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Developing a Saudi Health Informatics Competency Framework: A Comparative Assessment

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Abstract

In 2018, the Saudi Commission for Health Specialties (SCFHS) created a national working group composed of key health informatics (HI) professionals, researchers and educators tasked with the development of a draft competency framework for Saudi HI professionals. Over an eight-month period, the research group collected data obtained from literature sources (both academic and grey), international competency standards, participant surveys, focus groups, and expert panel reviews. Through multiple rounds of discussions and graphic visualisation of the information collected using Microsoft PowerPoint and flip charts, the data were summarised and a visual representation of the proposed SHICF was developed. The result of this effort was the development of the first Saudi Health Informatics Competency Framework (SHICF). This paper provides a comparative assessment between the Saudi HI competency framework development and that of other internationally recognised HI competency development frameworks. Challenges related to the development of the SHICF are also discussed.

Keywords:

Health Informatics, Professional Competency, Saudi Certification.

Introduction

Obtaining formal recognition for Health Informatics (HI) as a licensed and credentialed profession was the aim of many leading HI professional organisations such as Canada's Health Informatics Association and HISA (Health Informatics Society of Australia). Projects were carried out to identify the core HI domains and competencies that would describe the performance and set pathways of a health informatics professional. Due to the evolving and multidisciplinary nature of health informatics, it has been a challenge for HI professional organisations to define the competencies and core domains of HI in a manner that would satisfy the variety of stakeholders practicing the HI profession. Nonetheless, this has not stopped HI professional organisations from trying to develop core domains and competencies to define the HI field.

In March 2018, the Saudi Commission for Health Specialties (SCFHS) invited key health informatics educators and researchers to participate in a national working group which, over an eight-month period produced the first competency framework for Health Informatics professionals in Saudi Arabia. The purpose of this paper is to compare the competency development project that was carried out in Saudi Arabia with similar projects in five internationally recognised HI professional organisations and identify the challenges that the Saudi national competency working group faced in the development of SHICF. We anticipate that our work will provide insights for future countries and/or regions when conducting similar work.

Methods

As part of the Saudi HI competency framework development project, the working group searched the literature and identified five primary organisations that previously created HI competency frameworks from Europe, North America and Australia: Digital Health Canada, formerly known as COACH [1], The International Medical Informatics Association (IMIA) [2], EU-US eHealth Collaboration Initiative [3], the Certified Health Informatician Australasia (CHIA) [4], American Medical Informatics Association (AMIA) and CAHIIM [5]. The HI competency frameworks for each country were reviewed and studied through a comparative analysis between the work the different organisations conducted in the creation of their own HI competency framework. An online discussion also took place between the key research members involved in this study between October 1 and November 15, 2018 to identify the challenges and issues relating to the development of the Saudi HI competency and domain-based framework. Comparisons relating to project's objectives, approaches of competency development, key outputs (framework), and framework applications were conducted between the different HI competency and domain-based HI professional frameworks. Figure 1 summarises the methodology followed.

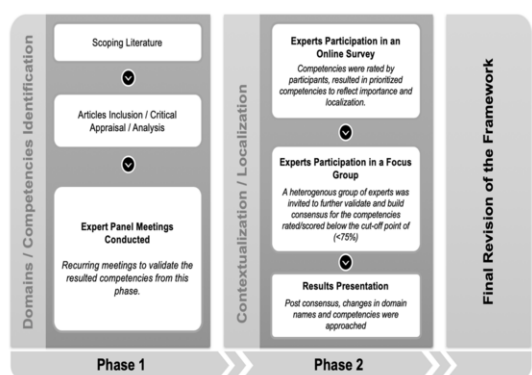

Figure 1– Methodology Followed in Developing the Saudi Health Informatics Competency Framework (SHICF).

Table 1 – Summary of the Comparative Analysis of Competencies Development Projects of Five Leading Organisations in HI with the Saudi Project

Country	Canada	Switzerland	Europe	Australia	USA	Saudi Arabia
Body/ organisation/ initiative description	**Digital Health Canada, formerly known as COACH:** Canada's Health Informatics Association is the organisation focused on advancing health informatics (HI) practices and professionalism in Canada.	**The International Medical Informatics Association (IMIA)** is an independent organisation established under Swiss law in 1989. IMIA plays a major global role in the application of information science and technology in the fields of healthcare and research in medical, and health informatics.	**EU-US eHealth Collaboration Initiative (Workforce Development Group):** Memorandum of Understanding (MoU) was signed between the European Union and the United States (The Office of the National Coordinator for Health Information Technology (ONC). Two work groups were launched: 1. Interoperability. 2. Workforce Development.	**CHIA (Certified Health Informatician Australasia):** It was launched by the Health Informatics Society of Australia (HISA), the Australasian College of Health Informatics (ACHI), and the Health Information Management Association of Australia (HIMAA).	**Health Informatics Accreditation Council (HIAC):** AMIA joined the CAHIIM and established HIAC. It was charged with revising the existing CAHIIM Curriculum Requirements document and the "Accreditation Standards for Masters' Degree Programs in Health Informatics".	**Saudi Commission for Health Specialties (SCFHS)**: National Health Informatics Competency Working Group was established as part of the Saudi National Health Informatics Advisory Committee.
Project's foundation year	2007	2010	2010	2013	2015	2018
Project's main objective/s	To set out a common core or shared set of skills, knowledge, attitudes, and capabilities necessary to effectively perform as a Health Informatics Professional.	To provide a framework for individual curriculum development in the field of biomedical and health informatics (BMHI).	To define standards, develop competencies and produce useful tools that support this work.	To develop a new competency framework based on the existing frameworks but with a focus on the Australian healthcare system.	To build CAHIIM Accreditation Standards to reflect the emergent knowledge, skills, and attitudes reflecting the foundational domains set forth in the AMIA White Paper of 2012.	To develop a new competency framework but with a focus on the Saudi healthcare system.
Approach for competency development	- LR (Journal articles, textbooks and the Internet were reviewed). - Existing provincial, territorial, national and international competency frameworks pertaining to HI were reviewed. - Workshops were carried out to revise list of competencies obtained from LR. Participants were leaders in the field,	- Establishing a Working Group on Health and Medical Informatics Education - Reviewing the publications by organisations on the development of competencies - Revising the existing international recommendations in health informatics /medical informatics education.	Members met every week for 20 months: 1. Narrowing down the focus to one setting where roles could be mapped to and evaluated against Health IT competencies 2. Collating and mapping over 250 job roles and careers in the Acute Care setting in the EU and US 3. LR (Gathering competencies from 15+ organisations from both the EU and US)	Three organisations (AMIA, IMIA, COACH) were reviewed. Any repetitions, overlaps, and redundancies were removed, and the new competencies were restructured, ultimately producing the final competency framework.	Through an iterative process of review and revision by the AMIA Accreditation Committee (AAC) of organisations, papers, and recommendatio ns pertaining HI.	- LR (published and grey literature were reviewed). - Existing international competency frameworks pertaining to HI were reviewed. - Seventeen expert panel meetings - Online survey followed by a focus group (workshop) were carried out to revise

	representative of the HI profession from across Canada.		4. Organising, levelling and categorising the competencies. 5. Reviewing and reworking the competencies.			list of competencies obtained from LR. Participants were leaders in the field, representative of the HI profession from across Saudi.
Key Output	Health Informatics Professional Core Competencies Framework (version 3.0), released 2012. It includes - 3 domains, - 7 areas of competencies, and - 51 competencies.	A three-dimensional framework: - 1) professionals in healthcare, - 2) type of specialisation in BMHI, and - 3) stage of career progression.	HitComp tool (http://hitcomp.org), released 2015. It includes - 5 domains, - 33 areas of skills, and - 1000 competencies.	CHIA Health Informatics Competencies Framework (edition 1), released 2013. It includes 6 domains and 52 competencies	Health Informatics Competencies Framework, released 2016. it includes 10 domains and 22 competencies.	Saudi Health Informatics Competencies Framework (version 1.0), released 2018. It includes 6 domains, 22 subdomains or areas of competencies, and 92 competencies.
Visual illustration of competencies?	Yes	No	No	Yes	Yes	Yes
Framework Applications	- Establishing Professional certification based on the core HI competencies required in the Canadian health system. - Establishing a Career Matrix and the Role Profiles. - Setting the minimum requirements in terms of skills, knowledge, understanding and capabilities that will enable a candidate to perform in a professional environment. - Defining more clearly the body of knowledge underpinning this discipline.	Accreditation of BMHI educational programs. Curricula guidelines for academic institutions that define minimum-level competencies required for each level and knowledge/skill domain. Recommendations for Bachelor, Master and Doctoral Programs in Biomedical and Health Informatics In future, IMIA will also develop teaching credentialing criteria to serve as a guide for teachers wishing to participate in BMHI education.	- Hiring Manager – needs all candidates to have eHealth skills - Technology College – developing new eHealth certificate program in management, quality and improved outcomes - ICT/IT Specialist – wants to transition to eHealth	- Providing the context in which the questions for the exam have been developed. - Setting guidelines for recruiting purposes, definitions of career pathways, or the design of educational and training activities. - Setting the minimum requirements in terms of skills, knowledge, understandings and capabilities that will enable a candidate to perform in a professional environment. - Defining more clearly the body of knowledge underpinning this discipline.	- Curriculum development - Accreditation quality assessment for graduate (Master's level) education in applied health informatics. - Setting the minimum requirements in terms of skills, knowledge, understandings and capabilities that will enable a candidate to perform in a professional environment. - Defining more clearly the body of knowledge underpinning this discipline.	- Establishing a professional credential certification based on the core HI competencies required in the Saudi healthcare system. - Setting the minimum requirements in terms of skills, knowledge, understanding and capabilities that will enable a candidate to perform in a professional environment. - Defining more clearly the body of knowledge underpinning this discipline.

Results

Table 1 presents a high-level summary of the competency development projects in Europe, Canada, Australia, United States and Saudi Arabia. The following sub-sections provide a summary of the body/organisation initiative, foundation year of the project, the project's main objectives, approach for competency development, key outputs, and visual illustrations of the competency framework. It also illustrates challenges and issues relating to the development of the Saudi HI competency framework.

Foundation Year of the Projects

When compared to other countries, Saudi Arabia is the latest country to join in developing a HI competency framework for HI professionals. Canada was the first to begin this task in 2007, followed by Europe in 2010, Australia in 2013, and the United States in 2015. Saudi Arabia's delay in the development of a HI competency framework can be attributed to the novelty of HI education within the country, undefined roles of HI professionals working within the Kingdom, and recognition of HI as a health profession vs a computing science profession.

Project's Main Objectives

Digital Health Canada and CHIA aimed to develop new competency frameworks that set out a core list of knowledge and capabilities necessary to effectively perform as a HI professional. IMIA and HIAC however built accreditation standards and guidelines for curriculum development that reflect the key knowledge and skills in HI as a discipline. On the other hand, EU-US eHealth Collaboration Initiative established Workforce Development that aimed at defining a variety of healthcare roles and careers, levels and areas of knowledge.

In Saudi Arabia, at the beginning of the project, there was a debate among the panel's members on whether we should adapt an existing competency framework or build a new one. Decision was made to build our own framework for the following reasons:

- EU-US eHealth Collaboration Initiative project was not designed to establish a professional credential certification which was an essential aim for our work in Saudi. A total number of 1000 of competencies were identified which means that they did not set the minimum requirements in terms of skills and knowledge to perform in a professional environment.
- HI is a rapidly evolving field. Some competencies were outdated; e.g., IMIA's framework was developed from 2010.
- The Australasian framework was built with a focus on the Australian healthcare system.
- AMIA and CAHIIM competencies were designed for curriculum development, not for providing professional credential certification.

Approaches for Competency Development

The comparative analysis of competencies development projects showed that most of the identified leading HI professional organisations (e.g., COACH, IMIA, etc.) had different project objectives but similar approaches for competency development. For example, review of published and grey literature, review of existing national and international competency frameworks pertaining to HI, and workshops and/or panel meetings were carried out by all HI professional organisations around the globe.

The Saudi approach was different in a number of ways than other approaches (see Table 1) primarily due to the complexity, diversity, and novelty of health informatics education and professional practice within the country. Our approach focused on building consensus among the diverse academic and professional perspectives by generating a list of key professional and educational stakeholders and inviting them to participate in both an online survey and a focus group session to garner their feedback on the proposed Saudi HI competency framework.

The online survey asked the participants to rank the competencies in order of importance. Once the survey and analysis were complete, the stakeholders were invited to a focus group session to discuss the findings and garner consensus for selecting the key elements of the Saudi HI competency framework. The findings were presented to the group via a PowerPoint presentation and each element of the proposed Saudi HI framework was discussed until a consensus was reached either to include, exclude or postpone discussion at a later date for the relevant competency discussed.

Key Outputs

EU-US eHealth Collaboration Initiative developed HitCopm tool (http://hitcomp.org). HitComp is a searchable database designed for interested parties in healthcare information technology and eHealth such as educators, workforce developers, students, eHealth managers, etc. It defines 5 domains (Administration, Direct Patient Care, Engineering/Information Systems/ICT, Informatics, and Research/Biomedicine), 33 areas of skills, and 1000 competencies.

Digital Health Canada built the Health Informatics Professional Core Competencies Framework (version 3.0). It includes 3 domains (Management Science, Health Science, and Information Science), 7 areas of competencies, and 51 competencies. Similarly, HISA developed CHIA Health Informatics Competencies Framework (edition 1). It has 6 domains (Management Science, Health Science, Information Science, Information and Communication Technology ICT, Scientific skills of Health Informatics, Human and Social Context) and 52 competencies.

AMIA and CAHIIM established the Health Informatics Competencies Framework for curriculum development that includes 10 domains and 22 competencies. This framework has six major domains: Health, Information Science and Technology, and Social and Behavioural Science, Professionalism, Interprofessional Collaborative Practice, and Leadership. The first three domains intermingle and provide four co-mingled domains: Health Information Science and Technology, Human Factors and Sociotechnical Systems, and Social and Behavioural Aspects of Health. On the other hand, IMIA built a three-dimensional framework. These dimensions are: professionals in healthcare (e.g. physicians, nurses, BMHI professionals), type of specialisation in BMHI (IT users, BMHI specialists), and stage of career progression (bachelor, master, doctorate).

The Saudi Health Informatics Competency Working Group developed the Saudi Health Informatics Competencies Framework (version 1.0). It has 6 domains (Core Principles in HI, ICT, Health Sciences, Data Science, Education and Research, and Leadership and Management), 22 sub-domains or areas of competencies, and 92 competencies.

All of the above projects were established by independent organisations/bodies that aim to foster the HI profession. However, in Saudi Arabia, SCFHS provided support for the Saudi project although it is not devoted for the HI profession. SCFHS is a professional body that regulates health care-related practices and accreditation at all levels in Saudi Arabia. Lack of independent body for taking charge of the HI profession may obstacle the process of keeping the framework updated. To achieve this state of sustainable professional presence, HI workforce development play a significant role, which can be accomplished by an independent professional body to fulfil this

purpose, or SCFHS via establishing a specialised unit to foster the HI profession. A collaborative initiative by SCFHS and the National Health Information Centre may be needed to set together the future career needs to ultimately improve overall HI profession scope and definition in Saudi Arabia.

Visual Illustrations and Framework Applications

The projects of competencies development that were conducted by HI organisations had led to building a variety of frameworks that visually define a set of fundamental competencies for describing the HI profession. Few organisations did not provide a visual illustration of their competencies. For example, EU-US eHealth Collaboration Initiative developed HITComp tool instead, and IMIA presented their framework in the form of guidelines and recommendations to guide the development of biomedical and health informatics bachelor, master, and doctorate programs.

The applications of the developed competencies-based frameworks varied from one organisation to another. For example, Digital Health Canada and CHIA established professional certification based on their frameworks that define the core HI competencies required in the Canadian and Australian health systems respectively. IMIA and HIAC, on the other hand, applied their framework for curriculum development and quality assessment for undergraduate and graduate education in HI.

In Saudi Arabia, SCFHS will use SHICF to guide the development of a professional credential examination. The SCFHS currently interviews candidates without providing the interviewer or interviewee with specific areas of study, leading to a very subjective interview process. Using the Saudi competency framework would provide valuable guidance and needed consistency to the SCFHS evaluation team when interviewing and credentialing HI professionals. In future phases, a written examination is needed to be developed based on the framework. A team of HI experts from academia and industry should work on developing exam questions using the competency framework produced from this project.

SHICF will also be utilised to refine the Health Informatics academic programs of local educational institutions. Since this initial framework has been developed, the framework itself may not be reflective of what is being taught today in HI programs across the country. Therefore, a collaborative initiative by SCFHS and the Ministry of Education may be needed to build guidelines for current university programs to be refined based on the competency framework, and specifically, the competencies for each sub-domain. Meanwhile, the need for building guidelines based on the framework to design and/or update academic programs/degrees in HI is essential to maintain consistency between the proposed framework and the current educational programs and practises.

Discussion

A number of attempts have been made in the last ten years to define the HI profession through the development of an HI competency framework to guide both HI professional practice and curriculum development. Our results show consistency between our work and the work developed by the selected five organisations. Also, our initial work will provide valuable benefits to the SCFHS in supporting planning activities for health informatics professional credentialing within the Kingdom of Saudi Arabia.

The project that was carried out over the past eight months illustrates the difficulties involved in developing a local framework given the discord between current programs being delivered and international standards for HI professionals. The lack of independent body for taking charge of the HI profession in Saudi could be a big challenge that may obstacle the process of keeping the framework updated.

Conclusions

The Saudi Health Informatics Competency Framework (SHICF) can be utilised to define the field of health informatics within the country. SCFHS can use the framework to define the boundaries of the field of health informatics and distinguish it from areas such as Bioinformatics based on the competencies outlined in the framework. As a result, SHICF will provide a clearer definition and formal recognition of the health informatics filed as it is practiced within the country. In addition, the work conducted in our project could be a first step towards providing a fair, objective, and reliable assessment and guidance for HI professionals, employers, and academic institutions within the country.

The health informatics field will continue to evolve and the SCFHS should continually review the proposed competency framework in order to develop in future a context-based HI competency framework that would make HI professionals competitive, competent, and reliable in helping improve overall healthcare quality within the Kingdom of Saudi Arabia.

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