Project key information

Project leaders: Moussa LO and Gaoussou CAMARA (UMMISCO, Senegal)
Project duration: Since 2012
Starting date: 2012
Total budget: ~75 000 EUR (from various funding)

Partner institutions

Numerical Analysis and Computer Science Laboratory (LANI) of the Gaston Berger University of Saint-Louis (UGB)
Interdisciplinary Research Team in Medical Informatics and Information and Communication Technologies for Education (IMTICE) of the Alioune Diop University of Bambey (UADB)
Faculty of Medicine of the Gaston Berger University of Saint-Louis (UGB)
Regional Hospital of Saint-Louis in the north of Senegal
Laboratory in Medical Informatics and Knowledge Engineering in e-Health (LIMICS)

Context

Information and Communication Technologies (ICT) has fostered a significant change in the management and capitalization of data within organizations. However, the public health sector in Senegal is lagging behind in its digital transformation. Indeed, large amounts of data are produced daily by medical activities such as consultations, hospitalization, laboratory test, surgical intervention, etc. These data are recorded in essentially textual media (registers), images, audio and video files, which are mainly accessed and used manually. Faced with this problem, Hospital Information Systems (HIS) are today a key solution for the electronic management of patient records, the improvement of health care and the rationalization of human and financial resources. To overcome all the problems mentioned above and taking advantage of HIS, we propose the National Medical Information System for Senegal (SIMENS) project.

Objectives

The SIMENS project aims to develop an information system for the management of medical and administrative activities and data of health facilities in Senegal.

The specific objectives of our project are:

- design and implement a Web-based integrated Clinical Information System (CIS) for the
  - management of patient record
  - management of administrative and financial data
  - automation of some medical, administrative and financial processes
- design and implement a mobile application to
  - provide access to medical staff to the CIS
  - provide access to patients for making appointment and or having controlled and limited access to their medical data such as their vaccination schedule
- Design and implement a health information web portal for
  - sharing information about diseases, their symptoms, prevention strategies and medical recommendations
  - providing a collaborative editing space to the health practitioners to propose medical recommendation articles from on their research results based on contextual data
  - providing a communication area such as a forum experience sharing between patients and moderated by health specialists
  - providing access to patients for making appointment and or having controlled and limited access to their medical data such as their vaccination schedule
  - provide a mapping of the most common diseases and their prevalence

- Build a de-identified national big database for biomedical research purposes
- Building a knowledge based from the original databases to provide reasoning capabilities in the CIS
- Build a repository of computing and mathematical models for medical issues detection and prediction (e.g. build a ML-based predictive model to detect potential cases of sickle cell diseased newborns within the HIS of Maternity wards to avoid systematic screening of all newborns)

Specific challenges

The main challenge of the SIMENS project is to propose a model of electronic patient record adapted to the health system in Senegal and in all countries with a pyramidal health system.

As the project evolves, many challenges need to be addressed such as

- Provide evaluation approaches to assess the effective contribution of hospital information systems
    - Improvement of the health care of the patients
    - Reduction of cost and time of health care
- Ensure interoperability between EHR and with decision making tools
- Guarantee the security and confidentiality of data and particularly sensitive data
- Integrate external / related data for a systemic analysis of health issues
    - Demographic, geographical, climatic, social, etc. => One Health
- Capitalize the data and knowledge of traditional medicine

In addition, given the new issues raised by the collection and storage of massive data by our health platforms, we are exploring new research directions such as (1) the design of visualization approaches and tools to improve easy and rapid access by doctors to patients' medical histories and (2) the proposal of prediction models for the complications of certain chronic pathologies, such as in cardiology, diabetes and sickle cell.

Expected results

- Improving the quality of the patient's healthcare
- Reducing the cost and time all along the healthcare process
- Improving medical data management and archiving
- Ensuring in care continuity throughout the health pyramid system
- Building real-time health surveillance system (alert, prevention and control)
- Designing clinical decision support system (diagnosis aid, therapeutic suggestion, medical image interpretation, etc.)
- Drawing reliable statistics
- Setting up dynamic dashboards
- Driving clinical research on real world data