

AUB Health (AUB’s “Epic” IT system) Live at the American University of Beirut Medical Center



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On August 1, 2016 the American University of Beirut Medical Center (AUBMC) announced its plan to implement “Epic” by November 3, 2018 and replace its existing homegrown electronic records (1). This formal event in AUB’s New York offices was the culmination of sixteen years of exploration, trials and errors, work with sister hospitals and government institutions to identify a high standard tool that will serve patients well and move Lebanon care delivery to higher standards. On November 3, 2018, AUBHealth (AUB’s Epic system) went live on time! This brief article is a review of the American University of Beirut Medical Center health information technology transformation journey.

Beginnings of Information Technology (IT) journey at AUBMC

In 2004, AUBMC’s IT strategic direction was to build inhouse, procure third party solutions and integrate them. Mr. Joe-Max Wakim, current AUBMC IT director, succinctly summarized the history of development of AUBMC’s Health Information System at a national conference in 2014 (2). As in most organizations, automation at AUBMC started in the 1980s with billing

procedures, followed by a Laboratory Information System (LIS), Radiology Information System (RIS), a Master Patient Index to integrate the various databases in the various departments and so on.

In 1998, the University Health Services outpatient clinics were fully electronic with papers only used to communicate orders and prescriptions to other units (3). Many other institutions in Lebanon had also realized similar achievements around the same time. The idea seemed simple: replace paper forms with electronic forms to allow easy retrieval of information and report generation. It did not take us much time to realize that such thinking was simplistic and we engaged in a quest for an “Integrated System” that would allow a more sophisticated and “meaningful use” of collected data.

Meaningful Use

Our challenge in the 2000’s decade was to figure out how the data we were collecting could improve patient safety and improve the physician efficiency. The challenge was (and still is) to deliver the “wisdom” of all the data collected at the point of care and not in hind sight as a review or quality report only. We learned this from the advances in Health Informatics regulations going on in the US which coined the term “Meaningful Use” in 2009 to incentivize IT developers to improve the abilities of their “Electronic Health Records” (EHR) and health providers to adopt these EHRs. (3,4)

To build or to buy

The standards set by US regulators made it challenging for hospitals with limited IT resources to continue in house development. Those same standards were also embraced by major IT vendors and regulators all over the world. It made sense that data on allergy recorded by a nurse in an outpatient clinic should be available to an emergency room doctor caring for an unconscious patient. Those simple clinical integration issues required sophisticated

programming and maintenance that is hardly available at any IT hospital unit. Building one’s own “meaningful” Health Information System became gradually an impossibility especially with regulators imposing certification standards on EHRs to make sure they are not simple data repositories (6). Upcoming advances that leverage the use of artificial intelligence or machine learning would be prohibitively costly to implement.

Components of an Electronic Health Record (EHR)

With the advancement of technology and its increased ease of use, data collection became standard almost in every hospital service area. Classically we think of EHR as having clinical and non-clinical components. The non-clinical components relate to finances, stock, scheduling transport and other business operations. The clinical components are related to health providers’ documentation, order entry, results review and care coordination with colleagues and patients. Sometimes we refer to the pure patient care clinical components as EMR (Electronic Medical Record) and the Health Record as the more encompassing record related all aspects of patient care clinical and non-clinical. A certified EHR needs to have a minimum of these components set up in specific way to ensure patient safety (6).

Some Essential Components in an EHR (6)	
(1) Computerized provider order entry—medications.	
(2) Computerized provider order entry—laboratory.	
(3) Computerized provider order entry—diagnostic imaging.	
(4) Drug-drug, drug-allergy interaction checks for order entry	
(5) Demographics.	
(6) Problem list.	
(7) Medication list.	
(8) Medication allergy list.	
(9) Clinical Decision Support (CDS)	
(10) Drug-formulary and preferred drug list checks.	
(11) Smoking status.	
(12) Family health history.	
(13) Patient-specific education resources.	
(14) Implantable device list.	
(15) Social, psychological, and behavioral data	
(10) Transitions of care	
(11) Data export	
(12) Care plan	
(13) Clinical quality measures	
(14) Authentication, access control, and authorization	
(15) Auditable events and tamper-resistance	
(16) Transmission to registries (Cancer, immunization, ...)	
(17) Transmission to public health agencies—reportable cases or results	
(18) Patient safe access to one’s own data	
(19) Clinical data exchange capabilities	

EHR Adoption

The sophistication of an EHR adoption by a hospital is now measured using HIMSS classification (7) which explores the number of hospital functions turned paperless. The model lists all the components of an EHR and assumes that these components are “integrated” and not independent electronic islands. For example: Hospital food services keeps data on the patient’s meal intake as much as an inventory of its supplies. The dietetics service also collects and needs to share similar information with the treating physician and food services and may be with the pharmacists as well. Food services, dietary, physician and pharmacy need to be able to see and use the same data “meaningfully” to prevent medical error, improve patient care and alert each providers to better service.

Middle East EMR Adoption Model (EMRAM)	
Stage	Cumulative Capabilities
Stage 7	Complete EMR; Clinical Care Document transactions to share data; Data warehousing; Data continuity with Emergency Department, ambulatory, outpatient
Stage 6	Physician documentation (structured templates), full Clinical Decision Support System (variance & compliance), closed loop medication admin
Stage 5	Full R-PACS
Stage 4	Computerized Physician Order Entry, Clinical Decision Support (clinical protocols)
Stage 3	Nursing / clinical documentation (flow sheets), Clinical Decision Support System (error checking), PACS available outside Radiology
Stage 2	Clinical Data Repository, Controlled Medical Vocabulary, Clinical Decision Support, may have Document Imaging; Health Information Exchange capable
Stage 1	Ancillaries - Laboratory, Radiology, Pharmacy - All Installed
Stage 0	Laboratory, Radiology, Pharmacy Not Installed

<http://www.himssme.org/analytics/emram/index.asp>

A list of Middle East hospitals at stage 6 is shown online at HIMSS Middle East website (7). At the time of writing this article, there were 15 such hospitals in UAE, 13 in KSA, 2 in Qatar and one in Egypt.

Integration: The AUBHealth edge

The EMRAM model shows the various components of an EMR. The integration among them is what makes an EHR unique and provides better and safer care. AUBHealth is stage 6 eligible on go live, similar to major vendors. However, it offers us additional advantages such as:

1. Provision evidence based and targeted patient care
2. Engaging patients in their own care through patient portal and hand held applications
3. Allowing access to records from a multitude of devices through portals and tablets and phone applications
4. Allowing interaction of all health providers among each other
5. Providing health care analytics reports at the point of care
6. Advanced interoperability with other Epic or major vendors users.

Privacy

No description of an EHR is complete without addressing the concern we all have when our personal data becomes electronic. Regulation of EHRs privacy in the US is mostly addressed through the Health Insurance Portability and Accountability Act - HIPAA (9) In Europe, privacy protection is addressed in the European General Data Protection Regulation (EGDPR) (10). Both laws govern how and when and with whom Protected Health Information (PHI) is shared and they both affect us in Lebanon in many ways especially when we deal with US or European citizens. EHRs compliant with HIPAA provide built in mechanisms to protect and audit access to all PHI and transactions. The extent of limitation of PHI access has to be balanced with the health and safety benefit of all health providers having easy access to a person's medical record. The critical element in this balance is building an institutional culture respect for privacy and instituting modes of operation to safeguard it. EHRs are only tools and they can become as useful or safe as we configure them, like any technology. AUBHealth has been configured to be HIPAA privacy compliant and strict rules of access and monitoring have been set at implementation.

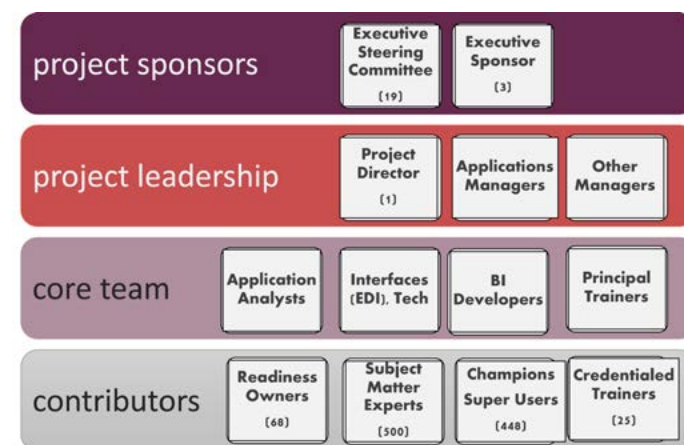
AUBHealth Implementation and Change Management

We listed many of the reasons that guided us in our

choice of vendor. However, we all know that there are a dozen vendors who fall in the same league and satisfy most of these criteria. What tipped AUBMC to its choice was the promise of a collaborative approach and transfer of knowledge. AUBHealth implementation was not a simple (or complex) software installation. AUB dedicated more than 100 team members to learn Epic installation, configuration, training and maintenance over 18 months. The application team reviewed all clinical and administrative workflows, policies and procedures and engaged around 25% of its staff in various roles to configure the system. We did not rely on any outside consultant or support. AUBHealth implementation was a collaborative project and the vision was to acquire all knowledge to be able to configure and maintain the system and be able to ultimately share the acquired know how with institutions in Lebanon. The implementation was a core part of AUBMC's mission to serve its community and 2020 vision to transform service and education delivery.

AUBHealth Guiding Principles & Team

1. Patient Safety
2. Clinical & Operational Ownership
3. Standardized Care



4. Adoption of Best Practices
5. Favoring Ease of Use

Next steps

Adoption of new technologies engender significant change in behavior. We all know how smart phones changed how we socialize or cars where we live and so on. EHRs will affect us (patients, doctors, nurses, pharmacists, hospitals and regulators) equally. Many of our common ways will

have to be changed: how we write prescriptions, consult a colleague, bill a procedure, schedule a surgery, etc... Our next year challenge at AUBMC will be to build more workflows that lead to better efficiency and safer care. At the national level, we plan to share our experience and what we learned with our students at AUB and colleagues in other hospitals and universities. We will be working closely with the Ministry of Public Health, the Ministry of Labor (NSSF), Third Party Administrators, Professional Orders (Physicians, Pharmacists and Hospitals) and WHO country office to use established standards for the secure exchange of health care information and develop standards for Lebanon similar to the US and Europe to protect our patients' privacy and ensure them a safer care delivery.

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Info

Une IRM Peut elle Déterminer votre QI

Des chercheurs espèrent être bientôt capables de mesurer l'intelligence d'une personne grâce à une simple image de son cerveau. Un premier pas vers la possibilité de recourir à l'IRM pour diagnostiquer des maladies mentales. Aujourd'hui, l'imagerie par résonance magnétique fonctionnelle cérébrale (IRMf) permet de diagnostiquer des tumeurs ou des anévrismes. Demain peut-être, grâce aux travaux d'une équipe du California Institute of Technology (Caltech, États-Unis), cet examen permettra-t-il de pointer les patients souffrant d'autisme, de schizophrénie ou même d'anxiété. Première étape : parvenir à évaluer le QI d'une personne à partir d'une image produite par IRMf. Rappelons que cette technique d'imagerie cérébrale montre l'activité des différentes aires du cerveau en détectant des changements dans les flux sanguins. Et selon les conclusions des

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chercheurs américains, l'intelligence d'un individu peut se lire dans l'activité de son cerveau, même lorsque celui-ci n'est pas sollicité. Pour arriver à ces conclusions, ils ont fait appel à un algorithme d'apprentissage automatique. Ils lui ont présenté quelque 900 images de cerveau, leur faisant correspondre un score de QI. L'algorithme s'est alors montré capable d'estimer les QI de manière « statistiquement significative ». Les erreurs observées sont notamment attribuées à la relative piètre qualité des images données par l'IRMf. Ainsi les chercheurs les qualifient-ils « d'images grossières et bruyantes de ce qu'il se passe dans un cerveau ». Mais ils ont bon espoir de pouvoir encore améliorer leur méthode. Ils ont ainsi déjà commencé à « nourrir » l'algorithme d'autres informations que celles données par le QI concernant le niveau d'intelligence des personnes testées.