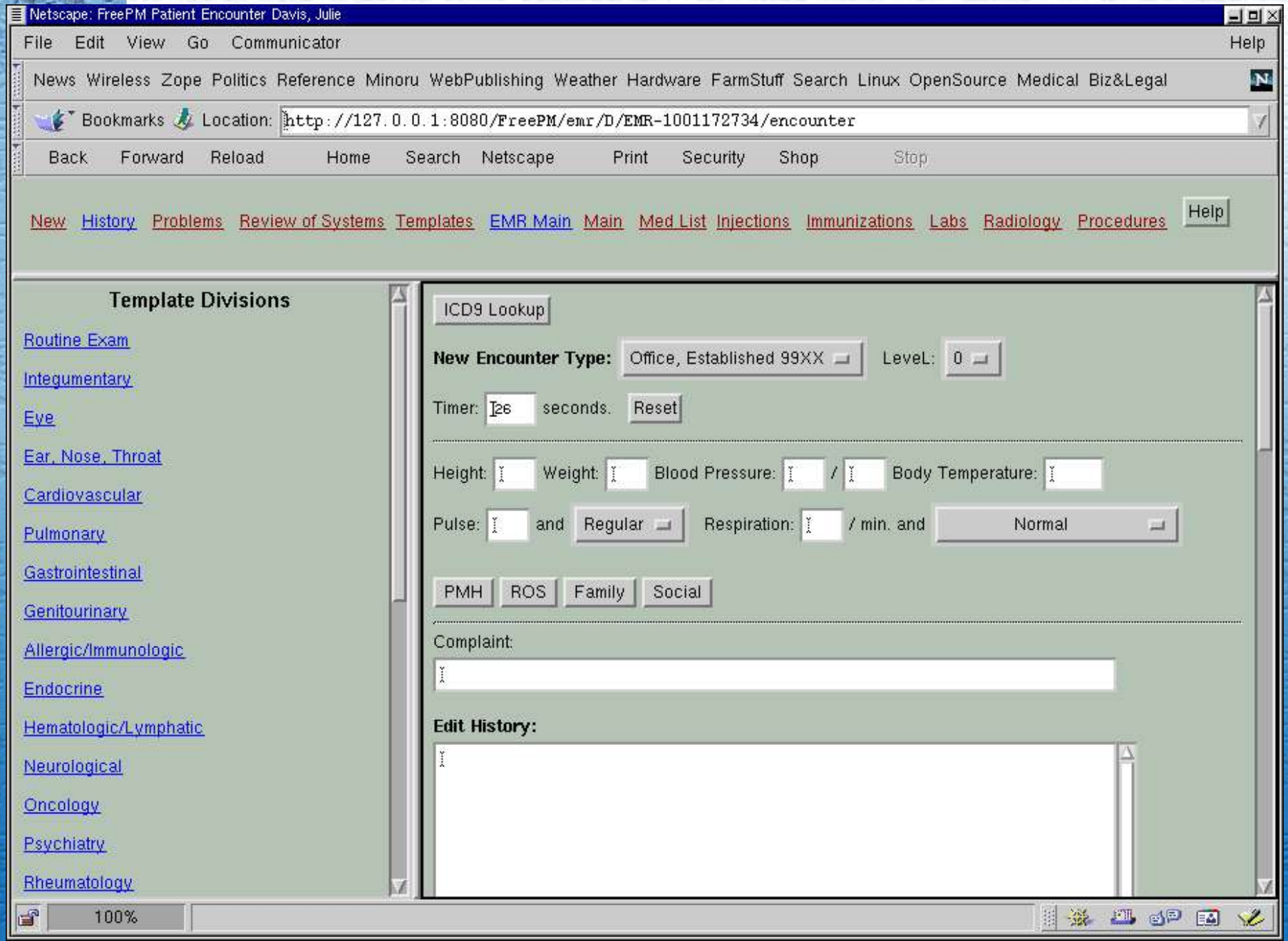
- Virtual Laboratory of Medical Informatics
  - links to relevant web sites
  - locally hosted systems, with free but protected access for students
- topics covered:
  - EHR
  - Terminologies and classifications
  - Guidelines and protocols
  - Image and signal processing
  - (plus other information)

- http://anpat.drmm.uniud.it/~informed/
  - (in Italian)

LAVIM : EHR

- since the introduction of MI (last three years) the following tools have been used:
- FreePM as example of GP health record
  - now discontinued due to difficulties in updating to Torch
- then substituted by OpenEMR
  - although less complete
- myPACS as example of PACS
  - simple, but gives an idea of image management
- in the last year, Care2002
  - example of HIS
  - very complete (even too much for teaching)
- **students are encouraged to create fictious patients, visits, order entries, etc**
  - however, no related evaluation

FreePM


Netscape: FreePM Patient Encounter Davis, Julie
File Edit View Go Communicator Help
News Wireless Zope Politics Reference Minoru WebPublishing Weather Hardware FarmStuff Search Linux OpenSource Medical Biz&Legal
Bookmarks Location: http://127.0.0.1:8080/FreePM/emr/D/EMR-1001172734/encounter
Back Forward Reload Home Search Netscape Print Security Shop Stop
New History Problems Review of Systems Templates EMR Main Main Med List Injections Immunizations Labs Radiology Procedures Help
Template Divisions
Routine Exam
Integumentary
Eye
Ear, Nose, Throat
Cardiovascular
Pulmonary
Gastrointestinal
Genitourinary
Allergic/Immunologic
Endocrine
Hematologic/Lymphatic
Neurological
Oncology
Psychiatry
Rheumatology
ICD9 Lookup
New Encounter Type: Office, Established 99XX LeveL: 0
Timer: 12s seconds. Reset
Height: Weight: Blood Pressure: / Body Temperature:
Pulse: and Regular Respiration: / min. and Normal
PMH ROS Family Social
Complaint:
Edit History:
100%

myPACS

Care2002 - the HIS sample

Terminologies and guidelines

- not really open…
- a searchable ICD9-CM (It) archive
  - PHP + MySQL
- links to MeSH and LOINC
- guidelines and protocols:
  - the **PRODIGY** guidance browser
  - guidelines.gov
  - protocol-online.org

Image and signal processing

- Biosignals:
  - link to PhysioNet
    - open biosignals archive
  - link to a sample ECG processing applet by J.Tchouvarda (no OS)
- Bioimages:
  - the luxurious ImageJ image processing software
  - http://rsb.info.nih.gov/ij/
  - public domain, Java, runs also as applet
  - an exercises page, with step-by-step operations to obtain simple image transformations
- students try the exercises under my guidance

Results

- The tools allowed to explain students real systems,
  - although with some simplification and not without problems
- Problems?
  - patient' data (and other) created by students are not always, ehm, "polite"
    - at a certain moment, I had to close FreePM because the drugs formulary contained "too much" (the least was beer)
- However, to have the same variety of systems starting from commercial products would have involved an unsustainable expense.

Discussion

- Open Source allows to give examples of otherwise too expensive software
  - not always available
  - if available, not usable for self-learning
- it is likely that OSS in the course will be the first medical software students see
  - often, also the last (in Italy, now)
  - often, they will know more than their next teachers
- unfortunately, 1st year is too early for MI (recommendations suggest 3rd year)
  - 1st year students do not know much about the doctor work
  - I'm trying to suggest a change

Discussion/2

- using OS for teaching:
  - easy,
  - useful
- using the same software in practice:
  - image processing, ok
  - EHR: it is a difficult due to the different administrative data in different countries
    - administrative data are an important component of EHR, but are unique
    - and rules change often (at least in Italy)
    - e.g., Care2x: I have so say students to disregard insurance-related data