

Establishing an Electronic Health Center of Research Excellence (E-CoRE) within the Kingdom of Saudi Arabia

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Abstract

Since 2002, the Kingdom of Saudi Arabia has been trying to build a research, training, and educational program for electronic health within the country. Recently, King Saud Bin Abdul Aziz University for Health Sciences (KSAU-HS) in association with the National Guard Health Affairs has proposed the establishment of a research center of excellence for electronic health care. The Electronic Health Center of Research Excellence (E-CoRE) will strive to become a world leader in e-health research and training through: 1) innovation and research excellence; 2) improving the quality of health services; and 3) reduce the cost of health care. The proposed center (E-CoRE) will:

- 1) Conduct research activities focused in the areas of e-health which are of national importance.
- 2) Create an environment of scientific research to enable researchers and graduate students to conduct innovative research and develop advanced technologies to assume a leadership position in the Kingdom in the various areas of e-health.
- 3) Strengthen the relationship between sectors of government, the private sector, and researchers in the areas of e-health.
- 4) Strengthen collaboration in the areas of research in e-health among Saudi universities, research centers, and other international universities and international research centers.
- 5) Attract capital for investment in projects emanating from the research ideas in the sphere of e-health scientific experience in the areas of e-health.

This paper details the planned proposal for the center where its core set of values will focus on acknowledging our researchers, creating a high quality research environment, producing relevant research, work in collaboration, and in atmosphere of the utmost respect towards colleagues and society.

Keywords

Health Informatics, E-Health, Saudi Arabia, National Guard Health Affairs, Research, Center of Excellence.

1.0 Introduction

1.1 The Need for Electronic Health Center of Research Excellence (E-CoRE)

The Kingdom of Saudi Arabia has one of the best health care systems in the Middle East. One of its largest and best healthcare institutions is administered by the National Guard Health Affairs (NGHA). The primary goal of NGHA is to become a leading healthcare facility in the Middle East, as well as a globally recognized healthcare system with outstanding clinical services, high quality education/training and cutting-edge research. NGHA has recognized that maintaining or improving the health outcomes of the country will require fundamental change in the way healthcare is delivered. Given this reality, NGHA is moving towards a system where each interaction between patients and care providers achieves maximum impact on health outcomes.

A change in the system will require a fundamental shift in the way information is, produced,

accessed, and shared across the healthcare system. NGHA is currently working to move away from a reliance on tools such as pen, paper, and human memory to an environment where patients, care providers, and healthcare administrators are securely accessing and sharing information in real time across various geographic regions and healthcare sectors. NGHA has been committed to e-health by investing in clinical and non-clinical information systems and in the creation of a dedicated college of health informatics, in 2005, housed at King Saud Bin Abdulaziz University for Health Science (KSAU-HS).

In this paper we outline the objectives of a proposed Saudi center of research excellence in Electronic Healthcare (e-health) that will be based at the King Saud Bin Abdul Aziz University for Health Sciences, College of Health Informatics. The purpose of the research center will be of national and strategic concern as Saudi healthcare

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institutions move towards a more electronic healthcare environment. On the national scale, the center will work towards coordinating a healthcare system where each patient and an authorized healthcare provider will be able to access an electronic record, thus improving health outcomes and reducing possible errors in diagnosis, medication, and treatment. In addition, the system will help to reduce the cost of healthcare services that result from unnecessary duplicated processes. For example, costs can be reduced by avoiding duplication of diagnostic and therapeutic interventions through health information sharing by care providers. On a more strategic level, the research center will aim to become a leading institution for e-health research in the Middle East and the world. A Saudi e-health research center of excellence will create opportunities to establish partnerships with international institutions and develop a culture of learning and sharing of information that will benefit the country.

1.2 E-Health in Saudi Arabia

E-health initiatives in Saudi Arabia are not new. Since 2002, Saudi Arabia has taken a key interest in utilizing e-health applications to improve the state of healthcare within the country. In 2002, a meeting was conducted around the development of a national e-health plan for the country. The group identified several key areas for the development of e-health within the country which were: to establish a health informatics society; to establish a college for the study of health informatics; establish a center of excellence for health informatics; improve the state of health records; and expand the use of tele-health.

In 2004, a key development occurred with the creation of the health sciences university, King Saud Bin Abdul Aziz University for Health Sciences (KSAU-HS) in 2004. The creation of the college of Health Informatics was to support the vital role that information and communication technologies are having on the healthcare sector. Over the years, Saudi healthcare providers have been increasingly relying on advanced health information systems to support their work. However, a national effort to develop an e-health framework for the country has yet to be addressed. As a result, a large number of different systems that use different proprietary data formats and processes were in use in the large regional hospitals without being integrated with each other. Changes are occurring within the country as organizations such as NGHA, have successfully implemented a large scale healthcare information system that span three remote sites. The system allows authorized medical practitioners to access the patients' electronic medical records from any of these sites.

Also, the Saudi Association for Health Informatics (SAHI) has been established since 2005 under the direct supervision of KSAU-HS. The goal of the association is to improve health informatics education, training, and system implementation throughout Saudi Arabia. The organization has been supported by key members from the government and has been identified as playing an important role in improving the state of health informatics within the country.

Also, two e-health conferences have occurred in 2006 and 2008, and another one is scheduled for 2010. The purpose of these conferences is to create an e-health awareness within the country. These conferences bring clinicians, administrators, students, and vendors together with the objective of learning about the current state of e-health within the country and what is required to be improved.

All these initiatives, have paved the way for establishing a research excellence in E-health within the country.

1.3 Why at KSAU-HS?

The human health and welfare is the focus, purpose and goal being sought by every official in the Kingdom. The objective of establishing the University of King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) is to be a local, regional and international leader in health sciences research and training. The initiative of creating the university was headed by King Abdullah and his Crown Prince. Both of them have been champions of healthcare and healthcare research within the country.

To be effective, the University's contribution to the Kingdom requires education, training and guidance to the clinical and administrative staff to turn their ideas and projects into economic realities that will create new research, training, and economic opportunities in the country.

The creation of an electronic healthcare center of research excellence (E-CoRE) at KSAU-HS will help Saudi Arabia to achieve its goals in the development of science and technology. E-health is about taking advantage of information technology, digital communications, and the internet for the purposes of improving health. E-health is also interested in using medical data, data storage, retrieval and information management in healthcare to achieve the following goals: a) increasing the quality of healthcare; b) improving the medical processes within a healthcare organization; and c) improve hospital efficiency. These can be achieved through the development of e-health applications related to: health information systems, health information management, resource management systems, biomedical engineering, digital telemedicine and electronic health record.

KSAU-HS focuses on the subject of e-health and thus has allocated resources to create e-health awareness in the form of conferences and workshops. For example, in 2008, a conference on e-health was hosted by KSAU-HS under the title: Towards National e-health. Speakers from various academic disciplines, professions, countries and organizations shared their knowledge and experiences. Case studies and lessons learned were presented as well as updates on national e-health initiatives. Additionally, pioneering technology companies in healthcare participated in the educational sessions.

Therefore, KSAU-HS will provide a fertile ground for research excellence in e-health since it has 1) the only college dedicated to the field; 2) the only graduate program in the region; 3) is connected with Saudi Association for Health Informatics;

4) working towards accreditation; and 5) is establishing international partnerships for research and training purposes.

2.0 Objectives of the Center for Research Excellence

2.1 Vision, Mission and Goals of E-CoRE

The Electronic Health Center of Research Excellence (E-CoRE) will strive to become a world leader in electronic health through innovation and research excellence. To achieve this, the center will adopt the following strategic directions:

- 1) To conduct research activities focused in the areas of e-health which are of national importance.
- 2) Create an environment of scientific research to enable researchers and graduate students to conduct innovative research and develop advanced technologies to assume a leadership position in the Kingdom in the various areas of e-health.
- 3) Strengthen the relationship between sectors of government, the private sector, and researchers in the areas of e-health.
- 4) Strengthen cooperation in the areas of research in e-health among Saudi universities, research centers, and other international universities and international research centers.
- 5) Attract capital for investment in projects emanating from the research ideas in the sphere of e-health scientific experience in the areas of e-health.

2.2 Values of E-CoRE

The realization of the research center's vision and mission is based on a core set of values:

- **Acknowledgement:** E-CoRE will recognize excellence in research of its investigators and students and the outstanding work they carry out in e-health research.
- **Quality:** E-CoRE will ensure that its research investigators and students will have access to leading-edge tools and work in an environment that is intellectually stimulating and rewarding.
- **Relevant:** E-CoRE will recognize the importance of e-health research within a clinical environment and will commit to making E-CoRE research relevant to improving the health of our population.
- **Collaboration:** E-CoRE will work with multidisciplinary teams and will encourage researchers and students to work with industry, government and other international universities and research centers.
- **Respect:** E-CoRE will ensure that all who work for the center will be treated with the upmost respect.

3.0 Conceptual Framework of E-CoRE

The Saudi Ministry of Higher Education has noted that one of its key aspirations moving forward is the development of a knowledge economy that is "directly based on the production, dissemination and use of knowledge and information in various production and service activities." (MoHE, 2010) This aspiration is consistent with the aspirations of the e-health center of research excellence. At E-CoRE, the center will be guided by a conceptual framework that is comprised of the production, dissemination, and use of knowledge. The framework is grounded in the processes outlined by the ministry.

3.1 Production of Knowledge

The production of knowledge is a corner stone of every research center. At E-CoRE knowledge produced will be a result of **research efforts, innovation** and **collaboration**. For research, E-CoRE will focus on four important e-health areas that have been identified as important to the kingdom and the general field of e-health. These four **research** fields are:

- 1) **Electronic Health Record** –Electronic health record systems are computerized records of health information specifically designed to help clinicians by providing accessibility to complete and accurate data, alerts, reminders, clinical decision support systems, links to medical knowledge and other aids (Latroux & Echenwald-Maki, 2006). Electronic health records systems are increasingly being used in the country within major public and private institutions. Few research have been conducted within Saudi Arabia on evaluating the systems and their impacts on health outcomes, clinical decision-making, or how to use information from the EHR for research and quality improvement purposes.
- 2) **Telehealth** – Telehealth has been defined as the use of "of telecommunications technology, including satellite links, dedicated line connections, interactive television systems and Internet connections, to provide healthcare services to patients at some location separate from the provider." (Gouston & Stours, 1997). Since 2000, telehealth has been identified by leading health informatics experts within the country as an important area that requires further development. There are many rural areas within the country that have few access to primary care services within their communities. The use of various telehealth services will provide healthcare services to underserved areas within the country. Research into the types of services needed for rural communities; the impacts of telehealth services on health; the cost savings accrued are all potential areas of research within this domain.
- 3) **Human Computer Interaction** – "Human-computer interaction (HCI) is a multidisciplinary field in which psychology and other social sciences unite with computer science and related technical fields with the goal of making computing systems that are both useful and

usable" (Olson & Olson, 2003). Usability studies have shown that poor health information system application design can cause clinicians to enter inaccurate data within the system (Cimino, Patel and Kushniruk, 2001). Usability studies for the healthcare systems within Saudi Arabia are required because of the heavy adoption of healthcare systems that occur in healthcare organizations. Poorly designed systems can lead to medical errors, lost time, and data reliability and validity issues. It is important to evaluate and improve health information systems within Saudi hospitals to avoid problems that occur as a result of poor design.

- 4) **Consumer Informatics** – Consumer informatics is the study of “consumer interfaces in healthcare systems or information supplied to patients using advanced information and communication technologies” (Houston and Ehrenberger, 2001). There is an increasing interest within NGHA and other Saudi hospitals in educating the public and creating awareness around health. There are some initiatives underway such as a patient portal for educational awareness around diabetes. Other initiatives are needed to take place and are to be evaluated.

As for **innovation**, the center will focus on the development of new e-health technologies, and new research methodologies for e-health. E-CoRE will focus on the development of new research methods in e-health and the development of new technologies that are patented under KSAU-HS and NGHA.

As for **collaboration**, the center will focus on working with both industry and other local and international academic institutions on e-health related projects. E-health is a multidisciplinary domain that includes elements of computer science, engineering, medicine, psychology, sociology, organizational behavior and other areas. It is important that E-CoRE develops local connections with engineering, computing science, psychology, sociology and other departments while conducting research activities in e-health. Furthermore, international collaboration is important for information sharing and growth. KSAU-HS has already started communication with other universities in Canada, USA, and England to work collaboratively on e-health related research projects.

To summarize, knowledge production, as defined at E-CoRE, includes the development of research, the creation of innovation, and making the right connections with local and international institutions within the field of e-health. This is what comprises the knowledge production of the proposed center.

3.2 Dissemination of Knowledge

At E-CoRE, the center will ensure that research information generated will be disseminated to clinicians, administrative staff, and the patients. Each research project carried out through the center will have a knowledge dissemination program. In general, research dissemination assumes that an extra step should be added

to the research process, a step in which researchers identify knowledge relevant to the users of knowledge and make it accessible to them (Landary, Lamara, & Amari 2001) either through direct mailing, workshops, presentations, conferences, multimedia, or the internet (Lomas, 1993). The goal of these methods is to create a sense of awareness of and influence on the users to use the research information in their decision-making process.

At the center, we plan to employ knowledge disseminators that will disseminate research knowledge produced within E-CoRE to the appropriate group that will benefit from this newly created knowledge. The knowledge disseminator activities will include, but are not limited to, the following activities: 1) using effective communication methods in reports; 2) making information relevant to decision-making needs; 3) using graphics and colour in the dissemination process (CHSRF, 2004); 4) preparing and conducting meetings to plan the scope of projects with users; 5) scheduling meetings to discuss progress of preliminary results with users (Landry, Lamara, & Amari 2001); 6) deciding on what information should be transferred; 7) specifying decision-making audience; 8) choosing a credible knowledge disseminator; 9) specifying a strategy for dissemination; and 10) evaluating the effects of the dissemination process (Lavis et al. 2003).

3.3 Use of Knowledge

After the dissemination of information has been made by the knowledge disseminators, it is important to determine the means by which health system decision-makers will use the information to formulate decisions. Both researchers and the knowledge disseminators will work with clinicians and administrative staff to ensure that they understand the data and how it can be applied within their local settings.

4.0 Conclusion

This paper outlined the objectives of the center, its research priorities, and values. We anticipate that E-CoRE will strive to become a world leader in Electronic Health (e-health) research and training through: 1) innovation and research excellence; 2) improving the health of our population; and 3) reduce the cost of health care. E-CoRE will play an important part in improving e-health research within the country, regionally, and internationally.

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