Health Information Exchange in California Community Clinics: Adoption, Priority, Facilitators and Barriers

Part I. Community Clinic Site Survey

January 30, 2014

Katherine K. Kim
Danielle Gordon
Holly C. Logan
San Francisco State University, Health Equity Institute

Prepared for California Health eQuality
University of California Davis
Institute for Population Health Improvement
http://www.ucdmc.ucdavis.edu/phi/programs/cheq/
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Part I: Community Clinic Sites

Background and Introduction

New healthcare delivery models such as learning healthcare systems, accountable care organizations (ACO) and patient-centered medical homes (PCMH) have evolved to address the imperative triple aims of patient experience (quality and satisfaction), population health, and cost (http://www.ihi.org/offerings/Initiatives/TripleAim/Pages/default.aspx). These models necessitate a new technical infrastructure for data collection, data normalization, making sense of data, and communication across disparate organizations and users. Health information exchange (HIE), the electronic movement of health-related information among organizations according to recognized standards\(^1\), is a critical component of this new technical infrastructure.

HIE has gained prominence in part due to one of the largest federal investments in health information technology, Title XIII of the American Recovery & Reinvestment Act of 2009, also called Health Information Technology for Economic and Clinical Health (HITECH)\(^2\). HITECH provided funding to improve healthcare quality and accessibility through interoperable health information technology through two key provisions. First, HITECH funded states directly to develop HIE. Second, it spurred adoption of electronic health records (EHR) among providers by authorizing $27 billion in Medicare and Medicaid incentives for achievement of certain clinical or “meaningful use” objectives with EHR data while promising future penalties for failure to adopt. HIE is an underlying requirement of the meaningful use of EHRs as it enables ePrescribing, lab result reporting, online access to health information for patients, exchange of summary of care documents between EHRs, and transmission of data for syndromic surveillance, cancer and other registries. HIE has been identified as a solution to healthcare coordination problems which include patient safety and quality issues, recalls of drugs, healthcare pandemics and chronic care coordination for patients who may be seen in different locations.\(^3\)

Community health information organizations (HIOs), those who organize and govern HIE for unaffiliated organizations, are considered a neutral party for enabling this cross-organizational data sharing. There are 161 HIOs nationally and 109 of them are supporting ACO or PCMH\(^4\). As of October 2013 there were eight operational—defined as transmitting data—community HIOs in California and eight others in some stage of
formation or implementation but not yet operational (http://www.ucdmc.ucdavis.edu/iph/Programs/cheq/hieactivity.html). Many community HIOs have a local or regional geographic boundary within which they operate which reflects the referral relationships, patterns of care, and flow of patients among the participating organizations.

There are several reasons that community clinics as providers of care for underserved and vulnerable populations may be particularly interested in HIE. First, they cooperate intensively with hospitals, specialists, retail pharmacies, and other community services in order to provide needed care. Second, they depend on federal and state programs to fund core infrastructure development and technology. Finally, they must leverage scant resources across communities to fulfill their mission.

However, there is little published on the status of HIE among community clinics or their participation in HIOs. One area that has been reported is facilitators and barriers to HIE for community clinics in small, qualitative studies. Facilitators include financial incentives, including those for e-prescribing and pay-for-performance, potential cost savings, workflow efficiencies and improved patient quality and safety. Barriers to HIE included lack of interoperability, privacy and security, high costs of both initial implementation and ongoing sustainability, inadequate buy-in, lack of trust, lack of leadership and technical/workflow issues. Lack of consistent connectivity and difficulty finding expert IT staff to assist are barriers that affect rural and underserved communities in particular.

In order to better understand whether and how California’s community clinics are participating in HIE and HIOs, California Health eQuality program (CHeQ), a program of the Institute for Population Health Improvement at UC Davis, engaged San Francisco State University to conduct a statewide survey in 2013. In addition, the California Primary Care Association (CPCA) partnered with CHeQ to develop the survey and help recruit participants.

Recognizing that the level of participation, knowledge, technical resources, and strategy development may differ substantially between potential clinic site respondents and corporate office respondents, we conducted two separate surveys. Results of each survey were reviewed with a subset of respondents who volunteered to participate in a webinar focus group.

This report covers the survey results and feedback from the focus groups. Part 1 reports on the clinic site survey and Part 2 reports on the clinic corporation survey.
Results

The responses of 194 eligible clinics are included in these results. Of these, 159 were considered urban and 33 rural, (2 missing) based on the zip code of the clinic site. 116 sites belong to a larger clinic corporation. (See Table 1.)

Table 1: Clinic Demographics

<table>
<thead>
<tr>
<th>Clinic Type</th>
<th>Urban</th>
<th>Rural</th>
<th>Don’t Know</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>159</td>
<td>33</td>
<td>2</td>
<td></td>
<td>194</td>
</tr>
<tr>
<td>Clinic with Parent Organization</td>
<td>116</td>
<td>75</td>
<td>3</td>
<td>194</td>
</tr>
<tr>
<td>Clinic without Parent Organization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Respondents were primarily day-to-day managers of the clinic sites or senior administrators. (see Table 2.)

Table 2: Respondent Role

<table>
<thead>
<tr>
<th>Role</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day-to-day clinic manager</td>
<td>94 (48.5)</td>
</tr>
<tr>
<td>Senior Administrator</td>
<td>75 (38.7)</td>
</tr>
<tr>
<td>Clinical</td>
<td>9 (4.6)</td>
</tr>
<tr>
<td>Technical</td>
<td>9 (4.6)</td>
</tr>
<tr>
<td>Financial</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Other: All of the above</td>
<td>2 (1.0)</td>
</tr>
</tbody>
</table>

Electronic Health Record Adoption

Clinic sites have a high level of adoption of electronic health records (EHR). Overall, 80% of clinic sites reported having an EHR: 97% or rural clinics and 77% of urban clinics. There were also differences among clinics that are part of a parent organization or clinic corporation (corporate sites) and those that are not (solo sites): 87% of corporate sites and 69% of solo sites have an EHR.

In order to meet the requirements and receive meaningful use incentive payments from the Centers for Medicare and Medicaid Services, providers must use an EHR certified for this purpose. Among those clinics with an EHR, overall, 75% have a certified EHR. (See
Figure 1.) Rural clinics have greater adoption of a certified EHR than urban clinics. Similarly, corporate sites have greater adoption than solo sites.

Figure 1. Electronic Health Record Adoption

Focus Group Findings Box 1: Relationship between electronic health records (EHR) and health information exchange (HIE)

Most focus group participants agreed that an EHR and HIE go hand-in-hand. Participants discussed the idea that an EHR is necessary to have pertinent and up-to-date data before exchange data. While all participants agreed that both are important and related, one participant noted that implementation did not necessarily need to occur simultaneously and that many clinics first implement an EHR before starting HIE.

Health Information Exchange Adoption

92 (47%) clinics are participating in some type of electronic health data exchange with an external location (an organization not under the same parent organization). Rural clinics are more engaged in external data exchange than urban clinics (73% vs. 43%). Similarly, corporate sites are more engaged than solo sites. (See Figure 2.)
Among the 92 clinics engaged in HIE with entities external to their own clinic organization, more than half are exchanging data with laboratories, pharmacies, or hospitals. (See Figure 3.) About a third reported exchanging with physician offices, other community clinic sites, or with radiology/imaging locations. One quarter are exchanging data with public health agencies. A small percentage are also providing data to a personal health record.
Figure 3. Electronic data exchange partners

There is variability between the exchange partners of urban clinics and rural clinics. (See Figure 4.) A greater percentage of urban clinics exchange data with hospitals.

Figure 4. Urban and rural clinics’ data exchange partners
Figure 5 shows the comparison between the data exchange partners for corporate and solo sites. A greater percentage of the corporate sites exchange with pharmacies, labs, other clinics, and personal health records. A greater percentage of solo sites exchange with physician offices, radiology/imaging, and public health.

![Figure 5. Data exchange partners among corporate sites and solo sites](image)

**Types of Data Being Exchanged**

Figure 6 shows the data types being exchanged between clinics and their exchange partners. The greatest percentage are exchanging laboratory orders (85%) and results (91%).

Close to half of the clinic sites are exchanging summary care records or referrals electronically (45% each). About one third of these clinics are exchanging radiology orders (37%), or results (39%), clinical summaries (33%), or inpatient clinical notes (29%) or medication lists (27%).
There is variability between urban and rural clinics in terms of the types of data being exchanged electronically. (See Figure 7.) In exchange of all data types except ambulatory clinical notes, a greater percentage of rural sites are exchanging data than urban sites.
Focus Group Findings Box 2: *Data Types*

Participants agreed that it is important to send and receive any patient data. As one participant stated:

“In a perfect world I think we would prefer to get all data...you never know what data is not important until you see it.”

Participants discussed some data that they considered high priority:

- Active Medications
- Chronic Conditions
- Labs and/or Radiology Diagnostics and Tests
- Perinatal Record/Newborn Discharge reports
- Syndromic Surveillance/Vaccine/Immunization registries
- Emergency Discharge/patient discharges
Impacts of Health Information Exchange

When asked about the financial impact of implementing HIE, clinics were divided on whether HIE decreases cost (38%), increases cost (31%), or has no change on cost (23%). In terms of revenue, almost half (47%) believe HIE has no impact on revenue, and 37% believe HIE increases revenue. Eight percent of clinic sites reported that HIE decreases revenue. (See Table 3.)

Table 3. Perceptions of HIE impact on cost and revenue

<table>
<thead>
<tr>
<th>Impact on Cost</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreases cost</td>
<td>73 (38)</td>
</tr>
<tr>
<td>Increases cost</td>
<td>61 (31)</td>
</tr>
<tr>
<td>No change to cost</td>
<td>45 (23)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact on Revenue</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreases revenue</td>
<td>16 (8)</td>
</tr>
<tr>
<td>Increases revenue</td>
<td>72 (37)</td>
</tr>
<tr>
<td>No change to revenue</td>
<td>92 (47)</td>
</tr>
</tbody>
</table>

Focus Group Findings Box 3: Cost and Revenue Impacts

A few participants were able to speak about their experience with regard to the financial impact of HIE to the clinic. In one urban clinic, they experienced reduction in staff due to the elimination of paper records but also spent substantial funds to implement HIE. They had not conducted a financial analysis to quantify these impacts. Other participants discussed the possibility that costs might be lowered from reductions in emergency room visits and better organization overall; however they also expected to see increased costs for technology fees and IT department expansion.

A few of the rural participants said they had not seen any changes in revenue after HIE implementation and others felt it was too early to be able to tell. They thought there was a possibility to increase revenue by having access to patients’ comprehensive data and decreasing the amount of time searching for information, which might capacity to see more patients.

Participants suggested that in order to understand any impacts on costs or revenue, HIE would need to be in place for 18 months to 3 years.
Priority of Health Information Exchange

In examining the importance of HIE implementation among clinic priorities, it was reported that HIE was considered important, but not a top priority. (See Table 3). Rural clinics placed a greater importance rating on every factor compared to the urban clinics. Corporate sites also rated these factors higher than solo sites.

Table 4: Importance of HIE in relation to other priorities, scale of 1 (not important) to 7 (extremely important)

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Urban Clinics</th>
<th>Rural Clinics</th>
<th>Corporate Sites</th>
<th>Solo Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority of HIE vs. other initiatives</td>
<td>5.1</td>
<td>5.1</td>
<td>5.2</td>
<td>5.3</td>
<td>4.9</td>
</tr>
<tr>
<td>Importance of HIE to clinic mission</td>
<td>5.5</td>
<td>5.5</td>
<td>5.8</td>
<td>5.8</td>
<td>5.1</td>
</tr>
<tr>
<td>Importance of HIE to daily operations</td>
<td>5.5</td>
<td>5.4</td>
<td>5.8</td>
<td>5.7</td>
<td>5.1</td>
</tr>
<tr>
<td>Importance of HIE to clinical care coordination</td>
<td>5.8</td>
<td>5.8</td>
<td>6.1</td>
<td>6.1</td>
<td>5.4</td>
</tr>
<tr>
<td>Importance of HIE to quality of care</td>
<td>5.7</td>
<td>5.7</td>
<td>5.9</td>
<td>6.0</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Focus Group Findings Box 4: Priority of HIE

Participants were not surprised that HIE was rated important in terms of clinic’s mission, daily operations, clinical care coordination and quality of care. While they agreed that HIE was an important priority it was not necessarily the most important priority. They talked about the many other initiatives with regulatory mandates or deadlines, and financial impacts that pushed the priority of HIE lower. One example was the need to convert to ICD-10.

In order to be a top priority, HIE needs to improve efficiency and/or effectiveness in providing healthcare to patients and communities. An important discussion that emerged was the idea that clinics were starting to feeling ‘burnt out’ with all of the different projects including HIE implementation.

“It is a strategic priority but been working so hard that everyone’s a little burned out.”
Facilitators and Barriers to Health Information Exchange

We asked clinics to rate the importance of several factors to their ability to implement HIE. (See Table 5). Clinics rated internet connection, privacy and security concerns as the most important factors. Of this group of factors, the availability of a Health Information Organization in the local area was rated lowest in importance to their ability to implement HIE, although this consideration was still considered important (mean of 5.7 out of 7).

Table 5. Importance of technical factors in ability to implement HIE, scale of 1 (not important) to 7 (extremely important)

<table>
<thead>
<tr>
<th>Focus Group Findings Box 5: Health Information Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>None of the urban focus group participants had participated in an HIO; there were no HIOs operating in their area. One rural clinic discussed their frustration with the performance on the HIO they had joined including delays and missing of milestones. These frustrations led to the participant considering other HIO’s to join. Other rural participants mentioned they were considered joining Inland Empire HIE. They expressed concerns about covering upfront and ongoing fees. For some rural participants whose coverage areas crossed California, Nevada and Oregon, another concern was selecting which HIO and how many to join.</td>
</tr>
</tbody>
</table>
When asked about the relative importance of financial factors, clinics report that capital expense (5.8 out of 7) and the availability of funds (6.3 out of 7) both rated highly important to the ability to implement HIE.

“Becoming more dependent on technology can be scary when you don’t have expertise to keep you stable or fix it if something goes down.”

**Focus Group Findings Box 7: Privacy and Security**

Participants discussed the importance of protecting privacy and security although there was a certain practicality expressed that it is not possible to guarantee absolute privacy and security.

“Everybody wants it to be safe, everybody wants it to be secure & want people’s record, you know, everybody wants to be a good steward of people’s information.”

Participants discussed that HIE needs to meet the highest standard of security and privacy and be able to demonstrate how it does so with an agreement (e.g. business associate agreement or memorandum of understanding) in place to commit to keeping those standards.

When asked about the relative importance of financial factors, clinics report that capital expense (5.8 out of 7) and the availability of funds (6.3 out of 7) both rated highly important to the ability to implement HIE.

**Table 6. Importance of financial factors in ability to implement HIE, scale of 1 (not important) to 7 (extremely important)**

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Urban Clinics</th>
<th>Rural Clinics</th>
<th>Corporate Sites</th>
<th>Solo Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital expense</td>
<td>5.8</td>
<td>5.7</td>
<td>6.2</td>
<td>5.8</td>
<td>5.9</td>
</tr>
<tr>
<td>Availability of funds</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
<td>6.4</td>
</tr>
</tbody>
</table>
The final set of factors we explored were related to the perceived degree of stakeholder buy-in. (See Table 7.) Here we saw that the highest rated factor is the perceived willingness of potential exchange partners to engage in HIE. In this particular group, the least important factor was the existence of an identified HIE leader in the local community.

Ratings of the importance of leadership factors were similar to those reported for other facilitators and barriers. The interest and willingness of leaders is very important. (See Table 7.)

"Thankfully I have taken a peek at the numbers for the proposed HIEs for up here and I’m convinced that the cost structure is not insurmountable."

Table 7. Importance of leadership factors in the ability to implement HIE, scale of 1 (not important) to 7 (extremely important)

<table>
<thead>
<tr>
<th>Focus Group Findings Box 8: Funding</th>
</tr>
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<tbody>
<tr>
<td>Participants acknowledged that resources are needed to be able to make HIE work now and in the future. Participants are currently funding HIE efforts through contracts with local extension centers, operating funds, and meaningful use funds. Their ideas regarding future funding included: covering costs as a matter of routine operating expense, reimbursement mechanisms from CMS and state coverage such as FamPact, and quality incentive programs. There was a sense of optimism that sustaining funds would be found.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Focus Group Findings Box 8: Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Thankfully I have taken a peek at the numbers for the proposed HIEs for up here and I’m convinced that the cost structure is not insurmountable.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 7. Importance of leadership factors in the ability to implement HIE, scale of 1 (not important) to 7 (extremely important)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Individual HIE leader in community</td>
</tr>
<tr>
<td>Knowledge about HIE</td>
</tr>
<tr>
<td>Clinic leadership understanding of HIE</td>
</tr>
<tr>
<td>Level of interest in HIE among clinicians</td>
</tr>
<tr>
<td>Level of interest in HIE of clinic leadership</td>
</tr>
<tr>
<td>Willingness of local health organizations to collaborate</td>
</tr>
<tr>
<td>Willingness of partners to share data</td>
</tr>
</tbody>
</table>
Focus Group Findings Box 9: Leadership Factors

Participants in the focus groups discussed the resistance to HIE among clinicians. They felt that most clinicians did not understand the value of HIE and had an unwillingness to consider it. The participants were nevertheless hopeful that demonstration of efficiencies and other benefits from HIE would help garner the supportive of clinicians. In contrast, they thought that clinic leadership was supportive and interested in HIE.

Participants discussed the need for community and healthcare partners to be engaged in order for HIE to be successful. While HIE might be a high priority for some community clinics, it might not be for their partners. For example, some felt that hospitals did not consider sharing information with clinics to be a high priority and they needed to advocate and push their hospital partners to support HIE.

Focus Group Findings Box 10: HIE Resources

Participants found current resources for HIE to be adequate. They utilized information from California Office of Health Information Integrity (CalOHII), California Primary Care Association (CPCA), and CalHIPSO, and accessed numerous webinars, articles, and conferences that included education on HIE. They also expressed that there were a number of successful examples for HIE that could serve as models. As the clinics move into more advanced stages of implementation and maintenance of HIE they felt that additional resources to help reduce the dependence on consultants and other outside resources would be helpful. They suggested templates for project plans and tools for training.

“I hope that in the upcoming years there will be a way to feel more comfortable and competent with what we’re doing with HIE and streamline it a bit. It feels a bit like creating the wheel and haven’t been able to steal something from someone and adapt it, I hope it gets easier in the future.”
Conclusions

Overall, EHR adoption among community clinics is substantial at 80%. There are differences in rates of adoption in general and for meaningful-use certified EHRs: rural clinics exceed urban clinics and corporate sites exceed solo sites.

Almost half of clinics are participating in HIE and with a diverse array of partners including labs, pharmacies, hospitals, physician offices, clinics, imaging centers, public health, and personal health records. Again, rural clinics have higher rates of adoption than urban, and corporate sites are higher than solo. There are many types of clinical data being exchanged. Lab orders and results are the most frequently exchanged type of data and are about twice as frequent as referrals, the next most frequent type of data exchanged. Although clinics may prefer to have all data, the types of data exchanged seem to be useful and fairly comprehensive.

Clinics are divided on the real and potential financial impact of HIE in terms of cost and revenue. There is a perception that the experience with HIE has not been long enough to be able to see financial impact. But, positive financial benefit would be a driver of HIE adoption.

HIE is important to clinics and their missions, operations, care coordination, and quality of care. However, HIE is in competition with numerous other priorities which may have more urgency due to regulatory requirements or tangible financial ramifications. Initiatives with hard deadlines or quantifiable impacts on cost or revenue trump initiatives such as HIE that are seen as enhancing infrastructure but are not backed by a mandate.

The most important factors in clinics’ ability to implement HIE were technical factors: adequacy of internet connections, privacy, and security. While connectivity may be a major concern for rural clinics, privacy and security is a concern for all clinics. For HIE to be successful, clinics must rely on their exchange partners including physician offices that may have even fewer resources than they to assure trust in electronic transactions. This may be worrisome to many clinics. Beyond these technical issues, the next highest factor in importance was funding. The availability of funds for sustaining HIE was more important than capital to start it up. Clinics are optimistic and considering a number of strategies for funding.

The benefit of HIE increases as the size of the network increases. With almost half of clinics exchanging data, the state is on its way towards seeing effective electronic sharing of health information. There is still work to be done to identify the needs of those clinics that have not adopted and implemented HIE technology. It appears that urban clinics and solo sites are lagging behind their counterparts and resources could be
applied to support them. Additional study should be done to see how rural clinics in particular have accomplished this greater rate of adoption and to further their work as well as extract lessons learned. Finally, attention must be paid to the prioritization of HIE. While HIE alone might not seem like a priority, it is a necessary component in many of the other strategic initiatives on which clinics are focusing. This value proposition for HIE should be clearly and compellingly stated so that funders, regulators, and clinicians will champion the resources to help clinics adopt the HIE technology necessary to increase care coordination and better serve their patients.
About the Partners

About California Health eQuality (CHeQ)
California Health eQuality (CHeQ) is a program of the UC Davis Institute for Population Health Improvement that administers statewide health information exchange (HIE) projects for California. Funded by the California Health and Human Services Agency, under the auspices of the Office of the National Coordinator for Health IT State HIE Cooperative Agreement, CHeQ is promoting coordinated and integrated care through health information exchange. Programs including a trusted exchange environment, improved public health capacity for electronic reporting, HIE acceleration funding opportunities, and the monitoring of HIE adoption lay a foundation for improved quality of care for all Californians. Please visit CHeQ at http://www.ucdmc.ucdavis.edu/iphi/programs/cheq/.

About Institute for Population Health Improvement (IPHI)
The UC Davis Institute for Population Health Improvement (IPHI) is working to align the many determinants of health to promote and sustain the well-being of both individuals and their communities. Established in 2011, the institute is leading an array of initiatives, from improving health-care quality and health information exchange to advancing surveillance and prevention programs for heart disease and cancer.

About Health Equity Institute at San Francisco State University
The Health Equity Institute at San Francisco State University (SFSU) seeks to foster innovation and community engagement towards a vision of a truly healthy society. The mission of the Health Equity Institute (HEI) is to create an intellectual environment that encourages diversity of perspectives, challenges conventional approaches, and produces innovative action-oriented research in the biomedical and behavioral sciences in order to improve health, eliminate health disparities, and establish equity in health. SFSU is a public university affiliated with the California State University system. Located in San Francisco, it offers 118 different Bachelor's degrees, 94 Master's degrees, and 5 Doctoral degrees.
References


Appendix: Methods

Survey Methods

A survey instrument was built to explore progress toward adoption of EHRs and implementation of HIE in community safety-net clinics across California. Constructs were selected to capture both objective measures of implementation (whether an EHR is in use or not), as well as subjective beliefs about the challenges and facilitators of HIE implementation.

Eligibility criteria were established to exclude specialist and single-issue centers (oncology; dialysis), and to capture true primary care community clinic sites. A list of eligible clinic sites was obtained via public access to the Office of Statewide Health Planning and Development (OSHPD) web site. The primary care clinic list was downloaded and reviewed for obvious non-eligibles, and an internet search was conducted for each clinic considered for exclusion. When it was still not clear whether a clinic met eligibility, a phone call was placed to ascertain the scope of care services provided at that site.

A screening script was developed to identify the individual best suited to respond at each site, usually the clinic site manager, nurse manager, or other administrator. The goal was to administer the survey to an individual whose role included oversight of day-to-day clinical services delivery. At the end of each survey, respondents were asked if they would be interested in participating in a follow-up focus group about HIE. Contact information was collected for interested participants.

The survey materials and study protocol received IRB exemption from the SFSU committee for human subject protection. Focus Group participants were required to provide written informed consent.

The screening script, survey instrument, and list of eligible clinic sites were provided to The Henne Group, a local survey firm (THG). THG programmed and tested the instrument prior to launching the telephone administration. Data collection occurred during August and September, 2013 with a goal of completing 200 interviews. A database of 1059 community clinic contacts was obtained from the publicly available OSHPD webpage. Originally 206 interviews were completed, however 12 of those were later deemed to be ineligible, leaving a final sample of 194 for analysis, and a cooperation rate of 73%. The data were collected through a Computer Assisted Telephone Interviewing (CATI) software application used by a team of 8 interviewers working from THG’s central interviewing location in San Francisco, CA.
SFSU performed the statistical analysis. These initial results were then presented to interested survey responders in a series of two focus group webinars held in November, 2013.

**Focus Group Methods**

Two focus groups were conducted via webinar and conference call. Each of the focus groups lasted 90 minutes. Participants who had indicated interest in a follow-up focus group on the survey were sent an invitation via email from researchers at SFSU. Those who responded to participate were sent a consent form to sign and return to the researchers before the group took place. The focus groups were recorded and transcribed by a professional transcriptionist. The groups were separated by rural and urban clinics.

One researcher led the focus groups. The focus group slides contained findings from the survey and were divided by the different sections of the survey. Participants were asked their thoughts about the findings and were then asked brief follow-up questions after each set of findings were shown. There were five sections covered in the focus group: Relationship between electronic health records (EHR) and health information exchange (HIE), data exchange, cost and revenue, priorities related to HIE and four sets of factors and their importance to clinics for HIE implementation.

One researcher analyzed the focus groups for common themes among the groups. The findings are not separated by urban or rural unless it differed from the common theme, in which case it is identified as whether it was a reaction from the urban or rural group.

A copy of the survey instrument can be obtained by contacting Katherine Kim at kathykim@sfsu.edu or kathykim@ucdavis.edu.