National eHealth Implementation: Country Experience

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Abstract. A national eHealth strategy is presumed to empower health professionals, patients and citizens to increase patient safety and quality of health care delivery. A national eHealth infrastructure encompassing a secure HealthNet, interconnected electronic health records, e-prescriptions, a national medication database and a patient portal has been implemented in Iceland. The timely and secure access to patient information by health professionals through a single portal, independent of where the patient received care, is expected to increase continuity of care, decrease duplication of data and tests, increase efficiency, increase cost effectiveness and benefit citizens in several ways. The eHealth strategy needs to be evaluated using comparable indicators.

Keywords. eHealth, electronic health record, information sharing, national strategy, patient portal, patient safety, quality of care

1. Introduction

The concept of eHealth encompasses the use of information and communication technologies within health care to meet the needs of patients, health care professionals, citizens and policy makers towards better health of the citizens [1]. The Icelandic Government has long recognized the need to utilize information technology within health care to improve patient safety and the quality of health care delivery. The *Act on Health Records* [2] in 2009 provided the first legal framework for access and sharing of electronic patient information across different health care institutions. Furthermore, it addressed the patient´s right to access own health record, and the right to be informed on who has accessed the health record, when and why.

A report in 2011 by the Boston Consulting Group [3] on the performance of the Icelandic health care system identified substantial improvements needed in planning and performance management. The report underlined the need to increase the use of information technology to improve data collection, retrieval and analyzes of health care data on all levels of service delivery.

Several policies have been published by the Government toward the aims for Iceland to become a leading nation in the utilization of information technology to improve the quality of life for all Icelanders. The current policy of the Information Society in Iceland, *ePower Expansion* [4] highlights increased use of information

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technology to improve public services and efficiency. It prioritizes access to public domain information and databases using a single portal for accessing data. Furthermore, emphasis is on knowledge building, privacy and safety, effectiveness and quality of services.

Current national eHealth policy in Iceland states that all health professionals shall have secure and timely access to all necessary patient data at point of care to support increased safety and quality of care for healthier populations [5]. It also supports patient empowerment, and thus all citizens shall have secure access to their own health record when needed. Furthermore, strategies involve implementation of a personal health record on a national level. This is in line with the *Act on Patients' rights* [6]. The patient has the right to the best available health services at any point in time. Furthermore, the patient has the right to continuity of health services and cooperation between health professionals.

Health care in Iceland is nationalized and mainly financed by the Government through taxes. The country is divided into seven health care districts. Each district has one or more hospitals and primary health care clinics. The National Hospital in Reykjavík is the biggest hospital providing highly specialized health care to all citizens.

The purpose of this paper is to give insight into how national eHealth strategies can empower health professionals, patients and citizens to increase patient safety and quality of health care delivery.

2. Methods

The Directorate of Health in Iceland is responsible for the development and implementation of an electronic health record (EHR) as well as a patient portal on a national level. The aims are seamless and secure access for all health professionals to relevant and timely patient information at point of care. Furthermore, secure electronic access for citizens to their own health record [5]. The Directorate works in close relationship with users, including nurses, at the University Hospital, the Primary Health care of the capital, other health care organizations and a vendor. Currently, all primary health care institutions and hospitals in Iceland use the same EHR, the Saga system. Moreover, Saga is being used by many private practitioners and most nursing homes. Saga is locally developed and was first implemented in 1997. In 2011 a fully integrated nursing documentation component was added to the Saga system.

In line with the goals of the European Commission to improve citizens' health by using eHealth tools, increase healthcare quality and access, and to make eHealth tools more effective, user-friendly and widely accepted [1] the Icelandic government has developed a national plan and strategy to reach these goals.

2.1. Implementation of a national plan and strategy

- The Icelandic HealthNet, Hekla.

All health care institutions in Iceland shall be connected via the secure HealthNet Hekla for health data exchange. Patient information, such as, on nursing and medical diagnoses and interventions, medications, allergies, visits, hospital admissions and discharges, various certificates, clinical notes, test results, vital signs, children's growth

charts, maternal care, labor and delivery shall be shared between health professionals and across different health care institutions and geographical boundaries. The HealthNet is owned and maintained by the Directorate of Health.

- Seamless Access and Sharing of Patient Information

According to the *Health Records Act* [2] all health care professionals shall have access to relevant health information about their patient in order to deliver best available health care services. The national eHealth strategy involves connecting and integrating health information systems for secure and seamless sharing of patient information via the HealthNet Hekla.

- e-Prescriptions and National Medication Database

E-prescriptions of medications are a prerequisite for building a national medication database. In 2012 the law on the national medication database was changed to give all physicians up to date access to medication prescriptions and dispensed medications [7]. All physicians shall preferably use e-prescriptions but nurses in Iceland, however, are not permitted to prescribe any medications. Furthermore, citizens shall have access to their own medication data.

- Vera - patient portal

All Icelandic citizens shall have secure electronic access to their health information and allowing for secure messages to be sent between citizens and health care providers.

3. Results

- The Icelandic HealthNet, Hekla.

The HealthNet is used to connect health information between different health care institutions and across the seven health districts within the country. A master patient index is used to identify the location of individual patient data located in the EHR databases of each health care institution, but all Icelanders are issued a unique ID at birth.

Health care institutions need to have implemented an active privacy and security standard, issued by the Directorate of Health, before they can connect to the HealthNet. All data are encrypted while being transferred and all access of health professionals is logged on an individual level. The logs for the national health information services are available to health authorities.

Currently, all hospitals and primary health care institutions in the country are connected to the HealthNet. Moreover, many privately run clinics have also been connected to the HealthNet. Eventually all privately run clinics are expected to be on board in adherence to the national eHealth policy.

- Seamless Access and Sharing of Patient Information

Currently nursing and medical diagnoses and interventions, medications, allergies, visits, hospital admissions and discharges, various certificates, clinical notes, nursing and physicians summaries, test results, vital signs in primary health care are accessible and shared across health care services and institutions. Examples of pending projects

include sharing of information on vital signs in hospitals, some nursing data, other than nursing summaries, from hospitals and nursing homes, children's growth charts, labor and delivery charting. Information sharing of maternal care is in a pilot phase.

The patient information is on a read only basis, except for allergies, where the information can be downloaded to own EHR system. To avoid information overload the health data can be searched and viewed depending on the need for information. For example, one can choose to view all diagnoses of a patient, only view data associated with one diagnose and sort by age of information. Patient privacy and security are highlighted and every health care institution has to have a security and disaster plan implemented to connect to the HealthNet.

- e-Prescriptions and National Medication Database

Every physician in Iceland has secure access to e-prescriptions. Furthermore, all pharmacies in the country are connected to the HealthNet. Currently e-prescriptions are approximately 70% of all prescribed medications in the country. Physicians' lookups or viewings are logged via the HealthNet as are logs for citizens' lookups. E-prescriptions are integrated within the EHR. Moreover, physicians and dentists can prescribe medications electronically through a secure website located at the Directorate of Health with official individual e-identity.

- Vera - patient portal

Vera is a national patient portal developed to be a platform from where citizens can access their own health information in a secure way. At present Vera contains for example "My immunizations", "My prescriptions", "My e-Prescription renewal", "My GP", "e-Booking", "Secure e-Mail with health professionals" and information on the individual's perspective on being an organ donor.

4. Discussion

Health services that use information and communication technologies are expected to improve prevention, diagnosis, treatment, monitoring and management. The national policy on eHealth supported by Icelandic law and regulations has proven to be of high importance for building an eHealth infrastructure. Furthermore, eHealth projects have been governed by one authority, the Directorate of Health. By building an infrastructure such as the HealthNet Hekla important health information is shared on a national level to support increased patient safety and quality of care. The HealthNet minimizes geographical hindrances. The timely and secure access to patient information by health professionals through a single portal, independent of where the patient received care, is expected to increase continuity of patient care, decrease duplication of data and tests and increase cost effectiveness.

The benefits of the implementation of the eHealth strategies for citizens and health professionals can be summarized with a few scenarios: 1. A patient visits the primary health care centre for monitoring of his health status and tells the nurse or general practitioner that he recently saw a cardiologist. With data accessible and at point of care the health professional can see the results of that visit and medication changes that may have been done. The quality of the care the patient receives increases, becomes more efficient and safer; 2. The elderly patient who is discharged from the hospital may

have an updated nursing care plan which can be accessed by the nursing home where he will be admitted and save the nurses in the nursing home valuable time; 3. Still another patient is admitted unconscious to the emergency room. He has an identification card which makes access to his health data possible. The quality of the care the patient receives is likely to increase, become more efficient and safer; 4. With deployment of the national medication database misuse of medications can be minimized. Patients 'shopping around' for medication prescriptions can be identified and misuse diminished. All prescriptions that are electronically prescribed or have been dispensed will show up in the database; 5. A patient needs a medication renewal and logs on to Vera. Within minutes the request has reached the physician who can then renew the medication and notify the patient through Vera. Patient and health professional time is saved and the service more effective.

Communication between health professionals and the citizens through Vera is possible but currently limited mainly due to physicians´ resistance to this innovation. Moreover, nurses have not executed their leadership skills enough in adopting information technology advocating benefits for citizens. Nurses in Iceland need to make better use of information technology for empowering patients.

Information and data sharing between patients and health professionals is an important step towards the goals of eHealth. Studies to evaluate the outcomes of eHealth implementation in Iceland are needed, for example by surveying health professionals, patients, and citizens. The implementation of eHealth is an ongoing project which needs to be evaluated using comparable indicators at local, national and international levels.

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