

National Health Information Network Development in Korea

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Abstract

National level efforts have been made to adopt information and communication technologies in health care to improve the quality and safety and to reduce the costs and errors of health care in many countries. A national strategic plan, National Health Information Network, is prepared for the successful implementation of the interoperable health information technology in health care by the Ministry of Health and Welfare, Korea.

The purpose of this study is to describe how the National Health Information Network programs are developed and working in Korea. To ensure the anywhere, anytime access for anyone who wants to the lifetime electronic health record (EHR) and decision supports in secure way to improve the quality, safety and efficiency of health care by 2010, national health information standards, national health information infrastructure, lifetime electronic health record, public health information system, building consensus were the selected as NHIN programs. And the challenges faced in the process of NHIN development are discussed later.

1. Introduction

Recently the national effort is going underway to adopt information and communication technologies to improve the quality and efficiency of health care and to reduce the cost of health care in all over the world. Ever since the series of IOM reports [1, 2] were published, many countries have made an effort to improve patient safety and quality of healthcare and to reduce the healthcare costs using information technology. According to the experience of countries including UK, US, Australia and Canada, which are leading the adoption of information technology in health care, a roadmap developed with a national consensus is the most necessary work to start for the successful health information technology (HIT) adoption.

Improving quality and safety of health care and reducing the health care costs are issues in Korea as well as in others. Since the Korean government felt needs for the HIT adoption and its efficient implementation, a national strategic plan for National Health Information Network (NHIN) has been prepared by the Ministry of Health and Welfare (MOHW), Korea. The health system of Korea is required to be more efficient and effective due to the consumer needs for the good quality, safe

health care and the burden of the increasing cost of health care.

According to the recent national survey for health care consumers, 13% of people had experienced the needs for health information sharing of the past medical tests [3]. Another study showed that almost 20% of people experienced the need for laboratory information sharing from other healthcare institutions [4]. Health information sharing improves the quality of health care from the continuity of care as well as causes the decrease of cost from the tests duplications. Lab tests duplications, prescription errors, and preventable medical errors cause the high cost and low quality of health care. Another noticeable factor requiring the modernization of Korea health system is the rapidly aging society and the increasing health care costs. Aging society means the increase of chronic diseases, which are known that preventable services and self management are important.

The increasing cost of health care due to poor quality and safety, performance of health care system, and aging society are not the only problems for Korea. The benefit of national HIT adoption is estimated about 5% of national health expenditure savings and expected more [4]. The benefits of national HIT adoption may only be the estimation; however, many studies and reports prove the improvement of the performance and the quality of health care and many countries pursues the HIT adoption. National HIT adoption started already, now we are at the point to find the key factors to drive the national HIT adoption successfully.

2. National Health Information Network Framework [5]

In 2005, the MOHW announced the vision of future healthcare, “anywhere, anytime access to electronic health records and decision supports in secure way to improve the quality, safety and efficiency of health care by 2010”. For the sake of the vision achievement, the Korean government developed a 5-year national plan for NHIN and started to carry into action. The 5-year, NHIN plan includes implementing interoperable EMRs for public hospitals and public centers and facilitating EMR adoption among private health care organizations, developing national services through the infrastructure for health information sharing, and developing the infrastructure and governing structure for NHIN as shown in Figure 1.

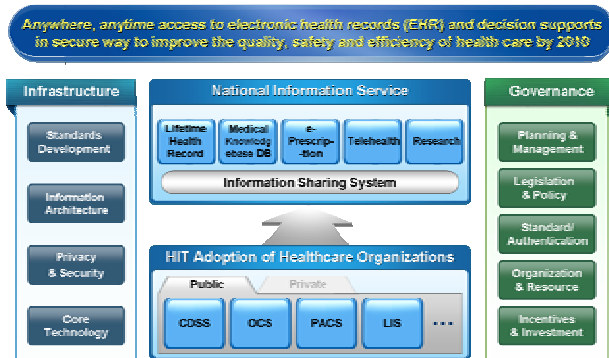


Figure 1 Korean NHIN Model

2.1. NHIN Programs

The development of NHIN programs is meant to be as flexible and comprehensive as possible allowing for the future changes of techniques and circumstances. The developed standards for NHIN programs define the functions enabling health care institutions following the national standards to exchange the health information and .be part of NHIN.

2.1.1. HIT adoption of public hospitals. The public hospital covers only 10% of the total number of beds in Korea. The performance and the quality of care in public hospitals are far behind the private hospitals. The HIT adoption in public hospitals is slow and inefficient. The utilization and satisfaction rate of public hospitals and health centers is low. According to the national plan for strengthening public health system, HIT adoption in public hospitals is considered as a way for the modernization of the public health care system.

Many public hospitals are planning to adopt HIT by their own; however, most of public hospitals are faced with the lack of budget, experience and expert personnel. Not only the HIT adoption effort of public hospitals costs high, but its implementation of individual institution makes it difficult the health information share. HIT adoption effort of public hospitals will be pursued according to the national NHIN plan for the efficient and effective implementation and investment.

The one of the NHIN program for public hospital HIT adoption is to develop and deploy a standardized hospital information system, which is flexible and standardized interoperable component-based hospital information system. Standardized hospital information system will be developed following the functions enabling health information share between health institutions following the national standards. A well developed standardized hospital information system and its core technologies will be provided to private hospitals and we are expecting that HIT adoption of public hospitals and standardized hospital information implementation can boost the HIT adoption in nation wide.

2.1.2. National health information share model

Neither the data sets for health information sharing, nor the NHIN data sharing model did not earn the consensus of the public yet. However, a data share model is necessary and inevitable to support the information exchange between health systems. The national health information share model plays the role for any health care institutions to be connected to the national services and to exchange the health information only if they follow the national standards. Though the public health system is taking up only 10% of total health care system, the national health information share model is not only aimed for the information exchange of public health care systems. At the present time Center for interoperable Electronic Health Record (CiEHR) is responsible for the development of the national health information share model and to get the public consensus on the model.

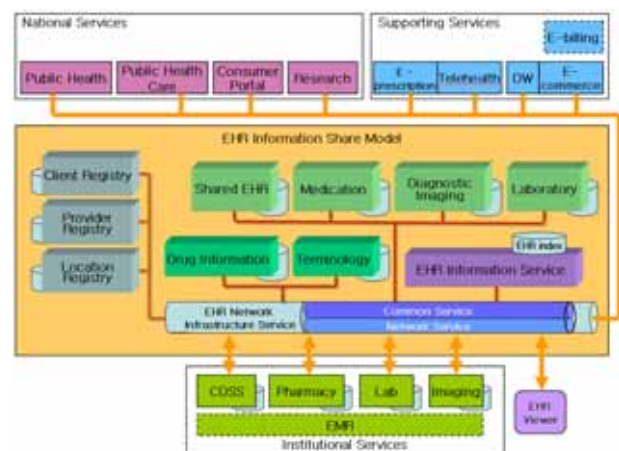


Figure 2 National health information share model

2.1.3. National health information services

If the national health information share model is the technical information exchange model such as networks, national health information services are made of the services enabling the health information sharing at the national level beyond only one health care institution such as e-prescriptions. The national health information service are e-prescriptions, lifetime health records, Telehealth, image information sharing, public health, data warehouse, e-procurement, and medical knowledge base sharing. E-prescription is known effective for improving the convenience of patients and reducing errors from the handwriting prescriptions; lifetime health records for the quality of care with the continuity of care, and the self management of chronic diseases; data warehouse for health care researchers; medical knowledge database enabling the data sharing for evidence based practice; e-procurement for efficient management of health care organizations, and so on. The development of national health information services is still undergoing and need to earn the consensus from stakeholders.

2.1.4. Infrastructure for NHIN

National health information standards. A national health information standard is the most critical factor for the interoperable national health information system and the health information exchange. Since National health information standards committee was organized first in 2004, now the phase three of national health information standards development has been started. 10 subcommittees started at the phase one and became 14 subcommittees at the phase three now. 14 health domains were selected for the national health information standards development and the domain experts including physicians, nurses, health information administrators, medical informaticians, etc have been participating in the standards development process.

National health information standards committee adopted the Unified Medical Language System (UMLS) to create, to process, to retrieve and to integrate the national health data and information in Korea. All health data concepts collected in the first and second phases were mapped into UMLS concept. The basic principles of the health information standardization in Korea were to localize the international standards, to add the required local concepts, and to take a gradual approach. Besides the National Health Information Standards Committee, Korea Standard Organization (KSO), ISO/TC215 working groups, and other international health information standard organizations are working. The cooperation and coordination effort among health information standards organizations has been made for the efficient and successful NHIN implementation. The Figure 3 described the relationship of health information standards organizations and the strategy of collaboration.

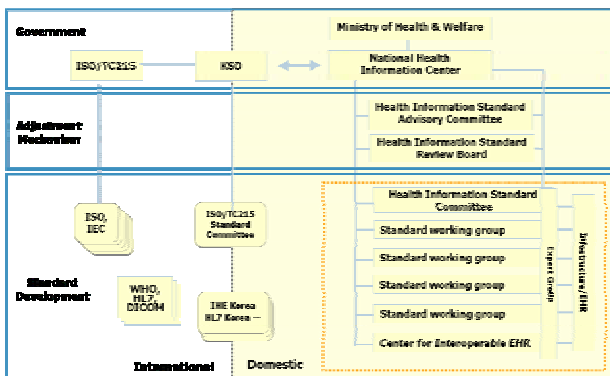


Figure 2 Health Information standard organizations

NHIN architecture. NHIN architecture is a business and technical framework of NHIN, and the specification of functions enabling to exchange health information such as the Blueprint of Canada. NHIN architecture describes how NHIN programs are collaborating and working for the health information exchange and electronic health records. Health care organizations, health information system vendors following NHIN architecture will be able to join NHIN and to access the national health information services. This effort is made for the successful HIT adoption in Korea with the government will to provide fair opportunities to any

organizations who want to participate and to foster the many health information system vendors.

Privacy and Security. Privacy and security is the most critical issues not only in building consensus, also in operating NHIN in real. When NHIN plan was announced by the government, privacy and security was the first concern from the public, and many organizations. Privacy and security standards are developed with a great concern by many privacy and security experts in the subcommittee of a national health information committee.

2.1.5. Governing structure

The governing structure of NHIN is developed for the purpose of efficient and effective implementation of NHIN plan. Strategic planning, law, regulation and policies, standard authentication process, organizations, and incentives and strategic investment are considered for the management purpose of NHIN. Governing structure is important as much as other components of NHIN. Currently legislations including the hospital information management, individual consent on the health information use are prepared and undergoing. National strategic plan for NHIN is prepared by the government. However, standard management process and incentives and strategic investment plans are still remained for the further considerations.

2.2. Organizations

There are several organizations engaged in the NHIN plan to translate into action: MOHW, Health Industry Development Commission under the Office of Prime Minister, e-Health committee, Health Information Working Groups, National Health Information Standards Committees, the Center for Interoperable EHR, and etc. Some are newly established and others are to be. The coordination and cooperation among organizations are important for the efficient NHIN implementation. These are the key organizations to be described for the successful implementation of NHIN in near future.

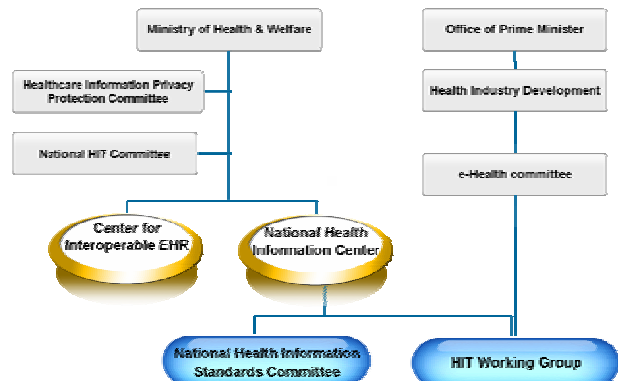


Figure 4 Organizations for NHIN development

2.2.1. The center for interoperable EHR (CiEHR). CiEHR is a research and development institution for the

development and dissemination of the national architecture of NHIN and the core technologies of the standard based health information systems. It is established in the late 2005, and now actively engaged in planning NHIN and developing core technologies of standard based health information systems.

2.2.2. National health information standard committee. The national health information standard committee was established in 2004 and has been responsible for the development, maintenance of the national health information standards. 14 domains of the vocabulary, document and technology standards were selected for the development of health information standards. The standard development process will be belonging to National health information center, and the evaluation, verification and authentication process will be the responsibilities of the National health information standards committee.

2.2.3. National health information center (NHIC). National health information task force team, now, is the former self of NHIC. NHIC is tentative to be the main body to promote the NHIN plan and to be responsible for the development, maintenance and management, and deployment of national health information standards, and the training of skilled personnel. NHIC is in charge of all the technical supports of NHIN implementation.

3. Challenges

To build consensus. The one of the biggest challenges for NHIN development and implementation is to build public consensus by clearing up the common misunderstandings and explaining the benefit of NHIN. There have been several projects proposed for national health information implementation for the past decade. The main reason for the program failure was again, the lack of consensus by public, health care providers, payers, policy makers, health information industries and etc. Not much difference can be found in the former projects or in the concept of health information exchange, but the circumstances shown in a global trend and the strong government will for health information technology adoption at the national level have been changed. It is the very critical time for Korea to drive strongly forward the health information technology adoption at the national level to ensure the more efficient and higher level of health care system facing the aging society. We need to focus on the development of strategies for building consensus of the society.

To increase the needs for health information standards. Another difficulty in adopting the national health information technologies is to make people realize the needs for a national health information standard. Most of people are not aware of the importance of the standard adoption in implementing interoperable life-time electronic health records. One of

the NHIN programs, national health information standards development is not evaluated and verified the usability and feasibility of them. The pilot programs are needed to be tried as soon as possible to apply them in real life system.

To encourage the participations of consumers and health professions. The engagement of health professions is another key factor for the successful NHIN implementation. However, the channel of participation to NHIN plan is limited to the few who are actively engaging already from the lack of general awareness. Besides the lack of health professions' participation will, public indifference for the idea of having EHR for their convenience and consumer rights causes the ignorance of healthcare providers. There are many communication channels including public relations, seminars, public hearings, workshops, etc. Better engagement of physicians and other health professions working in real system and the public interests will lead the NHIN program to be more successful by reducing the resistance of the system users and increasing the compliance of the program.

To assure the evidence of NHIN benefits. The evidence which NHIN implementation could bring benefits to not only for the public also for the healthcare providers is the most effective way to persuade them. The analysis of cost and benefit of NHIN implementation are rarely reported in the past. Again, the most effective method to increase the participation rate of stakeholders is to show the benefits what they can expect. More evidence studies of NHIN implementation at the national level, EMR adoptions, health information standard adoptions, and lifetime electronic health records use are required in near future.

4. Conclusion

A national strategic plan for the HIT adoption has been developed by the government initiations. With the advanced information and communication technologies of Korea and the flexible attitudes toward new technology, we can expect the synergy effect from promoting the HIT adoption by the government for health care markets.

The value of the health information exchange could be much higher than we can estimate at the current status since there are many factors we hadn't had counted yet. However, the value of NHIN could be achieved only with the high level of HIT adoption. In addition, a nation-wide effort for the health information technology adoption is even necessary than partial or local effort by individuals. The successful HIT adoption can only be achieved when the various needs of stakeholders are considered with a comprehensive national strategic plan of NHIN and the benefit of NHIN is agreed.

5. References

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