# Primer in Health Information Exchange for the Emergency Physician: Benefits and Barriers

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**Abstract:** For various reasons, patients seek care at different hospitals within a region, resulting in fragmented medical records at the point of care. In the emergency department, this is a particularly important issue because the emergency department provides open access to all patients and requires rapid high-stakes decision making to function well. To address these issues and as a result of federal initiatives, health information exchanges (HIEs) have been designed and implemented in various regions throughout the United States to promote health information sharing. The use of HIEs has been demonstrated to lower costs and avoid duplicative testing and treatment; however, obstacles such as physician usage characteristics and institutional concerns regarding information sharing exist and must be addressed before full implementation and adoption of HIEs among institutions take place. Further research is needed to describe the benefits of HIEs and how they can affect these barriers.

**Key Words:** cost avoidance, health information technology

I n contemporary society, many people seek emergency department (ED) care for a variety of healthcare problems. The reasons that patients choose the ED for care are multi-factorial; many have genuine emergencies, some cannot seek care at traditional times because of family or work obligations, and some experience restricted access to primary care (PC) as a result of distance, transportation, funding, or delays in scheduling an appointment.[1] Other patients choose the ED as their source for trusted health care and have done so for generations, despite other available options.[2] Although not originally designed to meet these needs, 24-hour EDs facilitate access to nonurgent care, especially for individuals seeking care during off hours.

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Unfortunately, the fragmented health care provided in the ED does not provide the same opportunity for the continuity of care afforded by PC. PC by nature is less expensive than emergency care and has long been accepted as having efficacy in reducing long-term morbidity and mortality. In addition, it provides indirect savings through the management of cardiovascular risk factors and cancer screening.[3,4]

By design, EDs are continuously open and are mandated to care for all patients, regardless of their ability to pay, until the presenting problem is stabilized. This mandate, established by the Consolidated Omnibus Budget Reconciliation Act of 1985 (Public Law 99–272), made the provision of a medical

## Key Points

- Overview of the current state of emergent and episodic care and how the value of access to timely and relevant patient data in the emergency department is clear.
- Overview of health information exchanges (HIEs) and how they address the issue of receiving relevant and timely patient data. Timely electronic access to the medical records of patients in the emergency department would enable the emergency physician to quickly define their pattern of care, review existing studies, avoid repetition of studies, and prevent unnecessary admissions.
- HIE also derives cost savings from avoiding unnecessary testing and treatment and from improved put-through times. Patient satisfaction is improved through decreased waiting times and staff satisfaction is improved through the experience of greater efficiency and effectiveness.
- Current state of HIE in the United States today and where an interested provider can obtain additional information.
- A comprehensive, easily accessed, up-to-date regional electronic medical record available to the clinician at the point of care appears to have enormous potential to improve health care, reduce duplication and waste, and reduce the cost of care. Additional research must be directed at defining the barriers to issues affecting adoption and implementation of this new resource and describing the direct and indirect consequences of a regional electronic medical record on patient care.

screening examination for those who present to EDs a virtual law that is enforced through financial penalties.

## Issues of Unscheduled Care

For a variety of reasons, a significant number of patients seek care at more than one hospital ED. Bourgeois et al found that during a 5-year period, 31% of patients sought care at two or more hospitals and 1% sought care at five or more hospitals, accounting for more than half of all acute care visits in their study.[5] Finnell et al reported that during a 1-year study, 19% of patients who were seen in the ED had clinical data in another hospital system and 25% of patients with more than one ED visit had visited another hospital.[6] Emergency physicians (EPs) caring for these patients lacked immediate access to dispersed medical records at the point of care, resulting in rapid decisions being made with incomplete information. The potential for improvement is reflected in a pilot study by Carr et al in which clinicians with access to information from regional facilities claimed that this improved the care of their patients in nearly 90% of cases.[7]

The Emergency Medical Treatment and Active Labor Act (42 USC 1395dd) mandates that every patient presenting to an ED be seen and evaluated until a life-threatening emergency or active labor is ruled out. These workups in the ED can be exaggerated, with overaggressive attempts to exclude morbidity by using expensive technology, increasing put-through times, and adding costs. The EP, blinded by lack of information and judged by a different standard, often has no option but to perform complex testing to verify that an acute, life-threatening disease is not present that would lead to potentially avoidable testing and hospital admissions.

In the context of this article, we define an avoidable admission or test as an event that would not have occurred if a patient's complete health information were available at the time of the ED visit. We emphasize that one must be wary of labeling any admission from the ED as avoidable. Such admissions may not be avoidable and describing them as such can lead to compromised health care, often for those most in need.[8]

## How Does Technology Play a Role in Solving These Issues?

The National Alliance for Health Information Technology released a report to the Office of the National Coordinator for Health Information Technology on April 28, 2008 defining a health information exchange (HIE) as the electronic movement of health-related information among unrelated organizations using nationally recognized standards.[9–12] HIEs provide value to healthcare providers by enabling timely access to patient information that was previously unavailable. Properly designed, governed, and implemented, HIE delivers to the clinician immediate electronic access to health information that is shared in a confidential manner via a secure network at the point of care. By providing access to health information, the HIE reduces cost and error, improves quality, and supports coordinated, efficient care.[7,13]

## Access to Timely and Relevant Patient Data in the ED: The Value Is Clear

According to the National Hospital Ambulatory Medical Care Survey, in 2008 there were more than 123 million ED visits and that number continues to increase each year.[14] EPs receive constant notification regarding new patients; data about existing patients; telephone reports from physicians both inside and outside the hospital; radio reports from emergency medical services; case presentations by residents, students, and mid-level providers; and questions from patients, nurses, and administrative assistants. Chisholm et al reported that EPs were interrupted an average of 9.7 times per hour and spent an average of 37.5 minutes/hour managing three or more patients concurrently, compared with 3.9 interruptions per hour for primary care physicians (PCPs), who spent an average of 0.9 minutes managing three or more patients per hour. PCPs spent significantly more time performing direct patient care and EPs spent significantly more time analyzing data, charting, and taking reports on patients.[15]

Despite the importance of medical records in the ED, delays created by obtaining records from other hospitals can be prohibitive. A survey of EPs employed at 12 EDs in New York City showed that physicians estimated that they spent an average of 66 minutes attempting to obtain clinical information from providers outside their hospital network and only attempted to do so for 0% to 10% of their cases.[16] The many steps necessary to obtain outside records are often prohibitive and the entire process is dependent on the vagaries of having correct fax numbers, correctly operating fax machines, and an attentive staff. The system typically works even more poorly during nights, weekends, and holidays, when many hospital medical record departments are closed.

The cost of care for patients who receive care at multiple facilities is staggering, at more than twice that of patients who make multiple visits to the same sites. Furthermore, for the small fraction of patients who visit five or more facilities, the cost is more than 10 times what it would have been for a patient who makes all visits to a single facility.[5]

Data support the concept that immediate access to health information for patients in the ED saves significant time and money. Carr et al showed an annualized savings of nearly $1 million when an HIE was used for 10.1% of an ED population and a 40% reduction in the length of stay.[7] Frisse et al illustrated the financial impact of an HIE at an 11-hospital system in Memphis, Tennessee, calculating that an annual savings of $1.07 million would be realized if all of the regional hospitals participated in and used the HIE.[13] Frisse et al stated elsewhere that if an HIE were fully operational in the Memphis region, taking into account the potential savings from avoiding unnecessary use of the ED and the use of an HIE to direct

patients toward appropriate PC, the estimated savings could be more than $8 million annually.[17] Bailey et al reported that although overall costs were not affected, a reduction in neuroimaging and improved adherence to clinical guidelines resulted from HIE use for ED patients with headaches.[18]

Another potential application for an HIE is as a tool to identify patients who visit multiple EDs. Incorporating data from an HIE into an outreach program could enable the coordination of care for such patients and direct them to appropriate PC services in the community. The benefits realized in health maintenance, patient and staff satisfaction, and cost savings could be extraordinary and is an ideal area for investigation.

## Considerations and Barriers to Implementation

The feasibility of exchanging health information was demonstrated by Overhage and colleagues in 2002; however, there were concerns about the adoption of this new resource by physicans.[19] Indeed, physician adoption of an HIE is second only to financial sustainability as a barrier to implementation. Unertl et al found that an HIE database was a function of user preference and that providers used the HIE only when they expected to find information that may change their management.[20] Vest et al, in a study seeking factors associated with HIE use, found that certain characteristics such as making a recent ED visit or having a chronic disease were associated with physician use of an HIE in an ambulatory care setting.[21] Existing HIEs are accessed in a range from <1% to 21% of encounters, which is likely based on provider expectation that data will be present in the HIE.[21,22] Access to the HIE should be easy and intuitive so that queries occur without additional effort. Multiple logons have been demonstrated to disincentivize physicians' use of available records. In short, if an HIE is not embedded in the electronic medical record (EMR) at the point of care, then the HIE is not likely to be consulted.

That said, designing, building, and implementing a robust, functioning HIE is a difficult task. Several barriers must be overcome to provide the proper information and to be user friendly and sustainable. In designing an HIE, incentives should be aligned with the mission of the HIE and the stakeholders' (physicians, chief information officers, chief executive officers, payors, and community representatives) return on investment expectations.[23] Including them in the governance structure will ensure that the varied interests are aligned and preserved. Data standards should be clearly defined and made consistent with national interoperability standards, with the ultimate goal of connecting to the National Health Information Network; however, nontechnological factors also affect adoption of HIEs.[23,24] The majority of successful HIEs have implemented services gradually (with scalability considered for future expansion), which has helped to build a stronger case for securing additional funding.

Many larger health systems are creating their own HIEs and funding them internally, with Healthy Eating and Living grants and minimal physician contributions. Although this action will provide temporary financial support, continuous funding will require new sources of revenue or a demonstration of savings for the HIE to remain solvent. Funding aside, building an HIE that contains all of the proper data in one database with seamless accessibility to the EP is essential for successful adoption. Available information that is not accessed and used will not improve patient care. Additional research is needed regarding other factors that influence physician adoption of HIEs.

## Data Integration

Data that the EP requires at the point of care can come from several databases, all of which are in different formats. The key to success is that all data be transferred seamlessly to the HIE and converted into the proper format. This could be accomplished by an interface engine that takes the various feeds of disparate data and places the data elements into a sharable system, allowing the HIE to function as a data repository for all of the participating institutions. Protected health information, once within the domain of the HIE, is treated in the same secure manner as it is at the participating healthcare facilities. Data security is ensured through contractual agreements between the HIE and participating hospitals that mandate compliance with Health Insurance Portability and Accountability Act (Public Law 104–191) and *Health Information Technology for Economic and Clinical Health Act* (Public Law 111–5) federal regulations.

When a patient presents to an ED and he or she is identified, the clinician can search the database for relevant information. Typically, this requires the clinician to use a second system (eg, logging into the HIE and performing a search) that is separate from the institutional EMR. This arrangement is somewhat cumbersome and discourages use, but it does work.

Vest categorized and studied nontechnical factors related to hospital adoption and implementation of HIE.[24] Having the requisite technology to participate, namely an internal certified EMR and in-house technical support, is mandatory to the adoption and implementation of an HIE; however, factors other than technology also were important. In Vest's analysis, hospitals in areas with high levels of competition for patients were less likely to implement an HIE, whereas public hospitals, nonprofit hospitals, and hospitals with more EDs were more likely to adopt an HIE. Additional research is needed to characterize how nontechnical factors impeding HIE implementation should be addressed.

## Where Does United States Stand Today?

Experience with an HIE is growing in the United States, with a total of 234 HIEs, 73 of which are fully operational, reaching nearly every state and several communities.[25] Two different types of HIEs exist in public and private hospitals. Public HIEs typically encompass a specific region and involve multiple hospital-based organizations that are large scale

and run and financed by public or government entities. The public HIEs are broader in region and cost approximately ≥$10 million to operate.[26] Private HIEs are based on two integrated delivery networks or large hospital organizations that are typically funded and governed by private sponsoring entities, many times by the integrated delivery network itself.[27] The majority of private HIEs have a 501(c) (3) status, which can mitigate funding challenges. Small regional HIEs cost <$5 million to create and in our experience can operate on $200,000/year. Sustainability is the single biggest obstacle facing the viability of HIEs. A combined subscription/ transaction approach, in which providers and hospitals pay a membership fee to join the HIE and payors are charged fees based on the number of transactions, is one model of a successful strategy to cover operational costs. According to a report by KLAS Research, private HIE growth is outpacing public HIE growth.[28] The report states that governance typically is the reason for the restricted growth of public networks and this is the result of public HIEs' reliance on public or government oversight, which adds to the complexity because of tighter rules and regulations. It is also believed that the financial models for public HIEs are more complex.

Privacy, security, and proprietary issues can interfere with the implementation of HIEs and information sharing among hospitals. Concerns regarding the potential for paying patients being recruited to competing facilities or information being used for purposes other than for patient care are common. For this reason, HIEs are typically configured to be "view only," with data available for a defined amount of time (eg, 4 hours for an ED encounter), which eliminates the potential for other parties to use the data for reasons other than those intended. The effect on patient choices about which hospitals they visit, knowing that their information can be accessed throughout the region, is another area for investigation.

Resources are available to providers and communities interested in implementing an HIE, including HealthIT.gov from the Office of the National Coordinator for Health Information Technology and the Healthcare Information and Management Information Systems Society.[9,11] HealthIT.gov allows providers to obtain additional information on regulations and guidance, news, events, and resources. The Healthcare Information and Management Information Systems Society is an excellent resource for providers who are pursuing additional information about HIEs, with access to HIE best practices and case studies via their HIE Toolkit, Ambulatory HIE Toolkit, and Enterprise HIE Toolkit. Health information organizations (HIOs) are available to provide assistance with technology, governance, and support and they are instrumental to physicians seeking additional information on HIEs since HIOs share and develop best practices among organizations. The regional health information organization (RHIO) is a type of HIO and the National Alliance for Health Information Technology defines an RHIO as "a health information organization that brings together health care stakeholders within a defined geographic area and governs HIE among them for the purpose of improving health care in that community."[12] RHIOs always include stakeholders who are concerned with improving the health of the community and making healthcare information more readily available in a confidential manner. RHIOs are created to support a community, groups of communities, a statewide area, or a region that crosses state boundaries.

It would be worthwhile for providers to explore the large healthcare systems and local departments of health in their areas because many have begun the process of bringing their hospitals into the local HIE. In addition, local health departments are usually well versed in the clinical and financial benefits of participating in an HIE.

## Future Directions

Pressing issues that need the additional attention of researchers include the nontechnical impediments to HIE implementation and adoption, utilization characteristics of clinicians and how these can be addressed, and the impact of HIE availability on patient choices regarding where to seek care. Studies of patient encounter patterns in areas where HIEs are well established are needed to determine whether outreach programs can be beneficial to patients lacking PC and who visit multiple EDs. Efficacy studies, which examine the quality of service, also are needed to determine whether clinician expectations are being met by HIEs.

## Conclusions

A comprehensive, easily accessed, up-to-date EMR available to the clinician at the point of care has enormous potential to improve health care, reduce duplication and waste, and reduce cost of care. Further research is necessary to define how HIEs can benefit workflow and evaluate how information sharing will affect patient choices once it becomes known that records are accessible throughout the community.

Although many administrative and mechanical (ie, software) barriers exist, the ultimate development of HIEs to bolster in-house EMRs seems an inevitable part of the march forward in health care. Our role is to build the bridges and promote the use of this powerful new tool.

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