



Health Information Exchange in Nebraska - Provider Satisfaction

Lina Lander, ScD

Daniel E. Lomelin, BS

Marsha Morien, MSBA, FHFMA, FACHE

Gary L. Cochran PharmD, SM

Harlan Sayles, MS

Donald G. Klepser, PhD, MBA

University of Nebraska Medical Center

November 21, 2013

EXECUTIVE SUMMARY

Health Information Exchange (HIE) systems are implemented nationwide to better integrate patient health information and facilitate communication among healthcare providers. The HIE in Nebraska is provided by the Nebraska Health Information Initiative (NeHII). The objectives of this study were to evaluate provider satisfaction with HIE in Nebraska and to determine utilization barriers.

We surveyed 5,618 Nebraska healthcare providers in 2013 and received 615 completed questionnaires (11%). One hundred providers (16%) were NeHII users and 19 providers (3.1%) indicated intention to use NeHII within the next 12 months. Of the 100 providers currently using NeHII, 63 (63%) indicated satisfaction with NeHII. The most common reasons for adoption among those who previously used HIE (N=198), were improvement in patient care (N=111, 56%) as well as receiving (N=95, 48%) and sending information (N=80, 40%) in the referral network. Cost (N=233, 38%) and loss of productivity (N=220, 36%) were indicated as the “major barriers” to adoption by all participants. Accessing a comprehensive patient medication list was identified as the most important feature of the HIE (N=422, 69%).

Cost and loss of productivity were identified as the primary areas of concern among providers. Streamlining HIE access through integration with Electronic Medical Records to minimize workflow interruption, as well as keeping costs reasonably low for providers may increase participation. More efficient access to laboratory values and medication information were indicated as important features for providers. Finally, additional education for providers on HIE practice integration may alleviate perceived barriers in the areas of technical support and staff training, which may move provider expectations toward the benefits that HIE can offer.

INTRODUCTION

As the potential financial and medical benefits of Health Information Exchange (HIE) continue to be explored nationally, the roll out of such systems has been met with both optimistic expectation and resistance to the perceived barriers.^{1,2} Widespread use of HIE systems around the country is a key aspect of the American Recovery and Reinvestment Act with the goal of more efficient information sharing, and ultimately the formation of a National Health Information Network (NHIN).³ Since 2005, the Nebraska's HIE has been maintained through the Nebraska Health Information Initiative (NeHII) and currently includes 2,186 healthcare professionals.⁴

Evaluation of NeHII implementation barriers among physicians and assessment of the desired NeHII features are needed to facilitate usage and implementation. Other states have discovered that while many physicians see HIE as likely to have positive impact on patient care, payment for access to the system is a common concern. In Massachusetts, for example, only 37% of physicians agreed to pay a monthly access fee of \$150.⁵

Utility is related to the willingness of patients and physicians to contribute information into the data sharing systems. Practitioners' rating of HIE's helpfulness is associated with the completeness of the available data.⁶ In addition, completeness of data is contingent on the belief that system security is maintained adequately. Data sharing is linked intrinsically with patient privacy. Mental health practitioners may be especially concerned with security of patient data in electronic systems.⁷

Moreover, efficient workflow integration is a concern for providers, even among current HIE users.⁸ As such, delays in patient visit interaction brought about by entering or locating patient data in the electronic systems, have also been associated with a decrease in HIE use.⁸⁻¹⁰

The purpose of this study was to conduct a comprehensive assessment of the providers' perspectives on HIE including the patterns of use, influences and barriers to adoption, important functionality, and the desired features. This is the first such study in Nebraska. Knowledge of the existing barriers to implementation and desired features may help policymakers facilitate HIE expansion in Nebraska and across the US.

METHODS

We mailed 5,618 surveys to healthcare providers in Nebraska including physicians (MD/DO), physician assistants (PA), and advanced practice registered nurses (APRN). A comprehensive mailing list of healthcare providers in Nebraska was obtained from the Health Professionals Tracking Service at the University of Nebraska Medical Center.¹¹ The initial mailing was conducted in May of 2013 and a reminder letter was sent in June 2013.

The survey was modeled after other provider satisfaction surveys and included 17 questions on: background use of HIE, reasons for adoption, utilized functionality, satisfaction and practice outcomes, identification of important functionality, and demographics.¹² In addition, open-ended questions focused on HIE system improvements, concerns, and other comments. Three physicians reviewed the final draft to establish face validity and avoid ambiguity of questions. Basic descriptive analyses were performed using SPSS.¹³ The study was approved by the Institutional Review Board of the University of Nebraska Medical Center.

RESULTS

A total of 5,618 surveys were mailed and 615 were completed (11%). The majority of surveys were completed by physicians (N=315, 51%), followed by advanced practice registered nurses (N=122, 20%), and physician assistants (N=97, 16%) (**Table 1**). The most common specialties were family medicine (N=149, 24%) and internal medicine (N=94, 15%). The majority of reported practices had 175 beds or more (N=200, 33%) and were urban, non-teaching (N=186, 30.2%). HIE usage was reported by 100 participants (16%) and 19 (3%) intended to implement HIE within the next year.

Among 615 participating providers, 198 had ever used HIE (32%). These providers were asked to rate their influences to adopt HIE. Desire to improve patient care was indicated by the majority of practitioners as a major influence to adopt HIE (N=111, 56%) (**Table 2**). The capabilities of receiving (N=95, 48%) and sending information (N=80, 40%) among a physician's referral network were indicated as major influences to adopt. Also, the desire to meet meaningful use criteria was indicated by 89 responders (45%) as a major influence. Patients' expectations, financial benefits to practice, HIE use among colleagues were not influences to adopt HIE for the majority of providers.

Of the 100 providers who currently use NeHII, 50 (50%) reported enhanced patient care as a result of using NeHII and 63 providers (63%) were somewhat or very satisfied with NeHII.

Table 1. Characteristics of the Participating Providers and their Practices, Provider Satisfaction Survey, Nebraska, 2013

Characteristic	N (%)[*]
Occupation	
MD/DO	315 (51.2%)
Advanced Practice Registered Nurse	122 (19.8%)
Physician Assistant	97 (15.8%)
Other	14 (2.3%)
HIE Adoption Status	
Implemented and using NeHII	100 (16.3%)
Intend to use NeHII within the next 12 months	19 (3.1%)
Deciding whether or not to use NeHII in the next 12 months	33 (5.4%)
Not intending to use NeHII within the next 12 months	25 (4.1%)
Specialty	
Family Medicine	149 (24.2%)
Internal Medicine	94 (15.3%)
Pediatrics	54 (8.8%)
Surgery	37 (6.0%)
Anesthesiology	33 (5.4%)
Emergency Medicine	30 (4.9%)
Orthopedic Surgery and Rehabilitation	26 (4.2%)
Obstetrics and Gynecology	22 (3.6%)
Psychiatry	20 (3.3%)
Otolaryngology	11 (1.8%)
Other [†]	47 (7.6%)
Practice Location	
Rural	169 (27.5%)
Urban non-teaching	186 (30.2%)
Urban teaching	174 (28.3%)
Practice Bed Size	
Small (1-74)	187 (30.4%)
Medium (75-174)	91 (14.8%)
Large (175+)	200 (32.5%)
TOTAL	615 (100%)

* Percentages were calculated out of 615 total responses.

† Specialties with fewer than 10 providers.

Table 2. Influences to Adopt HIE, Provider Satisfaction Survey, Nebraska, 2013 (N=198)

Influences to adopt HIE	Major influence N (%) [†]	Minor influence N (%)	Not an influence N (%)
Desire to improve patient care	111 (56.1%)	24 (12.1%)	37 (18.7%)
Capability of receiving information electronically within my referral network	95 (48.0%)	42 (21.2%)	34 (17.2%)
Desire to meet meaningful use criteria	89 (44.9%)	35 (17.7%)	48 (24.2%)
Capability of sending information electronically within my referral network	80 (40.4%)	47 (23.7%)	46 (23.2%)
Interest/expectation from my patients	29 (14.6%)	51 (25.8%)	90 (45.5%)
Financial benefit to my practice	41 (20.7%)	46 (23.2%)	84 (42.4%)
HIE being used by trusted colleagues	52 (26.3%)	51 (25.8%)	69 (34.8%)
Technical assistance with HIE implementation in my practice	57 (28.8%)	54 (27.3%)	61 (30.8%)

*Most common responses are indicated in bold.

[†]Percentages were calculated out of 198 participants who reported previous HIE use. The percentages do not add up to 100 due to missing data.

Regardless of the previous HIE usage or implementation plans, all providers were asked to rank barriers to using NeHIE. The cost of use and lost productivity during implementation were cited as major barriers to utilization by 38% and 36% of respondents, respectively (**Table 3**). Minor barriers included resistance of employees to change in work habits (N=244, 40%), adequacy of HIE training (N=235, 38%), concern with sharing patient information in the network (N=231, 38%), system reliability (N=222, 33%), and NeHIE technical support (N=204, 33%). In addition, access to high speed internet was a barrier for 184 providers (30%) and reaching a consensus to use NeHIE was a barrier for 290 providers (47%).

Table 3. Perceived Barriers to Utilization, Provider Satisfaction Survey, Nebraska, 2013

Barriers to utilization	Major barrier N (%) [†]	Minor barrier N (%)	Not a barrier N (%)
Costs associated with using NeHII	233 (37.9%)	160 (26.0%)	95 (15.4%)
Loss of productivity during the transition to using NeHII	220 (35.8%)	192 (31.2%)	85 (13.8%)
Resistance to change in work habits	122 (19.8%)	244 (39.7%)	131 (21.3%)
Adequacy of training for you and your staff	185 (30.1%)	235 (38.2%)	75 (12.2%)
Concern with providing patient information over the NeHII network	97 (15.8%)	231 (37.6%)	172 (28.0%)
Reliability of the system	187 (30.4%)	222 (36.1%)	75 (12.2%)
Adequacy of NeHII technical support	198 (32.2%)	204 (33.2%)	82 (13.3%)
Access to high speed internet	43 (7.0%)	141 (22.9%)	314 (51.1%)
Reaching consensus within my practice to use NeHII	106 (17.2%)	184 (29.9%)	203 (33.0%)

*Most common responses are indicated in bold.

†Percentages were calculated out of 615 participants and do not add up to 100 due to missing data.

All providers were asked to assess the desired HIE features regardless of their HIE implementation status. Providers ranked a variety of HIE features by their importance from ‘*very important*’ to ‘*not important*’ (**Table 4**). Features ranked as ‘*very important*’ were accessing comprehensive medications (N=422, 69%), patient allergies (N=396, 64%), viewing lab results (N=381, 62%), clinical notes (N=378, 62%), patient problem lists (N=358, 58%), and radiology images (N=325, 53%). Exchanging clinical summaries (N=343, 56%) was also reported as ‘*very important*’. Features ranked ‘*somewhat important*’ by the majority of participants included public health reporting (N=257, 42%), additional free access for staff (N=217, 35%), and electronic insurance information (N= 205, 33%).

Table 4. Important Functionality for Inclusion in HIE, Provider Satisfaction Survey, Nebraska, 2013

Functions	Very important* N (%) [†]	Somewhat important N (%)	Not important N (%)
Accessing a comprehensive list of the patient's medications	422 (68.6%)	40 (6.5%)	10 (1.6%)
Accessing a comprehensive list of the patient's allergies	396 (64.4%)	66 (10.7%)	15 (2.4%)
Viewing lab results from other providers	381 (62.0%)	91 (14.8%)	16 (2.6%)
Accessing clinical notes	378 (61.5%)	88 (14.3%)	14 (2.3%)
Accessing a patient problem list	358 (58.2%)	107 (17.4%)	20 (3.3%)
Exchanging patient clinical summaries with other physicians	343 (55.8%)	121 (19.7%)	25 (4.1%)
Viewing images from radiology procedures	325 (52.8%)	130 (21.1%)	35 (5.7%)
Indicator of availability of the patient's NeHII record	251 (40.8%)	180 (29.3%)	44 (7.2%)
Single sign-on	232 (37.7%)	189 (30.7%)	61 (9.9%)
Public health reporting	138 (22.4%)	257 (41.8%)	102 (16.6%)
Additional free access for staff	150 (24.4%)	217 (35.3%)	124 (20.2%)
Accessing electronic insurance information	178 (28.9%)	205 (33.3%)	113 (18.4%)

*Most common responses are indicated in bold.

[†]Percentages were calculated out of 615 participants and do not add up to 100 due to missing data.

HIE was believed to have significant impact on practice regardless of previous experience and usage (**Table 5**). HIE was reported to 'very likely' help identify critical lab values (N=264, 43%), duplicate prescriptions (N=263, 43%), medication errors (N=221, 36%), and needed lab tests (N=211, 34%). In addition, providers identified that HIE would 'very likely' help order fewer tests (N=256, 41.6%) and monitor prescription drugs (N=240, 39%), and enhance patient care (N=243, 39.5%).

Table 5. Perceived Likelihood of HIE Use to Help the Provider, Provider Satisfaction Survey, Nebraska, 2013

HIE Benefit	Very likely N (%) [†]	Somewhat likely N (%)	Not at all likely N (%)
Identify critical lab values	264 (42.9%)	136 (22.1%)	20 (3.3%)
Identify duplicate prescriptions	263 (42.8%)	121 (19.7%)	30 (4.9%)
Order fewer tests due to better availability of lab results	256 (41.6%)	129 (21.0%)	26 (4.2%)
Overall, would NeHII enhance patient care?	243 (39.5%)	160 (26.0%)	24 (3.9%)
Prescription drug monitoring	240 (39.0%)	144 (23.4%)	24 (3.9%)
Identify potential medication errors	221 (35.9%)	180 (29.3%)	22 (3.6%)
Identify needed lab tests	211 (34.3%)	154 (25.0%)	42 (6.8%)
Order more on-formulary drugs (as opposed to off-formulary drugs)	130 (21.1%)	194 (31.5%)	79 (12.8%)
Provide preventative care	170 (27.6%)	180 (29.3%)	50 (8.1%)

*Most common responses are indicated in bold.

[†]Percentages were calculated out of 615 participants and do not add up to 100 due to missing data.

Most responders indicated HIE was ‘*somewhat likely*’ to help order more on-formulary drugs (N=194, 32%) and provide preventative care (N=180, 29%). The ability of NeHII to enhance patient care was reported as ‘*very likely*’ by 243 providers (40%) and to ‘*somewhat likely*’ by 160 providers (26%) totaling 403 participants (66%).

DISCUSSION

The majority of healthcare providers were satisfied with their NeHII usage and experience. Once adoption barriers are overcome, providers will likely remain NeHII users. Furthermore, participants specified that they have high expectations for both features of HIE and its ability to enhance care. For every potential enhancement to their practice, providers frequently chose HIE as '*very likely*' or '*somewhat likely*' to help. Education on the degree to which NeHII can deliver such improvements will continue to be a critical to ensure provider satisfaction through realistic expectations.

In managing provider expectations, it would likely benefit HIE designers to ensure that the most highly important features indicated by physicians are maintained or enhanced. The most important information areas were patient medications and laboratory values. Completeness of the laboratory data has the opportunity for improvement. Viewing of radiology images is currently absent from the NeHII's functionality, but was indicated as being '*very important*' by over half of responders. The medication history feature was absent while the survey was conducted, yet it was the feature selected most frequently of all as '*very important*', demonstrating its value for providers.

The primary reported barriers to adoption were logistic concerns. Consistent with other studies, Nebraska providers reported the cost of HIE as a major barrier.⁵ The finding that loss of productivity was considered a major barrier was also similar to that of other studies, that found decline in HIE use, when it served as an additional step in the patient-provider interactive process.⁸⁻¹⁰ Although the adequacy of NeHII training and technical support were classified as

'*minor barriers*'; these items were frequently reported. Adequate outreach to address these specific items will be crucial to increase adoption and utilization among providers.

Providers indicated that HIE is likely to help their practices in a variety of ways. The expected outcomes of HIE use by providers in Nebraska were similar to the outcomes reported in other US studies. Improvement to patient care was the most commonly reported reason for adoption of HIE in Nebraska. Improvement in patient care was also regarded by a large majority of providers in Massachusetts to result from HIE use.⁵ Accessing laboratory values and prescriptions were considered important features of HIE by responders in our survey. Accessing laboratory and prescription information were also found by Patel et al. to be '*very useful*', indicating the importance of these features to healthcare providers.¹ In addition, most responders to this survey believed that HIE use would aid in preventing repeat testing. Studies on HIE usage patterns have shown that 20% of users report preventing repeat testing as a direct consequence of HIE usage.¹⁰ Nebraska providers will also likely to experience similar benefits from using HIE.

Future directions for NeHIE and HIE in Nebraska should focus on dispelling concerns about HIE implementation. Cost was a barrier that may be addressed through discussion with outside organizations and data providers that influence the prices of the HIE services. Overall, a strong campaign informing providers of the ease of HIE integration for their practice, numerous potential benefits, and assurance of a continued technical support will address the majority of provider concerns and help increase NeHIE utilization.

CONCLUSIONS

Nebraska's healthcare providers desire a variety of HIE features, high reliability, and workflow integration. Providers identified detailed laboratory results and medication histories as important components of the HIE. Addressing important concerns for adoption, such as cost and lost productivity, will help alleviate apprehensions and ensure successful long-term implementation of HIE in Nebraska.

REFERENCES

1. Patel, V., Abramson, E. L., Edwards, A., Malhotra, S., & Kaushal, R. (2011). Physicians' potential use and preferences related to health information exchange. *International journal of medical informatics*, 80(3), 171-180.
2. Frisse, M. E., & Holmes, R. L. (2007). Estimated financial savings associated with health information exchange and ambulatory care referral. *Journal of biomedical informatics*, 40(6), S27-S32.
3. Fontaine, P., Zink, T., Boyle, R. G., & Kralewski, J. (2010). Health information exchange: participation by Minnesota primary care practices. *Archives of internal medicine*, 170(7), 622.
4. NeHII Fact Sheet (2013, October) Retrieved from http://nehii.org/images/stories/videos/docs/nehiifactsheet_20131011.pdf
5. Wright, A., Soran, C., Jenter, C. A., Volk, L. A., Bates, D. W., & Simon, S. R. (2010). Physician attitudes toward health information exchange: results of a statewide survey. *Journal of the American Medical Informatics Association*, 17(1), 66-70.
6. Hincapie, A. L., Warholak, T. L., Murcko, A. C., Slack, M., & Malone, D. C. (2011). Physicians' opinions of a health information exchange. *Journal of the American Medical Informatics Association*, 18(1), 60-65.
7. Salomon, R. M., Blackford, J. U., Rosenbloom, S. T., Seidel, S., Clayton, E. W., Dilts, D. M., & Finder, S. G. (2010). Openness of patients' reporting with use of electronic records: psychiatric clinicians' views. *Journal of the American Medical Informatics Association*, 17(1), 54-60.
8. Vest, J. R., Zhao, H., Jasperson, J., Gamm, L. D., & Ohsfeldt, R. L. (2011). Factors motivating and affecting health information exchange usage. *Journal of the American Medical Informatics Association*, 18(2), 143-149.
9. Vest, J. R. (2009). Health information exchange and healthcare utilization. *Journal of medical systems*, 33(3), 223-231.
10. Johnson, K. B., Unertl, K. M., Chen, Q., Lorenzi, N. M., Nian, H., Bailey, J., & Frisse, M. (2011). Health information exchange usage in emergency departments and clinics: the who, what, and why. *Journal of the American Medical Informatics Association*, 18(5), 690-697.
11. Health professions tracking service. Health Professions Tracking Service Web site. <http://app1.unmc.edu/healthprof/>. Accessed September 10, 2013.
12. National Ambulatory Medical Care Survey (NAMCS) 2011: Electronic Medical Records & Physician Workflow Supplements. http://www.cdc.gov/nchs/ahcd/ahcd_survey_instruments.htm#namcs. Accessed October 4, 2012
13. IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.