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NEVADA HEALTH INFORMATION TECHNOLOGY STRATEGIC AND OPERATIONAL PLAN IMPLEMENTATION PROGRAM EVALUATION

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I. Introduction

This report presents an evaluation of the current status of electronic medical record (EMR) and health information exchange (HIE) utilization in Nevada. This work was completed as a deliverable for the agreement between the University of Nevada, Reno Office of Sponsored Projects and Nevada Health Information Exchange (NV-HIE) (a private 501(c)(3) organization) pursuant to the State Health Information Exchange Cooperative Agreement evaluation requirement. The agreement was signed on September 5, 2013 and work started on that date. This report was originally delivered on February 7, 2014 for review by NV-HIE and the Nevada Department of Health and Human Services Office of Health Information Technology State Health IT Coordinator.

The report presents information from a survey of providers, stakeholder interviews, analysis of national survey data, and relevant published evidence. This report includes the following sections:

Section II: Presents the research methodology used for the study.

Section III: Assesses the status of e-prescribing in Nevada.

Section IV: Evaluates the status of electronic medical record and health information exchange utilization among Nevada's hospitals.

Section V: Assesses the status of electronic medical record and health information exchange utilization among Nevada's physicians.

Section VI: Focuses on patient perceptions of health information technology.

Section VII: Provides recommendations for ongoing tracking of the status of health information technology in Nevada, and state policy initiatives.

Section VIII: Provides references used throughout the report.

Section IX: Provides appendices referenced throughout the report.

Executive Summary

This study focuses on the status of health information utilization in Nevada, including both use of electronic medical record (EMR) systems and health information exchange (HIE). We present information about current use of these technologies in Nevada, comparison of utilization rates in Nevada with rates in the Mountain States and in the United States (US), and factors that boost or impede increased utilization.

Analysis of nationwide data from 2012 indicates utilization rates in Nevada were slightly lower than the rates for the US, but the gap was small. For many functions, utilization in Nevada was comparable to the US rate. While Nevada ranks towards the bottom in the availability of health care providers for the state population, providers in Nevada are similar to other states in their adoption of EMRs and participation in HIE.

Significant changes in the use of a formal health information exchange have occurred during 2013 and the proportion of Nevada hospitals connected to an HIE increased substantially in the second half of 2013. Figure I-1 illustrates the current status of health information exchange connections, as found in the stakeholder interviews conducted for this study.[1]

Hospitals representing 58% of the hospital bed capacity are currently connected to a formal, statewide, privately operated HIE, and if those in contract negotiations finalize an agreement, 70% will be connected.

Figure I-1 also illustrates the geographic challenge facing the state. The connected hospitals currently participating in the exchange of health care data are located in the two urban areas of the state. Hospitals outside of the urban areas are not exchanging data electronically with the urban hospitals, nor are they exchanging data with local providers through a health information exchange.

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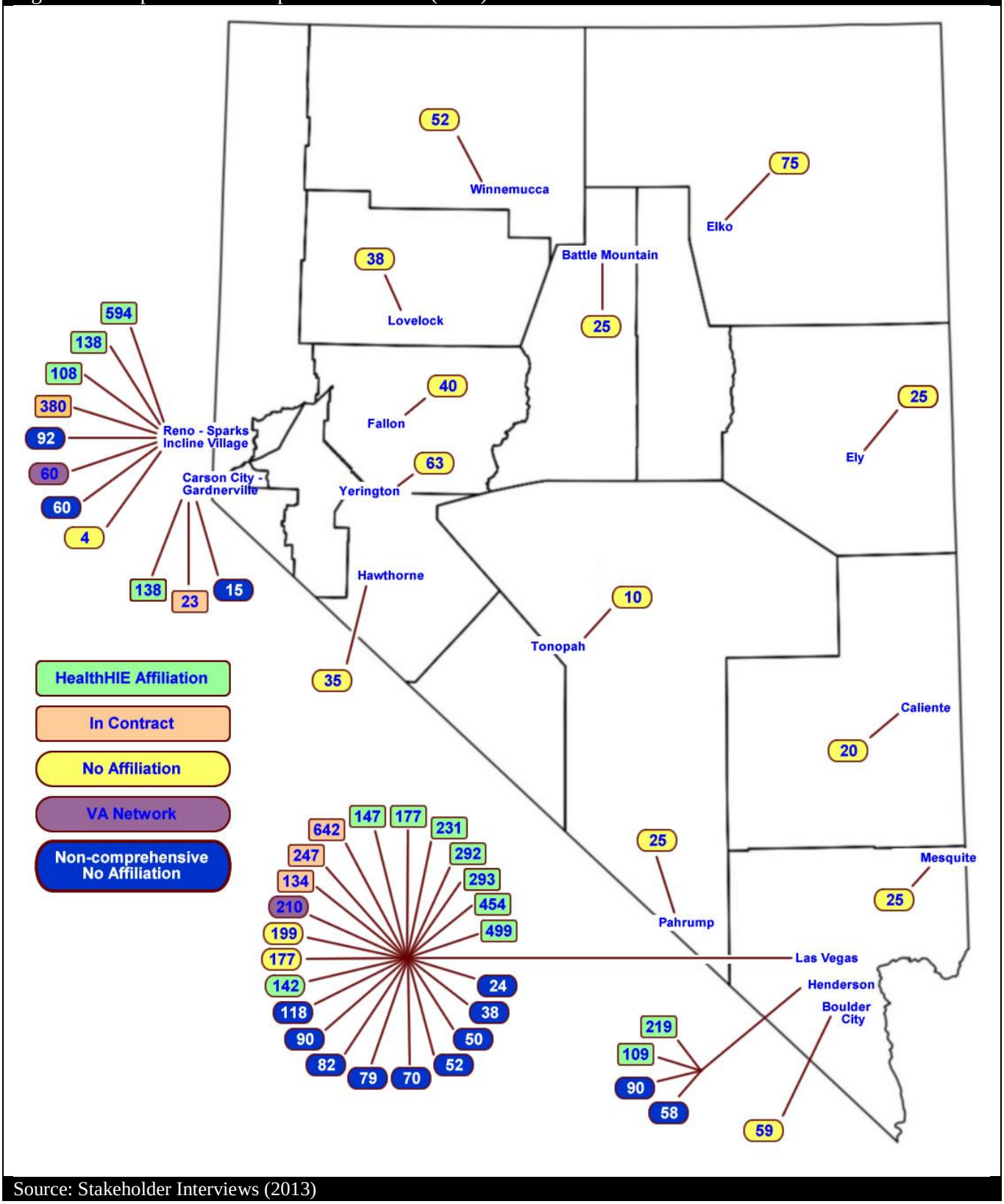
[1] Two types of hospitals with overnight facilities are depicted in Figures I-1 and IV-9: Short-term general hospitals (also known as comprehensive facilities) and specialized facilities (such as mental health hospitals, sub-acute and long-term care facilities). Non-comprehensive facilities and Veteran's Administration (VA) hospitals) are shown in dark colors; dark blue and purple, respectively. Comprehensive facilities are shown in light colors, yellow, orange, and green. Each hospital is depicted in Figure I with a number encased in a symbol, with a line connecting the hospital to its city. The number of beds in each facility is the number inside the symbol, and the type of symbol and color shows the electronic exchange affiliation with HealtHIE Nevada, a formal, non-profit, statewide HIE. The management of HealtHIE Nevada and its services are performed by HealthInsight, which also serves as the Health Information Technology Regional Extension Center and Medicare Quality Improvement Organization for Nevada. HealtHIE Nevada is a separate 501(c)(3) organization from HealthInsight. Those affiliated with HealtHIE Nevada are shown in a rectangle, while those not affiliated with HeatHIE Nevada are shown in an oval. The two VA hospitals in the state (shown in oval dark purple) exchange data with each other and with other facilities in the VA network across the country. Hospitals depicted in green are currently sending data to HealtHIE Nevada, hospitals depicted in orange are currently in contract negotiations with HealtHIE Nevada, and hospitals symbolized in yellow are not sending data to the current exchange network.

Figure I-1: Map of HIE Participation in Nevada (2013)



Source: Stakeholder Interviews (2013)

Key Findings

This section summarizes our key findings in each of the primary areas identified during our stakeholder interviews as targets for evaluation.

E-Prescribing

1. Almost all Nevada pharmacies are enabled to participate effectively in e-prescribing, and a slim majority of Nevada health care providers are capable of participating in e-prescribing activities.
2. The percentage of prescriptions transmitted electronically in the Mountain States is below the average for the entire US and the percentage in Nevada is slightly below the average for the Mountain States, which means that Nevada lags most of the country in the electronic transmission of prescriptions.
3. The number of prescriptions transmitted electronically in Nevada has increased significantly over the last six years, and the rate of growth has increased over the last three years, demonstrating continued increase in the use of e-prescribing in Nevada.
4. Nevada is currently ranked near the bottom (#48) of all fifty states by the dominant e-prescribing facilitator (Surescripts) because of the state's relatively low percentage of eligible prescriptions that are routed electronically (35% according to Surescripts) and the relatively low percentage of physicians routing prescriptions electronically (54%).
5. Qualitative interviews with health care providers and pharmacists show that members of both groups believe that using e-prescribing takes longer than paper prescriptions, but e-prescribing offers potential for better health care outcomes. This finding aligns with current quantitative research concerning time required for health care professionals to use e-prescribing.

Hospitals

1. The proportions of Nevada general hospitals reporting basic EMR components to store data are similar to the proportions of hospitals reporting these capabilities nationwide.

2. The information exchange environment in Nevada hospitals increased dramatically within the last year. Hospitals representing 58% of the hospital beds (excluding Veterans' Administration hospitals) are now connected to a formal HIE[2] (HealtHIE Nevada).

3. Hospitals participating in a formal HIE are transmitting data to HealtHIE Nevada, but these organizations have not begun to pull data from the exchange to support decisions. Hospitals are not accessing the data for the following reasons: (a) there is no reported demand from health care providers for external data, (b) there may be difficulties quickly and accurately matching patient identification; and (c) data integration from external sources into existing hospital EMRs will require additional software creation and implementation effort.

[2] The term "formal HIE" is used to mean a technologically-based system capable of sending and receiving a variety of different health data from disparate organizations throughout the state. This term is used to differentiate a "formal HIE" system from other exchange systems that are used for intra-organizational exchange of data, or the exchange of only one type of data, such as laboratory results.

4. The primary reasons Nevada hospitals joined a formal HIE were to meet meaningful use requirements and to contribute to the "public good." Initial participants in the formal HIE were primarily non-profit organizations with the desire to demonstrate their participation in community-wide efforts. To encourage the long-term sustainability of hospital participation, it may be necessary to identify additional value that can be obtained for these organizations.

Health care providers

1. Providers in Nevada are similar to providers in other states in their adoption of electronic medical records and participation in health information exchange.
2. Providers are adopting electronic medical records and participating in health information exchange, but not as extensively as hospitals.
3. The ongoing shortage of physicians and other providers in Nevada, particularly in rural areas, highlights the importance of potential health IT impacts on health care quality and physician productivity. It also highlights the importance of the potential impact of health IT issues on physician retirement decisions.

Patients

1. The distribution of the Nevada's population creates special challenges. Residents of the state's two population centers in Clark and Washoe counties have options for access to health care services, while residents in other parts of the state have limited access to health care and may have to travel hundreds of miles to see a specialist or obtain specialized services.
2. Patients generally have positive perceptions of their providers' use of health information technology and the value of patient portals.

Recommendations for Ongoing Evaluation

We recommend that the State create and maintain a health information technology dashboard. The dashboard can be maintained efficiently by focusing on information that is available from existing secondary data sources on a recurring basis. Data is available from national sources to help evaluate the ongoing progress within the state for the exchange of health information.

We also recommend that the State could focus on reducing regulatory uncertainty by finalizing the regulatory structure and the regulations that will govern the exchange of health information and certification of HIE organizations.

Finally, the low rate of health information technology in the rural counties poses challenges. Direct secure exchange can provide a pragmatic strategy for those providers. We recommend that the State use local data to evaluate the rural adoption and use of health information technology, since the available national data is not comprehensive for the rural health care environment.

II. Study Methodology

A sub-recipient grant award contract was signed at the beginning of September, 2013 between UNR's Office of Sponsored Projects and NV-HIE (a non-profit private entity responsible for protecting the public interest regarding the electronic exchange of protected and health-related information) to research and evaluate the progress of health information exchange (HIE) implementation in the state of Nevada. The contract was modified at the beginning of November, 2013 to include research and development of a sustainability plan for NV-HIE. Nevada's State Health IT Coordinator ensured the contract met the State HIE grant requirements for program evaluation.

Scope of Work

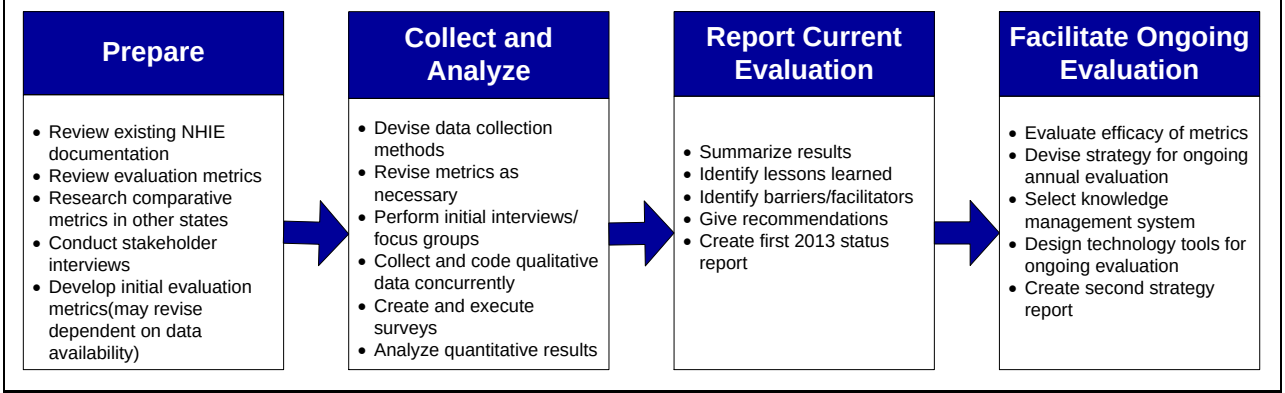
The original intent of the study was to focus on the health information exchange implementation efforts of NV-HIE. The initial scope of work stated that the evaluation would be conducted concurrently with the implementation of a required core HIE technical infrastructure at NV-HIE, so the evaluation would include collecting and evaluating baseline information while also developing a strategy for evaluating the ongoing efforts of NV-HIE. During the evaluation process, the scope evolved to a more general understanding and evaluation of the implementation of health information exchange across the state.

The overall goal of this evaluation is unchanged - to gain insight into the exchange of electronic health information among health care stakeholders in Nevada. We generalized the scope beyond the evaluation of a single exchange (NV-HIE) because of three factors: (1) discussions with the ONC Project Officer that emphasized the importance of understanding health information exchange more broadly than a single HIE implementation; (2) knowledge obtained during the evaluation process that a separate, private non-profit HIE existed in the state (HealtHIE Nevada); and (3) the decision by the NV-HIE Board of Directors to terminate operations and dissolve their organization at the end of the grant period. Nevada's State Health IT Coordinator agreed with the modified scope of work during telephone discussions, given the circumstances.

Stages of Evaluation

The evaluation process we originally proposed included four stages as illustrated in Figure II-1:

Figure II-1: Evaluation Process



Source: NV-HIE Evaluation Proposal

The components of this report will vary from the list anticipated when the process was originally defined in response to the recent NV-HIE decision to cease operations. While we suggest a strategy for collecting and reporting data for ongoing evaluation, we did not select a knowledge management system, nor did we design technology tools for ongoing evaluation. If the State identifies an appropriate client to direct the structure of that output, we can complete those deliverables as a no-cost addendum to this report.

Data collection

We obtained University of Nevada Institutional Review Board (IRB) approval for data collection through stakeholder interviews, surveys, and secondary data analysis. Three types of data collection were completed for this project as described below:

1) **Stakeholder interviews:** Data were collected through semi-structured face-to-face and phone interviews with representatives of each stakeholder group identified during data collection preparation. Interview length varied from fifteen minutes to 2.5 hours, with time for questions and feedback during each session. While most of the interviews were completed with individual stakeholders, some were conducted with small groups (2-4 people). A total of 48 people were interviewed, representing 41 distinct stakeholder entities. About half of the interviews were conducted with at least two of the faculty researchers from UNR, and the other half were conducted by individual faculty researchers. Interviews were not taped, but interviewers took detailed notes. The faculty research team conducted all interviews; graduate assistants did not complete any of the stakeholder interviews. Appendix II-B.1 is the stakeholder information sheet for all stakeholder interviews and sample interview protocols are provided in Appendices II-B.2 through II-B.7. We used this data to provide input for qualitative analysis of the factors most important to representative HIE stakeholders in the state (Dey, 1999).

2) **Secondary data:** Several types of secondary data were used in this report as discussed below.

   - <u>Hospital utilization of health information technology</u>
     Survey data on hospital use of health information technology was obtained from the American Hospital Association (AHA) and the Health Information Management Systems Society (HIMSS). We purchased AHA main and information technology (IT) supplement survey data for the years 2008, 2009, and 2012. The HIMSS data was downloaded for years 2008, 2009, 2011, and 2012. The 2012 data includes 16 Nevada hospitals that represent over 40% of the state's beds. These hospitals include 5 from Clark County, 5 from Washoe County and 5 in other counties of the state. Data on hospital outcomes measures was obtained from the Center for Medicaid and Medicare Services website. We used this data to compare Nevada adoption of EMR and HIE with national adoption, and to support analysis of the impact of health information technology on outcomes measures. This analysis provides a template for ongoing tracking and monitoring. Data from these sources was supplemented with additional information, as noted in the methodology description below.

Additional information about Nevada hospitals was obtained from the state's Hospital Compare website, and by collecting data from hospitals directly.

- Physician use of health information technology and patient responses
  Survey data on physician use of health information technology and patient attitudes about health information technology was obtained from the Center for Health System Change (HSC). This data is available (after completion of a review process) through the Inter-university Consortium for Political and Social Research (ICPSR).
- E-Prescribing
  Data on electronic transmission of prescriptions was obtained from the Surescripts website.
- Meaningful Use incentive payments
  The State of Nevada Department of Health and Human Services provided information on health care providers that met Stage 1 Meaningful Use criteria.

3) **Health care provider survey:** We created a survey to obtain data from health care providers about actual EMR and HIE adoption, as well as perceptions about the effectiveness and use of both types of technologies. We piloted the survey with 5 health care providers, modified the instrument, piloted again with the Dean of the University of Nevada School of Medicine (UNSOM), and then finalized the instrument. The piloted survey responses were not included in our response totals discussed in this document. Surveys were distributed through UNSOM, state medical societies, hospitals, and individual practices. Surveys could be completed either online or on paper. Paper survey responses were entered into the online survey system. The finalized health care provider survey is attached as Appendix II-C. Out of approximately 5,200 possible health care providers in the state, we received 72 completed surveys. This response rate is similar to the health care provider survey conducted for Nevada's State Office of Health Information Technology by CapGemini Government Solutions (CapGemini) in 2012 (they received 59 responses). The online and paper surveys became available to health care providers in late November, 2013 and we are still collecting responses as of February, 2014.

   These survey results cannot be considered statistically significant for the Nevada health care provider population. Instead, the survey results indicate the types of issues that are salient for providers that chose to respond to the survey. If the state elects to design a system for ongoing tracking and monitoring of health information technology issues, the low response rate on the two surveys suggests that physician surveys are not a useful tool for ongoing collection of information about issues that are important for providers.

Data Analysis

The following sub-sections discuss how the data sets were analyzed.

Analysis of Stakeholder Interviews

Data collected from stakeholder interviews were analyzed using a four stage process: (1) Interview notes were typed and made available to all members of the research team; (2) Initial individual descriptive coding was completed by researchers; (3) Focused codes were identified to group together like descriptive codes; and (4) Pattern coding was completed to identify the key concepts and findings most relevant to the assessment of HIE. A sample part of the coding scheme used by the researchers is included in Appendix II-D.

Data were analyzed on an ongoing basis among three researchers – after each interview we discussed the meaning of the data and how it fit with our current findings. We clarified the meaning of each interview in relationship to our understanding of the quantitative data results.

Analysis of Health Care Provider Survey

We analyzed the health care provider survey to gain insight into the perceptions and practices of providers in Nevada. We provide descriptive statistics about adoption percentages and Likert-scale perception values by Nevada health care providers.

Analysis of Secondary Data

We analyzed the secondary data to provide three types of information, and we compare these results to published information about adoption and utilization of EMR and HIE. The regional and US information provides a context for interpreting and understanding issues and trends faced by providers and patients in Nevada.

- Descriptive statistics
  We provide descriptive statistics about hospital adoption and utilization of EMR and HIE services in Nevada, and we compare adoption/utilization rates in Nevada with rates nationwide. We also provide descriptive statistics about physician adoption and utilization of EMR and HIE in the Mountain States and in the US as a whole. The "Mountain States" is a region defined by the US Census Bureau, which includes the State of Nevada. We present this Mountain Region data because these states have large rural areas with low population densities. We also present descriptive statistics about patient responses to the use of health information technology.

- Analysis of characteristics of hospitals, physicians and patients associated with adoption and utilization of health information technology
  We reported summarized results of multivariate analysis of the characteristics of providers and patients that are using EMR and HIE. These results provide a context for considering the difference in utilization of HIE in Nevada's urban vs. rural counties, and it provides a starting point for evaluation of predictions that shifts in payment models (away from Fee-for-Service) will accelerate the use of health information technology.

- Analysis of the impacts of adoption and use of this technology on outcomes that are important for providers and patients.
  Health information technology requires substantial investment; hence analysis of outcomes is important. Assuming that the federal government will continue to fund the

hospital, physician and patient surveys, the analysis of the impacts of EMR and HIE on outcomes can provide a template for ongoing tracking and analysis. For hospitals, we focus on outcomes measures that are reported by CMS for individual hospitals. For physicians and patients, we focus on outcomes measures that are included in the survey data.

A full description of these analyses requires substantial technical detail. We present summarized results in this report. More detail is available upon request.

III. E-Prescribing

E-Prescribing refers to the direct computer-to-computer transmission of prescription information from prescribing physician offices to pharmacies, and the electronic exchange of any renewal requests and responses between the prescriber and the pharmacist.

Much research has been conducted to understand the benefits, drawbacks, and use of e-prescribing by pharmacies, health care providers and patients. E-prescribing was intended to improve the safety, quality, and efficiency of health care by decreasing the amount of time spent processing prescriptions, reducing errors, increasing patient adherence to medication therapy, and providing greater prescription monitoring capabilities (Hagstedt et al. 2011). This section of the report assesses Nevada's progress towards the implementation of e-prescribing.[1]

Key Findings

1. Almost all of Nevada pharmacies are enabled to participate effectively in e-prescribing, while a slim majority of Nevada health care providers are capable of participating in e-prescribing activities.
2. The percentage of prescriptions transmitted electronically in the Mountain States is below the average for the entire US and the percentage in Nevada is a little below the average for the Mountain States, which means that Nevada lags most of the country in the electronic transmission of prescriptions.
3. The number of prescriptions transmitted electronically in Nevada has increased significantly over the last six years, and the rate of growth has increased over the last three years.
4. Nevada is currently ranked near the bottom (#48) of all fifty states by the dominant e-prescribing facilitator (Surescripts) because of the state's relatively low percentage of eligible prescriptions that are routed electronically (35% according to Surescripts) and the relatively low percentage of physicians routing prescriptions electronically (54%).
5. Qualitative interviews with health care providers and pharmacists show that both believe that using e-prescribing takes longer than paper prescriptions, but there is potential for better health care outcomes. This finding aligns with current quantitative research concerning time required for health care professionals to use e-prescribing.

Summary Description of E-Prescribing Environment

According to the 2012 Nevada Statewide HIT Assessment, there are an estimated 445 pharmacies serving Nevada consumers.[2] As of 2013, 97.5% of those pharmacies are enabled to participate effectively in e-prescribing. That number and percentage has not changed significantly over the past three years. Many of the chain pharmacies, such as Wal-Mart,

[1] The information provided in this section is derived from the Surescripts Medication Network Services website (http://www.surescripts.com/medication-network-services/) and the Kaiser Family Foundation website (http://kff.org/other/state-indicator/total-retail-rx-drugs/). All population data was obtained from the US Census website (http://www.census.gov/). Data was accessed for this report from these websites on a variety of dates in December, 2013, and January and February 2014.

[2] This number excludes pharmacies that limit the types of prescriptions that they fulfill such as compounding and mail order pharmacies, tribal and federal government pharmacies, and dedicated in-house clinic-based pharmacies.

Walgreens and CVS, have enterprise-wide systems and participate on a corporate level in electronic exchange. There are relatively few independent pharmacies outside of state hospital facilities.

The State Health Information Technology Strategic and Operational Plan (State Health IT Plan) submitted in 2011 accurately depicted the e-prescribing environment as one where "Based on the statistics, we believe all urban and suburban physicians wishing to demonstrate Meaningful Use Stage 1 capabilities for e-prescribing will have access to a pharmacy that supports e-prescribing." We agree with that assertion and describe the capabilities to participate in e-prescribing in the next section.

Capability to Participate in E-Prescribing

Adoption of e-prescribing by both pharmacies and health care providers has increased significantly over the last five years. Studies show that the vast majority of both urban (94%) and rural (93%) pharmacies in the US are equipped to process prescriptions transmitted electronically (Hufstader et al. 2012). Health care providers have also increased their use of e-prescribing. Recent evaluation of the data from the Surescripts network shows that the total number of prescribers prescribing through an EMR system increased from 7% in 2008 to 54% in 2012 (Gabriel et al. 2013).

Nevada's capability to participate in e-prescribing is very similar to the rest of the US. Approximately 93% of Nevada's pharmacies are able to accept electronic transmission of prescriptions, and approximately 54% of Nevada physicians are capable of routing prescriptions electronically (Surescripts 2013). The number of pharmacies capable of receiving electronic transmissions has not changed for the last three years, as the state nears electronic capacity saturation. On the other hand, the number of providers capable of routing prescriptions has increased significantly from 26% in 2010 to 54% in 2012.

We use the mountain states for comparison in this section of the evaluation because a smaller group provides a more granular base than the US as a whole for the assessment of Nevada's participation in e-prescribing activities. A map of the mountain states with the numbers used for calculations in this section are provided in Figure III-1 and Table III-1. This region includes Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.

Figure III-1: States included in the Mountain States Census Region

Source: US Census Bureau , http://www.census.gov/

In 2012, 18% of prescriptions written in the Mountain states were transmitted electronically. The number of prescriptions transmitted in the Mountain States increased 86% from 2010 to 2011, and 49% from 2011 to 2012, while the population of the Mountain States grew 1.4% from 2010 to 2011, and 1.1% from 2011 2012. Thus, the per capita number of electronic prescriptions increased 83% from 2010 to 2011, and 47% from 2011 to 2012. (See Table III-1)

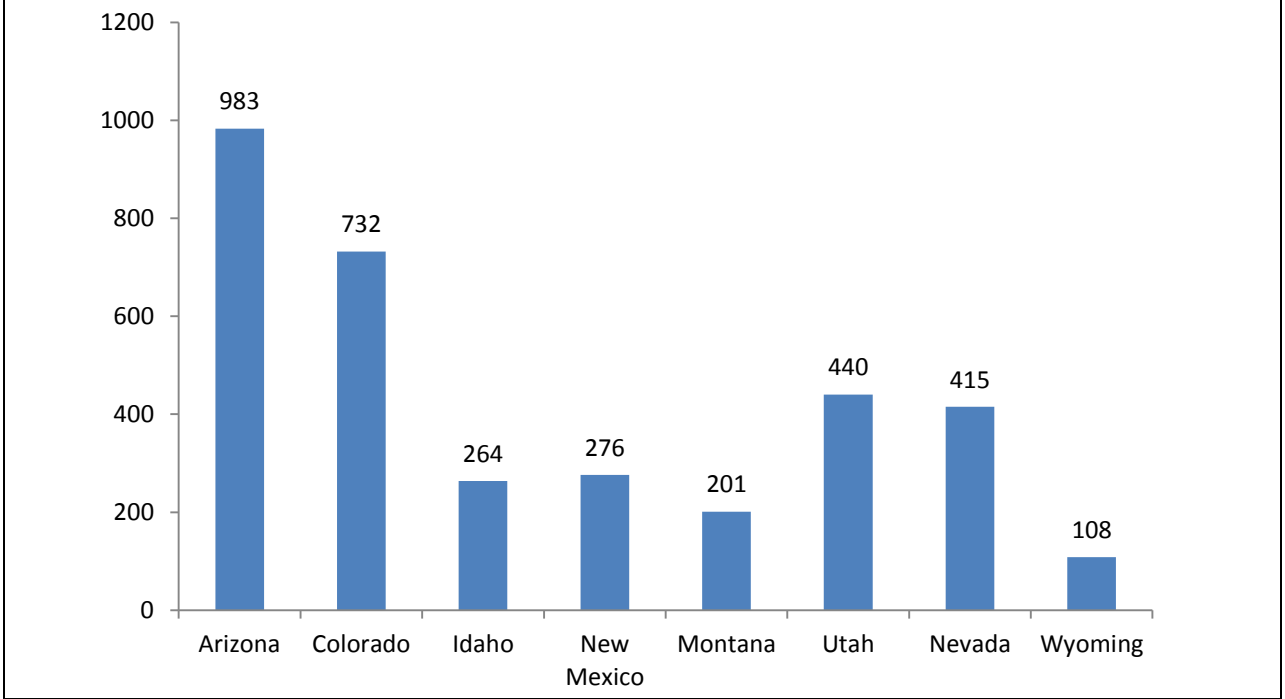
Table III-1: E-Prescribing in the Mountain States

	2010	**2011**	**2012**
Population	22,066,461	22,375,422	22,620,424
# of electronic prescriptions	15,642,096	29,026,687	43,241,834
Electronic prescriptions per capita	.71	1.30	1.91
# of total prescriptions	n/a	n/a	237,907,587

Source: Surescripts Medication Network Services website (http://www.surescripts.com/medication-network-services/)

Figure III-2 shows the number of community pharmacies in each of the mountain states that are connected for routing e-prescriptions, to better understand the relative capability of Nevada pharmacies to participate in e-prescribing.

Figure III-2: Community Pharmacies Connected for e-Prescribing - Mountain States (2012)



Source: Surescripts Medication Network Services website (http://www.surescripts.com/medication-network-services/)

Interest and Participation in E-Prescribing

Almost all pharmacies in the state have the capability to accept electronic transmission, and a majority of health care providers have the capability to transmit electronic prescriptions. The purpose of this section is to analyze the actual interest and participation in e-prescribing in Nevada. Table III-2 below provides information about the relative percentage of prescriptions filled electronically at retail pharmacies in Nevada in comparison to the US and the group of mountain states for 2011.

Table III-2: 2011 E-Prescriptions in the US, the Mountain States, and Nevada

	US	**Mountain States**	**Nevada**
Total # of Retail Prescriptions	3,764,698,318	237,907,587	28,617,506
Total # of Electronic Prescriptions	556,132,286	29,026,687	3,053,763
Percent of prescriptions that were electronic	15%	12%	11%

Sources: # Retail Prescriptions retrieved from Kaiser Family Foundation Website: http://kff.org/other/state-indicator/total-retail-rx-drugs/# on 2/1/2014)
# of Electronic Prescriptions retrieved from Surescripts Website http://www.surescripts.com/medication-network-services/progress-reports/state-progress-reports on 2/1/2014)

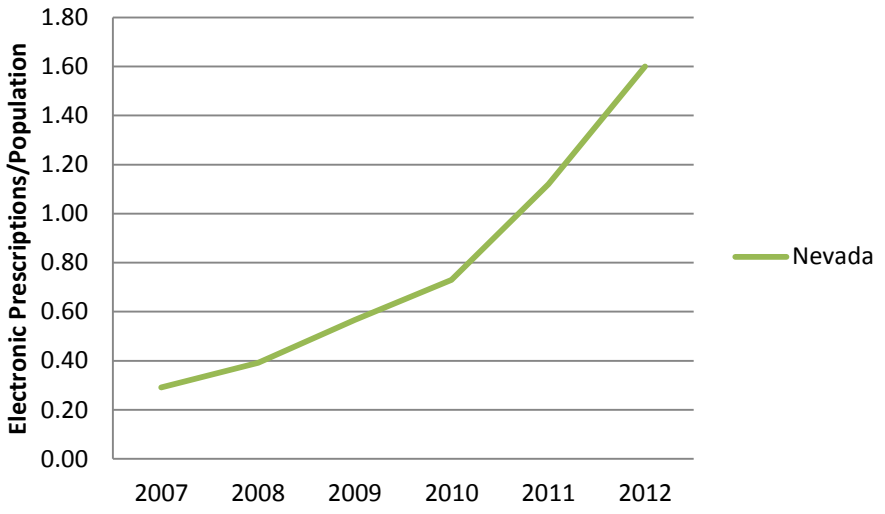
The Kaiser Family Foundation provides data on the total number of prescriptions by state and Surescripts provides data on the number of prescriptions transmitted electronically in each state. Using these two data sources, we calculate that about 15% of the prescriptions in the US were transmitted electronically in 2011 with lower percentages for the Mountain states (12%) and Nevada individually (11%). These numbers differ from percentages reported by Surescripts

which may be a function of how the total number of prescriptions is calculated (e.g. type of prescription (renewal vs initial), count of prescriptions from differing types of pharmacies, or variations in reporting methods (individual vs. grouped drugs)). However, the purpose of the percentage calculations provided in Table III-2 is not to evaluate the accuracy of the data available from Surescripts, nor to determine the exact percentage of prescriptions sent electronically, but rather to understand Nevada's relative ranking for participation in e-prescribing. While Nevada's participation is less than the US, it is comparable to the rest of the mountain states, which as a region is lower than the US rate.

Nevada Participation in E-Prescribing

While Nevada is currently participating in e-prescribing less than the US overall, the state has steadily increased participation. As shown in Figure III-3 below, the number of electronic prescriptions per capita has increased each year since 2007, with a marked trend upward since 2010.

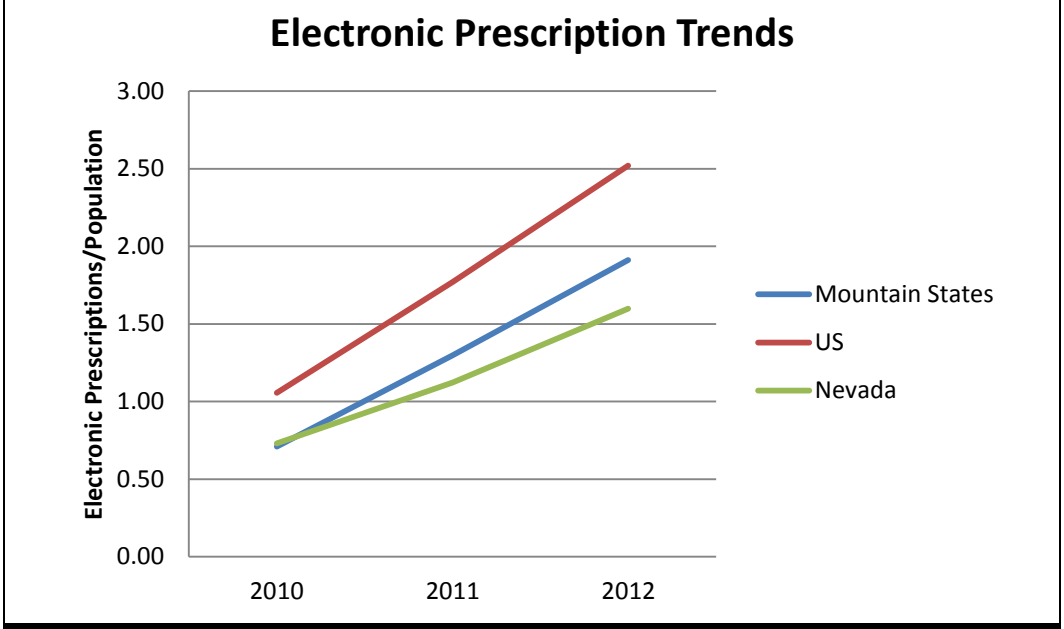
Figure III-3: Nevada Electronic Prescription Trends



Source: Surescripts Medication Network Services website (http://www.surescripts.com/medication-network-services/)

Figure III-4 below depicts the trends from 2010 through 2012 in Nevada, the US and other mountain states. The number of electronic prescriptions is normalized by the total population for comparison purposes. (Population numbers were access from the US Census Bureau website: http://www.census.gov/ on 2/1/2014.) As shown in Figure III-4, Nevada's participation in e-prescribing is slightly less than in the other mountain states, but the trajectory for e-prescribing in Nevada has clearly not plateaued and is trending upwards.

Figure III-4: Electronic Prescription Trends



Source: Surescripts Medication Network Services website (http://www.surescripts.com/medication-network-services/)

Nevada Interest in E-Prescribing

Nevada is ranked towards the bottom (#48) of the US by the Surescripts ranking system for progress towards the adoption and use of e-prescribing (Surescripts 2013). This ranking reflects the total number of responses to requests for patient eligibility information as a percentage of total patient visits, the total number of responses to requests for patient medication history as a percentage of total patient visits, and the total number of prescriptions routed electronically to both retail and mail order pharmacies as a percentage of all prescriptions within a state that are able to be submitted electronically. Nevada received its low ranking primarily because of its relatively low percentage of eligible prescriptions that are routed electronically (35% according to Surescripts) and the relatively low percentage of physicians routing prescriptions electronically (54%). While the state health care environment is capable of making more use of e-prescribing, health care providers are not embracing its use.

Current research is exploring the differences in adoption level between pharmacy and health care provider adoption and use of e-prescribing. While pharmacies have achieved almost 100% adoption levels, and a majority of physicians have the capability to participate in e-prescribing, a comparatively smaller percentage are actively using e-prescribing for both initial and renewal prescriptions (Perna 2012). Research shows that health care providers find that comprehensive patient's medication lists in an EMR are helpful in improving patient safety and value having medications prescribed by other providers on that list (Lapane et al. 2011), but the relative value of e-prescribing is less clear. Health care providers report that e-prescribing requires almost three times more time and effort than producing a paper prescription (Hagstedt et al. 2011).

A study focusing on the communications issues between health care providers and pharmacies determined that initial prescription submissions via e-prescribing result in fewer communication problems, while renewals are more problematic. The study found that nearly one-quarter of the respondents didn't fill renewals electronically because of the desire to avoid transaction fees from SureScripts. Among those that did elect to renew via e-prescribing, some reported problems with communications. Pharmacies and physicians reported using FAX and phone to communicate about renewals that had been submitted electronically, thus requiring more time to process the renewal transactions (Perna 2012).

Qualitative interviews with Nevada health care providers yield results consistent with the Nevada Statewide HIT Assessments completed in 2010 and 2012 – providers do not participate in e-prescribing for the following reasons:

- E-Prescribing takes more time than paper prescriptions. Health care providers observed that some EMR systems require many "clicks" until a prescription is complete. This perception is in alignment with a recent study that found it took on average 15 mouse clicks to complete a single prescription (Hill Jr et al. 2013).
- Patients do not request electronic prescriptions and patients frequently reject an offer of an electronic prescription.
- Patients do not always select a pharmacy prior to receiving a prescription so there is no place to electronically transmit the request.

Interviews with pharmacists founds that they are willing and able to accept electronic prescriptions. Pharmacists think that electronic prescriptions have reduced the number of call-backs to health care providers concerning illegible prescriptions, but we were unable to locate any pharmacies that kept track of data related to call-backs or time spent processing individual prescriptions to validate that belief. Pharmacists also thought that e-prescribing increased the amount of time spent confirming the processing prescriptions, but believed that the results were more accurate and contributed to more accurate recording of medication lists for patients.

Interviews with EMR vendors echo the quantitative findings. Some EMR vendors assert that virtually all customers are using e-prescribing in some form, and that many write all prescriptions (other than for controlled substances) using an e-prescribing system.

Barriers and Facilitators to E-Prescribing

Nevada is making consistent progress in the implementation of e-prescribing. The vast majority of pharmacies are equipped for electronic acceptance and processing of prescriptions. EMR systems used within the state are also able to incorporate the features required to support e-prescribing and providers using those systems can participate effectively in e-prescribing. Thus, the major facilitator for e-prescribing is an infrastructure capable of handling electronic transmission and acceptance prescriptions.

The barriers to e-prescribing include: (1) slow implementation of EMR systems by Nevada health care providers; and (2) the formed habits of health care providers and patients. Both groups have previous experience with paper prescriptions and it may take time to learn new habits and methods of prescription delivery and use. Health care providers are learning how to

navigate the software necessary to issue a prescription; as the software matures and it becomes less cumbersome to complete a prescription, we anticipate that more health care providers will insist on using e-prescribing. Patients are used to a time lag between when a prescription is issued and when they opt to fill that prescription. During that time, the patient can choose whether or not to fill the prescription, and what pharmacy to use. A new, troublesome habit may be that patients will tell doctors where to send a prescription, and then elect not to retrieve it after the appointment is complete. This may be a more problematic result than the request for a paper, versus an electronic, prescription.

IV. Stakeholder Evaluation - Hospitals

Hospitals could potentially function as both data sources and data users in the exchange of health records. Hospitals represent a key source of data for the exchange of health records. Data generated by hospitals include lab tests, birth/death records, immunization records, images, treatment plans, treatment results, and discharge summaries which are then referenced by health care providers to inform ongoing care for patients. While hospitals rarely see patients on a long-term, continual basis, they potentially need quick access to health records to deliver emergency care. This section of the report presents: a summary of our key findings related to hospitals; a summary description of hospitals in Nevada; an evaluation of hospitals' capability to participate in HIE; an evaluation of hospitals' interest in participating in HIE; and a description of hospitals' participation in HIE.

Key Findings

1. The proportions of Nevada general hospitals reporting basic EMR components to store data are similar to the proportions of hospitals reporting these capabilities nationwide. The reported proportions tend to be slightly lower in Nevada than nationwide, but there are no statistically-significant differences between the proportions reported in Nevada and the proportions reported nationwide. Thus, Nevada hospitals have the capability to exchange electronic health care data that is similar to the capacity in the rest of the US.

2. The information exchange environment in Nevada hospitals has changed dramatically within the last year. The findings derived from the American Hospital Association (AHA) 2012 data (collected at the end of 2011) show that proportions of Nevada hospitals that are exchanging data within hospital systems is lower than the nationwide proportion, but the difference is small. The proportion exchanging at least one type of information electronically with hospitals across system boundaries is significantly lower in Nevada (13%) than in the nation (39%). However, hospital connectivity increased substantially in the second half of 2013. Hospitals representing 58% of the hospital beds (excluding Veterans' Administration hospitals are transmitting data to an existing formal health information exchange (HealtHIE Nevada)).

3. Hospitals participating in HealtHIE Nevada are transmitting data to the formal exchange but these organizations have not begun to pull data from the exchange to support decisions. Hospitals are not accessing the data for the following reasons: (a) there is no reported demand from health care providers for external data, (b) there may be difficulties quickly and accurately matching patient identification; and (c) data integration from external sources into existing hospital EMRs will require additional software creation and implementation effort.

4. The primary reasons Nevada hospitals joined a formal HIE were to meet meaningful use requirements and to contribute to the "public good." Initial participants in the private sector formal HIE effort were primarily non-profit organizations with the desire to demonstrate their participation in community-wide efforts. To encourage the long-term sustainability of hospital participation, it may be necessary to identify additional value that can be obtained for these organizations.

Description of Nevada Hospitals

There are over fifty hospitals in Nevada, including acute care, rehabilitation, behavioral, and rural health facilities with overnight capacity as measured by patient beds. The majority of the facilities in the state (about 72%) have less than or equal to 150 beds, with a significant group (22%) of larger hospitals in the two urban areas (Las Vegas, Reno and their adjacent urban areas). Table IV-1 below shows the distribution of hospitals based on number of beds. (It is possible that some very small care facilities or behavioral health hospitals were not included in the total count. In addition, it was not possible to include Department of Defense facilities in this table, because this agency declined to provide information.)

Table IV-1: Nevada Hospitals by Number of Beds

Number of Beds	**Count**	**% of Total**
1-50	15	29%
51-100	14	27%
101-150	8	16%
151-200	3	6%
201-300	6	12%
> 300	5	10%
Total Hospitals	51	100%

Source: http://nevadacomparecare.net

Table IV-2 below eliminates those hospitals that do not report revenue (Veterans Administration hospitals and those that report consolidated earnings with other Nevada hospitals) to depict the breakdown by 2012 patient revenue. The picture is similar, showing that almost 60% of the hospitals generated less than $150 million (per hospital) during 2012 in patient revenue, while 26% of Nevada's hospitals generated more than $800 million in revenue (per hospital).

Table IV-2: Nevada Hospitals by Patient Revenue

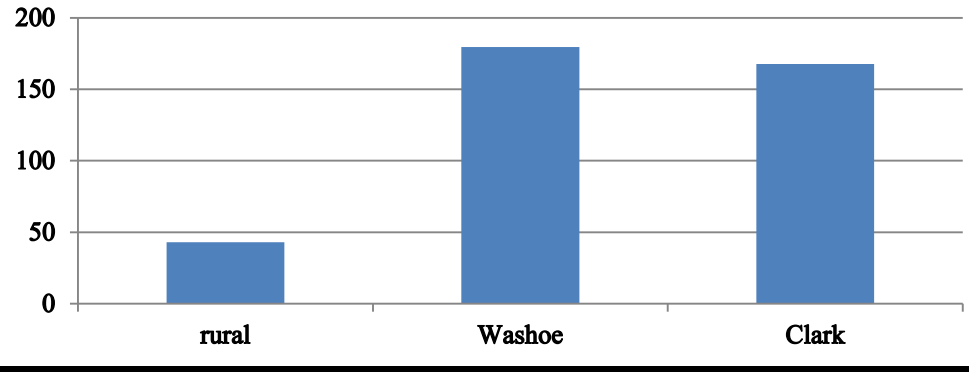
Patient Revenue ($ thousands)	**Count**	**% of Total**
<= $50,000	17	36%
>$50,000 and <= $150,000	10	21%
>$150,000 and <=$400,000	4	9%
>$400,000 and <=$650,000	2	4%
>$650,000 and <=$800,000	2	4%
>$800,000 and <=$1,500,000	5	11%
>$1,500,000	7	15%
Total Hospitals	47	100%

Source: http://nevadacomparecare.net

The two tables above do not separate urban vs. rural hospitals but there are significant differences between the two types. The average number of beds in rural hospitals is 35, while the average number of beds for hospitals in the two urban areas is 176. While 44% of Nevada hospitals have more than 100 beds, there are no rural hospitals with more than 100 beds. There

is only one rural hospital with patient revenue greater than $150 million for 2012; the average patient revenue for a rural hospital was about $50.5 million, while the average for an urban hospital was about $695 million. Figure IV-1 shows the difference in average number of beds in the rural counties as compared to the two urban counties (Washoe County-urban and Clark County-urban) in the state.

Figure IV-1: Average Number of Beds per Hospital (2012)



Source: 2012 AHA Annual Survey Health Forum, L.L.C. American Hospital Association Company.

Thus, the size and revenue generating capabilities of the two areas are significantly different and should be considered when evaluating the differences in EMR and data exchange implementation. The hospitals in the two urban areas should be considered the key data sources for their communities, as well as critical treatment facilities for their surrounding rural areas since the rural communities frequently transfer patients to the urban areas for non-routine hospital treatment.

Capability to Participate in HIE

Implementation of EMR and the availability of sufficient communications bandwidth are critical to the capability for a hospital to participate in HIE. Without the ability to capture and transmit electronic health data, a hospital does not have a way to exchange their data with others. While electronic sharing of information is still limited throughout the health care community, existing literature indicates that hospitals have been some of the earliest adopters of EMR (Williams et al. 2012). Surveys of EMR implementation in hospitals from 2008 to 2012 show that the proportion of US hospitals with basic EMR systems (health record documentation) increased significantly from 9% to 44% during that time period (DesRoches et al. 2013). The results of that research show that large, urban hospitals are the most frequent adopters of EHR, and that rural hospitals are much less likely to have a basic system.

A recent review of Florida's HIE program determined that while other health care providers were still struggling to implement EMR systems, hospitals were rapidly moving into the exchange of data and the analytical processing of that data (Bresnick 2012). This is also true in Nevada. Almost all urban hospital facilities have implemented some level of EMR (at least electronic clinical documentation) and are in the process of ongoing implementation of additional components of EMR systems

Capabilities Related to EMR Implementation

The American Hospital Association (AHA) IT Survey Supplement asks hospitals whether they have the capability for basic EMR documentation collection (electronic clinical documentation for patient demographics, physician and nursing notes, problem and medication lists, discharge summaries, advanced directives, lab reports, radiology reports and images, diagnostic test results and images, consultant reports, lab and radiology tests, medications, consultation requests, and nursing orders). In addition, they ask about comprehensive EMR system capabilities (computerized order entry, decision making support, and other functions). The AHA IT Supplement reports this information for 2951 general hospitals, 11 general hospitals in Nevada, and 16 hospitals (of all types) in Nevada. Of these 16 hospitals, one third are located in Clark County, one third are located in Washoe County, and the remaining third are located in rural counties in Nevada.

Table IV-3: Basic EMR Implementation for General Hospitals (2012)
Comparison of US, Nevada, and Nevada rural areas

Definition	US Proportion	NV Proportion	Difference (US-NV)	Rural NV* Proportion	Difference (NV-Rural NV)
Electronic Clinical Documentation					
Patient demographics	0.95	0.82	0.13	0.60	0.220
Physician notes	0.59	0.73	-0.14	0.60	0.13
Nursing notes	0.88	0.73	0.15	0.60	0.13
Problem lists	0.78	0.73	0.05	0.60	0.13
Medication lists	0.87	0.64	0.23	0.60	0.04
Discharge summaries	0.81	0.82	-0.01	0.60	0.22
Advanced directives (e.g. DNR)	0.80	0.64	0.16	0.60	0.04
Results Viewing					
Lab reports	0.94	1	-0.06	1.00	0.00
Radiology reports	0.94	0.91	0.03	0.80	0.11
Radiology images	0.93	1	-0.07	1.00	0.00
Diagnostic test results (e.g. EKG report, Echo report)	0.82	0.82	0.00	0.60	0.22
Diagnostic test images (e.g. EKG tracing)	0.75	0.73	0.02	0.60	0.13
Consultant reports	0.79	0.73	0.06	0.60	0.13

Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Healthcare%20IT%20File%20Layout.pdf
Note: This is a self-selected sample of general hospital nationwide. This sample may not be representative of the Nevada hospital population
*Nevada rural hospitals included varying types (i.e. general, emergency) with sample size = 5.

It should be noted, that published evidence indicates that the sample of reporting hospitals is not representative of all hospitals. The sample of hospitals that respond to the IT Survey Supplement over-represents large hospitals, teaching hospitals, and hospitals located in the Midwest. Thus, the proportion of adopters reported in the survey is likely to over-estimate the true population proportion.

The proportions of hospitals that have implemented basic EMR components is similar in Nevada and in the US, as detailed in the column labelled "Difference: (US-NV)" in Table IV-3. While NV hospitals are less likely to have medication lists implemented than hospitals generally in the US, they are more likely to have physician notes. More important to the exchange of data, NV hospitals are more likely to have lab reports and radiology image components implemented than US hospitals in general. As shown in Table IV-3, 100% of Nevada hospital facilities surveyed by the AHA have electronic access to lab reports and radiology images for viewing results, which is considered "basic" implementation of EMR (DesRoches et al. 2013).

The proportion of Nevada hospitals that have implemented basic EMR functions exceeds the proportion of rural Nevada hospitals that have these capabilities. This comparison is similar to rural vs. urban comparison reported for US hospitals: fewer rural hospitals are using basic EMR documentation systems. Nevada rural hospitals, contrary to national results however, are similar to other hospitals in the state with full implementation of electronic lab reports and radiology images. The rural hospitals included in this survey may not be comparable to NV general hospitals because of the small sample size, and the inclusion of emergency and surgery centers with general hospitals.

Table IV-4 shows the implementation statistics for the components of EMR that are considered to be part of a comprehensive system. The level of implementation nationwide of comprehensive EMR components is lower than the level of implementation for basic EMR functions, and the pattern of difference between US and NV implementation is similar to the pattern for basic EMR components. Nevada uses computerized order entry for laboratory and radiology tests, but uses fewer of the decision support components available in comprehensive EMR systems. Again, rural implementation of comprehensive EMR components is generally less than implementation in urban hospitals in Nevada.

Overall, Nevada hospitals, both rural and urban, have implemented at about the same level as other US hospitals the EMR systems necessary to participate in the electronic exchange of health care data.

An additional consideration for Nevada rural hospitals is the availability of sufficient bandwidth for the electronic transmission of large data files such as radiology images. A few geographic areas in Nevada do not have sufficient broadband capability for electronic exchange of large data files. These areas lie outside the two urban regions (Washoe County/Reno; Clark County/Las Vegas) and the Interstate-80 corridor. For example, the city of Yerington is located only 80 miles from Reno, but it does not have sufficient broadband capacity for effective image exchange. Even though the hospital in Yerington (South Lyon Medical Center) is not yet ready to transmit EMR data through an exchange, the geographic area in which it resides is not prepared to support exchange because it does not have the broadband capabilities for transmission.

Table IV-4: Comprehensive Component EMR Implementation for General Hospitals (2012)
Comparison of US, Nevada, and Nevada rural areas

Definition	US Proportion	NV Proportion	Difference (US-NV)	Rural NV* Proportion	Difference (NV-Rural NV)
Computerized Provider Order Entry					
Laboratory tests	0.73	0.73	0	0.60	0.13
Radiology tests	0.72	0.73	-0.01	0.60	0.13
Medications	0.72	0.64	0.08	0.40	0.24
Consultation requests	0.65	0.55	0.1	0.20	0.35
Nursing orders	0.73	0.64	0.09	0.40	0.24
Decision Support					
Clinical guidelines (e.g. Beta blockers post-MI, ASA in CAD)	0.64	0.73	-0.09	0.60	0.13
Clinical reminders (e.g. pneumovax)	0.67	0.73	-0.06	0.60	0.13
Drug allergy alerts	0.86	0.73	0.13	0.60	0.13
Drug-drug interaction alerts	0.85	0.73	0.12	0.60	0.13
Drug-lab interaction alerts	0.75	0.55	0.2	0.60	-0.05
Drug dosing support (e.g. renal dose guidance)	0.72	0.73	-0.01	0.60	0.13
Bar Coding					
Medication administration	0.67	0.45	0.22	0.40	0.05
Patient verification	0.67	0.45	0.22	0.40	0.05
Caregiver verification	0.5	0.36	0.14	0.40	-0.04
Other Functions					
Bar coding or Radio Frequency (RFID) for supply chain management	0.42	0.36	0.06	0.40	-0.04
Telehealth	0.43	0.27	0.16	0.40	-0.13
Ability to connect mobile devices (tablet, smart phone, etc.) to EHR	0.53	0.36	0.17	0.40	-0.04
Pharmacy verification	0.61	0.55	0.06	0.40	0.15

Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Health care%20IT%20File%20Layout.pdf
Note: This is a self-selected sample of general hospital nationwide. This sample may not be representative of the Nevada hospital population
*Nevada rural hospitals included varying types (i.e. general, emergency) with a sample size of 5.

Our qualitative interviews with hospital personnel showed strong urgency in the implementation of basic and comprehensive EMR systems. Interviewees stated that "they are in a constant state" of EMR implementation with components coming online and being made available on an ongoing basis. Interviews with Nevada urban hospitals indicate that all are in some form of final implementation of EMR systems. Rural hospitals, on the other hand, are still in earlier stages of implementation, solidifying basic EMR documentation functionality while just starting implementation of comprehensive EMR components. Interviews indicated that the major barriers to implementation were not really financial, even in the rural hospitals. "Of course the

money is important, but EMR implementation is really dependent on physician preference," was a quote that encapsulated the necessity of engaging physicians. Another relevant reaction in the rural hospital environment was "We want to keep our doctors happy – we don't want them to leave – and many of our older doctors don't want to use a computer system."

While physician preference was also a barrier at urban hospitals, it seemed to be of less importance to those in charge of implementation. "We have to keep training them (doctors) over and over again, but this is what we are going to do" said one representative from an urban hospital.

This qualitative data is supported by the concerns stated in the 2012 AHA data summarized below in Table IV-5. As shown in this table, initial costs are less important than obtaining physician cooperation. The major difference in issues between Nevada and US hospitals is the concern for the availability of adequate IT personnel. This concern was also repeated during interviews with hospital CIOs in Nevada. In the AHA data, issues that are of less concern in Nevada than in the US are concerns about security, privacy and meeting meaningful use criteria within the implementation timeline. We did not find this result to be supported in the qualitative interviews with urban hospitals. Urban hospitals were very concerned with meeting meaningful use criteria and technological issues surrounding security and privacy.

Table IV-5: Concerns about EMR Implementation for General Hospitals (2012)
Comparison of US and NV hospitals

Definition	US Proportion	NV Proportion	Difference (US-NV)
Upfront capital costs/lack to capital to install systems	0.56	0.50	-0.06
Ongoing costs of maintaining and upgrading systems	0.59	0.25	-0.34
Obtaining physician cooperation	0.61	0.63	0.02
Obtaining other staff cooperation	0.24	0.38	0.14
Concerns about security or liability for privacy breaches	0.23	0.13	-0.10
Uncertainty about certification requirements	0.14	0.13	-0.01
Limited vendor capacity	0.21	0	0.21
Lack of adequate IT personnel in the hospital to support implementation/maintenance	0.43	0.63	0.20
Challenge complexity of meeting all meaningful use criteria within implementation timeline	0.48	0.38	-0.10
Complexity associated with coordinating decision with system-level leadership	0.19	0.25	0.06

Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Health care%20IT%20File%20Layout.pdf
Note: This is a self-selected sample of general hospital nationwide. This sample may not be representative of the US or Nevada hospital populations.

Capabilities Related to Meaningful Use of EMR

Hospital personnel at urban hospitals indicated the desire to obtain the next stage of meaningful use incentives and while the financial incentives for meaningful use were significantly less than the cost of the systems, "every little bit helps since we were doing it anyway – this just helps hurry us along." The personnel at rural hospitals did not mention meaningful use incentives as a key instigator for EMR implementation. As shown in table IV-6, 78% of the meaningful use payments received in Nevada was paid to hospitals. A relatively small percentage of the payments went to providers, and a relatively small percentage of providers (216 providers represents about 4% of the total providers in Nevada) received meaningful use incentive payments.

Table IV-6: Meaningful Use Payments to Hospitals and Professionals in Nevada

Hospitals	**Total Paid**	**Number of Hospitals**
	$15,698,487	24
Provider Type	**Total Paid**	**Number of Providers**
Physician	$3,234,257	156
Certified Nurse Midwife	$106,250	5
Dentist	$403,750	19
Nurse Practitioner	$582,250	27
Phys Ass't practicing in FQHC or RHC led by a PA	$191,250	9
	$4,517,757	216
Total Paid	**$20,216,244**	
% paid to hospitals	78%	
% paid to physicians	16%	
% paid to professionals other than physicians	6%	

Source: Data supplied by Nevada State Medicaid offices

Table IV-7 displays adoption statistics for the US and NV of the information critical to obtaining meaningful use stages 1 and 2. This table shows a clear distinction between Nevada and the US. For example, of the US hospitals with basic EMR documentation capabilities, most of them record patient and family health history as structured data, while only about 70% of NV hospitals have it available as structured data. This can make it more difficult to participate in the exchange of structured health data with other health care facilities. In addition, fewer NV hospitals incorporate structured data lab results for 40% of their emergency room patients – another area that is critical to the effective exchange of health data.

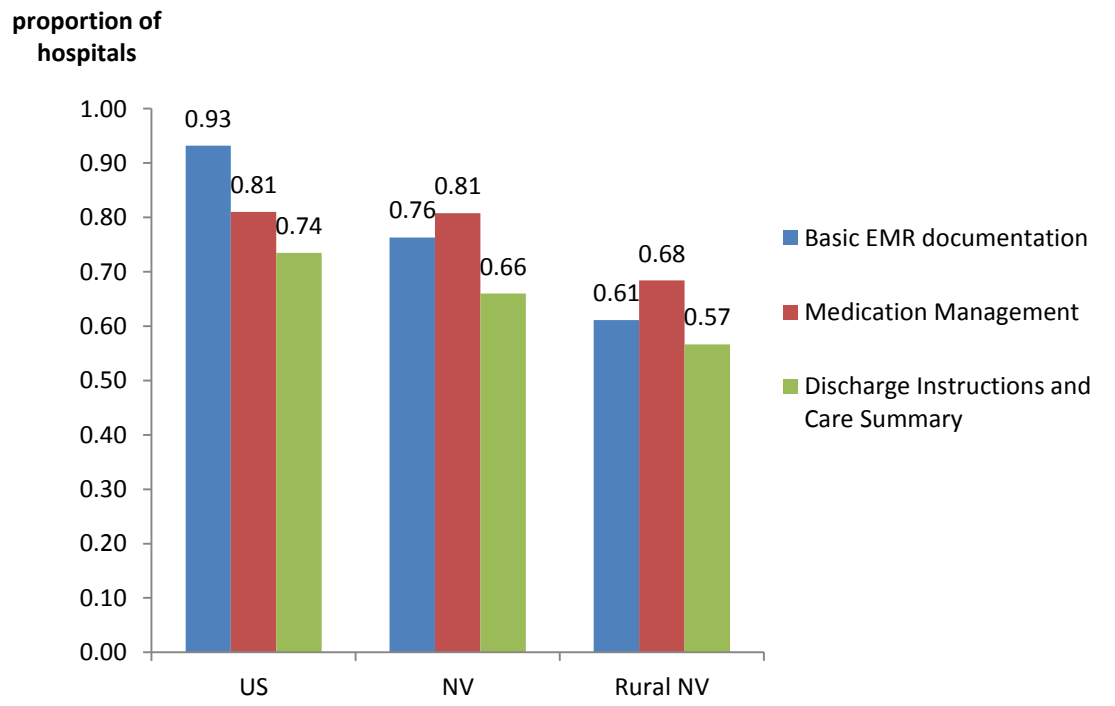
Table IV-7: Data Stored Related to Meaningful Use Stages 1 and 2 for General Hospitals (2012) Comparison of US, Nevada, and Nevada rural areas Basic EMR Documentation, Medication Management, Discharge Instructions and Care Summary					
Definition	**US Proportion**	**NV Proportion**	**Difference (US-NV)**	**Rural NV* Proportion**	**Difference (NV-Rural NV)**
Basic EMR Documentation					
Record gender and date of birth	0.98	0.91	0.07	0.80	0.11
Record race and ethnicity	0.98	0.82	0.16	0.60	0.22
Record time and preliminary cause of death when applicable	0.92	0.70	0.22	0.50	0.20
Record preferred language for communication with providers of care	0.96	0.82	0.14	0.60	0.22
Vital signs (height, weight, blood pressure, BMI, growth charts)	0.93	0.73	0.20	0.60	0.13
Record smoking status using standard format	0.94	0.73	0.21	0.60	0.13
Record and maintain medication allergy lists	0.95	0.73	0.22	0.60	0.13
Record patient family health history as structured data	0.81	0.70	0.11	0.60	0.10
Incorporate as structured data lab results for more than 40 percent of patients admitted to inpatient or emergency departments	0.92	0.73	0.19	0.60	0.13
Medication Management					
Compare a patient's inpatient and preadmission medication lists	0.85	0.82	0.03	0.80	0.02
Provide an updated medication list at time of discharge	0.91	0.82	0.09	0.60	0.22
Check inpatient prescriptions against an internal formulary	0.88	0.9	-0.02	0.75	0.15
Automatically track medications with an electronic medication administration record	0.87	0.78	0.09	0.67	0.11
Electronic prescribing of discharge medication orders	0.54	0.72	-0.18	0.60	0.12
Discharge Instructions and Care Summary					
Provide patients an electronic copy of their discharge instructions upon request	0.84	0.72	0.12	0.60	0.12
Provide patients an electronic copy of their record upon request within 3 business days	0.83	0.72	0.11	0.60	0.12
Generate summary of care record for relevant transitions of care	0.79	0.60	0.19	0.50	0.10
Include care teams and plan of	0.69	0.72	-0.03	0.60	0.12

care in summary care record					
Electronically exchange key clinical information with providers	0.76	0.64	0.12	0.60	0.04
Send transition of care summaries to an unaffiliated organization using a different certified electronic health record vendor	0.5	0.56	-0.06	0.50	0.06

Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Healthcare%20IT%20File%20Layout.pdf
Note: This is a self-selected sample of general hospital nationwide. This sample may not be representative of the Nevada hospital population
*Nevada rural hospitals included varying types (i.e. general, emergency) with sample size = 5.

Figure IV-2 displays an average of the proportions of hospitals that have implemented each of the items in Table IV-7 to provide a more visual understanding of the relative assessment of Nevada's hospital's participation in EMR documentation related to meaningful use. As seen Figure IV-2, the proportion of Nevada's hospitals that have implemented medication management documentation is the same as the proportion of US hospitals, while fewer hospitals in Nevada have implemented EMR documentation than in the US. Nevada's participation in discharge instructions is close to the average mean for the US.

Figure IV-2: Meaningful Use Documentation for US, NV, and Rural Hospitals (2012)



Each category of functions illustrated on this figure includes a set of components, as detailed in Table IV-6. The proportion of hospitals that has implemented each set of components shown in this figure is the average of the proportions shown in Table IV-6.
Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C. American Hospital Association Company

The gap between US hospitals and Nevada hospitals is larger for some capabilities that are important to attesting to meaningful use. For example 76% of US hospitals can "Automatically generate hospital-specific meaningful use quality measures by extracting data from an electronic record without additional manual processes", while 64% of Nevada hospitals can perform this task. See Table IV-8.

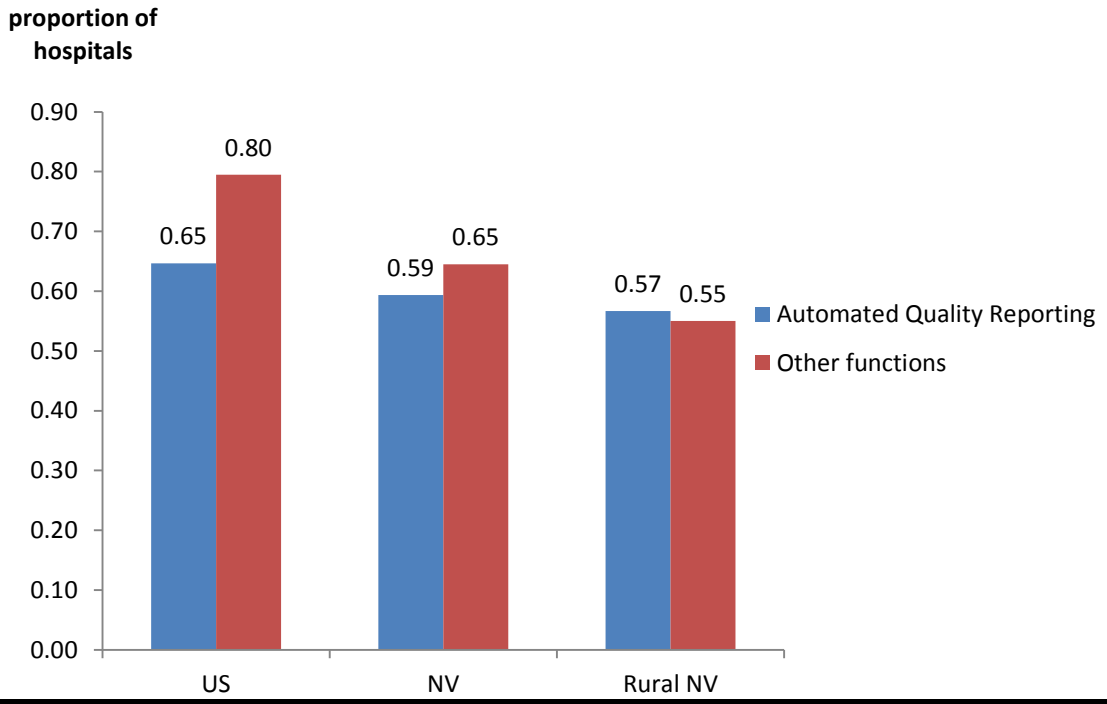
Table IV-8: Data Stored Related to Meaningful Use Stages 1 and 2 for General Hospitals (2012)
Comparison of US, Nevada, and Nevada rural areas
Automated Quality Reporting and Other Functions

Definition	US Proportion	NV Proportion	Difference (US-NV)	Rural NV* Proportion	Difference (NV-Rural NV)
Automated Quality Reporting					
Automatically generate hospital-specific meaningful use quality measures by extracting data from an electronic record without additional manual processes	0.76	0.64	0.145	0.60	0.04
Automatically generate Medicare Inpatient Quality Reporting program measures for a full Medicare inpatient update	0.58	0.50	0.177	0.50	0.00
Automatically generate physician-specific meaningful use quality measures calculated directly from the electronic health record (EHR) without additional manual processes	0.60	0.64	0.145	0.60	0.04
Other Functions					
Implement at least 5 Clinical Decision Support interventions related to 4 or more clinical quality measures	0.71	0.62	0.171	0.50	0.12
Conduct or review a security risk analysis and implement security updates as necessary	0.88	0.67	0.157	0.60	0.07

Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C.
American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Healthcare%20IT%20File%20Layout.pdf
Note: This is a self-selected sample of general hospital nationwide. This sample may not be representative of the Nevada hospital population
*Nevada rural hospitals included varying types (i.e. general, emergency) with sample size =5.

Figure IV-3 compares two key EMR functional components across US, Nevada, and rural Nevada hospitals. Despite the fact that Nevada hospitals lag in implementing capability for automatically generating hospital-specific meaningful use quality measures, Nevada hospitals are relatively well-equipped to generate physician-specific measures. Taken as a whole, Nevada hospital's capability for automated quality reporting is roughly comparable to the capability of US hospitals.

Figure IV-3: Meaningful Use Decision Components Comparison of US, NV, and Rural NV Hospitals (2012)



Each category of functions illustrated on this figure includes a set of components, as detailed in Table IV-6. The proportion of hospitals that has implemented each set of components shown in this figure is the average of the proportions shown in Table IV-6.
Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Healthcare%20IT%20File%20Layout.pdf
Note: This is a self-selected sample of general hospital nationwide. This sample may not be representative of the Nevada hospital population
*Nevada rural hospitals included varying types (i.e. general, emergency) with sample size = 5.

Table IV-9 reports the proportions of US and Nevada hospitals that store data for population health management and public health reporting. Overall data storage for Nevada and US hospitals is comparable. The major difference lies in the lack of rural Nevada hospitals' capability to "Identify and provide patient specific education resources."

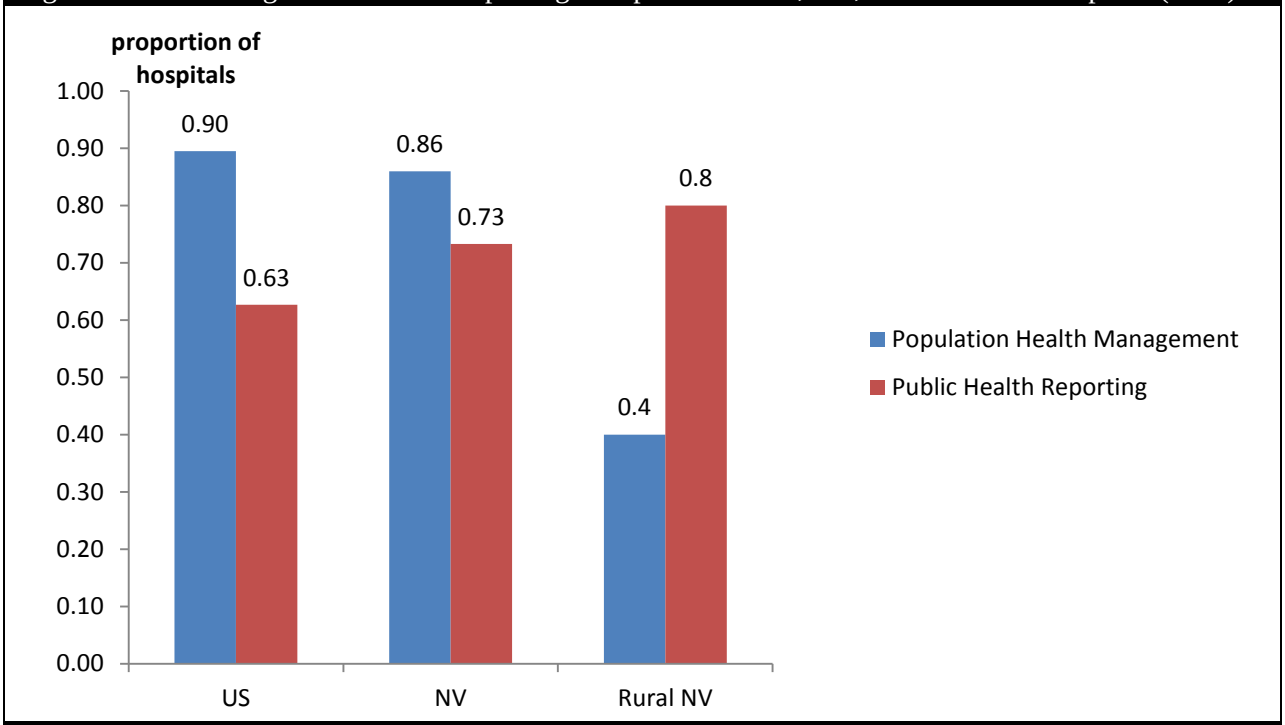
Table IV-9: Data Stored Related to Meaningful Use Stages 1 and 2 for General Hospitals 2012
Comparison of US, Nevada, and Nevada rural areas
Population Health Management and Public Health Reporting

Definition	US Proportion	NV Proportion	Difference (US-NV)	Rural NV* Proportion	Difference (NV-Rural NV)
Population Health Management					
Generate lists of patients by condition	0.92	0.82	0.10	0.80	0.02
Identify and provide patient specific education resources	0.87	0.9	-0.03	0.00	0.90
Public Health Reporting					
Submit electronic data to immunization registries or immunization information systems per Meaning full Use standards	0.67	0.78	-0.10	1.00	-0.22
Submit electronic data on reportable lab results to public health agencies per meaningful use standards	0.61	0.82	-0.21	0.80	0.02
Submit electronic syndromic surveillance data to public health agencies per meaningful use standards	0.60	0.6	0.00	0.60	0.00

Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Health care%20IT%20File%20Layout.pdf
Note: This is a self-selected sample of general hospital nationwide. This sample may not be representative of the Nevada hospital population
*Nevada rural hospitals include varying types (i.e. general, emergency, surgical only) with sample size=5.

Figure IV-4 compares public health reporting and population health management average proportions across US, Nevada, and rural Nevada hospitals. Rural Nevada hospitals use electronic methods of exchange on average, more than either Nevada or US hospitals.

Figure IV-4: Meaningful Use Public Reporting Comparison of US, NV, and Rural NV Hospitals (2012)



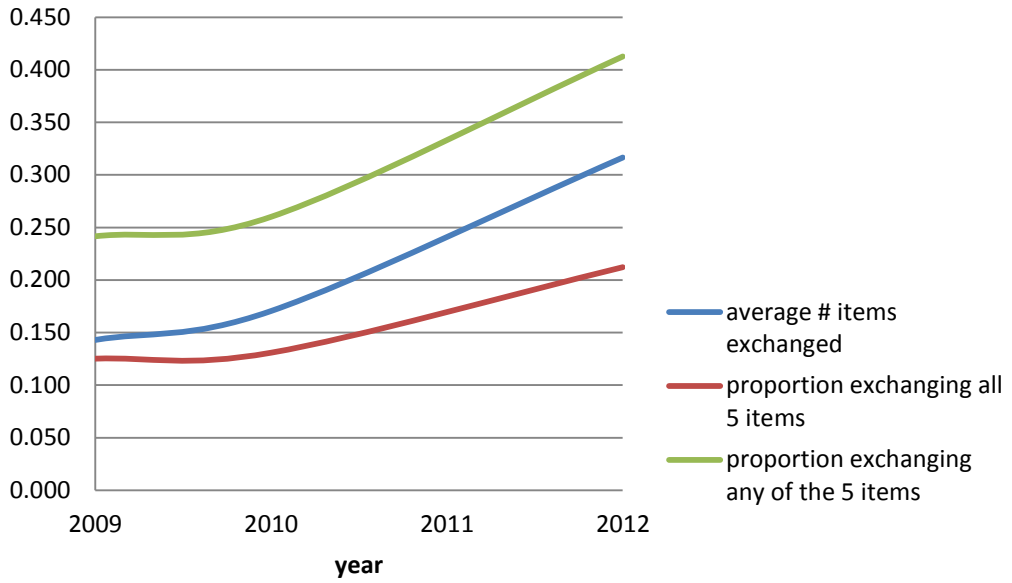
Each category of functions illustrated on this figure includes a set of components, as detailed in Table IV-6. The proportion of hospitals that has implemented each set of components shown in this figure is the average of the proportions shown in Table IV-6.
Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Healthcare%20IT%20File%20Layout.pdf
Note: This is a self-selected sample of general hospital nationwide. This sample may not be representative of the Nevada hospital population
**Nevada rural hospitals include varying types (i.e. general, emergency, surgical only) with sample size=5.

Participation in Health Information Exchange

According to the data presented, hospitals across the US report substantially higher levels of electronic information exchange with other hospitals within the same hospital system, compared with hospitals outside the system. More than two-thirds (72%) of hospitals report electronic exchange of at least one type information with other hospitals within the system, while only 39% report such exchange with hospitals outside the system. The relationship of exchange inside the system to exchange across system boundaries is similar for exchange with ambulatory care providers: 55% of hospitals report electronic exchange of at least one type of information with ambulatory care providers within the system, but only 27% report such exchange across the system boundary.

HIE utilization was flat in the US during 2008-2010 and it increased substantially by the year 2012 (see Figure IV-5 below). In 2012, 20% of hospitals exchanged all 5 items, 40% exchanged at least one item, and the average number of items exchanged was slightly above 3.

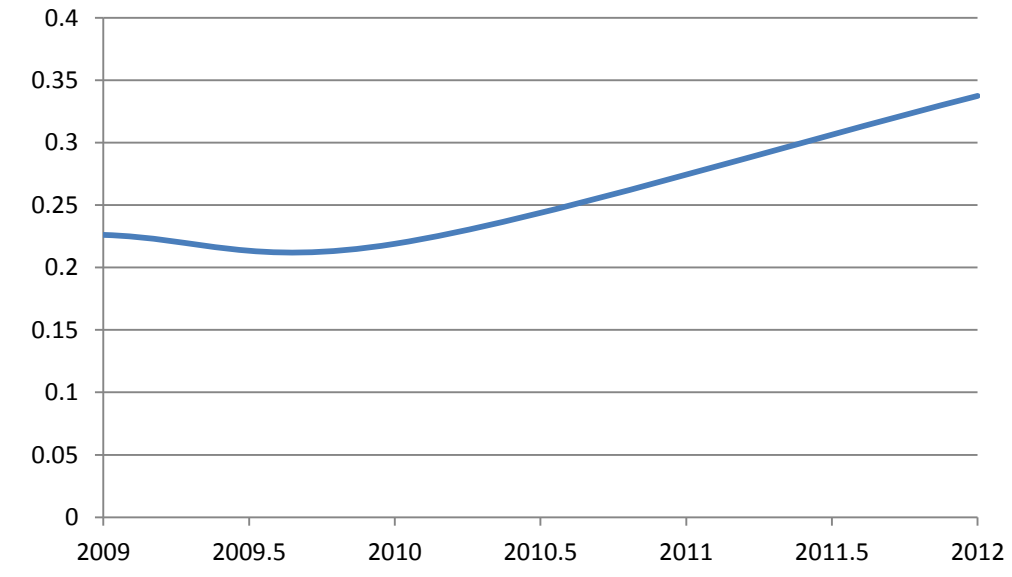
Figure IV-5: US General Hospitals Reporting Exchange Outside Their Own Systems



Source: AHA Annual Surveys and IT Supplements

The proportion of US hospitals reporting that health information exchange infrastructure was locally available increased from 20% in year 2010 to 33% in year 2012, as shown in Figure IV-6.

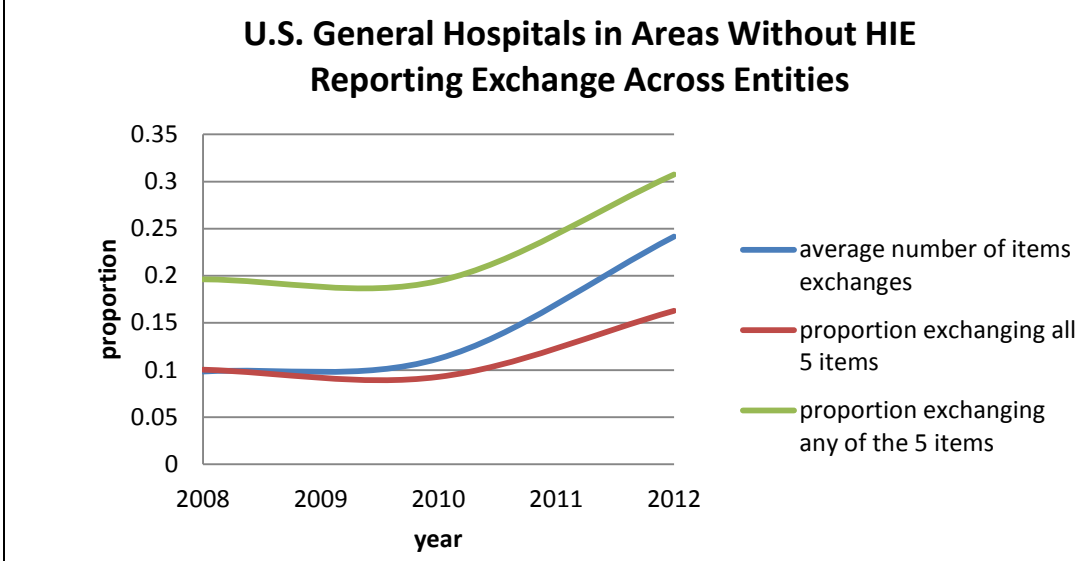
Figure IV-6: Proportion of Hospitals Reporting that HIE is Available in the Local Area



Source: AHA Annual Surveys and IT Supplements

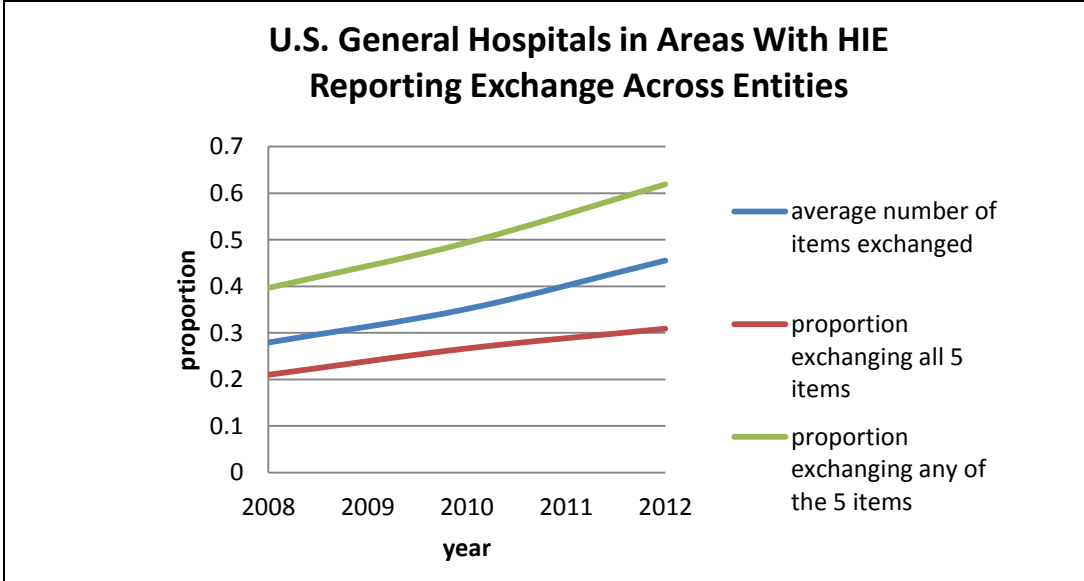
Information exchange across the boundaries of hospital systems is clearly facilitated by health information exchange infrastructure. Among hospitals reporting that HIE is not locally available, 16% of hospitals exchanged all five key items outside their own hospital systems, and 30% exchanged at least one item (see Figure IV-7). Exchange across organizational boundaries is substantially increased when HIE infrastructure is available: over 60% exchanged all five items with hospitals outside their own systems and 30% of these hospitals exchanged at least one item (see Figure IV-8). This may be a critical point. Infrastructure to support inter-organizational health information exchange may be essential to support the competitive success of smaller and less-integrated provider organizations.

Figure IV-7: US General Hospitals in Areas without HIE Reporting Exchange Across Entities



Source: AHA Annual Surveys and IT Supplements

Figure IV-8: U.S. General Hospitals in Areas with HIE Reporting Exchange Across Entities



Source: AHA Annual Surveys and IT Supplements

The proportions of all Nevada hospitals who are exchanging data within hospital systems is lower than the nationwide proportion, but the difference is not significant. The proportion exchanging at least one type of information electronically with hospitals across system boundaries is significantly lower in Nevada (13%) than in the nation (39%). With regard to electronic exchange of information with ambulatory care providers, 53% of hospitals in Nevada report electronic exchange at least one type of information with ambulatory care providers within the system, while 40% report this exchange outside the system.

Hospital participation in HIE Updated with Stakeholder Interviews 2013

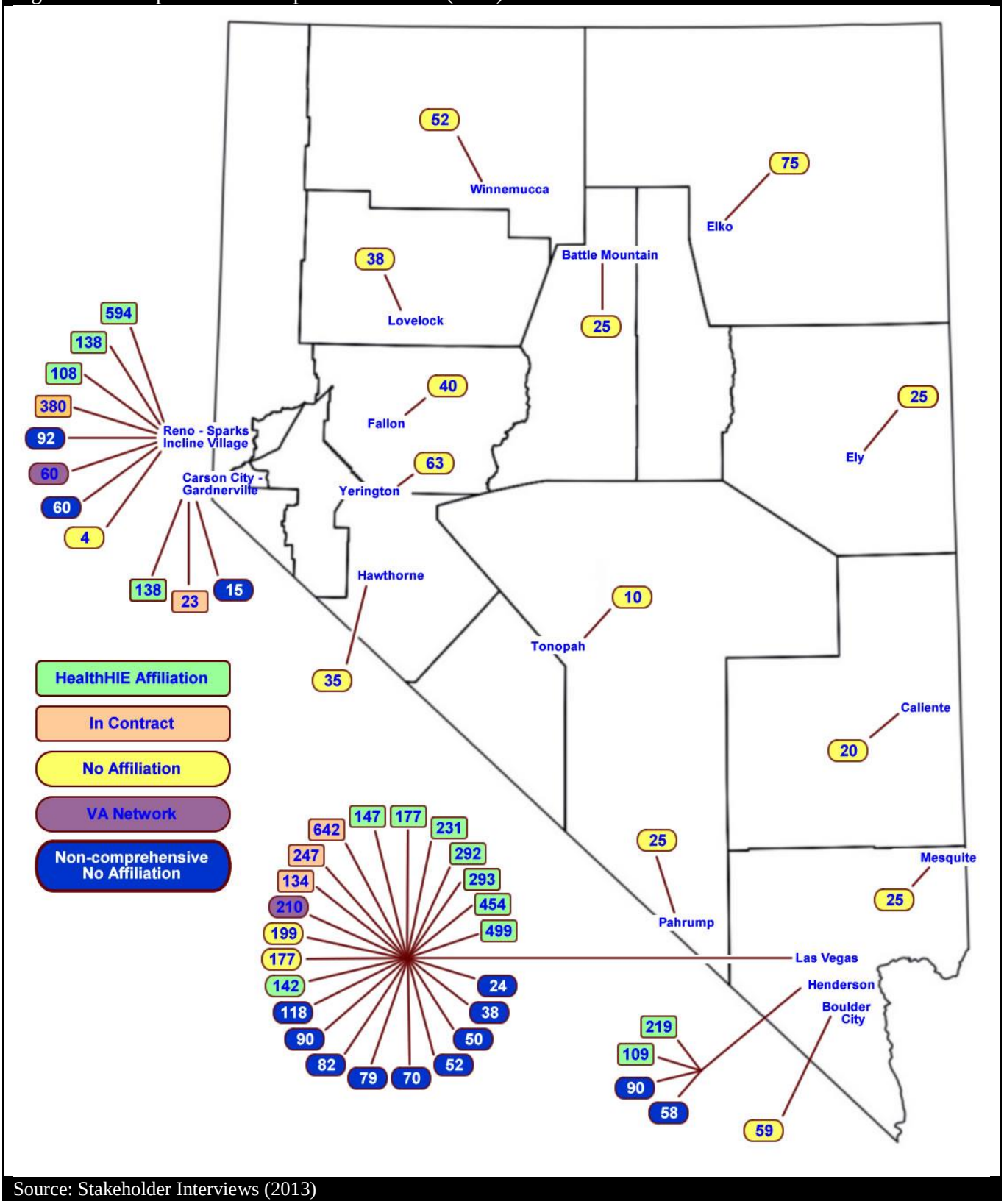
The 2013 stakeholder interviews indicate that substantial progress has occurred since the HIMSS data was collected in 2012. During the 2012-2013 timeframe, hospitals representing a 58% of the state's beds were connected to a private-sector formal HIE, HealthHIE Nevada. This is a recent development; much of this progress occurred during 2013. Appendix IV-A provides a list of the hospitals used to derive the data discussed in this section.

Figure IV-9 gives a graphical overview of the external organizational exchange of health data occurring in Nevada, as indicated in the stakeholder interviews. Two types of hospitals with overnight facilities are depicted in Figure IV-9: Short-term general hospitals (also known as comprehensive facilities) and specialized facilities (such as mental health hospitals, sub-acute and long-term care facilities). Non-comprehensive facilities and Veteran's Administration (VA) hospitals) are shown in dark colors; dark blue and dark purple, respectively. Comprehensive facilities are shown in light colors, yellow, orange, and green. Each hospital is depicted in Figure IV-9 with a number encased in a symbol, with a line connecting the hospital to its city. The number of beds in each facility is the number inside the symbol, and the type of symbol and color shows the electronic exchange affiliation with HealtHIE Nevada. Those affiliated with HealtHIE Nevada are shown in a rectangle, while those not affiliated with HeatHIE Nevada are shown in an oval. The two VA hospitals in the state (shown in oval dark purple) exchange data with each other and with other facilities in the VA network across the country. Hospitals depicted in green are currently exchanging data through HealtHIE Nevada, hospitals depicted in orange are currently in contract negotiations with HealtHIE Nevada, and hospitals symbolized in yellow are not exchanging data through the current exchange network.

Figure IV-9 shows that the primary external exchange of data is occurring with large hospitals (measured by number of beds) in the two major urban areas. Approximately 58% of the hospital bed capacity is currently exchange data via HealtHIE Nevada, and if those in contract negotiations finalize agreements, hospitals with 70% of the state's bed capacity will be exchanging data. Figure IV-9 shows that health care organizations in the two urban areas are currently participating in the exchange of health care data. We did not add the laboratories participating in external exchange to the figure because the overall structure of the figure remains the same – exchange capabilities are clearly focused in the urban areas. The laboratories in the southern urban area are more actively involved in exchange through HealtHIE Nevada, but almost all of the state's laboratories and imaging centers are able to participate in electronic exchange.

It is a completely different picture when viewing the rural areas of the state. As shown on Figure IV-9, hospitals outside of the urban areas are not exchanging data electronically with the urban hospitals, nor are they exchanging data with local providers.

Figure IV-9: Map of HIE Participation in Nevada (2013)



Source: Stakeholder Interviews (2013)

Analysis of Hospital Adoption of EMR and HIE

This section uses statistical analysis of the secondary sources data described earlier to understand the characteristics of hospitals that adopt EMR and HIE[1] and whether the utilization of health information technology is associated with positive outcomes for hospitals.

Characteristics of Hospitals that Adopt EMR and HIE

Table IV-10 provides an overview of the proportions of US and NV hospitals that have adopted EMR and HIE, by hospital size. Larger hospitals report higher levels of adoption, for both EMR and HIE, than smaller hospitals. This pattern is observed in both the US as a whole, and in Nevada; however many of these differences are small. We report national results for hospitals with more-than or less-than 300 beds. However, it was necessary to use 150 beds as the cut-point in Nevada to ensure that each cell summarized information for at least five hospitals.

Table IV-10: EMR and HIE Implementation by Hospital Size

	US		**Nevada**	
	Small hospitals < 300 beds	**Large hospitals >= 300 beds**	**Small hospitals < 150 beds**	**Large hospitals >= 150 beds**
Average proportion of EMR components implemented				
2009	0.45	0.62	.53	.57
2010	0.48	0.68	.42	.60
2012	0.66	0.81	.59	.62
Proportion of hospitals that participate in HIE				
2009	0.16	0.22	.17	.33
2010	0.18	0.27	.17	.33
2012	0.28	0.43	.33	.4

Source: 2012 AHA Annual Survey Information Technology Supplement Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Health_care%20IT%20File%20Layout.pdf

note: Implementation proportions cannot be reported for Nevada hospitals with at least 300 beds due to the low sample size. Therefore, the cut-point of 150 beds is used for Nevada hospitals. This ensures that each cell summarizes information for at least 5 hospitals.

We estimate regression equations for adoption of EMR and participation in HIE using data for 2012. The results for earlier years are comparable; hence we focus on the results for 2012. We build on previously published work, to define variables for inclusion in the analysis.

Table IV-11 summarizes the regression results that identify hospital characteristics associated with EMR and HIE adoption. Both regressions were estimated for three samples: the full sample of US general hospitals, and two subsamples including US general hospitals with fewer

[1] The measure of EMR adoption is computed as the proportion of EMR components (included in the survey) that were implemented by the hospital. The measure of HIE participation is binary: a hospital is listed as participating in HIE if the hospital reports that an HIE or RHIO is available and the hospital is exchanging data through this mechanism.

than 300 beds and US general hospitals with at least 300 beds. Table IV-11 presents results for the full sample and the smaller hospitals.

Table IV-11: Characteristics Associated with EMR and HIE Adoption - All US general hospitals and US general hospitals with fewer than 300 beds. Statistically-significant associations only displayed

Characteristic	Impact on EMR Adoption	Impact on HIE Participation
Hospital ownership	Non-profit hospitals and hospitals owned by state and local governments are positively associated with EMR adoption.	
Hospital Size	Large size is positively associated with EMR adoption.	
Membership In A network or system	Network membership is positively associated with EMR adoption.	After controlling for the EMR adoption level, system membership is positively associated with HIE participation among small hospitals.
Rural Location	Rural location is negatively associated with EMR adoption.	
ER Visits Per 100 Beds	High numbers of emergency department visits (relative to the number of beds) are positively associated with EMR adoption.	
Medicare Payments	Location in Hospital Referral Regions with high Medicare expenditures per enrollee is negatively associated with EMR adoption.	
Capitated Contracts With Employers		Increased hospital risk, as measured by the existence of capitated contracts between the hospital and employers, is positively associated with HIE participation.
Market Share[2]		After controlling for the EMR adoption level, market share is positively associated with HIE participation.
Teaching And Critical Access Status	Teaching hospitals are significantly less likely to adopt EMR and critical access hospitals are significantly more likely to adopt EMR.	After controlling for the EMR adoption level, teaching hospital status is negatively associated with HIE participation in the full sample; this association is not observed in the small-hospital sub-sample.
Census Region		Hospitals in the Mountain Region are less likely to adopt HIE than hospitals in New England.
R-squared	Ranges from .26-.31	.08

Note: These results report associations. These results do not support assessment of causality.
Source: 2012 AHA Annual Survey and AHA Information Technology Supplement. Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Health care%20IT%20File%20Layout.pdf
Regression analysis: detailed results are available on request

[2] Market share is calculated as the number of beds in each hospital, as a proportion of the beds in the relevant Hospital Referral Region (HRR). If two hospitals in an HRR are owned by the same hospital system, then both hospitals are credited with the system's market share.

The independent variables in the EMR adoption regression equation explain about one-fourth (R-square = .26) of the variation in EMR adoption levels for non-federal general hospitals, and 8% of the variation in HIE participation. The smaller R-square for the HIE participation regression may partly reflect the fact that EMR adoption is measured by a continuous variable that indicates the degree of adoption, while HIE participation is measured by a binary variable that indicates adoption vs. non-adoption.

We omit results for the larger hospitals, because the results indicate that most of these variables are not significant in the sample of large hospitals. This may reflect the high degree of adoption in this sample. This limited degree of variation in the dependent variable limits the potential for regression analysis to identify significant associations in this sample.

These 2012 results are similar to results reported in the literature for earlier years, prior to the 2009 ARRA-HITECH Act legislation. Published literature based on analysis of 2007-2009 data indicates that hospital characteristics associated with adoption of health information technology included: network membership, large size, and location in an urban area. In contrast, increased market power is associated with increased likelihood of health information technology adoption (Desroches et al. 2013, Jha et al. 2009, Vest 2010). This suggests that the incentives and funding provided in this legislation have not altered the underlying economics of EMR and HIE adoption. This suggests that it may be unrealistic to expect that all hospitals will eventually utilize health information technology (we use Health IT as the acronym to encompass both EMR and HIE technologies) to the same extent.

Association of Health IT Adoption and Utilization with Quality Health Care Outcomes

Previously published work does not provide strong evidence that health IT utilization generates improved health outcomes or positive returns on investment. An existing literature survey concludes that the literature provides projections of potential of community-wide HIE, but actual results have not been demonstrated. Other studies, conclude that HIE did not generate the anticipated benefits.

Two studies based on data from earlier reports conclude that HIE implementation was associated with increased proportions of discharged hospital patients reporting satisfaction with nurse communication (Vest and Miller 2011), and with significant but small reductions in 30-day hospital readmission rates (Jones et al. 2011).

We analyze the impact of HIE participation on three types of outcomes measures: radiology tests, patient satisfaction and reported hospital profit. Each of these outcomes is important for HIE success and sustainability. The impact of HIE participation on 30-day hospital readmission rates is also an important issue, but we do not analyze this impact because the CMS website reports current work to redefine these rates. These measures may be useful for tracking and monitoring impacts of health information technology in the future, but it does not appear to be useful to include them in the analysis reported here.

We use the four measures of inappropriate use of radiology that are defined by CMS and reported in the CMS Hospital Compare data:

- duplicate scans of the abdomen,
- duplicate scans of the thorax,
- inappropriate use of diagnostic mammograms, and

  The CMS definition classifies both "too few" mammograms and "too many" mammograms are inappropriate. For the mammogram measure, we assume that HIE will not address the issue posed by "too few" scans; hence we assume – for this analysis – that a reduction in the number of scans represents improvement.
- inappropriate use of scans of the back.

  For example, CMS defines as "inappropriate" scans that are not preceded by physical therapy.

For each of these measures, a decrease in the number of scans represents improvement. CMS provides detailed definitions for each of these outcomes measures, and it provides outcomes data for a subset of all hospitals.

We use the overall patient satisfaction scores reported by CMS. Specifically, we focus on answers to the question "Would you recommend this hospital?" The impact of HIE on patient satisfaction may impact patient willingness to opt-in to the system. In addition, as providers face increasing pay for performance incentives and increasing convenience of patient access to provider comparison data, the impact of HIE on patient satisfaction may impact provider interest in HIE participation.

Finally, the impact of HIE on provider profits will be critical in determining willingness to pay for HIE services. Profit is defined in the HIMSS 2011 data as follows:

> "Profit: Net Operating Revenue - Total Operating Expense
> - Net Operating Revenue: Net operating revenue includes revenues associated with the main operations of the hospital (net inpatient + net outpatient revenue). It does not include dividends, interest income or non-operating income.
> - Total Operating Expense: The total amount of money the Acute-Care Hospital spends on operations such as staffing, property expenses, etc. for the most recent fiscal year."

We include hospitals in this analysis that are included in the data reported by the AHA and by CMS. The information currently posted by CMS reports hospital outcomes for the year 2011.

Table IV-12 presents descriptive statistics for each of these outcomes measures, for reporting hospitals the US and in NV:

Table IV-12: Descriptive Statistics for General Hospitals: NV vs. US (2011)

		# of hospitals	mean	min	max
Scans: abdomen	US	2837	0.141	0	0.95
	Nevada	29	0.126	0	0.41
Scans: thorax	US	2569	0.055	0	0.81
	Nevada	26	0.092	0	0.46
Scans: mammograms	US	1556	0.377	15	0.68
	Nevada	17	0.379	26	0.53
Scans: back	US	2564	0.358	0	1
	Nevada	29	0.414	0	1
Patient satisfaction	US	3697	67.351	19	97
	Nevada	22	62.227	50	75
Self-reported profit	US	2576	20.425	11	21.53
	Nevada	12	20.462	20.29	21.29

Source: 2012 AHA Annual Survey and AHA Information Technology Supplement. Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Health care%20IT%20File%20Layout.pdf

Impact of HIE on the outcomes measures

We use a series of analytical strategies to assess the relationship between HIE participation and the outcomes measures. We begin by testing whether the average outcomes scores are the same for HIE participants and non-participants. Second, we estimate ordinary least squares regressions to assess whether the univariate relationships continue to hold, after controlling for relevant independent variables. Finally, we estimate instrumental variable regressions to reduce the potential influence of self-selection bias.

Bivariate analysis: Impact of HIE participation on the average outcomes scores

Most of the performance differences between HIE participants and non-participants are small, and insignificant. The only difference that approaches significance is for inappropriate scans of the abdomen. HIE participants do nearly 10% fewer scans of the abdomen, compared to HIE non-participants. However, the t-statistics is 1.58, which implies that the difference is insignificant at standard levels of significance. Table IV-13 displays a comparison of the outcome measures for US and NV hospitals that do and do not participate in HIE. The information in Table IV-13 is summarized in descriptive format in tables IV-14 and IV-15.

Table IV-13: Outcomes Measures for US and NV Hospitals that do vs. do not Participate in HIE
T-test for statistical significance of the difference between mean outcomes for HIE participants and HIE non-participants
All general hospitals, including federal hospitals, are included in the US dataset
Information currently posted on the CMS website reports hospital outcomes for 2011

		US		Nevada	
		non-participants	**participants**	**non-participants**	**participants**
Scans: abdomen	**# of observations**	1416	344	7	3
	mean	0.145	0.130	0.090	
	standard deviation	0.004	0.008	0.018	
	t-stat	t = 1.5796			
Scans: thorax	**# of observations**	1283	311	7	3
	mean	0.055	0.056	0.071	
	standard deviation	0.003	0.006	0.123	
	t-stat	t = -0.1074			
Scans: mammograms	**# of observations**	777	178	6	1
	mean	0.375	0.374	0.378	
	standard deviation	0.003	0.006	0.036	.
	t-stat	t = 0.0520			
Scans: back	**# of observations**	1407	277	10	3
	mean	0.354	0.361	0.500	
	standard deviation	0.013	0.029	0.167	
	t-stat	t = -0.2245			
Patient satisfaction	**# of observations**	1846	473	7	3
	mean	67.770	67.666	62.429	
	standard deviation	0.194	0.379	3.401	
	t-stat	t = 0.2430			
Self-reported profit	**# of observations**	1318	319	3	1
	mean	20.385	20.366		
	standard deviation	0.015	0.040		
	t-stat	t = 0.5120		t cannot be computed	

Numbers of observations are lower than in the descriptive statistics table above. The previous table includes all hospitals in the AHA main survey. The numbers reported here are restricted to hospitals in the main AHA survey that also answered the IT Supplement questions.
Source: 2012 AHA Annual Survey and AHA Information Technology Supplement. Health Forum, L.L.C. American Hospital Association Company. http://www.ahadataviewer.com/Global/data/2012%20AHA%20Health care%20IT%20File%20Layout.pdf

Multivariate analysis (OLS estimation): Impact of HIE participation on the average outcomes scores

We estimate two sets of regressions. In the first set of regressions we use 2009 data on EMR adoption and HIE participation, and we use 2011 data to measure the outcomes variables. In the second set of regressions, we use 2008 data on EMR adoption and HIE participation, while we continue to use 2011 data to measure the outcomes variables. The second set of regressions provides a longer interval between adoption of EMR and participation in HIE, and the measurement of the outcomes. This interval could potentially be an important factor in measuring HIE impacts, if implementation requires time for individuals to develop new work processes, for analysts and programmers to develop new systems for developing and delivery reports, and for patients to adjust to the changes in provider practice patterns. However our results (reported below in Tables IV-14 and IV-15) do not indicate that this issue is significant.

In each set of regressions, we include the following independent variables to control for relevant hospital characteristics: ownership status, membership in a system, size (measured as beds), location (rural vs. urban), existence of capitated contracts with employers, market power, teaching hospital status, critical access hospital status, and revenue from patients covered by managed care. Selection of these variables was based on results previously reported in the literature.

Table IV-14: OLS results for EMR, HIE, and Outcome Measures		
	EMR	HIE
Statistically significant associations		
All US general hospitals	Positive association: EMR with patient satisfaction Positive association: EMR with profit	
Small hospitals	Positive association: EMR with patient satisfaction	
Large hospitals	Positive association: EMR with patient satisfaction	
No CIC	Positive association: EMR with patient satisfaction	
Has CIC	Positive association: EMR with patient satisfaction	
Sources: AHA Annual Survey and IT Supplement, HIMSS Survey, CMS Hospital Compare		

The OLS results are useful to identify statistically significant associations between the dependent variables in each regression (the level of EMR utilization and a binary variable indicating whether the hospital exchanges information with entities outside its organization (HIE)). As summarized in Table IV-14, the degree of EMR utilization is positively associated with patient satisfaction and with profit in the full sample. The significant positive association between EMR utilization and patient satisfaction is also observed in the subsamples of small hospitals (fewer than 300 beds), large hospitals (at least 300 beds), hospitals with Cardiac Intensive Care units (indicating a high level technological sophistication), and hospitals without Cardiac Intensive Care units (indicating a lower level of technological sophistication).

After controlling for EMR, the HIE variable (which indicates whether the hospital exchanges information with entities outside its system) is not significantly associated with improvements in any of the outcomes measures.

Multivariate analysis (IV estimation): Impact of HIE participation on the average outcomes scores

The OLS estimation provides a good "first-look" at relationships between health IT utilization and the outcomes measures, but this estimation strategy does not account for the possibility of bi-directional causality between the outcomes measures and the two measures of health IT utilization. A positive association between EMR utilization and profit could potentially reflect either: (i) a positive return on investment for hospitals that invested in EMR systems, or (ii) decisions by profitable hospitals to purchase EMR systems. The second possibility represents "selection bias", because this type of positive association merely reflects the characteristics of hospitals that choose to purchase EMR systems.

We use Instrumental Variable (IV) estimation to address this issue for the HIE dependent variable. IV estimation reduces the potential influence of selection bias; hence these results are more likely to provide an estimate of the impact of HIE on the outcomes measures. Due to sample size concerns, we only present the IV results for the full sample (See Table IV-15).

Table IV-15: IV results: EMR, HIE and outcomes measures

	EMR	HIE
Statistically significant associations		
All US general hospitals	Positive associations: EMR with patient satisfaction and EMR with profit	Hospitals with HIE report lower scores the measure of duplicate scans of the thorax

Source: AHA Annual Survey and IT Supplement, HIMSS survey, CMS Hospital Compare

As shown in Table IV-15, the IV estimation results indicate that exchange of information outside the hospital's organization contributes to reducing duplicate scans of the thorax. In addition, the degree of EMR utilization continues to have a positive association with patient satisfaction and with hospital profit.

It is important to note that the statistically significant associations between health information technology and two outcomes measures (patient satisfaction and duplicate scans of the thorax) are not observed in simple univariate comparisons. Multivariate analysis is needed to track the impacts of health information technology on outcomes measures.

Barriers and Facilitators to Hospital Utilization of Health IT

Urban hospitals in Nevada are demonstrating increased usage of health IT; the last year has shown dramatic increases in usage beyond data available in national datasets. Nationwide analysis indicates that small rural hospitals are less likely to engage in high levels of EMR and HIE activity. This suggests that Nevada's small rural hospitals may require assistance or alternate solutions. Some of Nevada's small rural hospitals do not have the broadband access this is required for exchanging radiology results and other large files. Nationwide analysis also

shows that market share is positively associated with HIE utilization. This may signal challenges for smaller hospitals in Nevada's two urban markets.

Hospitals representing the majority of Nevada's hospital beds are currently providing information to one HIE that is operating statewide. National evidence and Nevada stakeholders indicate that hospitals are primarily providers of data (not users of data). While some analysts predicted that hospital emergency departments would be important users of HIE data, the stakeholder interviews do not substantiate the prediction that this would be an important motivation for hospital participation in HIE. One published study of the impact of HIE on emergency department care concluded that the evidence does not support the prediction that this would be a major source of health care expenditure savings (Bailey, et al. 2013). Instead, hospitals indicate that the primary motivation to participate is to contribute to the community benefit. Currently, hospitals are contributing both data and money. Absent a clear business-reason for hospitals to participate, it is not clear whether it is realistic to expect long-term financial support by hospitals (particularly for-profit hospitals and those owned by out-of-state entities).

The rate of EMR utilization in Nevada is similar to the national rate. This is important, because EMR utilization is a significant predictor of HIE utilization. Area-wide HIE infrastructure is new in the state; hence it is likely that hospital utilization of HIE will increase. Our analysis of nationwide evidence on the impact of HIE on CMS-monitored outcomes is encouraging. This evidence indicates that HIE is contributing to improvement in some of the outcomes tracked by CMS, and the evidence indicates that HIE is contributing to hospital profits.

This section of the report identifies an efficient strategy for ongoing tracking of EMR and HIE adoption and utilization. The results reported here also provide an analytical strategy for ongoing tracking of the nationwide impact of HIE utilization on outcomes measures that are defined, tracked and reported by CMS. CMS reports the outcomes measures for several Nevada hospitals; hence it would also be feasible to generate graphs to compare Nevada hospital progress on these measures with progress throughout the US. Finally, the state could track – and report – the degree to which Nevada's hospitals exchange information with entities outside their systems (vs. exchanging information only with entities that are within the hospital's own system).

V. Stakeholder Evaluation - Providers

In this section we discuss providers and their adoption and use of electronic medical records (EMR) and health information exchange (HIE) focusing primarily on physicians. We start with a picture of the demographics and characteristics of physicians and nurses in Nevada. We then discuss providers' perceptions and utilization of EMRs and HIE. Perception and utilization are addressed for Nevada through a physician survey we conducted with Nevada providers and nationally through an analysis of the literature and secondary data sources.

Key Findings

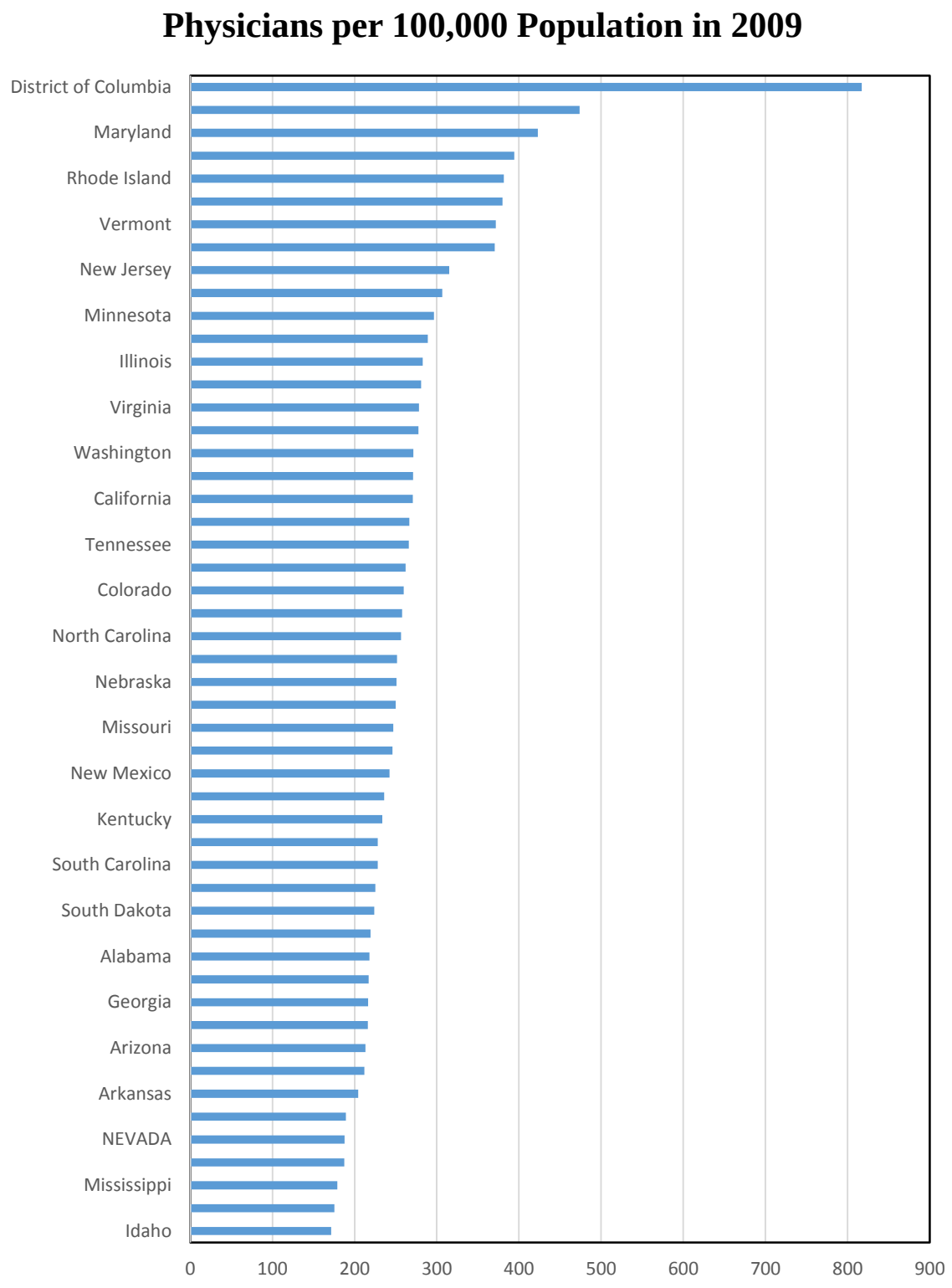
1. Aside from shortages of health care professionals in Nevada, providers in Nevada are similar to providers in other states in their adoption of electronic medical records and participation in health information exchange.
2. Providers are adopting electronic medical records and participating in health information exchange, but not as extensively as hospitals.
3. The ongoing shortage of physicians and other providers in Nevada, particularly in rural areas, highlights the importance of potential impacts of health information technology impacts on health care quality and physician productivity. It also highlights the importance of the potential impact of health information technology issues on physician retirement decisions.

Description of Nevada Providers

Nevada faces two issues regarding health care providers. First, the state is underserved. Nevada has a near-statewide designation as a Health Professional Shortage Area by the US Department of Health and Human Services. Second, the proportion of Nevada physicians who work in solo practice or small groups is higher in Nevada than in other states.

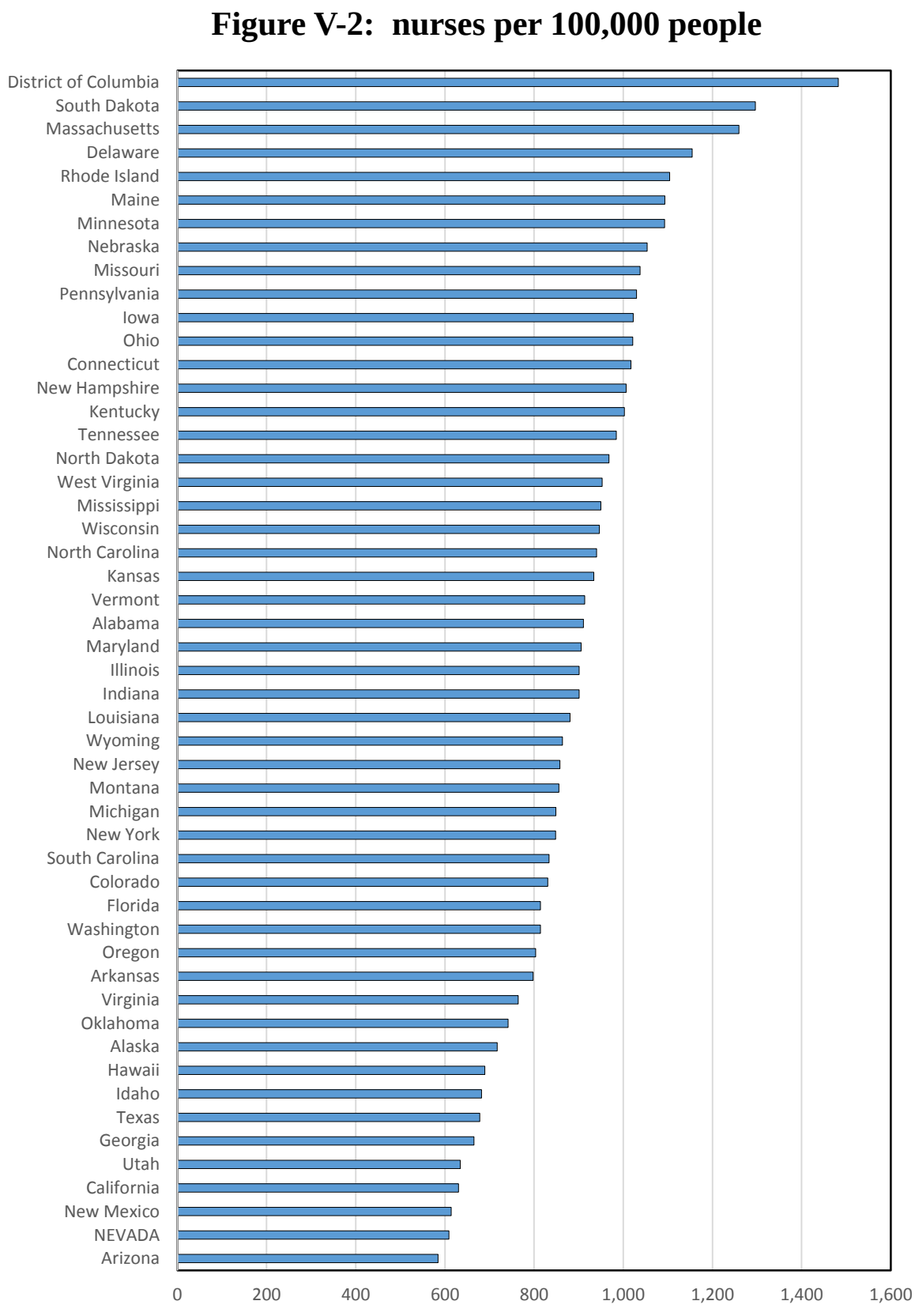
Figures V-1 and V-2 show the number of physicians and nurses, respectively, per 100,000 population for each US state with Nevada in the bottom five in both categories.

Figure V-1: Physicians per 100,000 Population in 2009



Source: US Statistical Abstract (2012)

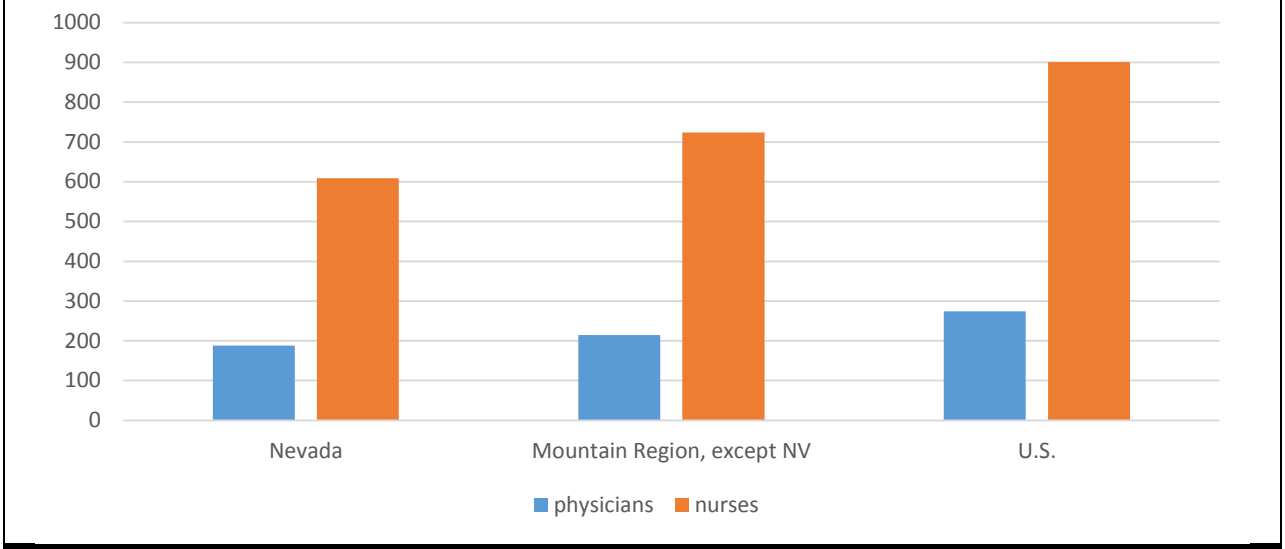
Figure V-2: Nurses per 100,000 Population in 2009



Source: US Statistical Abstract (2012)

To assess whether the low rate of physicians and nurses per 100,000 people reflects Nevada's terrain and population density, Figure V-3 provides a comparison of the rates in Nevada, other states in the Mountain Region, and the US The other Mountain Region states are Arizona, Colorado, Idaho, Montana, New Mexico, Utah and Wyoming.

Figure V-3: Providers per 100,000 Population in 2009 Averaged Over States



Source: Calculated from US data in the Statistical Abstract (2012)

Most of Nevada is designated by the federal government as a medically-unserved area, as detailed in Table V-1.

Table V-1: Federally-designated Medically-Underserved Areas

County	Medically-Underserved Area Type
Clark	partial county
Douglas	Multiple state
Elko	partial county
Esmeralda	whole county
Eureka	whole county
Lander	whole county
Lincoln	whole county
Lyon	whole county
Mineral	whole county
Nye	whole county
Pershing	whole county
Storey	whole county
Washoe	partial county
Carson City	partial county

Source: http://datawarehouse.hrsa.gov/

Nevada residents, especially residents in rural areas, have fewer health care options than the residents of most other states. Improvement in care efficiency that may be achieved with the use of health information technology is particularly important in Nevada, and – at the same – negative impacts of health information technology may be more important in Nevada than in other states.

Nevada has a high proportion of physicians working in small practices. There are currently 70 physician practices in Nevada with 6 or more providers. These practices include 1,082 physicians, which means that a sizable portion of the states (approximately) 5,300 physicians work in small practices with 5 or fewer providers. This is significant based on findings presented in the next section indicating that smaller practices are less likely to utilize health information technology.

Provider Perceptions and Utilization of Health Information Technology

This section presents three types of information about physician perceptions and utilization of health information technology:

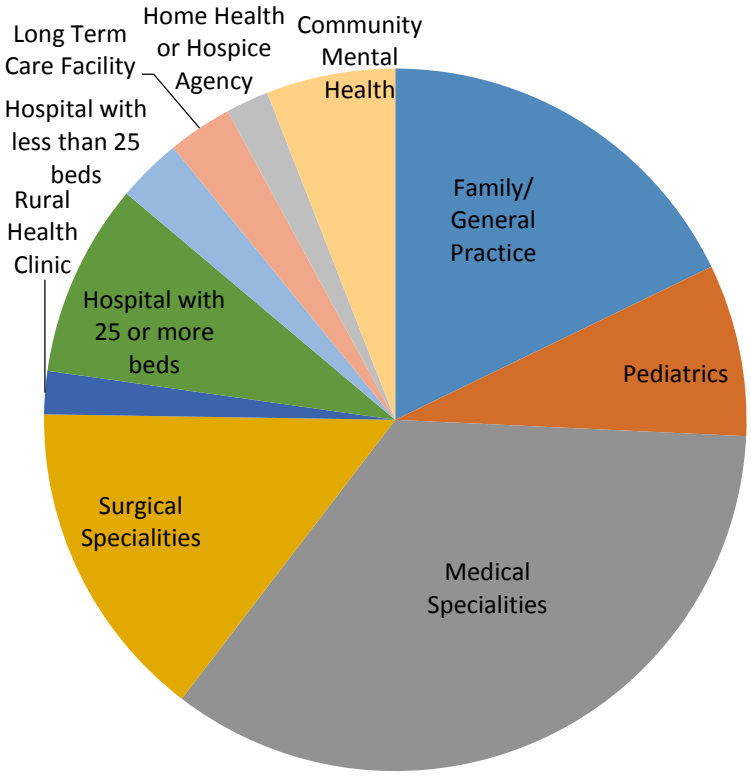
1. Nevada health care provider survey: We surveyed health care providers, to understand their perceptions of the costs and benefits EMR and HIE, and to understand utilization of specific features offered by these technologies.
2. Published findings: To provide a context for interpreting whether the views reported for Nevada health care providers are similar to the views of providers nationwide, we provide a brief overview of relevant published findings.
3. Data from Center for Health System Change (HSC): We examine the data provided by the HSC 2008 nationally-representative survey of physicians. We use this data to examine the baseline (pre-ARRA-HIT) utilization rates nationwide for EMR and HIE components, identify practice characteristics that are associated with EMR and HIE utilization, and test whether health information technology utilization is statistically-significantly associated with patient care and physician productivity outcomes.

2013 Survey of Nevada Health Care Providers: EMR Perceptions and Utilization

To assess EMR adoption and HIE participation in Nevada, we distributed a survey to health care providers in Nevada. The response rate was similar to the response rate on the 2012 Nevada Statewide HIT Assessment survey conducted by Capgemini. In that survey, 59 physicians responded, while 72 health care providers responded to this survey conducted during 2013.

Most of the survey participants (84%) were physicians, the remainder were nurses, social workers, speech-language pathologists, and other health care providers. Figure V-4 shows the types of employment settings of the survey respondents.

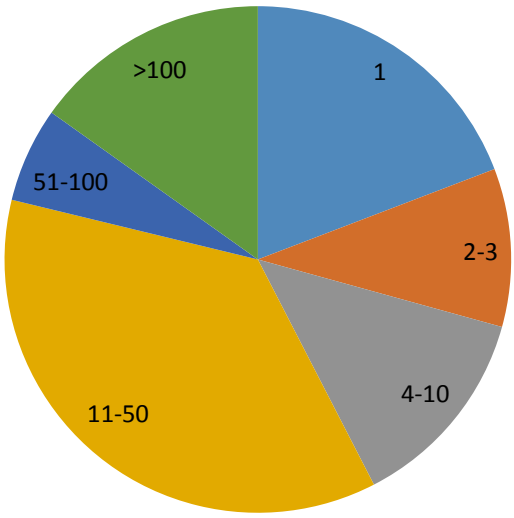
Figure V-4: Types of Organizations Represented in the Survey



Source: Provider Survey (2013)

Figure V-5 shows the number of providers in the participant's organizations.

Figure V-5: Number of Providers in Organizations Represented in the Survey



Source: Provider Survey (2013)

73% of the participants in the survey reported that their organization has an EMR system while 27% do not. For the providers who reported not having an EMR system in their organization, we asked a set of six questions using a 5-point Likert scale from strongly agree to strongly disagree to understand why their organization did not yet have an EMR (see Table V-2). The percentages in Table V-2 indicate how many of the participants either agreed or strongly agreed with the question. The results indicate that a majority of providers are concerned that an EMR will make their work processes less efficient or will introduce new errors into their decision making and half of the providers felt an EMR would not help them achieve better patient outcomes. Only one third felt they already had enough data to support their care decisions.

Table V-2: Why Providers Do Not Have an EMR System

Questions	% Agree
EMR might make my processes less efficient.	72%
EMR may introduce new errors into decision making.	61%
EMR will not help me achieve better patient outcomes.	50%
I already have all the data I need to support my care decisions.	33%
I do not need to meet federal meaningful use requirements.	17%
I am waiting until the technology is more mature before investing.	11%
I am planning to retire within the next two years.	6%
I am planning to change my profession within the next two years.	6%

Source: Provider Survey (2013)

For the providers who reported that their organization did have an EMR system, we asked them to rate their EMR using the set of six questions, shown in Table V-3. These questions were also based on a 5-point Likert scale from strongly agree to strongly disagree. The percentages indicated how many of the participants either agreed or strongly agreed with each statement. The results indicate that a majority of the providers with EMRs rely on them while seeing patients and to improve office activities. A majority feel that their EMR helps them improve the quality of health care they provide and that the system correctly matches patients based on information received from other providers. However, a majority also feel that their EMR system slows them down, so the providers without an EMR who felt a system would make their processes less efficient may have some justification for that concern. Only one third of the providers with an EMR felt the system helped them to reduce costs, which is a challenge for justifying the cost of the system.

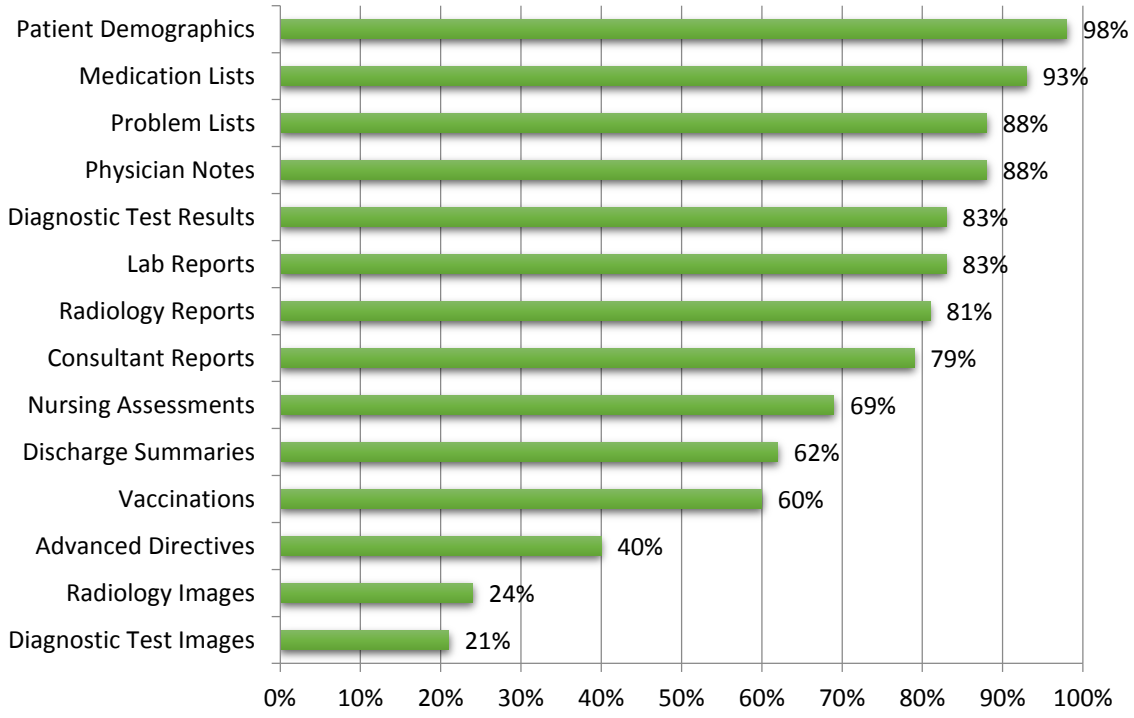
Table V-3: What Providers Think of Their EMR System

Questions	% Agree
I rely on our EMR system while I'm seeing a patient.	67%
We rely on our EMR system to improve office activities.	60%
Using our EMR system helps me improve the quality of health care I provide.	58%
Our EMR correctly matches the patients for at least 70% of the information received from other providers.	58%
When I'm providing health care, our EMR system slows me down.	57%
Our EMR system helps reduce costs.	33%

Source: Provider Survey (2013)

Figure V-6 shows the types of data stored and the percentage of providers who store that type of data in their EMR in the order of data most often stored. The most commonly stored data is patient demographics and the only data not stored by a majority of providers are advanced directives, radiology images, and diagnostic test images. Most providers store radiology and diagnostic test results but not the images.

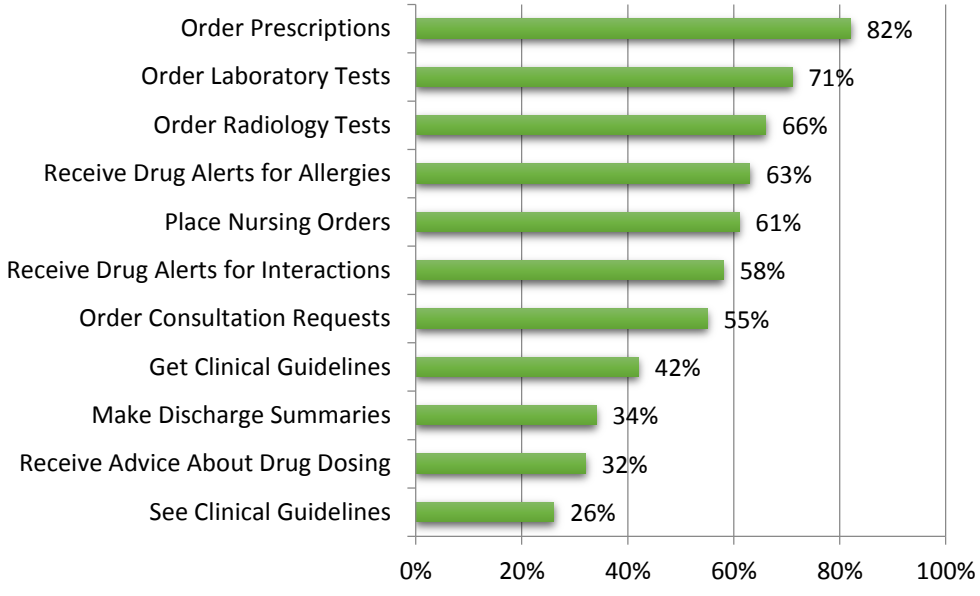
Figure V-6: Data Nevada Providers Store in their EMR Systems



Source: Provider Survey (2013)

Figure V-7 shows activities, including activities involving exchange with other entities, which could be performed through an EMR and the percentage of providers who used their EMR for those activities in the order of most use. Ordering prescriptions was the most common activity at 82% which is an indicator of the extent to which providers in Nevada are engaging in e-prescribing relative to other forms of electronic exchange. Ordering lab and radiology tests are also performed by a majority of the providers in this survey.

Figure V-7. Activities Nevada Physicians Perform with their EMR Systems



Source: Provider Survey (2013)

Providers with an EMR rated their participation in HIE using the eight questions shown in Table V-4. These questions are also based on a 5-point Likert scale from strongly agree to strongly disagree. Only 18% felt it was easy for them to get information electronically from other care providers and only 26% felt that electronic information from other care providers is available when they need it to treat patients. 33% agreed that information they receive from other health care providers is structured in a way that is useful, but 23% report frequently receiving duplicate data from other health care providers and 32% report receiving information that is too detailed. 33% of the providers indicated that they receive electronic information from other care providers in their EMR with 3% reporting receiving electronic information via email. The very low percentage receiving electronic information via email reflects the low usage of direct secure messaging within the state. Finally, 23% indicated they prefer using paper medical records rather than electronic records which is relatively high given that these are all providers who have adopted an EMR.

Table V-4: Providers Opinions on HIE

Questions	% Agree
It is easy for me to get information electronically from other care providers.	18%
Electronic information from other care providers is available when I need it to treat patients.	26%
I frequently receive duplicate data from other health care providers.	23%
The information I receive from other health care providers is structured in a way that is useful.	33%
I receive information that is too detailed.	32%
I usually receive electronic information from other care providers via email.	3%
I usually receive electronic information from other care providers in our EMR.	33%
I prefer using paper medical records rather than electronic records.	23%

Source: Provider Survey (2013)

The results indicated that 15% of the survey respondents are participating in HealtHIE Nevada, and 5% are using NV-Direct (direct secure messaging). The results indicate that very few providers are participating in NV-Direct which is consistent with information provided by the State of Nevada Office of Health Information Technology, indicating that only 35 providers in the state have enrolled in NV-Direct. This is in contrast to some other states, such as Alaska, where a significant number of providers are using some form of direct secure messaging to exchange health care data. More of the providers in our survey were exchanging data through HealtHIE Nevada, although the numbers are still relatively low at this point.

In summary, while this survey is not statistically significant and cannot be considered representative of the population of health care providers in Nevada, it does provide insight into their relative use of electronic medical records and participation in health information exchange. A significant majority of the participants in the survey are using an EMR system, although a smaller majority find that using an EMR improves their practice efficiencies and health care outcomes. The survey results suggest that health information exchange is occurring, even though a small percentage of health care providers are participating directly in either HealtHIE Nevada or NV-Direct. While the existence of an HIE entity can facilitate exchange, it is not the only mechanism for exchange across organizational boundaries. Even though a small percentage

of health care providers are participating in a formal HIE (such as HealtHIE Nevada or NV-Direct) a significant majority are using electronic transmission for prescriptions (e-prescribing), laboratory results, and radiology imaging.

To assess whether Nevada physician perceptions and utilization of EMR are similar to perceptions and utilization nationwide, we examine published evidence on physician adoption decisions and national survey results.

Published evidence on physician adoption decisions

Some physician practices are using EMR, while others continue to use paper records. Some of these practices transmit and receive patient health information electronically, while others do not. This raises the question: what factors do physicians consider, when they make health information technology adoption decisions? Published evidence highlights four types of issues (DeMello and Deshpande 2012; Hill et al. 2013; Hinpapie et al. 2011; Hsiao et al. 2013; Jamoom et al. 2012; Jha et al. 2009):

- The federal health information technology incentive strategy is rooted in the premise that EMR implementation is a predictor of physician use of HIE. In addition, analysts predict that shifts to new non-fee for service (FFS) payment models will eliminate some barriers to physician use of EMR systems**.**
- Published literature hypothesizes that the structure of payment incentives is an important determinant of physician decisions to adopt EMR systems. Some commentators note that FFS payment does not provide incentives for physicians to improve quality or reduce duplicate testing, and conclude that this has been a major barrier to adoption of health information technology. These commentators therefore hypothesize that the shift to new payment structures (e.g. bundled payment, Accountable Care Organizations, and capitated payment) will lead to increased utilization of health information technology.
- If the physician adoption decisions reflect comparison of costs and benefits of health information technology for specific physician practices, then adoption decisions would reflect physician and practice characteristics, patient characteristics, and market characteristics, in addition to payment incentives.
- Finally, some analysts have noted that empirical evidence of the impact of health information technology on specific outcomes is sparse, and the available evidence is mixed. Predictions of the widespread impacts were largely based on projections and results obtained in specific situations. Providers continue to work on the workflow redesign strategies that will be needed to realize the potential offered by health information technology, and health information technology vendors work to make the systems more user-friendly. During this transition phase, surveys indicate that providers view health information technology as one of several strategies for responding to new types of payment incentives. Will innovations in payment structures induce increased utilization of health information technology prior to demonstration of widespread impacts on health care quality and patient satisfaction

The published evidence indicates that the factors that influence health information technology adoption decisions have remained reasonably stable over time. For example, a survey of 2,926

small practices of 20 or fewer physicians in Florida in 2008 reported that groups were more likely to use EMR systems than solo practitioners. Additional practice characteristics associated with higher likelihood of EMR adoption included: fewer years of experience, higher proportion of patients covered by Medicare, and location in a county with more physicians per capita (Aboldrasulnia 2008). These patterns suggest that physician adoption decisions reflected reasonable assessments of costs and benefits. To the extent that this is the case, simply providing information about health information technology will only increase utilization of health information technology if that information alters physician estimates of the magnitudes of the costs and benefits.

More recently, DeMello and Deshpande (2012) reports the results of a survey of 3,425 physicians who worked in a solo or group practice in the United States (see Table V-5 for a summary of the results). These results indicate that the extent of physician use of an EMR system is positively associated with physician use of IT to support clinical practice, transmit prescriptions, and obtain patient information. Additional characteristics associated with increased use of IT to support clinical practice include: group size, market competition, physician age, primary care practice (rather than specialist), and high proportion of revenue from Medicare. The similarity between this list of issues that impact adoption decisions and the list reported in 2008 indicates that the key issues influencing physician decisions have not changed dramatically during these years.

Table V-5: Summary of findings reported by DeMello and Deshpande

	IT in clinical practice	IT prescriptions	IT for patient information
Extent of use of EMR	+	+	+
# physicians	+	+	+
Competitive situation	+		
Age	+		+
Income			+
Level of ownership in private practice			-
PCP	+	+	
Pt = Asian/Pacific Island	+	+	
Pt = Hispanic	-	-	
Financial incentives		+	
Rev from Medicare	+		+
Rev from Medicaid			+

Source: DeMello and Deshpande (2012)

Patel et al. (2011) surveyed 144 physicians affiliated with regional health information organizations in the US to assess their attitudes and preferences about HIE. 68% of the physicians were interested in using HIE in their clinical work and 87-89% expected HIE to improve communication among providers, coordination and continuity of care, and efficiency. Start-up costs were a potential barrier for over half of the physicians and limited resources to select and implement a system were a potential barrier for just over a third. The majority felt that technical assistance and financial incentives would positively influence their adoption and use of HIE.

This evidence and logic raise four questions:

- Is EMR utilization a significant predictor of HIE engagement after accounting for other physician practice characteristics? If so, then increased EMR utilization is a necessary first step toward increasing the utilization of HIE.
- Which types of non-FFS payment structures are associated with increased utilization of health information technology? Understanding these issues would help proponents of health information technology utilization provide useful information to physicians who are considering adoption.
- Do other factors such as practice characteristics and patient characteristics impact physician adoption decisions? Understanding these issues would also help proponents of health information technology utilization provide useful information to physicians who are considering adoption.
- Does utilization of EMR and HIE exert measurable impacts on physician variables such as care coordination or physician productivity? Understanding these issues could help clarify the health information technology value proposition and inform health care payment policies.

Analysis of nationwide data on physician perceptions and utilization of health information technology

We examine the Center for Health System Change Physician Survey data to analyze these issues. Table V-6 reports the results of multivariate analyses of patient characteristics, physician characteristics, practice characteristics and payment incentives that are associated with EMR and HIE utilization for all physicians, primary care physicians, and specialists.

- The dependent variable for the analysis of factors that are associated with EMR adoption is an index that measures the degree to which individual physicians utilize EMR systems. This index counts the number of capabilities that are both available and used. These capabilities include:
    - Decision support
    - Remind clinician on previous service
    - Remind patients on previous service
    - Remind clinician on follow-up
    - Communication with patient by e-mail
    - Access patient notes
    - Get information on patient medication interactions
    - Get information on formularies
    - Use EMR
    - Write prescriptions

- The dependent variable for the analysis of factors that are associated with HIE adoption is an index that measures the degree to which individual physicians utilize HIE systems. This index counts the number of capabilities that are both available and used. These capabilities include:

- Order lab, other diagnostic tests
- View lab, diagnostic tests
- Exchange clinical data with other physicians
- Exchange clinical data with hospitals and labs
- Transmit prescriptions to pharmacies

Table V-6: Statistically-significant associations Between Incentives and EMR/HIE Utilization				
	EMR adoption		**HIE adoption**	
	PCP[1]	**SCP[2]**	**PCP**	**SCP**
EMR adoption index			positive	positive
Proportion of patients				
Black				negative
Hispanic	negative			
Asian		positive		
Difficulties with English language			positive	
Physician characteristics				
Years of experience	negative	negative	positive	positive
Practice type (compared to solo or 2-physician practice)				
Group practice with 3-5 physicians	positive	positive	positive	positive
Group practice with 6-50 physicians	positive	positive	positive	positive
Group practice with 51+ physicians	positive largest impact	positive largest impact	positive	positive
Group/staff HMO	positive			
Community Health Center	positive	positive		positive
Medical school/university	positive	positive	positive	positive
Hospital	positive 2nd largest impact	positive 2nd largest impact	positive	positive
Other	positive			
Payment incentive types				
Individual physician incentives based on volume		positive		positive
Individual physician incentives based on patient satisfaction		positive	positive	
Individual physician incentives based on quality measures	positive	positive		
Practice-level incentives	positive		positive	positive
R-squared	.17	.20	.56	.52
n	1,670	2,510	1,642	2,468

Source: Health Tracking Physician Survey, 2008. Center for Health System Change.

[1] PCP: Primary Care Provider

[2] SCP: Specialty Care Provider

These results indicate that EMR adoption decisions are correlated with patient characteristics, physician characteristics, practice type, and payment incentives:

- Younger physicians are more likely to use EMR systems than older physicians,
- Physicians in group practice (at least 3 physicians), HMOs, Community Health Centers, universities and hospitals are all more likely to use EMR systems than physicians in solo practice. The EMR utilization rate is highest among physicians in large group practices (more than 50 physicians), followed by physicians employed by hospitals.
- Payment incentives are correlated with EMR utilization and the specific types of incentive is important. Further, the impacts of specific types of incentives on primary care provider (PCP) adoption decisions differ from the impacts on adoption decisions made by specialists.

These variables explain about one-fifth of the variation in the EMR utilization index.

The results also indicate that EMR utilization is a significant predictor of HIE utilization. After controlling for EMR utilization, we also observe:

- Patient characteristics are associated with HIE utilization decisions,
- Older physicians are MORE likely to be utilizing HIE than younger physicians,
- Physicians in group practices (at least 3 physicians), and physicians working in universities and hospitals are more likely to utilize HIE than solo practitioners,
- The structure of payment incentives impacts HIE utilization decisions, and the impacts for PCPs differ from the impacts for specialty care providers (SCP). This suggests that it is not realistic to assume that all non-FFS payment incentive-structures will encourage health information technology utilization. Instead, it appears that the impact of financial incentives on health information technology utilization will depend on the ability of health information technology systems to support improvements in specific situations.

These variables explain half of the variation in the HIE utilization index. The fact that the independent variables have more explanatory power in the HIE regression than in the EMR regression probably reflects the fact that EMR utilization is strongly associated with HIE utilization.

The associations reported here, between health information technology utilization and patient, physician and practice characteristics are consistent with results reported in the literature and with survey and interview results in Nevada.

Impact on Care Coordination and Provider Productivity

Because physician adoption decisions are influenced by the magnitudes of the impacts of health information technology on patient care and on physician productivity, we also examine the literature and the HSC survey data to assess whether existing evidence supports the views that health information technology exerts statistically-significant impacts on these variables. This survey was conducted in 2008; hence the impacts reported here reflect the experience of early-adopters and early EMR systems. While subsequent versions of EMR systems may have improved features (which would suggest improved EMR performance), the early-adopters were probably relatively highly-motivated to use the EMR systems, compared with subsequent

adopters. The survey results provide baseline information to identify key issues, and the analytical strategy provides a template of ongoing tracking of these issues. This template can offer an efficient tracking strategy, if CMS continues to fund periodic physician surveys.

Proponents of health information technology utilization argue that health information technology will help physicians increase both the quality of patient care and their own productivity. However, published evidence that physician practices have actually achieved these results is not strong, and physician survey responses indicate that many physicians are not convinced that health information technology implementation will generate these results. Recent physician survey results suggest that EMR utilization continues to be associated with these negative productivity impacts.

Fontaine et al (2010) reviewed published studies of the impacts of HIE on physician practices. These authors conclude: "the only benefits to be reliably documented were those regarding efficiency, including increased access to test results and other data from outside the practice and decreased staff time for handling referrals and claims processing."

Chen et al. (2009) examined the impact of implementation of an EMR system at Kaiser Permanente during the years 2004-2007. These authors report that the number of patient visits decreased, while telephone and email communications increased.

Similarly, the 2012 Physicians Foundation survey reports responses from a self-selected sample of 13,575 physicians practicing in the US. Only 50% of the physicians who have implemented EMR systems indicated that they believe the system improved the quality of care. In addition, 47% indicated a significant concern that EMRs pose a risk to patient privacy. (Emails were sent to 600,000 physicians which is 80% of the 750,000 physicians involved in patient care in the US. The survey was configured to prevent any duplicate submissions from any one computer.)

Published work also reports survey evidence on the impact of EMR use on physician satisfaction. A 2012 RAND survey focused on specific EMR characteristics that increase and decrease physician satisfaction (Friedberg, et al., 2013). This survey reports that physicians generally indicated that the EMR concept is valuable, but current technology is not mature from a customer-usability perspective. Characteristics that decrease physician satisfaction include increased data entry time, reduced quality of the face to face interaction with patients, increase in the volume of tasks that physicians view as 'less-fulfilling' such as lack of interoperability, information overload from alerts, the cost to purchase and maintain systems, and degradation of the quality of clinical documentation (due to template-generated notes and the length of check-box check lists). In contrast, physicians reported that three EMR characteristics generate increased satisfaction: the ability to access patient data from any location (which permits physicians to complete documentation at home after dinner), support to facilitate guidelines-based care, and increased ability to track patient conditions over time.

Analysis of the survey data

We use multivariate regression to estimate the associations between physician utilization of health information technology (EMR and HIE) and four outcomes measures:

- We construct two care coordination indexes.
    - The PCP Care coordination index is constructed from the answers to the following three questions:
        - How often do you know about your patients' visits to other physicians?
        - How often do you send patient history information to specialists?
        - How often do you talk with patients about the results of specialist visits?
    - The specialist care coordination index is constructed from the answers to the following two questions:
        - How often do you know about your patients' visits to other physicians?
        - How often do you send the results of consultations?
- The number of visits includes office visits, hospital visits and nursing home visits.
- The number of hours spent on unpaid activities includes time spend emailing and telephoning physicians and patients
- The number of hours of uncompensated care reflects responses to the question: How many hours did you spend last month providing charity care?

Multivariate analysis of the survey results indicates that higher-level utilization of EMR was associated with increased time spent on unpaid activities (such as email or telephone calls), and fewer patient visits per week. We find this result for the full physician sample and for the primary care and specialist subsamples. Finally, the productivity impact of increasing utilization of EMR does not appear to affect the numbers of weekly hours spent providing uncompensated care. This implies a reduction in the ratio of compensated to uncompensated visits, and it is not clear whether this will be sustainable for the long-term term. The answer to this question may hinge on Medicare and Medicaid decisions about physician reimbursement rates, patient responses to Health Savings Accounts, and other marketplace innovations. Thus, the issue of physician utilization of EMR systems may not be independent of the array of changes that are currently reshaping the health care industry.

Notably, the 2008 survey results also indicate that increasing utilization of EMR was associated with increased coordination of patient care. Thus, physicians face a trade-off: the EMR systems offered the benefit of improved care coordination, at the cost of decreased productivity. This trade-off poses a serious issue: is the EMR strategy the most efficient option for generating improved care coordination? Are there alternate strategies for improving care coordination that impose a smaller productivity penalty? Survey results indicating that HIE is not a top priority suggest that providers consider this issue to be important.

After controlling for the degree of EMR utilization, increasing levels of HIE utilization generate a positive impact on care coordination for specialists, but we do not observe this result for PCPs. Increased utilization of HIE does not impact productivity: there are no significant impacts on either time spent on unpaid activities such as email or on the number of visits per week. Thus, HIE does not appear to be generating communication efficiencies to offset the productivity

penalty imposed by the EMR systems. In addition, utilization of HIE does not impact the number of weekly hours devoted to provision of uncompensated care.

Table V-7 provides an overview of the signs of significant impacts of EMR and HIE utilization on the outcomes variables. The table also provides the sample sizes for each analysis and the R-squared statistics (that measure the proportion of variation in the outcomes measure that is explained by the independent variables).

Table V-7: Statistically-significant associations between outcomes and HIT utilization (multivariate regression results)

Dependent variable	**Sample**	**Measure of HIT**		**N**	**R-squared**
		EMR-index	HIE-index		
Unpaid activities					
	All physicians	positive		4,107	.056
	PCP	positive		1,639	.042
	specialists	positive		2,468	.061
Patient visits					
	All physicians	negative		4,068	.088
	PCP	negative		1,623	.087
	specialists	negative		2,445	.092
Uncompensated care					
	All physicians			4,061	.315
	PCP			1,653	.283
	specialists			2,426	.322
Care coordination					
	All physicians	positive		3,824	.078
	PCP	positive		1,601	.040
	specialists	positive	positive	2,223	.048

Notes: All regressions include the following additional independent variables: weekly hours devoted to patient care, patient characteristics (proportions of patients who are Black, Hispanic, Asian and proportion of patients with English as a second language), physician characteristics (gender, experience, specialty), payment incentive structure (individual-level incentives based on volume, patient satisfaction and/or quality and group incentives at the practice level).
Source: Physician Survey (2008). Center for Health System Change.

The signs of significant coefficients for the set of additional independent variables included in each regression equation indicate the following additional associations:

- Women see fewer patients per week (after controlling for hours devoted to patient care), they engage in more unpaid activities such as email, and they report higher levels of care coordination.
- More experienced physicians provide higher levels of uncompensated care and complete more patient visits per week (after accounting for the number of hours devoted to patient care).
- Compared with solo practitioners, physicians working in group practices (more than 2 physicians) report higher levels of care coordination and physicians working in Community Health Centers report less care coordination.

Usability and Feature Availability in EMRs

We also evaluated the Health Tracking Physician Survey to see how often physicians use EMR features that are available to them. Table V-8 offers a view of the correlation between use of specific EMR features and their availability and Figure V-8 plots those frequencies to show the positive correlation between use and availability. This implies that vendors are providing the features that are most valuable to physicians. We provide descriptive statistics from the physician survey conducted by the Center for Health System Change. This information indicates whether specific capabilities are available to the physician, and whether the physician uses the capability if it is available.

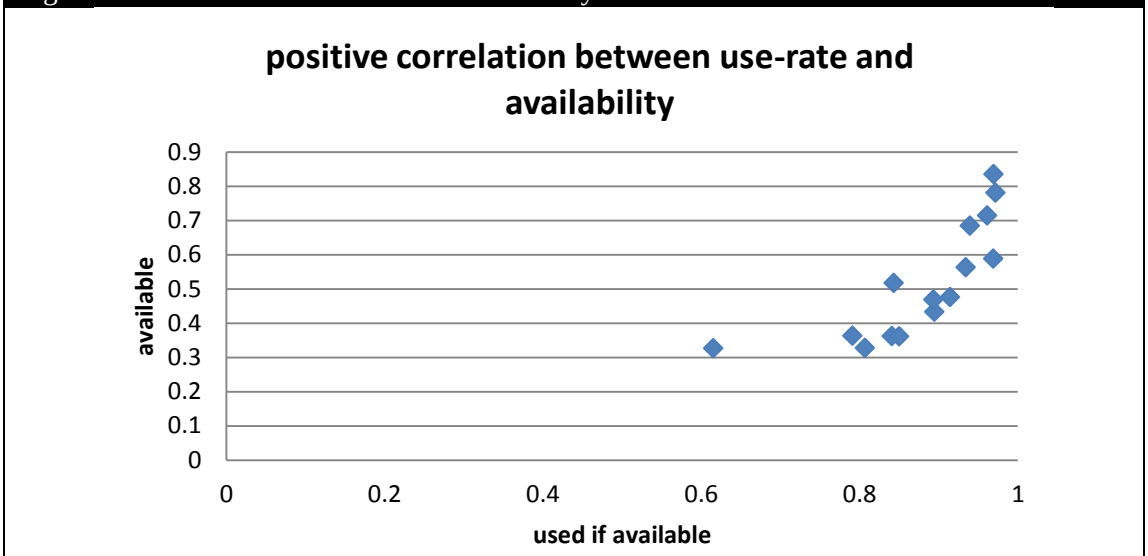
Table V-8: Correlations Between Feature Use and Feature Availability

Features	P(available)	P(used given available)
Get information on recommended guidelines	0.84	0.97
View lab, diagnostic test results	0.78	0.97
Get information on potential drug interactions	0.71	0.96
Get decision support	0.68	0.94
To access patient notes	0.59	0.97
Order lab, other diagnostic tests	0.56	0.93
Get information on formularies	0.52	0.84
Exchange clinical data with other physicians	0.48	0.91
Exchange clinical data with hospital and lab	0.47	0.89
Write prescriptions	0.43	0.89
Remind clinician on previous service	0.36	0.79
Remind clinician on follow-up	0.36	0.84
Transmit prescription to pharmacy	0.36	0.85
Remind patients on previous service	0.33	0.81
Communication w patient by e-mail	0.33	0.62

Source: Health Tracking Physician Survey (2008). Center for Health System Change.

The probability that a feature is available is positively correlated with the probability that physicians use that feature when it is available, with a correlation coefficient is .77. This relationship is illustrated in Figure V-8. This positive correlation suggests that EMR vendors are successfully providing capabilities that physicians want to use.

Figure V-8: Plot of Feature Use and Availability Correlations



Source: Health Tracking Physician Survey (2008). Center for Health System Change.

This positive correlation between availability and use is also observed in Mountain Region, (see Table V-9). The same pattern is also apparent in both the PCP and specialist subsamples, as detailed in the regression results and illustrated in the following tables. Univariate regressions of the probability a specific feature is available, on the probability that the feature would be used, given availability, indicate that the relationship is statistically significant nationwide, in the Mountain Region, among PCPs and among SCPs (see Tables V-10 and V-11).

Table V-9: Statistically-significant association between availability and use univariate regression results
Dependent variable: probability that a feature is available
Independent variable: probability that a feature would be used, if it is available

	coefficient	**t-statistic**	**R-sq**
US	1.4	4.39	56.6
Mountain Region	0.98	4.37	56.4
PCP	1.28	3.4	43
SCP	1.37	5	63.2

Source: Health Tracking Physician Survey (2008). Center for Health System Change.

Table V-10: Availability and Use in the Mountain Region is similar to availability and use nationwide						
Features	**All**		**Mountain Region**		**% difference**	
	P(available)	P(use given available)	P(available)	P(use given available)	P(available)	P(use given available)
Get information on recommended guidelines	0.84	0.97	0.81	0.96	0.04	0.01
View lab, diagnostic test results	0.78	0.97	0.77	0.97	0.01	0.00
Get information on potential drug interactions	0.71	0.96	0.74	0.96	-0.04	0.00
Get decision support	0.68	0.94	0.67	0.94	0.01	0.00
To access patient notes	0.59	0.97	0.58	0.96	0.02	0.01
Order lab, other diagnostic tests	0.56	0.93	0.57	0.92	-0.02	0.01
Get information on formularies	0.52	0.84	0.51	0.82	0.02	0.02
Exchange clinical data with other physicians	0.48	0.91	0.49	0.93	-0.02	-0.02
Exchange clinical data with hospital and lab	0.47	0.89	0.48	0.86	-0.02	0.03
Write prescriptions	0.43	0.89	0.46	0.87	-0.07	0.02
Remind clinician on previous service	0.36	0.85	0.36	0.82	0.00	0.04
Remind clinician on follow-up	0.36	0.79	0.37	0.68	-0.03	0.14
Transmit prescription to pharmacy	0.36	0.84	0.38	0.76	-0.06	0.10
Remind patients on previous service	0.33	0.81	0.31	0.74	0.06	0.09
Communication with patient by e-mail	0.33	0.62	0.37	0.53	-0.12	0.15
Sample size ranges	4593-4650		274-279			
Source: Health Tracking Physician Survey (2008). Center for Health System Change.						

Table V-11: Availability and Use for Primary Care Physicians and Specialists						
Features	**PCP**		**SCP**		**% difference**	
	P(available)	P(use given available)	P(available)	P(use given available)	P(available)	P(use given available)
Get information on recommended guidelines	0.85	0.96	0.82	0.97	0.04	-0.01
View lab, diagnostic test results	0.79	0.97	0.77	0.97	0.03	0.00
Get information on potential drug interactions	0.72	0.97	0.71	0.96	0.01	0.01
Get decision support	0.7	0.95	0.67	0.93	0.04	0.02
To access patient notes	0.54	0.97	0.62	0.97	-0.15	0.00
Order lab, other diagnostic tests	0.55	0.93	0.57	0.94	-0.04	-0.01
Get information on formularies	0.54	0.87	0.5	0.83	0.07	0.05
Exchange clinical data with other physicians	0.44	0.91	0.5	0.92	-0.14	-0.01
Exchange clinical data with hospital and lab	0.46	0.91	0.47	0.89	-0.02	0.02
Write prescriptions	0.47	0.91	0.41	0.88	0.13	0.03
Remind clinician on previous service	0.43	0.88	0.31	0.83	0.28	0.06
Remind clinician on follow-up	0.43	0.88	0.32	0.71	0.26	0.19
Transmit prescription to pharmacy	0.38	0.87	0.35	0.82	0.08	0.06
Remind patients on previous service	0.36	0.84	0.3	0.78	0.17	0.07
Communication w patient by e-mail	0.32	0.62	0.33	0.62	-0.03	0.00
Sample size ranges	1842-1871		2743-2779			
Source: Health Tracking Physician Survey (2008). Center for Health System Change.						

There is little difference in use when features are available for PCP vs. SCP but there is a difference in the types of features that are available for PCP vs. SCP. SCPs are less likely to be able to transmit prescriptions to a pharmacy, which has implications for driving the adoption of e-prescribing. On the other hand, SCPs are more likely to have access to patient notes and they are more likely to have the ability to exchange clinical data with other physicians.

Barriers, facilitators, and key issues

The number of health care providers in Nevada is very low when compared to other states. Thus, efforts to integrate health information technology into health care operations must be sensitive to the needs and efficiencies of the provider community. For example, attempting to use penalties or other dis-incentives for use of health information technology could be counterproductive in the state. Other **barriers** to the implementation of health information technology include:

- A high proportion of Nevada physicians work in small practices with one or two physicians. Nationwide evidence indicates that EMR and HIE utilization rates are low in this type of practice, compared with larger practices, or other physician work environments.
- Physicians express concerns about the impact of EMR systems on physician productivity. Nationwide evidence indicates that this issue should be considered seriously.
- Health care providers express concern about the increase of uncompensated care that could occur as technology potentially replaces contact. Nationwide evidence does not support this concern.
- Nationwide evidence indicates that EMR utilization is associated with increased care coordination, but it imposes a business challenge for physicians. Increased EMR utilization is associated with increased physician time devoted to unpaid activities such as email and decreased numbers of patient visits.
- The anticipated statewide, and nationwide, increase in health information technology utilization could potentially impact the distribution of health care provider resources throughout the state. Trends should be monitored, to identify issues that may arise.

Health care providers in Nevada perceive that using an EMR helps improve office practices and helps improve the quality of care provided to patients. Positive reception of EMR technology could encourage a more positive reception to HIE. Other **facilitators** to broader implementation of HIE include:

- Physician interest in EMR systems focuses on the potential beneficial impact on patient care. Nationwide evidence indicates that EMR systems do generate statistically-significant benefits for care coordination.
- The value that physicians obtain from HIE utilization hinges on the quality of data that is available from other sources. The recent expansion in the number of hospitals participating in HIE in Nevada will expand the range and types of data available in the state.

VI. Stakeholder Evaluation - Patients

This section focuses on patient perceptions of the use of electronic health records and HIE. We start with a picture of the demographics and characteristics of patients in Nevada. We then discuss national data on patient perceptions of health information technology.

Key Findings

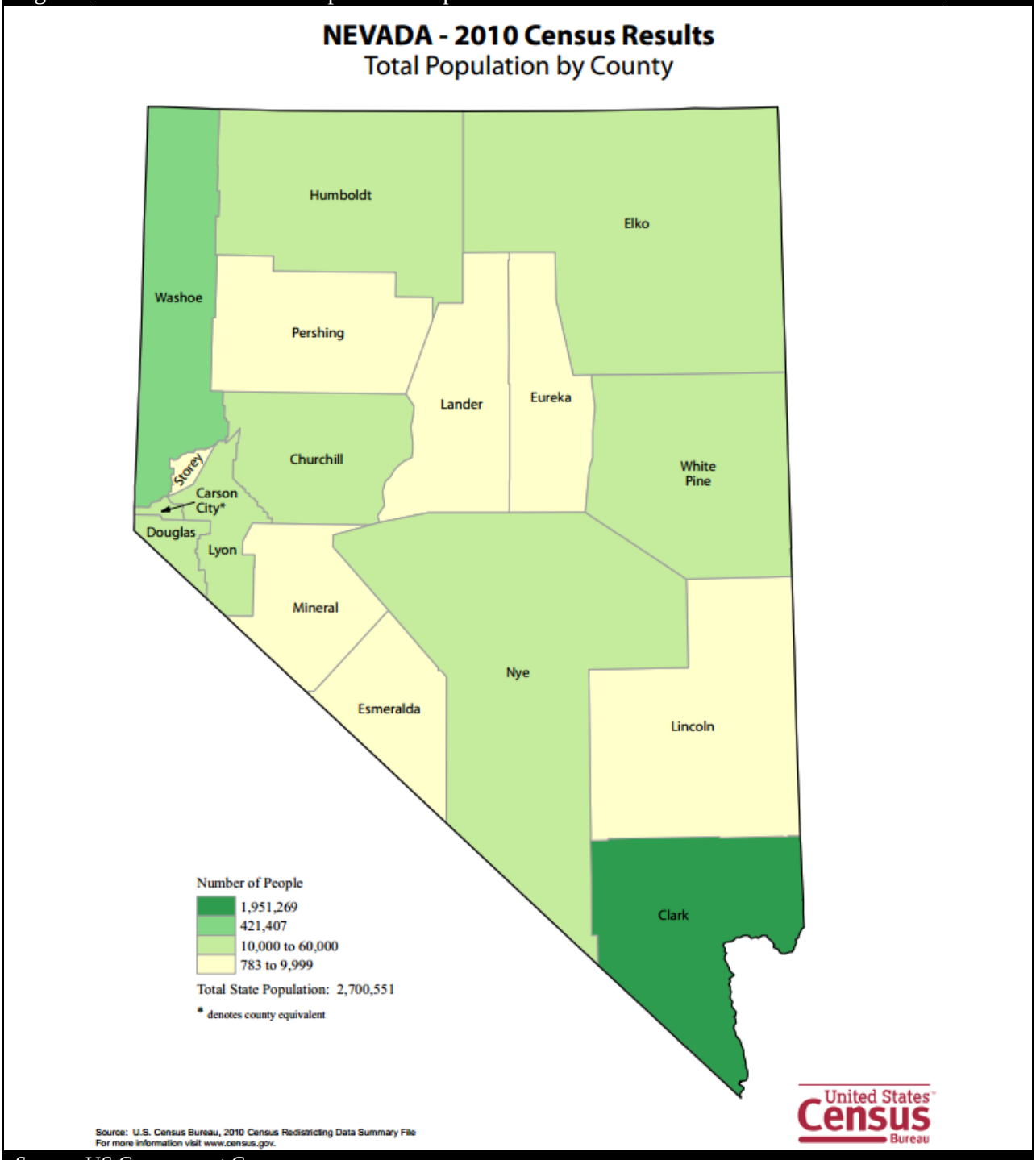
1. The distribution of the Nevada's population creates special challenges. Residents of the state's two urban population centers in Clark and Washoe counties have more options for accessing health care services than residents in other rural parts of the state.
2. Patients generally have positive perceptions of their providers' use of health information technology and the value of patient portals.

Description of Nevada Patients

Nevada is a rural state with 24.6 persons per square mile in 2010, compared to the national average of 87.4 persons per square mile in 2010. More than two thirds of the state's population lives in Clark County in and around Las Vegas with over half of the remaining population living in Washoe County. (See Figure VI-1 for a 2010 US Census population map for Nevada). This distribution of population creates special challenges for patients in Nevada. Residents of the two urban counties have significantly more options for accessing health care services than residents in other parts of the state.

Nevada has a higher percentage of Hispanic or Latino residents (27.3%) than the national average (16.9%) and a higher percentage of homes where a language other than English is normally spoken (29%) than the national average (20.5%). This indicates there is a higher need for consideration of bi-lingual services in patient portals. The proportion of Nevada residents who are age 65 or older (12.2%) is comparable to the nationwide proportion (13.2%).

Figure VI-1: 2010 US Census Population Map for Nevada



Source: US Government Census

Patient Perceptions of Health Information Technology Use by Providers

Wen et al. (2010) used data from the 2007 Health Information National Trends Study to investigate consumer attitudes towards their provider's use of HIE. Approximately half of the survey respondents perceived HIE to be very important. People are more likely to rate HIE as important if they are older than 35, male, and individuals who believe that their health information is securely maintained by their doctors.

We analyze household perceptions of health information technology, using the public version of the data provided by the 2010 Household Survey from the Center for Studying Health System Change (HSC). The survey respondents include 9,200 families, including 17,000 individuals. The survey respondents constitute a representative sample of the US population. Table VI-1 summarizes the responses to questions about health information technology.

Table VI-1: Household Survey Questions about Health Care Provider Use of Electronic Information

Variable	Survey Questions	Number respondents	Proportion of "yes"
Normal visits	Doctors may use computers or handheld devices during an office visit to do things like look up your information or order prescription medicines. In the last 12 months, did your provider use a computer or handheld device during any of your visits?	9495 respondents were eligible to answer this question, because they had an office visit in the last 12 months	.60
Look_ up info	During your visits in the last 12 months, did your provider ever use a computer or handheld device to look up test results or other information about you?	Of these 5667 respondents, 5447 answered "yes" or "no"	.86
Show info	During your visits in the last 12 months, did your provider ever use a computer or handheld device to show you information?	Of these 5667 respondents, 5605 answered "yes" or "no"	.47
Order prescription	In the last 12 months, did your provider ever use a computer or a handheld device to order your prescription medicines?	Of these 5667 respondents, 5355 answered "yes" or "no"	.64
			Proportion each category
Helpful or not?	During your visits in the last 12 months, was the use of a computer or handheld device by your provider definitely helpful to you, somewhat helpful to you, or not at all helpful to you?	Of these 5667 respondents, 5525 answered "yes" or "no"	
	Very helpful		.53
	Somewhat helpful		.34
	Not helpful		.13

Source: Inter-University Consortium for Political and Social Research, Health Tracking Household Survey in 2010 (United States).

These findings indicate that providers used computers and handheld devices during 60% of patient visits. Physicians primarily used the computers and handheld devices to look up information (86% of these visits), or order medications (64% of these visits). Physicians used the computers and handheld devices to show patients information less frequently (47% of these visits). Most patients also felt that the use of a computer or handheld device by their provider was somewhat or very helpful.

Patients who report that their providers use health information technology are more likely to be female, have more years of education and have employer-sponsored or military insurance. Patients who felt the provider's use of health information technology was helpful were more likely to be female and have more years of education. Patients also responded positively to providers who used health information technology to look up information, show information to the patient, or e-Prescribe. Patients who were most satisfied with provider use of health information technology were older females with higher incomes and more years of education. Satisfaction with health information technology use spanned all types of insurance and was significantly associated with providers who used health information technology to show information to the patient.

Patient Perception and Use Patient Portals

Zarcadoolas et al. (2013) investigated the perceptions of vulnerable populations to patient portals using focus groups to collect data from 28 individuals with a high school or less education. Most of the participants were not familiar with patient portals prior to the study but were generally positive about them and those positive perceptions increased during the focus groups. Participants were comfortable using technology and did not consider technology concerns to be an impediment to accessing a portal. They also recognized their need to better engage with their health and felt a portal would be a good tool for that purpose.

Goel et al. (2011) analyzed patient enrollment in, and use of, a patient portal based on race, gender, and age. Minority group patients were less likely to enroll than white patients and older patients were less likely to enroll because of lower computer literacy compared to young patients. However, once older patients enrolled in the portal, they were more likely to use it to "see provider advice or request medication refills" which is a reflection of increasing chronic medical conditions.

Sarkar et al. (2011) collected data from 14,102 patients with diabetes in Northern California on their use of a patient portal. Use of the patient portal varied based on educational attainment: participants with a college degree were more likely to use the patient portal than the participants without a college degree. Participants used the patient portal to view lab results (53%), requested medication refills (38%), send email messages to their providers (37%), and make appointments (15%).

Ancker et al. (2011) conducted a survey of 74,368 adult patients to investigate their use of an electronic patient portal. Patients with chronic conditions were more likely to receive an access code for the portal and become repeat users. They also found that repeated use of the portal was

associated with patients who were white, English speaking, and covered by private insurance or Medicaid (compared to no insurance).

We examined data on patient use of a portal provided by one health care provider. The data covered a 10-month period, during which the portal was available to 25,000 patients. 57% of eligible patients activated their portal accounts at the beginning of this period, and this rate remained stable. Only 5% declined access while the remainder did not use their accounts. The proportion of unique users per month who viewed lab test information or renewed medications was relatively low, but the average hits per unique user per month indicate that the patients who did use the portal were accessing it frequently. (See Table VI-2).

Table VI-2: Patient Portal Information

	Proportion of patients / 10-month period	
	start	**end**
Activated	0.57	0.58
Inactivated or not used or non-std status or other	0.39	0.38
Declined	0.05	0.04
Total Patients	20,500	25,000
	# unique users per month as proportion of 25,000 = ending #	average hits per unique user per month
Lab Tests	0.09	7.54
Lab Results	0.08	7.38
Medication renewal request	0.03	2.62
Immunizations	0.06	2.07

Source: Nevada health care provider patient portal data (2013)

Barriers and Facilitators

Nevada and nationwide data indicate that patients are interested in using health information technology to facilitate health care decisions. A barrier to the exchange of health care data in Nevada may be the need for language translation capabilities. This issue may be of most importance for the development and implementation of patient portal technology. We are currently conducting a patient survey in Nevada to gain greater insight into the issues of most concern to patients in the state.

VII. Recommendations

Our findings indicate that while Nevada may be behind other states in the external exchange of health information, it is on a similar trajectory. The state has two major urban areas that are beginning to exchange data through internal and external networks, with a large geographic region of rural hospitals and providers that are not currently prepared to exchange data. Ongoing tracking can provide information about the evolution of health information technology utilization in the state, to support policy analysis of issues related to that evolution. The Black Book (2014) survey documents the rapid pace of change in this industry; hence it is not realistic to assume that the profile of health information exchange will continue in future years.

We recommend that the following actions be taken:

1. Complete the promulgation of authorized regulations for HIE.
2. Identify a strategy for providing directed secure exchange for Nevada rural hospitals and providers.
3. Establish an office within the state for ongoing oversight and evaluation of health information technology.
4. Establish a method to track, analyze and evaluate the progress of health information exchange within the state. Make this information available through a publicly-accessible dashboard.

   Secondary data is available from the American Hospital Association (AHA), Centers for Medicare and Medicaid Services (CMS), Center for Health System Change (HSC), Surescripts, the Dartmouth Atlas website, and the Healthcare Information and Management Systems Society (HIMSS) to support efficient ongoing tracking and analysis. Table VII-1 on the next page provides our recommendations for ongoing evaluation metrics relevant to the state. Most of the data to evaluate Nevada's progress can be gathered from the secondary sources described above.

Table VII-1. Suggested Metrics for Ongoing Evaluation of Health Information Technology			
Category	**Metric**	**Description**	**Data sources**
Adoption	% Hospitals EMR	Percent of hospitals prepared to exchange data outside their systems through implementation of EMR	AHA
	% Hospitals lab results HIE	Percent of hospitals exchanging data outside their systems	AHA
	% Hospitals lab results HIE	Percent of hospitals exchanging data inside their systems	AHA
	% Providers EMR	Percent of providers using basic and comprehensive functions of an EMR	HSC (the updating schedule for this information is not known)
	% Providers HIE	Percent of providers exchanging data	HSC (the updating schedule for this information is not known)
	% Prescriptions transmitted electronically	Percent of prescriptions transmitted electronically	Surescripts
	% Providers e-prescribing	Percent of providers using e-prescribing	Surescripts
	% of labs	Percent of labs sending electronic lab results to providers in a structured format	Not currently identified
Process Impact	# of hospital beds	Count of hospital beds available in urban and rural areas.	AHA
	Hospital ownership	Percent of hospital beds available in urban and rural areas by organizational ownership	AHA
	% Medicare and Medicaid access	Percent of providers accepting Medicaid and Medicare patients	Survey funded by the State
	# privacy complaints	Count of privacy/security complaints	Not currently identified
Impact	Patient satisfaction	Survey every five years	Survey funded by the State
	Outcomes measures defined by CMS and reported at the hospital level on the CMS website	Patient satisfaction with the hospital stay	CMS website
		Number of duplicate tests (defined for specific tests by CMS)	CMS website
		30-day readmission rates to hospitals (defined by CMS)	CMS website
		Other quality measures defined by CMS	CMS website
	Provider satisfaction	Survey every five years	Survey funded by the State

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IX. Appendices

Appendix II-A – List of Potential Stakeholders

Table IX-1: Potential HIE Stakeholders in Nevada
Carson City Department of Health and Human Services
Southern Nevada Health District
Washoe County Health Department
NV Department of Health and Human Service – Office of Health Information Technology
NV Division of Child and Family Services
NV Division of Aging and Disability Services
NV Division of Mental Health and Developmental Services
NV Division of Public and Behavioral Health
NV State Medical Officer
NV Secretary of State (Living Will Lockbox)
State Health Division Bureau of Child, Family and Community Wellness (includes immunization registry)
State Health Division Bureau of Early Intervention Services
State Health Division Office of Community Health Nurses
State Health Division Bureau of Health Statistics, Planning and Emergency Response
State Health Division Bureau of Health Care Quality and Compliance
State Health Division Office of Informatics and Technology
Nevada State Lab
Indian Health Board of Nevada Tribes
Nevada Department of Corrections
Nevada Division of Insurance
Nevada Division of Health Care Financing and Policy
Nevada Division of Welfare & Supportive Services
Nellis Air Force Base, Fallon Naval Air Station, U.S. Army National Guard
Nevada VA Hospitals in Reno and Las Vegas
College of Southern Nevada
University of Nevada School of Medicine
University of Nevada Office of Rural Health
Nevada Chapter of American Health Information Management Association (NvHIMA)
Nevada HIMSS Chapter
Nevada Osteopathic Medical Association
Nevada Dental Association
Nevada Hospital Association
Health Services Coalition
Culinary Health Fund
Nevada State Medical Association
Clark County Medical Society, Washoe County Medical Society
Western Physician's Alliance
Physician's Managed Care
Nevada Rural Hospital Partners
Southwest Medical Associates
Physician's Select Management
Regional Emergency Medical Services Authority
Payers such as: Wellpoint, Aetna, Amerigroup, Saint Mary's Health Plan
Hospitals such as: Renown Medical Center, Saint Mary's Hospital, Valley Hospital Group, Sunrise

Hospital System, St. Rose Hospital, University Medical Center, Kindred Hospitals, Humboldt General Hospital, Pershing General Hospital, etc.
HealtHIE Nevada
Health Insight
Labs: Quest Diagnostics, LabCorp
Connect Nevada

Appendix II-B.1 – Stakeholder Information Sheet

Purpose: The purpose of this study is to assess the status of electronic health information exchange in Nevada. We want to understand how stakeholder organizations view the increasing use of electronic records for filling prescriptions, obtaining lab test results, and exchanging information with other care providers and with patients. You are being invited to participate as a representative of an organization that is an important stakeholder in the State's development of health information exchange. We are inviting you to participate in this research study through an interview with one of the study's investigators. A total of 25 to 50 participants will be recruited for this study. The interview results will provide baseline information about stakeholder perceptions of the advantages and disadvantages of electronic health information exchange, and factors that facilitate or inhibit expansion of electronic storage and exchange of health information.

Procedures: If you agree to participate, you will be interviewed by one of the study's investigators. The interview will take 30 minutes to one hour. The study's investigators are faculty members in the College of Business at the University of Nevada, Reno. Written notes will be taken by the investigators during the interview. The interview will focus on your organization's current and planned future use of electronic health information and health information exchange, and your organization's views of factors that facilitate and factors that inhibit increased use of these technologies.

Risks and Benefits: You will not experience any more risks that you would in a normal business conversation at your workplace. Study participants will not benefit directly; however the interviews will clarify factors that impact the current status, and future utilization, of electronic health information and health information exchange in Nevada.

Participation: Participation is voluntary, and participants have the right to withdraw at any time without penalty. You may skip any questions asked during the interview.

Confidentiality: Data is collected for the sole purpose of this research. Project personnel will have access to the data. This includes four university professors: Dr. Dana Edberg, Dr. Chad Anderson, Dr. Jeanne Wendel, and Dr. Sankar Mukhopadhyay. Three graduate students will also have access to the data. The graduate students will be supervised by the four professors listed above. All project personnel will sign confidentiality statements. Only the project personnel will have access to the information you provide, although information may be shared with those who make sure the study is done correctly. Every interview will be assigned a unique identification number. This number will be used in place of your name on all study records.

Use and Disclosure of your Information: Information gathered during the interview will be publicly disclosed at the conclusion of the study. However, your name, your organization's name, and other facts that might point to you or your organization will not appear when we present or publish the results of this study. You and your organization will not be identified specifically.

You may ask about your rights as a research subject or you may report (anonymously if you so choose) any comments, concerns, or complaints to the University of Nevada, Reno Social Behavioral Institutional Review Board, telephone number (775) 327-2368, or by addressing a letter to the Chair of the Board; c/o UNR Office of Human Research Protection; 205 Ross Hall/331; University of Nevada, Reno; Reno, Nevada 89557. If you have questions about this research project, you can call or email:

University of Nevada Reno	Office phone number	Email address
Dr. Dana Edberg	775-784-6179	dte@unr.edu
Dr. Jeanne Wendel	775-784-6695	wendel@unr.edu

Appendix II-B.2: Health Care Administrator Interview Protocol

Interview Structure

1. Provide definitions of EHR (billing/financial vs. health-related data), intra-organization HIE, and inter-organization HIE.
2. Discover level of participation of the organization represented by the stakeholder in the exchange of health information.
3. Identify benefits/drawbacks to the organization.
4. Define knowledge level of the process of the development of a health information exchange within the state.
5. Describe facilitators/barriers to the exchange of health data within the state.

Interview Questions

1. Does your organization send and/or receive health-related data to other organizations within the state? Are you using NV Direct? Why or why not?
2. Describe the types of data that are sent and/or received. Computerized provider order entry? Health care summaries? Test results? Test result analysis? Images? Cancer registry? Vaccinations? Disease reporting?
3. How do you integrate the data received into your existing systems? Does it come in via email? Do you have to manually integrate the data or does the data integrate directly into your EHR?
4. How quickly do you send and/or receive data? Is it real-time?
5. What would you change about your current exchange of data? More data? Less data? Faster? More integrated?
6. Do the health care providers in your organization have the data available from external organizations when meeting with patients? Is it available in digital format or on paper?
7. Do the health care providers use the data available from external organizations when meeting with patients? Why or why not?
8. What percentage of patients need to have data sent and/or received?
9. How important is external data exchange to your organization?
10. Do you keep track of the costs involved in exchanging data with other organizations? Percentage of budget required for data exchange?
11. Do you have a patient portal for patient health care summaries? Why or why not?
12. What kinds of information do you provide on your patient portal?
13. Do your patients use the portal? Why or why not?
14. Are you familiar with the development of HIE in Nevada? Describe your participation in the process of NV-HIE implementation.
15. What might make it easier to implement health information exchange in the state?
16. What do you think are the biggest problems to implementing health information exchange in the state?
17. What role should the state government play in implementing HIE in the state?

Appendix II-B.3: Technology Administrator Interview Protocol

Interview Structure

1. Provide definitions of EHR (billing/financial vs. health-related data), intra-organization HIE, and inter-organization HIE.
2. Discover level of participation of the organization represented by the stakeholder in the exchange of health information.
3. Identify technical problems/facilitators for HIE
4. Define knowledge level of the process of the development of a health information exchange within the state.
5. Describe facilitators/barriers to the exchange of health data within the state.

Interview Questions

1. Does your organization send and/or receive health-related data to other organizations within the state? Are you using NV Direct? Why or why not?
2. Describe the types of data that are sent and/or received. Computerized provider order entry? Health care summaries? Test results? Test result analysis? Images? Cancer registry? Vaccinations? Disease reporting?
3. What EHR system are you using?
4. What format do you use to send data? HL7, XML? Is the data formatting and transmission completed within your EHR?
5. How do you identify patients when you send data?
6. How do you integrate the data received into your existing systems? Does it come in via email? Do you have to manually integrate the data or does the data integrate directly into your EHR?
7. How do you identify patients from external data received?
8. How do you know that the patient data you receive is accurate?
9. How quickly do you send and/or receive data? Is it real-time?
10. Do the health care providers in your organization have the data available from external organizations when meeting with patients? Is it available in digital format or on paper?
11. Do the health care providers use the data available from external organizations when meeting with patients? Why or why not?
12. What percentage of patients need to have data sent and/or received?
13. Do you have a patient portal for patient health care summaries? Why or why not?
14. What technology do you use for your patient portal? Did you create it in-house? Do you maintain it inhouse? Is it separate from your EHR or linked to the EHR?
15. What kinds of information do you provide on your patient portal?
16. Do your patients use the portal? Why or why not?
17. Are you familiar with the development of HIE in Nevada? Describe your participation in the process of NV-HIE implementation.
18. What might make it easier to implement health information exchange in the state?
19. What are the technical barriers to implementing health information exchange in the state?

Appendix II-B.4: Health Care Provider Interview Protocol

Interview Structure

1. Provide definitions of EHR (billing/financial vs. health-related data), intra-organization HIE, and inter-organization HIE.
2. Discover level of participation of the organization represented by the stakeholder in the exchange of health information.
3. Identify benefits/drawbacks for the care of patients.

Interview Questions

1. Does your organization send and/or receive health-related data to other organizations within the state? Are you using NV Direct? Why or why not?
2. Describe the types of data that are sent and/or received. Computerized provider order entry? Health care summaries? Test results? Test result analysis? Images? Cancer registry? Vaccinations? Disease reporting?
3. How do you use data that comes from external organizations?
4. Do you have the data available from external organizations when meeting with patients? Is it available in digital format or on paper?
5. What percentage of the time do you have to go and find data from external organizations when meeting with patients because it isn't available in the patient record?
6. Do you use data available from external organizations when meeting with patients? Why or why not?
7. What percentage of your patients need to have data sent and/or received?
8. How much time do you spend reading email from patients?
9. How much time do you spend processing email from other providers?
10. How important is external data exchange to your practice of health care?
11. Do you have a patient portal for patient health care summaries? Why or why not?
12. What kinds of information do you provide on your patient portal?
13. Do your patients use the portal? Why or why not?

Appendix II-B.5: Task Force Member Interview Protocol

1. You were part of the blue ribbon task force that was created to plan for a health information exchange in Nevada. What was your role on the task force?
2. What were the results of the task force? Do you think that the task force accomplished its goals?
3. If you think the task force didn't accomplish its goals, what do you think prevented it from accomplishing its goals?
4. What barriers do you think exist in the state to the implementation of a statewide health information exchange?
5. Do you personally think that a statewide health information exchange is a "public good"? Do you think a statewide health information exchange is valuable?
6. One of the key strategic tenets of our statewide health information exchange effort is that it will be fully financially self-supporting, yet there are no statewide exchanges in the country at this time that function without some kind of government support (such as using Medicaid funds, special fees, or additional taxes on health insurance). Do you think that Nevada should support a statewide health information exchange with funds from the state budget?

Appendix II-B.6: Pharmacy Director Interview Protocol

The purpose of these questions is to understand the impact of ePrescribing on the Pharmacy group.

1. What percent of original prescriptions are received electronically (as compared to a paper prescription)?
2. What percent of refills are received electronically?
3. Are health care providers showing a growing tendency to use ePrescribing (electronic prescriptions)?
4. Does it matter to your organization whether prescriptions are received electronically or on paper? Does it reduce or increase the time used to process a prescription if it is received electronically?
5. Does receiving prescriptions electronically reduce the number of callbacks for prescription clarification? Does your organization keep track of the number of callbacks?
6. Does the size of a provider group affect whether a prescription is sent electronically? For example, do large provider groups send more prescriptions electronically?
7. Do customers (patients) prefer electronic prescriptions? Do customers mention their preference?
8. Does your organization promote the use of electronic prescriptions?

Appendix II-B.7: Other State HIE Director Interview Protocol

1) Have you created a public-private partnership as your state-designated entity for HIE?

If the state-designated entity is a public-private partnership, can we get a copy of the bylaws?

2) Is there more than one state-designated entity for HIE in the state?

3) What functions are being performed by the state-designated entity (examples):

Establishing policy for HIE standards?
Establishing policy for provider participation?
Establishing policy for patient participation?
Delivering actual HIE services among disparate organizations?

4) If there is more than one HIE in the state, does the state-designated entity serve a coordination function?

Does the state-designated entity maintain a master-patient index for the other HIE's?
A master-provider index?

5) If the state-designated entity is actually providing exchange services, what kinds of services are being offered?

Basic transmission of data? (discharge summaries, provider order entry, lab results, radiology images, etc?)
Data analytics? (identified or de-identified data analytics)

6) Is the state focusing on the use of DIRECT (point-to-point email-type communication) or query-based exchange?

7) If the state-designated entity is actually providing query-based exchange services, what software/hardware platform is used?

8) About what percentage of health care providers are participating in the exchange of data? What percent in DIRECT and what percent in query-based exchange?

9) What does the state-designated entity see as the biggest challenge right now in data exchange among disparate organizations?

10) Who is serving as the main advisor/consultant for the implementation of HIE? Examples: state employees, consulting company employees, HIE vendor employees, volunteers, etc.

11) What type of help does the state need right now to enhance the use of HIE by health care providers? Examples: people to train health care providers about the goals and use of HIE, marketing advice, technical advice, security/privacy advice, etc.

Appendix II-C: Health Care Provider Survey

Study purpose
This survey is one component of a research study. The study is the annual evaluation of the use of Health Information Technology in Nevada. This survey focuses on the use of electronic health information exchange. Four professors at the University of Nevada Reno are conducting the Project, with funding from the NV-HIE (Nevada Health Information Exchange).

Who is eligible to complete the survey?
Individuals who provide healthcare in Nevada are eligible to complete the survey.

Benefits from participation and time commitment
You will not benefit directly from completing the survey. Completion of the survey will require approximately 15 minutes.

Study location
After you complete the survey, mail it to the researchers in the addressed, postage-paid, attached envelope. Alternatively, you may take the survey online by going to the following address, **http://goo.gl/rlwCYN**, or using the QR code on the right.

Confidentiality
All data collected from this survey will be anonymous. The survey will not ask you to provide any identifying information. The research report will summarize the survey responses.

Voluntary participation
Participation is voluntary. Participants have the right to withdraw at any time without penalty.

For questions or concerns
If you have questions about this research project, you can call or email the researchers.
You may ask about your rights as a research subject or you may report (anonymously if you so choose) comments, concerns, or complaints to the University of Nevada, Reno Social Behavioral Institutional Review Board.

Researchers		Chair of the Reno Social Behavioral Institutional Review Board
Dr. Dana Edberg	Dr. Jeanne Wendel	
(775)784-6179	(775)784-6695	(775) 327-2368
dte@unr.edu	wendel@unr.edu	Office of Human Research Protection 205 Ross Hall/331 University of Nevada, Reno Reno, NV 89557
Department ACC/IS (0026) College of Business University of Nevada, Reno Reno, NV 89557	Department of Economics (0030) College of Business University of Nevada, Reno Reno, NV 89557	

You may remove this information sheet from the survey and keep it for your records.

Health Care Provider Survey – Nevada Health Information Exchange

1. What is your role as a health care provider? (check one box)	
Physician	
Nurse	
Advanced Practice Nurse	
Social Worker	
Dentist	
Dental Assistant	
Dental Hygienist	
Psychologist	
Dietician/Nutritionist	
Other (please describe)	

2. Characterize your organization into one of the selections below:	
Family/General Practice	
Pediatrics	
Medical Specialties	
Surgical Specialties	
Dental	
Rural health Clinic	
Hospital with 25 or more beds	
Hospital with less than 25 beds	
Long Term Care Facility	
Home Health or Hospice Agency	
Community Mental Health Center	

3. How many health care providers work in your organization?	1	2-3	4–10	11–50	51-100	> 101

4. Does your organization have an electronic medical record (EMR) system?
If YES, go to question #6; If NO, go to question #5

Yes	No

5. IF YOU DO NOT USE an EMR SYSTEM: Please indicate how much you agree or disagree with the following statements.	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
EMR might make my processes less efficient.	☐	☐	☐	☐	☐
EMR will not help me achieve better patient outcomes.	☐	☐	☐	☐	☐
I already have all the data I need to support my care decisions.	☐	☐	☐	☐	☐
I am waiting until the technology is more mature before investing.	☐	☐	☐	☐	☐
EMR may introduce new errors into decision making.	☐	☐	☐	☐	☐
I do not need to meet federal meaningful use requirements.	☐	☐	☐	☐	☐
I am planning to retire within the next two years.	☐	☐	☐	☐	☐
I am planning to change my profession within the next two years.	☐	☐	☐	☐	☐

Thank you. If you do not have an EMR system, you are done with the survey!

6. Check the types of data you store in your Electronic Medical Record (EMR) system.	
Patient demographics	
Physician Notes	
Nursing Assessments	
Problem Lists	
Medication Lists	
Discharge Summaries	
Advanced Directives	
Lab Reports	
Radiology Reports	
Radiology Images	
Diagnostic test results	
Diagnostic test images	
Consultant reports	
Vaccinations	

7. Check the activities you perform through your EMR.	
Order Laboratory Tests	
Order Radiology Tests	
Order Prescriptions	
Order Consultation Requests	
Place Nursing Orders	
Make discharge summaries	
See Clinical Guidelines	
Get Clinical Reminders	
Receive drug alerts for allergies	
Receive drug alerts for interactions	
Receive advice about drug dosing	

8. Do you offer your patients the option to electronically transmit their prescriptions to a pharmacy (e-Prescribing)? *If YES go to question #9. If NO or N/A go to question #11.*	Yes	No	N/A

9. What percentage of the time do you offer to use e-Prescribing for your patients? _____

10. What percentage of your patients agrees to forego a paper prescription? _____

11. Please indicate how much you agree or disagree with the following statements.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't know
We rely on our EMR system to improve office activities.	☐	☐	☐	☐	☐	☐
Using our EMR system helps me improve the quality of health care I provide.	☐	☐	☐	☐	☐	☐
Our EMR system helps reduce costs .	☐	☐	☐	☐	☐	☐
I rely on our EMR system while I'm seeing a patient.	☐	☐	☐	☐	☐	☐
When I'm providing health care, our EMR system slows me down.	☐	☐	☐	☐	☐	☐
Our EMR correctly matches the patients for at least 70% of the information received from other providers.	☐	☐	☐	☐	☐	☐

12. Please indicate how much you agree or disagree with the following statements about the exchange of health care data.	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't know**
It is easy for me to get information electronically from other care providers.	☐	☐	☐	☐	☐	☐
Electronic information from other care providers is available when I need it to treat patients.	☐	☐	☐	☐	☐	☐
I frequently receive duplicate data from other health care providers.	☐	☐	☐	☐	☐	☐
The information I receive from other health care providers is structured in a way that is useful.	☐	☐	☐	☐	☐	☐
I receive information that is too detailed.	☐	☐	☐	☐	☐	☐
I usually receive electronic information from other care providers via email.	☐	☐	☐	☐	☐	☐
I usually receive electronic information from other care providers in our EMR.	☐	☐	☐	☐	☐	☐
I prefer using paper medical records rather than electronic records.	☐	☐	☐	☐	☐	☐

14. Do you use Nevada DIRECT to exchange data?	**Yes**	**No**
15. Do you use HealtHIE Nevada to exchange data?	**Yes**	**No**
16. Do you offer your patients an electronic portal to view their health records online? *If NO go to question #17. If YES go to question #18*	**Yes**	**No**
17. Do you anticipate offering a patient portal within the next year?	**Yes**	**No**

If you do <u>NOT</u> have a patient portal, thank you for completing this survey!
Please put your survey in the envelope provided with it and place in a mailbox.

If you <u>do</u> have a patient portal, please continue to question #18

18. Check all data below that is available now or that you anticipate you will make available in the future through the patient portal.		
Patient Health Data	**Available Now**	**Available in the Future**
Patient demographics		
Physician Notes		
Nursing Assessments		
Problem Lists		
Medication Lists		
Lab Reports		
Radiology Reports		
Diagnostic test results		
Consultant reports		

19. Please indicate how much you agree or disagree with the following statements.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't know
The patient portal primarily **benefits the patient.**	☐	☐	☐	☐	☐	☐
The patient portal primarily **benefits the healthcare provider.**	☐	☐	☐	☐	☐	☐
My patients frequently use the patient portal.	☐	☐	☐	☐	☐	☐
I plan to make more information available in the patient portal.						
Both the **patient and the health care provider receive substantial benefits**.	☐	☐	☐	☐	☐	☐
The primary benefit of a patient portal is to **satisfy federal meaningful use requirement**s.	☐	☐	☐	☐	☐	☐

Thank you for completing this survey!

Please put your survey in the envelope provided with it and place in a mailbox.

Appendix II-D: Sample Interview Coding Scheme

Pattern Category Codes	Descriptive Codes			
Competition	Competing entities	Types of possible competitors	Sustainability of competitors	Ongoing evolution of competitive environment • acknowledgement
Regulations	Responsibility • Timing • Types: Privacy, patient matching, etc.	Development • Initial, Ongoing • Evolution • Federal/State	Placement • Law/Regulation • Certification	Enforcement • Timing • Penalties • incentives
Success	Financial • Reduce costs • Develop revenue	Health care providers • More HCPROFs • New health care facilities • Cover new Medicaid	Health care outcomes • Reduced errors • "Better" health	Fewer tests • Less intrusion • Less travel
HIE Technology	Implementation effort • Time • IT people required • Broadband availability	Capabilities • Privacy protection • Data segmentation • MPI index • Patient matching methods • Filtering	EMR integration • Multiple logins • Vendor payback • Filtering	Architecture • Repository • Data access method • Edge servers • Connectivity methods
Adoption	Sequence of adoption • EMR • HIE • DIRECT placement	Culture • FAX already paid for • Use available approaches • Filtering via paper	Email • Quantity • Non filtering • DIRECT differences	Financial • Incremental cost • Ongoing cost
Sustainability	Financial • Initial costs • Ongoing support • Personnel • State support	IT • Initial installation • Ongoing modifications • Company viability	Evolution • Changing IT env. • Changing reg. env.	Marketing • Training efforts • Townhall • Stories: installation/use
Relationships	Health care domain knowledge • Credibility • Lab connections	health care practice knowledge • credibility • integration into existing processes	state connections • state agency use • state agency support	medical society integration • training efforts
Applications	Eprescribing • Certification • Call backs • Patient issues	Patient portal • Filtering • Legal • Architecture • Connectivity method	Provider oriented virtual health record • filtering • legal responsibilities to view/use	•
Healthcare Culture	Lack of financial emphasis • Health care outcome focus • Pay for treatment, not outcome	Entrepreneurial approach • Mixed – little marketing/much financial control • Earn money	Expectation of ongoing customers • Always more customers • Increasing Medicaid base	Consolidation • Vertical integration • Horizontal integration • Employees vs. entrepreneurs

Appendix IV-A: Nevada Hospital List

Hospital	County	City	Urban /Rural	# of Beds	Patient Revenue (2012)	Status with HealtHIE Nevada	Hospital Type
Banner Churchill Community Hospital	Churchill	Fallon	R	40	$ 115,638,908		Comprehensive Care
Battle Mountain General Hospital	Lander	Battle Mountain	R	25	$ 9,689,176		Comprehensive Care
Boulder City Hospital	Clark	Boulder City	R	59	$ 30,570,001		Comprehensive Care
Carson Tahoe Regional Medical Center	Carson	Carson City	U	138	$ 680,203,584	connected	Comprehensive Care
Carson Valley Medical Center	Douglas	Gardnerville	R	23	$ 118,882,598	in process	Comprehensive Care
Centennial Hills Hospital Medical Center	Clark	Las Vegas	U	177	$ 865,522,656	connected	Comprehensive Care
Complex Care Hospital at Tenaya	Clark	Las Vegas	U	70	$ 76,356,006		Long term care
Desert Springs Hospital Medical Center	Clark	Las Vegas	U	293	$ 1,220,202,784	connected	Comprehensive Care
Desert View Hospital	Clark	Pahrump	R	25	$ 72,221,112		Comprehensive Care
Grover C. Dils Medical Center	Lincoln	Caliente	R	20	$ 6,151,835		Comprehensive Care
Harmon Medical and Rehabilitation Hospital	Clark	Las Vegas	U	118	$ 1,220,203		Long Term care
Healthsouth Desert Canyon Rehabilitation Hospital	Clark	Las Vegas	U	50	$ 35,092,463		Long Term Care
Healthsouth Rehabilitation Hospital, Henderson	Clark	Henderson	U	90	$ 57,842,235		Long Term Care
Healthsouth Rehabilitation Hospital, Las Vegas	Clark	Las Vegas	U	79	$ 54,723,128		Long Term Care
Horizon Specialty Hospital, Las Vegas	Clark	Las Vegas	U	199	$ 42,948,952		Comprehensive Care
Humboldt General Hospital	Humbolt	Winnemucca	R	52	$ 78,424,988		Comprehensive Care
Incline Village Community Hospital	Washoe	Incline Village	R	4	$ 13,401,794		Comprehensive Care
Kindred Hospitals - Flamingo Campus	Clark	Las Vegas	U	142	incl. below	connected	Sub-Acute care
Kindred Hospitals - Sahara Campus	Clark	Las Vegas	U	52	$ 273,419,839		Sub-Acute care
Mesa View Regional Hospital	Clark	Mesquite	U	25	$ 61,396,924		Comprehensive Care
Montevista Hospital	Clark	Las Vegas	U	90	$ 42,362,128		Psychiatric
MountainView Hospital	Clark	Las Vegas	U	247	$ 1,667,024,256	in contract negotiations*	Comprehensive Care
Mount Grant General Hospital	Mineral	Hawthorne	R	35	$ 19,662,587		Comprehensive Care
Nathan Adelson Hospice	Clark	multiple	U	38			Long term care
North Vista Hospital	Clark	Las Vegas	U	177	$ 495,474,672		Comprehensive Care

Hospital	County	City	Urban /Rural	# of Beds	Patient Revenue (2012)	Status with HealtHIE Nevada	Hospital Type
Northeastern Nevada Regional Hospital	Elko	Elko	R	75	$ 159,096,440		Comprehensive Care
Northern Nevada Medical Center	Washoe	Sparks	U	108	$ 349,269,096	connected	Comprehensive Care
Nye Regional Medical Center	Nye	Tonopah	R	10	$ 14,825,626		Comprehensive Care
Pershing General Hospital	Pershing	Lovelock	R	38	$ 11,209,638		Comprehensive Care
Progressive Hospital	Clark	Las Vegas	U	24	$ 21,514,876		Long term care
Renown Regional Medical Center	Washoe	Reno	U	594	$ 1,992,181,696	connected	Comprehensive Care
Renown South Meadows Medical Center	Washoe	Reno	U	138	$ 349,432,336	connected	Comprehensive Care
Saint Mary's Regional Medical Center	Washoe	Reno	U	380	$ 954,795,632	in process	Comprehensive Care
Seven Hills Behavioral Institute	Clark	Henderson	U	58	$ 25,746,475		psychiatric hospital
Sierra Surgery Hospital	Carson	Carson City	U	15	$ 89,258,848		Comprehensive Care
South Lyon Medical Center	Lyon	Yerington	R	63	$ 16,509,349		Comprehensive Care
Southern Hills Hospital & Medical Center	Clark	Las Vegas	U	134	$ 511,744,000	in contract negotiations*	Comprehensive Care
Spring Mountain Treatment Center	Clark	Las Vegas	U	82	$ 32,179,560		Behavioral
Spring Valley Hospital Medical Center	Clark	Las Vegas	U	231	$ 1,398,377,760	connected	Comprehensive Care
St. Rose Dominican Hospitals - Rose de Lima Campus	Clark	Henderson	U	109	$ 664,932,864	connected	Comprehensive Care
St. Rose Dominican Hospitals - San Martín Campus	Clark	Las Vegas	U	147	$ 812,192,512	connected	Comprehensive Care
St. Rose Dominican Hospitals - Siena Campus	Clark	Henderson	U	219	$ 1,597,124,032	connected	Comprehensive Care
Summerlin Hospital Medical Center	Clark	Las Vegas	U	454	$ 1,825,278,336	connected	Comprehensive Care
Sunrise Hospital & Medical Center	Clark	Las Vegas	U	642	$ 3,068,077,888	in contract negotiations*	Comprehensive Care
Tahoe Pacific Hospitals	Washoe	Reno	U	60	$ 90,798,892		Long term care
University Medical Center of Southern Nevada	Clark	Las Vegas	U	499	$ 1,991,565,120	connected	Comprehensive Care
VA Sierra Nevada Health Care System	Washoe	Reno	U - VA	60			Comprehensive Care
VA Southern Nevada Health Care System	Clark	Las Vegas	U- VA	210			Comprehensive Care
Valley Hospital Medical Center	Clark	Las Vegas	U	292	$ 1,604,230,528	connected	Comprehensive Care
West Hills Hospital	Washoe	Reno	U	92	$ 20,143,963		Psychiatric
William Bee Ririe Hospital	White Pine	Ely	R	25	$ 39,786,219		Comprehensive Care

Hospital	County	City	Urban /Rural	# of Beds	Patient Revenue (2012)	Status with HealtHIE Nevada	Hospital Type

Total Hospital Beds	7,027
Total Hospital Beds (Excluding VA)	6,757
Hospital Beds connected via HealtHIE Nevada	3,802
Percentage Connected via HealtHIE Nevada (Beds) – Does not include those in contract negotiations	58%
Total Hospital Revenue	$ 23,678,704,515
Revenue connected via HealtHIE Nevada	$ 16,424,191,534
Percentage Connected via HealtHIE Nevada (Revenue$) – Does not include those in contract negotiations	69%

Data Source: Data were collected through website information for each hospital and through confirmatory telephone calls to each hospital.

HealtHIE Nevada data collected through website: http://www.healthienevada.org/

*Data obtained during stakeholder interviews