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The Nationwide Health Information Network: The Case of the Expansion of Health Information Exchanges in the United States

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THE NATIONWIDE HEALTH INFORMATION NETWORK: THE CASE OF THE EXPANSION OF HEALTH INFORMATION EXCHANGES IN THE UNITED STATES

Abstract

The Nationwide Health Information Network (NHIN) implemented secure exchange of health records through utilization of the Internet. NHIN has greatly assisted in achieving the goals of the HITECH Act by promoting the adoption of Meaningful Use. Epic introduced a Health Information Exchange (HIE) platform, Care Everywhere (CE), which has facilitated HIE availability. The purpose of this research was to determine the impact of NHIN and Epic Care's CE on healthcare to determine whether their use in the ED has increased. The methodology for this study utilized a literature review. Twenty-nine sources were referenced for this study. With the NHIN implementation, repeated visits were decreased, visit times become faster, and charges were lower. ED reported significant benefits with sharing clinical information. NHIN implementation throughout the ED has increased the quality of healthcare; duplicated tests and drug usage were determined, and a reduction of the ED length of stay was also achieved.

Introduction

The Nationwide Health Information Network (NHIN) was developed in 2004 under Office of the National Coordinator for Health Information Technology, and it was comprised of technical, policy, data use, and service level agreements, as well as other requirements that required the exchange of data between two different organizations no matter the location of the facility.[1] Additionally, 24 public and private agencies have been participating in the NHIN Cooperative since 2008 in the United States (U.S).[1] The NHIN has provided a secure set of policies, standards, and services to implement the secure exchange of Health Information Exchange (HIE) over the Internet.[2] This program has helped achieve the goals of the Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted as part of the American Recovery and Reinvestment Act of 2009 and was created in 2009 to promote healthcare industry's adoption and use of meaningful health information through technology.[3] The HITECH Act originated $14-$27 billion of net incentive with the use and adoption of Electronic Health Records (EHR).[4]

When the NHIN was created, it was comprised of two phases: the development of prototype architectures in the first phase and development of and trial implementations in the second phase.[5] The NHIN was built based on core capabilities which included: the ability to create patient records and support patient health, locate health information between different healthcare organizations, consider preferences of consumers regarding the exchange of information and their decision to participate in the NHIN.[6] Also, the NHIN was constructed to ensure the security of information exchange and to support a collective agreement of trust which established obligations and assurances that any NHIN participants must agree upon the foundation of corresponding standards. Furthermore, rules matched patients with their similar health information without the use of a patient identifier.[6]

EpicCare, more commonly identified as Epic, has introduced an HIE platform called Care Everywhere (CE). CE has been utilized to facilitate patient health information to providers, which has allowed them to pull data from other healthcare organizations and transfer a summary of care to primary caregivers or the referred-to provider.[7] The majority of emergency department physicians have had a positive perception of HIE and have agreed that it will be useful to them, especially regarding communication.[8] Electronic HIE has enabled the sharing of patient medical record information between healthcare organizations involved in the treatment of the same patient and has made it possible to download information to EHRs for future reference.[9]

In 2016, there were 141.1 million emergency room visits in the U.S.[10] The NHIN has assisted in the reduction of emergency department visits and inpatient hospitalizations for ambulatory care sensitive conditions among adult.[11] In 2011, the National Emergency Medical Services (EMS) Assessment was established and was commissioned by the Federal Interagency Committee for Emergency Medical Services. The report proclaimed that it was funded through the National Highway Traffic Safety Administration.[12] Another federal agency that contributed to the development of NHIN was the Social Security Administration (SSA), who began accessing electronic medical records held by a private HIE in 2008.[13]

The purpose of this study was to research the impact of NHIN and CE on healthcare and determine if their use has increased in the emergency department in the U.S.

Methodology

The primary hypothesis of this study was that the implementation of NHIN in hospitals using HIE should reduce the hospital length of stay and increase the quality of healthcare in hospitals. The methodology for this research analysis utilized a literature review of academic sources. The research framework, illustrated in Figure 1, shows an adaptation of the research framework by Yao et al.,[14] which demonstrated the benefits and barriers to adoption of NHIN with HIE in hospitals. The use of this framework was appropriate as it explained the adoption of the HIT in healthcare. It was like any project development in that the process was circular; it began with identification and definition of the problems and included development solutions to possible questions. In this case, the answer has been implementing NHIN with HIE into hospitals and EDs. Through process assessment, the need for NHIN in hospitals and ED have researched as well as its implementation phases. Once hospitals have adopted the NHIN, barriers and benefits were assessed (Figure 1).

The literature review was conducted in three individual stages involving: (1) developing a search strategy and gathering data for the case study; (2) determining and analyzing the relevant literature; (3) delegating literature to appropriate categories.

Step 1: Literature Identification and Collection

The electronic databases used include ProQuest, PubMed, Medline, and Google Scholar. The terms searched within each database were: "Nationwide Health Information Network" OR "NHIN," AND "Health Information Exchange" OR "HIE" AND "Care Everywhere" OR "emergency department" OR "length of stay" OR "barriers." Journals cited include but are not limited to: The Journal of the Medical Library Association, The Journal of the American Medical Informatics Association, Journal of Cultural Diversities, Journal of Nursing Scholarship, Journal

of American Health Information Management Association, and other reliable medical and government websites.

Step 2: Literature Analysis

As the implementation of NHIN has expanded throughout health care, it has become essential to know its impact on hospitals. Therefore, the literature analyzed focused on the following key areas: the utilization of NHIN in emergency departments, length of stay, and the quality of healthcare since NHIN has been implemented. In an attempt to collect the most recent data, sources older than ten years were removed from the search and only sources written in English were used. Primary and secondary data from articles, literature reviews, research studies, and reports written in the US were included in this research. The literature review included 28 references which were assessed for information about this research project. The literature search was conducted by MR, VW, and HW, and validated by AC, who acted as the second reader and double checked if references met the research study inclusion criteria.

Step 3: Literature Categorization

The following subheadings were included in part of the following research framework: Applications and Adoptions reported *Emergency Department Utilization of HIE, Use of Care Everywhere in HIE, HIE Implementation with EMS, Federal Agencies, and Private Organization,* and *Provider Perceptions of HIE.*

Results

Emergency Department Utilization of HIE

According to Moore et al.,[15] the number of visits between 2006-2014 increased by 14.8%, but during the same time, the population in the US grew by 6.9%. The number of ED visits with an expected primary payer of Medicaid increased 66.4% between 2006 and 2014, from 26.5% to 44.1 million visits. During this same time, the number of ED visits with an expected primary payer of Medicare increased 28.5% from 24.3 to 31.2 million visits. Another study showed a 93% success rate in outside information retrieval.[16] These researchers also reported that the change rage of decision-making was 32% of the cases studied resulted from the use of HIE.

Healthcare users have accessed HIE for 6.8% of all encounters, and most patients have returned for repeat visits, which gave a higher rate of access for these visits.[17] According to these authors, on October 10, 2010, clinicians and hospitals had access to over 7.5 million encounter records, including 1.7 million patients and 2.1 million other healthcare documents. Also, these investigators performed a study that determined after two years of the HIE being implemented, overall rates of HIE access increased 2.5% to patient encounters and HIE access rose with an average of 14.6% for return visits with the emergency departments, along with an 18.7% increase for return clinic visits.[17] In another study, an analysis performed in 2014-2015, determined that emergency department visits associated with HIE retrieved outside information 58.5 minutes faster, which resulted in care decision changes and expedited service in emergency care.[18] These authors stated every hour that had been reduced exchanging documents ended in a 52.9-minute shorter ER length of stay, average charges were $1187 lower, and the admission rate was 2.4% lower$_1$.[18]

Benefits of The Use of Care Everywhere in HIE

Emergency departments have determined that HIE has avoided duplicate diagnostic testing and could identify drug-seeking behavior in a patient's visit.[19] These researchers performed a study that used the CE tool associated with HIE, and it reported CE was used in approximately 1.46% of emergency department encounters within a six months' period in 13 EDs. The study also demonstrated 560 duplicate diagnostic tests had been avoided as well as 28 drug seeking behavioral cases were previously identified at another healthcare facility. CE has used the Consolidated Clinical Document Architecture (C-CDA) which has been required for Meaningful Use Stage 2 for information exchange in hospitals.[20] According to Health IT, CE has participated in all 50 states, in 900 hospitals, 20,000 clinics, and 115,000 providers.[20] Other exchanges which joined have HIE included 28 eHealth exchange members such as, the Department of Veterans Affairs, the SSA, and the Department of Defense.[20] In 2014, a study was performed that portrayed monthly growth rates of patient record exchange C-CDA that grew from 2 million in January to 4.6 million in July, which demonstrated a large increase in HIE.[20] Based on the research conducted by Pennic,[21] Epic reported in 12 months, close to a quarter of a billion patient records were exchanged on Epic's CE platform. This HIE was nearly 300% increase from the previous year. This author has also suggested that CE has supported millions of patient record exchanges and has improved patient safety, coordination, and has eliminated unnecessary tests.

Another study determined whether hospitals should automatically search for information from other organizations or whether to require HIE specific patient consent, with 82% of the organizations examined using the automatic querying.[22] In 2013, these researchers' study documented, 6,909,416 clinical summaries were being retrieved over the HIE network, and six organizations had received 57,000 medical histories, but by 2015 all the organizations tested were participating and received 826,000 medical records representing a 1349% increase in HIE volume. Furthermore, the impact of the auto-query increased exchange volume by was 9,929 exchanges and reports per month, compared to 635 per month in the pre-auto query period.

Federal Agencies' and Private Organizations' HIE Implementation with EMS

According to the Office of the National Coordinator for the HIT, it was predicted in 2011 that over 20 organizations would be using real-time health information.[23] HIEs have consisted of federal agencies and private organizations that have performed major roles in the development of the foundational components of exchanges. The SSA has reduced turnaround time for medical disability determinations from an average of 84 days to 46 days, a 45% enhancement.[23]

In 2011, Health IT National EMS Assessment revealed that over 825,000 credentialed EMS practitioners in the U.S had responded to an estimated 36.5 million calls for service and transported 28 million patients per year.[23] It has been reported that physicians in the ED have lacked important patient information 32% of the time.[24] According to Health IT, annually there have been 114 million visits to EDs, and 16 million have arrived by ambulances.[24]

Provider's Perceptions of HIE

The Robert Wood Johnson Foundation[25] reported in 2012 more than 38% of physicians adopted EHRs. Wright, Soran, Jenter, Volk, and Bates discussed physician attitudes toward HIE. A survey by these authors showed that 70% of physicians agreed HIE would reduce costs, 86%

of physicians claimed it would improve the quality of healthcare, and 76% of the physicians believed it would save time.[26] Another study reported 75-85% of physicians with EHRs had used most of the specific criteria for meaningful use.[27] Wright et al. reported only 16% of the physicians stated they were worried about privacy and security implications with HIE and 54% of the physicians agreed they would pay monthly for the system. Nearly 33% of providers have adopted HIE because of federal financial incentives.[25]

Discussion

The purpose of this research paper was to research the impact of NHIN and Care Everywhere on healthcare and determine whether its use in the emergency department has increased. The primary hypothesis of this study was supported by the implementation of NHIN in hospitals reducing the length of stay and improving quality in healthcare using HIE. A study showed every hour that had been decreased exchanging documents with the EHRs, resulting in a 52.9-minute shorter ER length of stay.[18] The analysis showed HIE adoption had been expanded throughout hospitals and quality of care increased.

HIE has been accessed for 6.8% of all encounters, and most patients return for repeat visits, which has given a higher rate of access.[17] CE participated in all 50 states, which has identified 560 duplicate diagnostic tests and 28 drug-seeking behavior cases.[20] The implementation of CE has enhanced the quality of care given to patients. Pennic, 2016 reported that CE has supported millions of patient record exchanges and have improved patient safety, coordination, and have eliminated unnecessary tests. According to Downing, et al., 2017, studies in 2013 showed a 1349% increase in HIE volume with clinical summaries retrieved over the network. It has been reported from Health IT, that 32% of the time physicians in the ED have lacked important individual information. HIE has assisted in the retrieval of necessary patient information promptly. Hinman and Davidson[28] reported electronic health records had affected ambulatory practices with a 52.7% use of health maintenance organizations. Providers' perceptions of HIE adoption have been positive since its implementation. The Robert Wood Johnson Foundation[25] reported 70% of physicians agreed HIE would reduce costs, 86% stated it would improve quality, and 76% of physicians believed it would save time.

A negative component to HIE integration has been the privacy issue, although all the NHIN and HIE practices have been regulated and mandated by the government to ensure HIPPA compliance. The time and money to implement the HIE systems have been a negative component because of cost, time to implement and training required to learn the system.

Limitations

This research study was not conducted without limitations. This literature review was restricted due to search strategy such as difficulty in identifying the distinction between keywords, number of databases, or sources used, which may have affected the availability and quality of the research during this search, and finally, research and publication biased. Further research is needed for the need for NHIN and lack of HIE information for the future.

Practical Implications

Continual participation by physicians in the emergency department and advancements in technology throughout the coming years will help to further research regarding the NHIN and the use of CE. Reduced length of stay and increased quality in healthcare has shown that the NHIN

has contributed to promoting improvements in HIE. The practical implications of NHIN will need to be more heavily researched as more emergency room departments continue to participate.

Conclusion

HIE has proven to have a positive impact on ED and healthcare. This literature review has suggested the utilization of the NHIN and used of CE has increased the quality of healthcare and decreased the length of stay.

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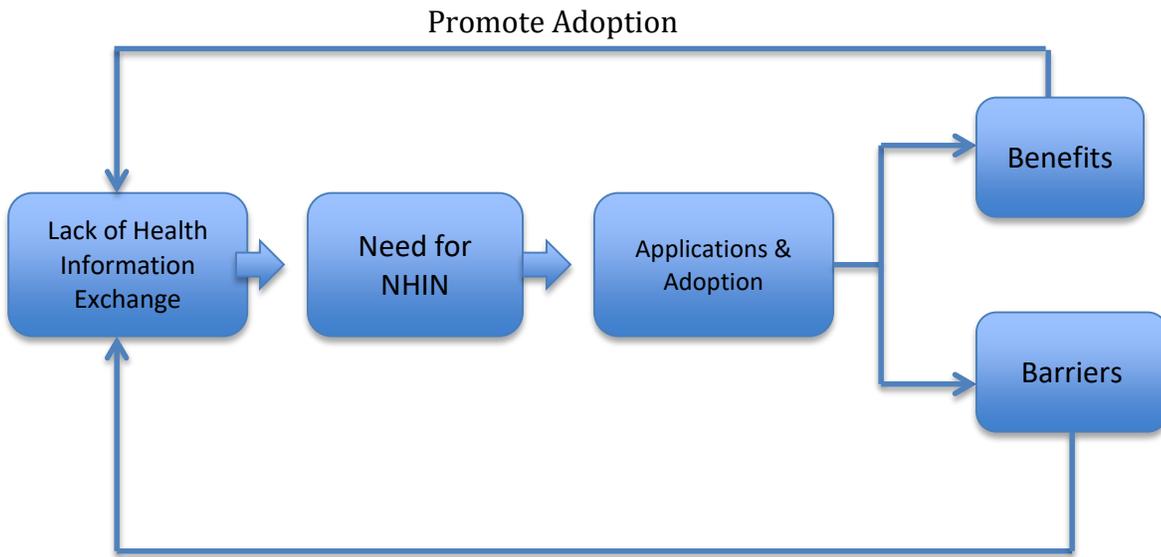
Source: Adapted from Yao et al., 2010.[14]

Figure 1: Conceptual Research Framework