

Usage of and Attitudes Toward Health Information Exchange Before and After System Implementation in a VA Medical Center

Julia M. Whealin, PhD; Reese Omizo, MD; and Christopher Lopez, MD

A quality improvement project demonstrated a meaningful improvement in VA staff satisfaction regarding access to community-based health records after implementation of an externally developed health information exchange system.

Julia Whealin is an Informatics Research Psychologist, **Reese Omizo** is a Physician Informaticist, and **Christopher Lopez** is an Associate Chief of Staff, all at the VA Pacific Islands Healthcare System in Honolulu, Hawaii. Julia Whealin is an Associate Clinical Professor at the University of Hawaii School of Medicine in Manoa.
Correspondence:
Julia Whealin
(julia.whealin@va.gov)

More than 9 million veterans are enrolled in the Veterans Health Administration (VHA). A high percentage of veterans who use VHA services have multiple chronic conditions and complex medical needs.¹ In addition to receiving health care from the VHA, many of these patients receive additional services from non-VHA providers in the community. Furthermore, recent laws enacted, such as the 2018 VA MISSION Act and the 2014 VA Choice Program, have increased veterans' use of community health care services.

VHA staff face considerable barriers when seeking documentation about non-VHA services delivered in the community, which can be fragmented across multiple health care systems. In many VHA medical centers, staff must telephone non-VHA sites of care and/or use time-consuming fax services to request community-based patient records. VA health care providers (HCPs) often complain that community records are not available to make timely clinical decisions or that they must do so without knowing past or co-occurring assessments or treatment plans. Without access to comprehensive health records, patients are at risk for duplicated treatment, medication errors, and death.^{2,3}

BACKGROUND

To improve the continuity and safety of health care, US governmental and health information experts stimulated formal communication among HCPs via the 2009 Health Information Technology for Eco-

nomics and Clinical Health (HITECH) Act.^{4,5} One of the primary aims of the HITECH Act was to promote reliable and interoperable electronic sharing of clinical information through health information exchange (HIE) for both patients and HCPs. Monetary incentives encouraged regional, state, or state-funded organizations to create and promote HIE capabilities.

Presently, empirical data are not available that describe the effect of external HIE systems in VHA settings. However, data examining non-VHA settings suggest that HIE may improve quality of care, although findings are mixed. For example, some research has found that HIE reduces hospital admissions, duplicated test ordering, and health care costs and improves decision making, whereas other research has found no change.^{3,6-13} Barriers to HIE use noted in community settings include poorly designed interfaces, inefficient workflow, and incomplete record availability.^{3,6-10,14}

A few US Department of Veterans Affairs (VA) medical centers have recently initiated contracts with HIE organizations. Because much of the present research evaluates internally developed HIE systems, scholars in the field have identified a pressing need for useful statistics before and after implementation of externally developed HIE systems.^{13,15} Additionally, scholars call for data examining nonacademic settings (eg, VHA medical centers) and for diverse patient populations (eg, individuals with chronic disorders, veterans).¹³

This quality improvement project had 2 goals. The first goal was to assess baseline descriptive statistics related to requesting/obtaining community health records in a VHA setting. The second goal was to evaluate VHA staff access to needed community health records (eg, records stemming from community consults) before and after implementation of an externally developed HIE system.

METHODS

This project was a single-center, quality improvement evaluation examining the effect of implementing an HIE system, developed by an external nonprofit organization. The project protocol was approved by the VA Pacific Islands Healthcare System (VAPIHCS) Evidence-Based Practices Council. Clinicians' responses were anonymous, and data were reported only in aggregate. Assessment was conducted by an evaluator who was not associated with the HIE system developers and its implementation, reducing the chance of bias.¹⁵

Coinciding with the HIE system implementation and prior to having access to it, VAPIHCS medical and managed care staff were invited to complete an online needs assessment tool. Voluntary trainings on the system were offered at various times on multiple days and lasted approximately 1 hour. Six months after the HIE system was implemented, a postassessment tool reevaluated HIE-related access.

VHA Setting and HIE System

VAPIHCS serves about 55,000 unique patients across a 2.6 million square-mile catchment area (Hawaii and Pacific Island territories). Facilities include a medium-sized, urban VA medical center and 7 suburban or rural/remote primary care outpatient clinics.

VAPIHCS contracted with Hawaii Health Information Exchange (HHIE), a nonprofit organization that was designated by the state of Hawaii to develop a seamless, secure HIE system. According to HHIE, 83% of the 23 hospitals in the state and 55% of Hawaii's 2,927 active practicing physicians have adopted the HIE system (F Chan, personal communication, December 12, 2018). HHIE's data sources provide real-time access to a database of 20 million health records. Records include, among other records, data

TABLE 1 Preimplementation Community Health Record Needs

During the past 3 months...	Variables	Staff by Department, No.		
		Medical	Managed Care	Total
During a typical week, how much time did you and/or your staff members spend requesting/obtaining health records from the community? ^a	< 10 min	2	0	2
	11-20 min	4	0	4
	21-30 min	4	0	4
	31-60 min	6	1	7
	> 1 h	15	5	20
	Total	31	6	37
During a typical week, about how many health records do you request from community providers?	None	1	0	1
	1-3 records	7	0	7
	4-6 records	10	0	10
	7-10 records	6	2	8
	> 10 records	8	5	13
	Total	32	7	39
If there was an easy tool that allowed you to instantly retrieve health records from the community, how often would you use it?	< 4 times	4	0	4
	4-6 times	4	1	5
	7-10 times	7	0	7
	11-20 times	4	1	5
	> 20 times	13	5	18
	Total	32	7	39

^aThis item presented only to staff who had requested records in the past 3 months.

such as patients' reasons for referral, encounter diagnoses, medications, immunizations, and discharge instructions from many (but not all) HCPs in Hawaii.

HHIE reports that it has the capacity to interface with all electronic health records systems currently in use in the community (F Chan, personal communication, December 12, 2018). Although the HIE system can provide directed exchange (ie, sending and receiving secure information electronically between HCPs), the HIE system implemented in the VAPIHCS was limited to query-retrieve (ie, practitioner-initiated requests for information from other community HCPs). Specifically, to access patient

TABLE 2 Barriers to Accessing Patient Health Records From the Community

Barriers	Response, %
Preimplementation (N = 32)	
Schedule too busy	28.6
Staff not available to request records	25.7
Do not receive requested records	14.3
Not applicable; do not need community records	5.7
Other	25.7
Postimplementation (N = 20)	
Schedule too busy	6.7
Do not have log in information	6.7
The site interface too confusing	6.7
Patient information incomplete	6.7
Problems with health information exchange software	6.7
Not applicable, no barriers	33.3
Other	33.3

records, practitioners log in to the HIE portal and enter a patient's name in a search window. The system then generates a consolidated virtual chart with data collected from all HIE data-sharing participants. To share records, community HCPs either build or enable a profile in an integrated health care enterprise electronic communication interface into their data. However, VHA records were not made available to community HCPs at this initial stage.

Measures and Statistical Analysis

A template of quality improvement-related questions was adapted for this project with input from subject matter experts. Questions were then modified further based on interviews with 5 clinical and managed care staff members. The final online tool consisted of up to 20 multiple choice items and 2 open-ended questions delivered online. A 22-item evaluation tool was administered 6 months after system implementation. Frequencies were obtained for descriptive items, and group responses were compared across time.

RESULTS

Thirty-nine staff (32 medical and 7 managed care staff) completed the needs assessment, and 20 staff (16 medical and 4 managed care staff) completed the postimplementation evaluation.

Before implementation of the HIE system, most staff (54%) indicated that they spent > 1 hour a week conducting tasks related to seeking and/or obtaining health

records from the community. The largest percentage of staff (27%) requested > 10 community records during a typical week. Most respondents indicated that they would use an easy tool to instantly retrieve community health records at least 20 times per week (Table 1).

Preimplementation, 32.4% of respondents indicated that they could access community-based health records sometimes. Postimplementation, most respondents indicated they could access the records most of the time (Figure 1).

Preimplementation, staff most frequently indicated they were very dissatisfied with the current level of access to community records. Postimplementation, more staff were somewhat satisfied or very satisfied (Figure 2). Postimplementation, 48% of staff most often reported using the HIE system either several times a month or 2 to 4 times a week, 19% used the system daily, 19% used 1 to 2 times, and 14% never used the system. Most staff (67%) reported that the system improved access to records somewhat and supported continuing the contract with the HIE system. Conversely, 18% of respondents said that their access did not improve enough for the system to be of use to them.

Preimplementation, staff most frequently indicated that they did not have time (28.6%) or sufficient staff (25.7%) to request records (Table 2). Postimplementation, staff most frequently (33.3%) indicated that they had no problems accessing the HIE system, but 6.7% reported having time or interface/software difficulties.

DISCUSSION

This report assessed a quality improvement project designed to increase VHA access to community health records via an external HIE system. Prior to this work, no data were available on use, barriers, and staff satisfaction related to implementing an externally developed HIE system within a VA medical center.^{13,15}

Before the medical center implemented the HIE system, logistical barriers prevented most HCPs and managed care staff from obtaining needed community records. Staff faced challenges such as lacking time as well as rudimentary barriers, such as community clinics not responding to requests or the fax machine not working.

Time remained a challenge after implementation, but this work demonstrated that the HIE system helped staff overcome many logistical barriers.

After implementation of the HIE system, staff reported an improvement in access and satisfaction related to retrieving community health records. These findings are consistent with most but not all evaluations of HIE systems.^{3,6,7,12,13} In the present work, staff used the system several times a month or several times a week, and most staff believed that access to the HIE system should be continued. Still, improvement was incomplete. The HIE system increased access to specific types of records (eg, reports) and health care systems (eg, large hospitals), but not others. As a result, the system was more useful for some staff than for others.

Research examining HIE systems in community and academic settings have identified factors that deter their use, such as poorly designed interfaces, inefficient workflow, and incomplete record availability.^{3,6,7,14,16} In the present project, incomplete record availability was a noted barrier. Additionally, a few staff reported system interface issues. However, most staff found the system easy to use as part of their daily workflow.

Because the HIE system had a meaningful, positive impact on VHA providers and staff, it will be sustained at VAPIHCS. Specifically, the contract with the HHIE has been renewed, and the number of user licenses has increased. Staff users now self-refer for the service or can be referred by their service chiefs.

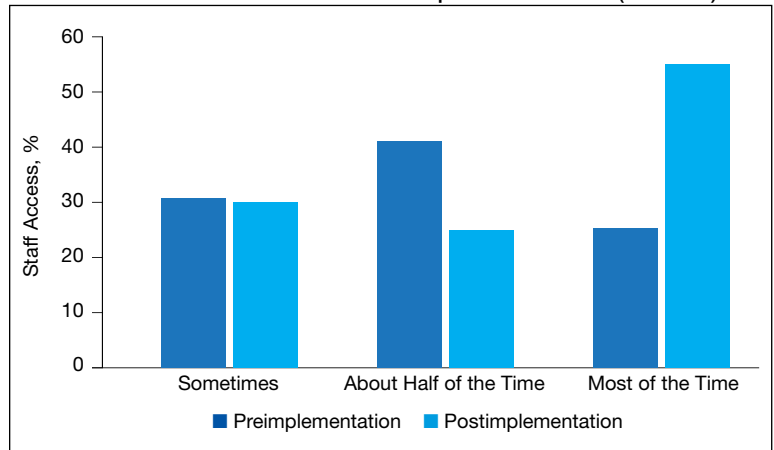
Limitations

This work was designed to evaluate the effect of an HIE system on staff in 1 VHA setting; thus, findings may not be generalizable to other settings or HIE systems. Limitations of the present work include small sample size of respondents; limited time frame for responses; and limited response rate. The logical next step would be research efforts to compare access to the HIE system with no access on factors such as workload productivity, cost savings, and patient safety.

CONCLUSION

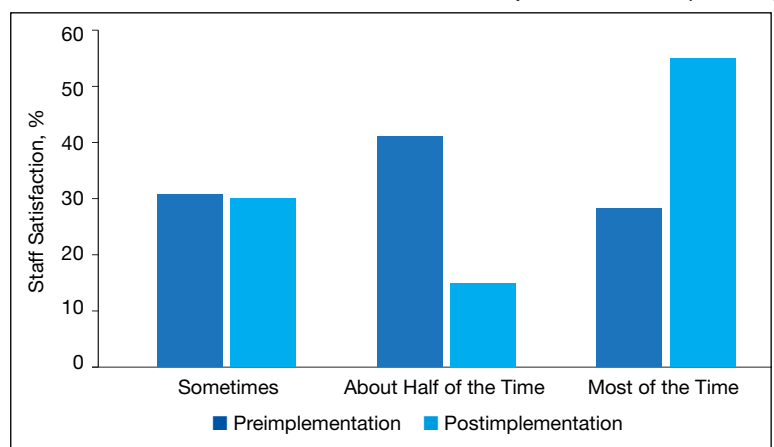
The vision of the HITECH Act was to improve the continuity and safety of health care via reliable and interoperable electronic shar-

FIGURE 1 Staff Reporting Access to Needed Community Records Before and After HIE Implementation (N = 32)



Abbreviation: HIE, health information exchange.

FIGURE 2 Staff Reporting Satisfaction With Community Records Access Before and After HIE Implementation (N = 20)



Abbreviations: HIE, health information exchange.

ing of clinical information across health care entities.⁶ This VHA quality improvement project demonstrated a meaningful improvement in staff’s level of satisfaction with access to community health records when staff used an externally developed HIE system. Not all types of records (eg, progress notes) were accessible, which resulted in the system being useful for most but not all staff.

In the future, the federal government’s internally developed Veterans Health Information Exchange (formerly known as the Virtual Lifetime Electronic Record [VLER]) is expected to enable VHA, the Department of Defense, and participating community care providers to access shared electronic health records nationally. However, until we can

achieve that envisioned interoperability, VHA staff can use HIE and other clinical support applications to access health records.

Author disclosures

The authors report no actual or potential conflicts of interest with regard to this article.

Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of *Federal Practitioner*, Frontline Medical Communications Inc., the US Government, or any of its agencies.

References

1. Yu W, Ravelo A, Wagner TH, et al. Prevalence and costs of chronic conditions in the VA health care system. *Med Care Res Rev*. 2003;60(3)(suppl):146S-167S.
2. Bourgeois FC, Olson KL, Mandl KD. Patients treated at multiple acute health care facilities: quantifying information fragmentation. *Arch Intern Med*. 2010;170(22):1989-1995.
3. Rudin RS, Motala A, Goldzweig CL, Shekelle PG. Usage and effect of health information exchange: a systematic review. *Ann Intern Med*. 2014;161(11):803-811.
4. Blumenthal D. Implementation of the federal health information technology initiative. *N Engl J Med*. 2011;365(25):2426-2431.
5. The Office of the National Coordinator for Health Information Technology. Connecting health and care for the nation: a shared nationwide interoperability roadmap. Final version 1.0. <https://www.healthit.gov/sites/default/files/hie-interoperability/nationwide-interoperability-roadmap-final-version-1.0.pdf>. Accessed May 22, 2019.
6. Detmer D, Bloomrosen M, Raymond B, Tang P. Integrated personal health records: transformative tools for consumer-centric care. *BMC Med Inform Decis Mak*. 2008;8:45.
7. Hersh WR, Totten AM, Eden KB, et al. Outcomes from health information exchange: systematic review and future research needs. *JMIR Med Inform*. 2015;3(4):e39.
8. Vest JR, Kern LM, Campion TR Jr, Silver MD, Kaushal R. Association between use of a health information exchange system and hospital admissions. *Appl Clin Inform*. 2014;5(1):219-231.
9. Vest JR, Jung HY, Ostrovsky A, Das LT, McGinty GB. Image sharing technologies and reduction of imaging utilization: a systematic review and meta-analysis. *J Am Coll Radiol*. 2015;12(12 pt B):1371-1379.e3.
10. Walker DM. Does participation in health information exchange improve hospital efficiency? *Health Care Manag Sci*. 2018;21(3):426-438.
11. Gordon BD, Bernard K, Salzman J, Whitebird RR. Impact of health information exchange on emergency medicine clinical decision making. *West J Emerg Med*. 2015;16(7):1047-1051.
12. Hincapie A, Warholak T. The impact of health information exchange on health outcomes. *Appl Clin Inform*. 2011;2(4):499-507.
13. Rahrkar S, Vest JR, Menachemi N. Despite the spread of health information exchange, there is little evidence of its impact on cost, use, and quality of care. *Health Aff (Millwood)*. 2015;34(3):477-483.
14. Eden KB, Totten AM, Kassakian SZ, et al. Barriers and facilitators to exchanging health information: a systematic review. *Int J Med Inform*. 2016;88:44-51.
15. Hersh WR, Totten AM, Eden K, et al. The evidence base for health information exchange. In: Dixon BE, ed. *Health Information Exchange: Navigating and Managing a Network of Health Information Systems*. Cambridge, MA: Academic Press; 2016:213-229.
16. Blavin F, Ramos C, Cafarella Lallemand N, Fass J, Ozanich G, Adler-Milstein J. Analyzing the public benefit attributable to interoperable health information exchange. <https://aspe.hhs.gov/system/files/pdf/258851/AnalyzingthePublicBenefitAttributabletoInteroperableHealth.pdf>. Published July 2017. Accessed May 22, 2019.