PHYSICIANS' USE, EXCHANGE, AND EVALUATION OF ELECTRONIC MEDICAL RECORDS

OCTOBER 2013

Sponsored by and Prepared for the

Arizona Health Care Cost Containment System (AHCCCS)

Arizona Strategic Enterprise Technology (ASET) Office

ISA Number YH12-0012

under the

Health Information Exchange Cooperative Agreement – 90HT0023

State Project ID: GVA600005

by the

Center for Health Information & Research (CHiR)

Health Solutions, Arizona State University

The Center for Health Information & Research (CHiR) is a multidisciplinary research team at Arizona State University. CHiR provides actionable information about health and health care to our community, health care providers and payers, researchers, public health and other community organizations. For more information about CHiR's current initiatives as well as downloadable publications, please visit http://chir.asu.edu or email us at chir@asu.edu.

Project Team

Professor & Founder of CHiR	William G. Johnson, PhD **william.g.johnson@asu.edu**
Senior Statistical Programmer	Gevork Harootunian, BS **gevork.harootunian@asu.edu**
Senior Coordinator	Tameka Sama, MBA **tameka.sama@asu.edu**

Acknowledgements

The authors gratefully acknowledge the cooperation of **Lisa Wynn** of the Arizona Medical Board (AMB) and **Elaine LeTarte**, formerly of the Arizona Board of Osteopathic Examiners (ABOE). The ABOE, under the leadership of **Jenna Jones** is continuing its cooperation with the ongoing survey of physicians. Special thanks to **James Gentile** and **Pushpa Gregory** of the AMB for their excellent and enthusiastic technical support. Helpful comments were provided by **Dr. Ronald Weinstein** of the University of Arizona.

Table of Contents

Executive Summary

- The percentage of Arizona physicians using electronic medical records (EMRs) increased from approximately 45% in 2007-2009 to approximately 80% in 2012-2013. The current trend suggests that, with very few exceptions, Arizona physicians will be using EMRs by 2018. The incentives and support provided by Medicare and Medicaid, combined with other influences, have succeeded in increasing EMR adoption, but important obstacles remain.
- The expected benefits of EMRs, such as the avoidance of duplicative tests, require the exchange of information among health care providers. However, among physicians for whose EMRs include options such as patient care summaries, e-prescribing and others, less than 20% to slightly more than 47% of the physicians share the information with other health care organizations, depending on the type of information being shared.
- The most important obstacle to inter-organizational transfers of electronic health information is the shortage of Health Information Exchanges (HIEs). The Health Information Network of Arizona (HINAZ) is one such HIE. Although HINAZ currently serves only thirty-three participants, it continues to expand and its future is hopeful.
- This report is the first in the CHiR series to include physician rankings of EMRs by brand. EMRs were ranked on a 1-5 scale where 1=awful and 5=outstanding. Twenty five different EMR packages were ranked on each of five criteria.
- Media articles and discussions among HIE professionals suggest that physicians are very dissatisfied with their EMRs. The results presented here differ, indicating that physicians are somewhat positive about their EMRs with rankings averaging slightly more than the midpoint in the 1-5 scale. A more accurate conclusion may be that physicians want EMRs improved but recognize that EMRs offer advantages not available from scanned or paper medical records.
- We plan to implement new survey questions at the end of the current renewal cycle in April 2014. Many of the new questions will focus on the use of and obstacles to the exchange of information among physicians who use EMRs. The new survey will include an enhanced focus on Medicaid providers.

Introduction

It is widely believed that increased use of EMRs will improve the quality of health care and reduce costs (Chaudhry, et al. 2006; Sequist, et al. 2007). That belief led to the creation of the Arizona Health-e Connection and is one of the major objectives of The State of Arizona Health Information Exchange awarded in 2010 to the Arizona Governor's Office of Economic Recovery. Funds from this award were distributed to AHCCCS, Arizona's single Medicaid agency.

This is one of a continuing series of reports designed to help the Arizona Health Care Cost Containment System (AHCCCS) and other stakeholders to encourage the expanded use of Electronic Medical Records (EMRs) and develop regional Health Information Exchanges (HIEs). This report describes patterns of EMR utilization, the extent to which EMR data are exchanged among health care providers, and the values placed on EMRs by users and non-users. This report also distinguishes between physicians who influence decisions to implement EMRs and physicians who are not decision makers. Physicians' evaluations of their EMRs are included for the first time in this series.

Background

Studies of EMR utilization have increased since 2005 but most use neither comparable definitions of an EMR nor comparable samples. We summarize several of the better known studies in Appendix A to this report. Additional, but not strictly comparable, information is available from a meta-analysis of national surveys of physician adoption of EMRs between 1994 and 2005. It estimated that, in 2005, approximately 24% of physicians used EMRs, but only 9% of the EMRs in use included functions such as e-prescribing (Jha, Ferris, et al. 2006). A consistent set of estimates is produced by the National Center for Health Statistics (NCHS) surveys of ambulatory care physicians in office settings. It is important to recognize that the estimates apply to only one segment of the physicians in this study. The exclusions include physicians in federal facilities and a number of specialty practices.

The percentage of office based physicians using some form of EMR in the United States increased from 48% in 2009 to 72% in 2012 (Hsiao and Hing 2012). The results from the NAMC survey estimate that more than 82% of physicians in office based practices in Arizona used some form of EMR in 2012 (Hsiao and Hing 2012).

The CHiR Survey of Physicians

This report and its predecessors are made possible by an ongoing partnership between the physician licensing boards in Arizona and Arizona State University's Center for Health Information & Research (CHiR). Beginning in 1992, the licensing boards permitted CHiR to add survey questions to license applications from physicians. With few exceptions, the data have been collected continuously since 1992. Previous reports and articles from the survey are listed in Appendix F.

The voluntary survey responses are merged with the licensing data collected by the boards for each physician. The licensing data for non-respondents to the survey permits a rigorous analysis of non-response bias.

The survey questions change over time and among different project sponsors. AHCCCS and the Arizona Strategic Enterprise Technology (ASET), an agency of the State of Arizona, have provided financial support for the project since 2009.

The survey was changed in July 2007 to focus on the use of EMRs and the influences affecting decisions to adopt EMRs. The 2007 survey was implemented with minimal pre-testing to accumulate information as early in the two year allopathic renewal cycle as possible and to capture the "once in every two year" renewal cycle for osteopathic physicians that included Fall 2007. The objective was to provide AHCCCS with estimates for targeting its campaign to expand the use of EMRs as quickly as possible. The rapid implementation of the survey was possible by the enthusiastic cooperation of the Directors and staff of the Arizona Medical Board (AMB) and the Arizona Board of Osteopathic Examiners (ABOE).

Short paper survey forms were used from 1992 through July 2009, greatly restricting the number and complexity of survey questions. The 2007 paper survey consisted, for example, of six questions. The licensing boards converted to electronic applications in 2009, but a large number of physicians continued to use paper surveys and funding was not available to create an electronic survey. (See Appendix B for a copy of the 2007-2011 survey instrument.) Results for the period July 2007 to July 2009 are described in a previous CHiR report (Johnson, Qiu, et al. 2010).

A new electronic survey was implemented in early 2012 with funding from AHCCCS and ASET. The electronic survey includes a greatly expanded set of questions and a large number of

decision trees, including different questions for physicians with Arizona licenses who practice outside the state. Many of the questions on the new survey duplicate questions used in national surveys, such as the NCHS and the National Health and Nutrition Examination Survey (NHANES) surveys, to permit direct comparisons to the national data. A copy of the new survey instrument is included in Appendix C.

The periods of data collection discussed in this report are:

- 2007-2009 – represents July 17, 2007 to July 17, 2009
- 2009-2011 – represents November 1, 2009 to November 1, 2011
- 2012-2013 – represents March 20, 2012 to April 29, 2013
- 2007-2013 – represents July 2007 to April 2013

The period between November 1, 2011 and March 20, 2012 was used to deploy the new electronic survey. The current two year renewal cycle data will be complete on March 20, 2014.

Some studies of EMR adoption identify the *number of practices* with EMRs, while this report counts the *number of physicians* with EMRs, as does the NCHS. Estimates of the number of physicians using EMRs is the most direct measure of potential impact on patients, but the number of practices is a more useful measure of the impact on organizations. A 2007 Massachusetts study is a good example of the effects of larger practices on physician counts (Simon, et al. 2007). The study reported that almost half of Massachusetts' physicians used EMRs, but less than one-quarter of practices in Massachusetts had adopted EMRs.

Definitions

Active license: The licensing boards define active physicians as those whose license has not expired or been suspended. Some physicians renew their licenses after retirement or while on leave. The distinction between physicians with an active license and those who are actively practicing medicine is only obtainable from responses to the survey. The true status of physicians who do not respond to the survey is, therefore, unknown. Survey respondents who indicate that they are retired or semi-retired/on leave physicians with active licenses are excluded from all but the initial descriptions of physician characteristics.

Electronic Medical Record: Physicians were given the opportunity to select any or all of the possible methods of storing their medical records. The specific survey question is:

How does the organization in which you practice store its medical records? (Check all that apply);

a) Paper ☐ Yes ☐ No
b) Scanned images of paper records ☐ Yes ☐ No
c) Electronic files (an electronic version of a patient's medical history, including progress notes, problems, medications and other information used in treatment.) ☐ Yes ☐ No
   i. *{if yes then ask}* What is the name of your EMR/EHR system

Note: Check boxes are provided for more than 21 types of EMRs with an open ended response for others.

This question is much more specific than the question on previous surveys which was thought to be too general, allowing some respondents to mistakenly include billing software as an EMR. The previous question was:

Are patients' medical records in your practice/organization stored as:

a.paper ◯ Yes ◯ No
Scanned images of paper files ◯ Yes ◯ No
Electronic files ◯ Yes (continue) ◯ No (If no, go to question #5)
◯ The records are stored on a PC/server located in my organization
◯ The records are stored on a server to which I connect via the internet
◯ I don't know where they are stored

Therefore, comparisons between the current results and data based on the short survey question are not, be strictly comparable.

Specialty: Physicians can report more than one specialty to the licensing boards, and they need not be board certified in the reported specialty. We adopt the first specialty reported and do not classify physicians by multiple specialties. *Pediatric Specialties* are defined as pediatricians or physicians practicing a pediatric subspecialty. *Surgical Specialties* are defined to include surgeons or any surgical subspecialty. *Hospital Based Specialties* include critical care medicine, diagnostic imaging and radiology, emergency medicine, hospitalist medicine, infectious disease, neonatology, respiratory care, transport medicine, anesthesiology, intensive care medicine, pathology, nuclear medicine, rehab and occupational medicine, or radiation oncology. *Primary Care is* defined to include family care, general practice, geriatrics, or internal medicine. All other specialties are defined as *Medical Specialties,* including obstetrics and gynecology, following the conventions used by AHCCCS.

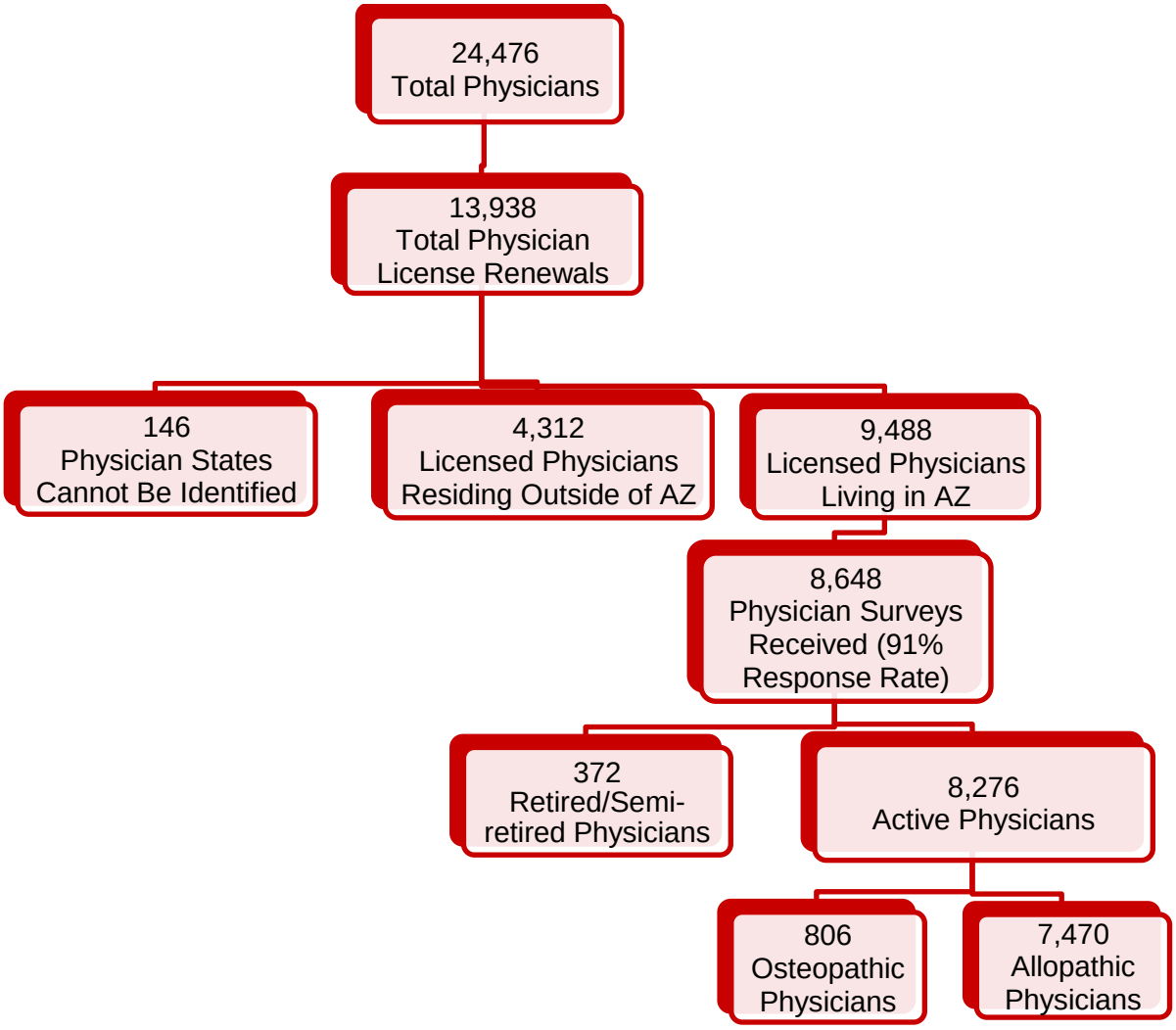
Type of Practice: The categories used from 1990-2012 were expanded and revised for the new electronic survey to be more internally consistent. Categories defined in terms of physician activity (e.g. semi-retired; locum tenens) were removed and replaced by categories representing the type of practice/organization in which a physician works. Thus, the type of practice data prior to 2012 is not strictly comparable to the data collected after March 2012.

Survey Sample

The number of physician renewals and survey respondents is described in Figure 1. A total of 13,938 physicians renewed their licenses between March 20, 2012 and April 29, 2013. Allopathic physicians renew their licenses every two years on their birthdays, and osteopathic physicians renew their licenses every other year, so the results represent approximately one-half of the physicians in the 2012-2014 renewal cycle. The results should be representative of all Arizona physicians, assuming that the distribution of license renewals over the two year period does not have a systematic bias in renewal dates. There is no guarantee, however, that the responses to some survey questions will not differ between the first and second year of the renewal cycle.

The renewals included 9,488 physicians who live in Arizona and 4,312 physicians with Arizona licenses who live outside the State. There were 146 physicians whose state of residence could not be identified. Survey responses were received from 8,648 physicians living in Arizona. Of those, 8,276 physicians were identified as being in active practice. These respondents include 7,470 allopathic physicians and 806 osteopathic physicians.

Figure 1. Active Physicians, 2012-2013



Source: Arizona Medical Board (AMB), Arizona Board of Osteopathic Examiners (ABOE) Survey and Administrative Data, 2012-2013.

Because all physicians renewing Arizona licenses have the opportunity to complete a survey, the number of respondents is substantially larger than the number obtained from the usual practice of sampling a small percentage of the renewals. If, for example, a twenty percent sample of renewals was drawn and the % of renewals in state was the same; and the response rate was 91% then the survey results would include 1,727 physicians rather than the 8,648 physician respondents represented in our results. Sample percentages are typically much lower than 20% and response rates of 60% or more are considered adequate for surveys. The NCHS survey, for example, used approximately 3,180 physicians to represent all office practice based physicians in the United States (Jamoom, et al. 2012).

Our very large sample minimizes the need to rely on small numbers of responses to some questions on the survey, and it reduces the variance surrounding estimates. In other words, the results are more certain.

Response Bias

The sample is quite large and the response rate is very high but the best test of the extent to which a survey represents a population is a comparison of the respondents to the non-respondents. Since we have licensing data on all physicians, we can make that comparison. The data described in Table 1 compare respondents to all members of the Arizona physician population rather than the usual comparison of respondents to all physicians who renewed their licenses in the first one-half of the renewal cycle. Thus, the "non-respondents" in our comparisons include physicians who have not yet received the survey because they have yet to file for renewal of their licenses. The non-respondents also include retired or semi-retired physicians with active licenses. The identification of these physicians is only possible using answers to the survey questions. The inclusion of retired physicians and physicians not scheduled for renewal at the time of this survey is a much stricter test of response bias than the usual comparisons.

There are a few significant differences between respondents and all Arizona physicians. Physicians aged 35-44 are slightly overrepresented in the survey results and physicians in the 55-64 and 65+ groups are slightly underrepresented among survey respondents. Physician with hospital specialities are slightly less likely to be respondents than physicians in other specialty groups. Physicians in Maricopa County are slightly underrepresented. The differences are small and since many of the non-respondents are not yet eligible to respond to the survey, the results are representative of the physician population, subject to very small variations. The comparisons between respondents and non-respondents for previous years are summarized in Appendix D. The results in previous years include complete renewal cycles rather than the partial cycle represented by the current results.

Table 1. Comparison of Respondents to Non-Respondents, 2012-2013

Characteristic	*Respondents (N = 8,648)*		*Non-Respondents (N = 7,543)*		*P-Value*
Sex					
Female	2,489	28.7%	2,105	27.9%	NS
Male	6,159	71.2%	5,438	72.0%	NS
Total	8,648	100.0%	7,543	100.0%	
Age Group					
25 - 34	998	11.5%	888	11.7%	NS
35 - 44	2,535	29.3%	1,979	26.2%	<0.01
45 - 54	2,233	25.8%	1,881	24.9%	NS
55 - 64	1,846	21.3%	1,713	22.7%	<0.05
65+	1,036	11.9%	1,082	14.3%	<0.01
Total	8,648	100.0%	7,543	100.0%	
Specialty					
Primary Care	3,006	34.7%	2,759	36.5%	NS
Medical	2,028	23.4%	1,727	22.8%	NS
Hospital-Based	2,023	23.3%	1,666	22.0%	<0.05
Pediatric	744	8.6%	615	8.1%	NS
Surgical	847	9.7%	776	10.2%	NS
Total	8,648	100.0%	7,543	100.0%	
Location					
Maricopa County	5,097	58.9%	4,570	60.5%	NS
Pima County	1,560	18.0%	1,388	18.4%	NS
All Other Counties	1,322	15.2%	1,038	13.7%	<0.01
Total	7,979	92.2%	6,996	92.7%	

Source: AMB, ABOE Administrative/Survey Data, 2012-2013. Data include retired and semi-retired physicians

Note: Percentages are calculated on numbers of cases with non-missing values. A p-value of .05 or less implies only a 5% probability of declaring the relationship significant when in fact it is not. NS = no significant difference. Location was unknown for 669 (7.7%) respondents and 547 (7.2%) non-respondents.

One potential source of response bias is the fact that physicians in the Veterans Administration (VA) health care system or the Indian Health Service (IHS) are not required to have an Arizona license unless they also practice outside the federal systems.

We tested for potential omissions of federal physicians in a previous report by comparing physicians who indicated employment in a government setting on the survey to a then recent HRSA report showing that 500 physicians were employed in the VA or IHS systems in Arizona (Health Resources and Services Administration (HRSA) 2007). The HRSA report showed that 38.8% (194/500) of Arizona physicians (MD) with a federal license practiced in primary care during 2007. The number of Arizona physicians who reported working in a government setting on the CHiR/AHCCCS survey was 390 MDs and 43 DOs.

Weighting the survey responses to population totals indicated that approximately 853 physicians with Arizona licenses worked in a government setting. The estimate included all government settings, not just the VA and IHS, but comparisons with the HRSA report suggest that the relatively large number from the survey data implies that most of the federally employed physicians had Arizona licenses. Unfortunately, HRSA has not published more recent reports that would permit an update of these results.

Subject to some uncertainty about the current numbers of physicians who work in federal government settings but who are not licensed in Arizona, the survey results are, reasonably representative of all osteopathic physicians and allopathic physicians practicing in Arizona in 2012-2013.

Note: From this point forward, retired and semi-retired/on leave physicians are excluded from all subsequent results in this report.

Physician Characteristics

The licensing board data are available for each of the 9,448 physicians who lived in Arizona and who renewed their licenses between March 2012 and April 2013. There were 8,648 of these physicians who responded to the survey. Of those, approximately 8,276 are in active practice. Each survey respondent represents approximately 1.14 physicians who renewed their licenses in 2012-2013. Except where noted, the results are un-weighted counts and percentages because our primary interest is in the averages, which do not change if weighted, rather than the absolute number of responses.

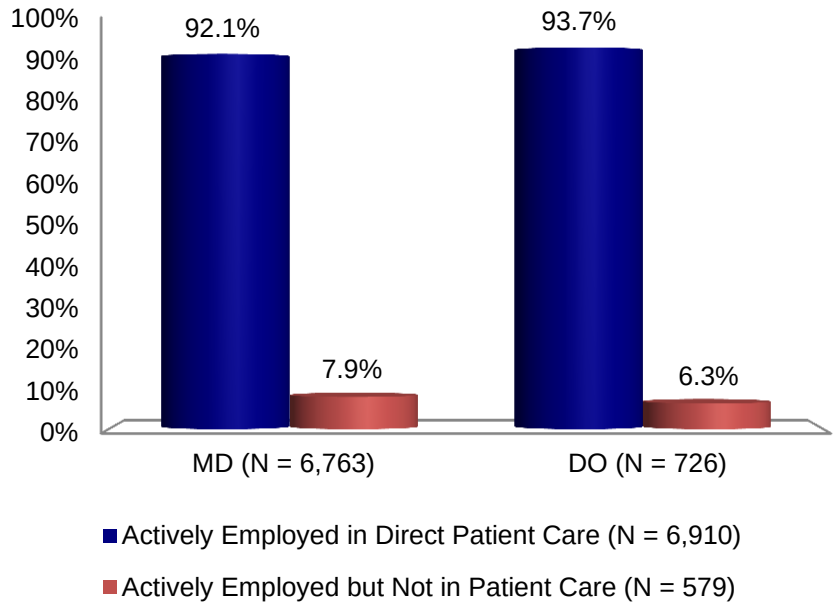
We measure EMR users as a percentage of all physician respondents actively practicing in Arizona, including some physicians who may not need EMRs because they don't treat patients. The inclusion of physicians who do not need EMRs understates the utilization rates by a small amount given the very low number of physicians not providing direct care. As indicated in Table 2, approximately 92.3% of the physicians provided patient care.

Table 2. Active Physicians by Employment Status, 2012-2013

Employment Status	*MD*		*DO*		*Total*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Actively Employed in Direct Patient Care	6,230	92.1%	680	93.7%	6,910	92.3%
Actively Employed but Not in Patient Care	533	7.9%	46	6.3%	579	7.7%
Total	6,763	100.0%	726	100.0%	7,489	100.0%

Source: AMB, ABOE Survey data, 2012-2013.

Figure 2. Physicians Providing Patient Care, 2012-2013



Source: AMB, ABOE Survey data, 2012-2013.

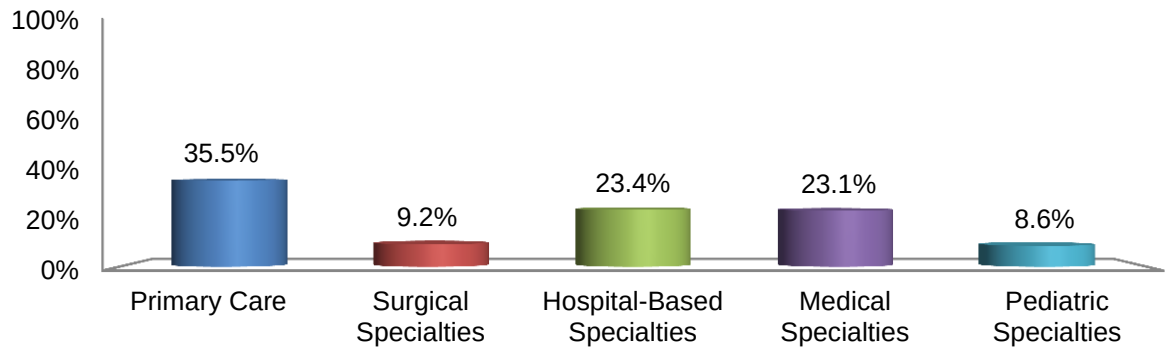
Table 3. Distribution of Practicing Physicians by Specialty, 2012-2013 (N = 8,239)

Specialty Groups	*Total Physicians*	
	N	*%*
Primary Care	2,925	35.5%
Surgical Specialties	760	9.2%
Hospital-Based Specialties	1,929	23.4%
Medical Specialties	1,910	23.1%
Pediatric Specialties	715	8.6%
Total	8,239	100.0%

Source: AMB, ABOE Survey data, 2012-2013.

Note: Primary specialty reported by physician at the time of licensure. 37 physicians did not report specialty to the medical board.

Figure 3. Distribution of Practicing Physicians by Specialty, 2012-2013 (N = 8,239)



Source: AMB, ABOE Survey data, 2012-2013.

Note: Primary specialty reported by physician at the time of licensure. 37 physicians did not report specialty to the medical board.

Practice Settings

Table 4. Type of Practice by DO and MD, 2012-2013

Type of Practice	*MD*	*DO*	*Total*
Physician Owned Solo Practice	1,132 (17.7%)	121 (17.5%)	1,253 (17.7%)
Physician Owned Group Practice	2,178 (34.1%)	244 (35.3%)	2,422 (34.2%)
Hospital/Medical School Group Practice	963 (15.1%)	101 (14.6%)	1,064 (15.0%)
Community or Rural Health Center	330 (5.2%)	35 (5.1%)	365 (5.2%)
Federal Government Hospital or Clinic	292 (4.6%)	28 (4.0%)	320 (4.5%)
Private Hospital System	476 (7.5%)	56 (8.1%)	532 (7.5%)
Non-Hospital Private Outpatient Facility	175 (2.7%)	35 (5.1%)	210 (3.0%)
Medical School, University Research Center	293 (4.6%)	12 (1.7%)	305 (4.3%)
Health Insurer/Pharmacy/Health Related Organization without Provision of Care	75 (1.2%)	8 (1.2%)	83 (1.2%)
State or County Hospital System	53 (0.8%)	6 (0.9%)	59 (0.8%)
Other	421 (6.6%)	46 (6.6%)	467 (6.6%)
Total	6,388 (100.0%)	692 (100.0%)	7,080 (100.0%)

Source: AMB, ABOE Survey Data, 2012-2013.

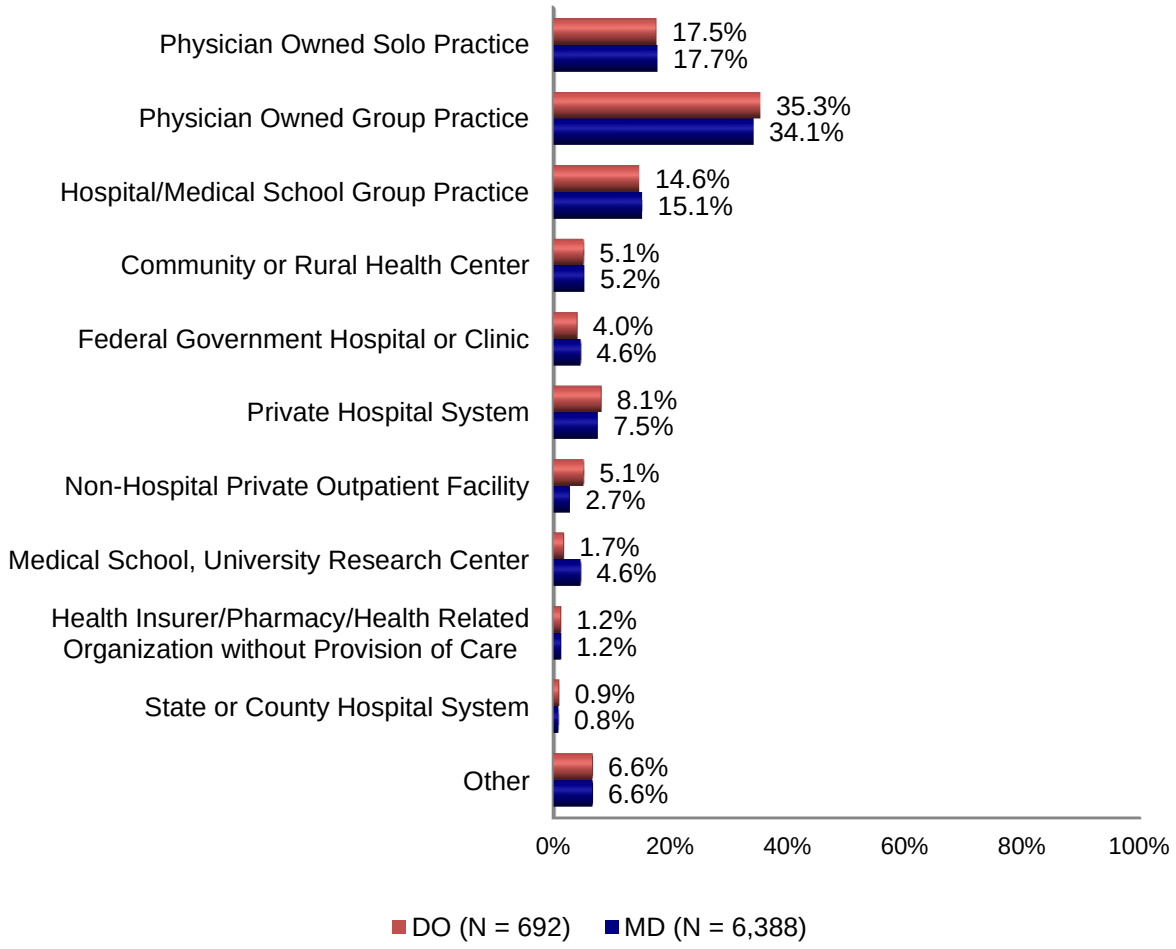
Note: 1,196 physicians did not report type of practice (missing). Percentages are based on responses.

Table 4 shows the distribution of physicians by type of practice. More than 34% of physicians work in physician owned group practices, followed by 17.6% of physicians in solo practices. Hospital or Medical School owned group practices accounted for an additional 15% of the physicians. In total, more than two-thirds of Arizona physicians work in solo or group practices. Physicians were rather thinly distributed among the other eight practice types.

The prevalence of solo practice is declining in Arizona, in part due to acquisitions of practices by hospital systems. The percentage of physicians in solo practice dropped from 24% in 2007-2009 to slightly more than 17% in 2012-2013. Solo practice physicians are, all else equal, much less likely to adopt EMRs than are physicians in other practice settings. All else equal, utilization rates of EMRs will continue to increase as the percentage of physicians in solo practice declines.

There are few differences in the distribution of MDs and DOs by type of practice. The exceptions include Private Outpatient Facilities where the percentage of DO's is nearly double that of MDs and Medical Schools where MDs are much more likely than DOs to be employed. Should the trend in the expansion of osteopathic medical schools in Arizona continue, it is likely that the differences between MDs and DOs in that category will narrow.

Figure 4. Type of Practice by DO, MD, 2012-2013



Source: AMB, ABOE Survey data, 2012-2013.

Note: 1,196 Physicians did not report type of practice (missing). Percentages are based on responses.

Table 5. Type of Practice by Number of MDs, 2012-2013

Type of Practice	*Number of Physicians*				*Total*
	2-5	*6-50*	*51-94*	*95+*	
Physician Owned Group Practice	789 82.7%	821 63.4%	57 33.5%	221 30.2%	1,888 59.9%
Hospital/Medical School Group Practice	53 5.5%	273 21.1%	58 34.1%	451 61.5%	835 26.5%
Community or Rural Health Center	62 6.5%	150 11.6%	44 25.9%	33 4.5%	289 9.2%
Non-Hospital Private Outpatient Facility	50 5.2%	51 3.9%	11 6.5%	28 3.8%	140 4.4%
Total	954 30.2%	1,295 41.1%	170 5.4%	733 23.2%	3,152 100.0%

Source: AMB, ABOE Survey data, 2012-2013.

Note: 1,082 MD's did not report practice type, and 1,650 MD's did not report the number of physicians in their practice.

Table 6. Type of Practice by Number of DOs, 2012-2013

Type of Practice	*Number of Physicians*				*Total*
	2-5	*6-50*	*51-94*	*95+*	
Physician Owned Group Practice	93 78.2%	94 58.8%	6 28.6%	20 32.3%	213 58.8%
Hospital/Medical School Group Practice	5 4.2%	40 25.0%	10 47.6%	34 54.8%	89 24.5%
Community or Rural Health Center	6 5.0%	17 10.6%	5 23.8%	4 6.4%	32 8.8%
Non-Hospital Private Outpatient Facility	15 12.6%	9 5.6%	0 0.0%	4 6.4%	28 7.7%
Total	119 32.9%	160 44.2%	21 5.8%	62 17.1%	362 100.0%

Source: AMB, ABOE Survey data, 2012-2013.

Note: 114 DO's did not report practice type, and 174 DO's did not report the number of physicians in their practice.

Communication in Practice Environments

The survey asks physicians about the methods of communication and billing in their practices. The results are shown in the next two tables.

Table 7. Methods of Communication by Renewal Period, 2007-2013

Method	*2012-2013 N = 6,616*		*2009-2011 N = 11,100*		*2007-2009 N = 6,699*	
	Number	*%*	*Number*	*%*	*Number*	*%*
Email	6,052	91.4%	9,634	86.7%	5,530	82.5%
Internet	6,167	93.2%	9,947	89.6%	5,702	85.1%
Fax	6,472	97.8%	10,365	93.4%	6,273	93.6%
Medifax	NA	NA	869	7.8%	536	8.0%
U.S. Mail	6,459	97.6%	NA	NA	NA	NA
None of the Above	0	0.0%	211	1.9%	96	1.4%

Source: AMB, ABOE Survey Data, 2007-2009, 2009-2011, 2012-2013.

Note: Categories are not mutually exclusive. 78 physicians did not respond to this question 2007-2009; 1,081 physicians did not respond 2009-2011; 1,660 physicians did not respond 2012-2013. Medifax was removed as a method of communication for the 2012-2013 data and U.S. Mail was added.

A surprisingly large number of physicians lacked access to the internet or email in the early years of the survey. As recently as 2007-2009, nearly 15% of the physicians practicing in Arizona did not have internet access. The rapid increases in internet access shown in Table 7 remove an important obstacle to the exchange of EMR information. Given the very high levels of access, we will discontinue publication of these results in the future.

Characteristics of EMR Users

The 2012-2013 survey expanded the set of questions on the types of practices in which physicians are employed (Table 8). The results, with the exception of solo practice, are not strictly comparable to the estimates from previous years.

The fact that solo practitioners have the lowest rates of EMR utilization relative to other practice types occurs in our previous surveys and in national studies. In absolute terms, however, EMR use by solo practitioners is rapidly increasing in Arizona. The utilization rate among solo practitioners increased from approximately 26% in 2007-2009 to approximately 54% in 2012-2013. The most recent rate is substantially higher than the NCHS estimate of 29% of all office based physicians in solo practice (Jamoom, et al. 2012). The national average is for a slightly earlier period (2011) and national averages are not representative of any particular state, but the difference is quite large and deserves additional investigation.

As expected, the highest utilization rate occurs in federal health systems with physicians associated followed by medical schools. Physicians in community health centers have essentially as high a utilization rate as those in medical school practices, presumably reflecting the effects of a number of federal and state incentive programs directed to community health centers and to rural areas. Physicians in private hospital systems and state or county systems are the next most highly ranked utilizers of EMRs.

Table 8. EMR Utilization by Type of Practice, 2012-2013 (N = 5,323)

Type of Practice	*Utilization Rates*
Physician Owned Solo Practice	53.9%
Physician Owned Group Practice	78.6%
Hospital or Medical School Physician Group Practice	91.7%
Community or Rural Health Center	91.3%
Government Health Organization (VA, Indian Health Service, etc.)	95.8%
Private Hospital System	87.4%
Non-Hospital Private Outpatient Facility	76.5%
Medical School/University/Research Center	91.6%
Health Insurer/Pharmacy/Health Related without Provision of Care	NA
State or County Hospital System	85.9%
Other	69.2%

Source: AMB, ABOE Survey Data, 2012-2013.

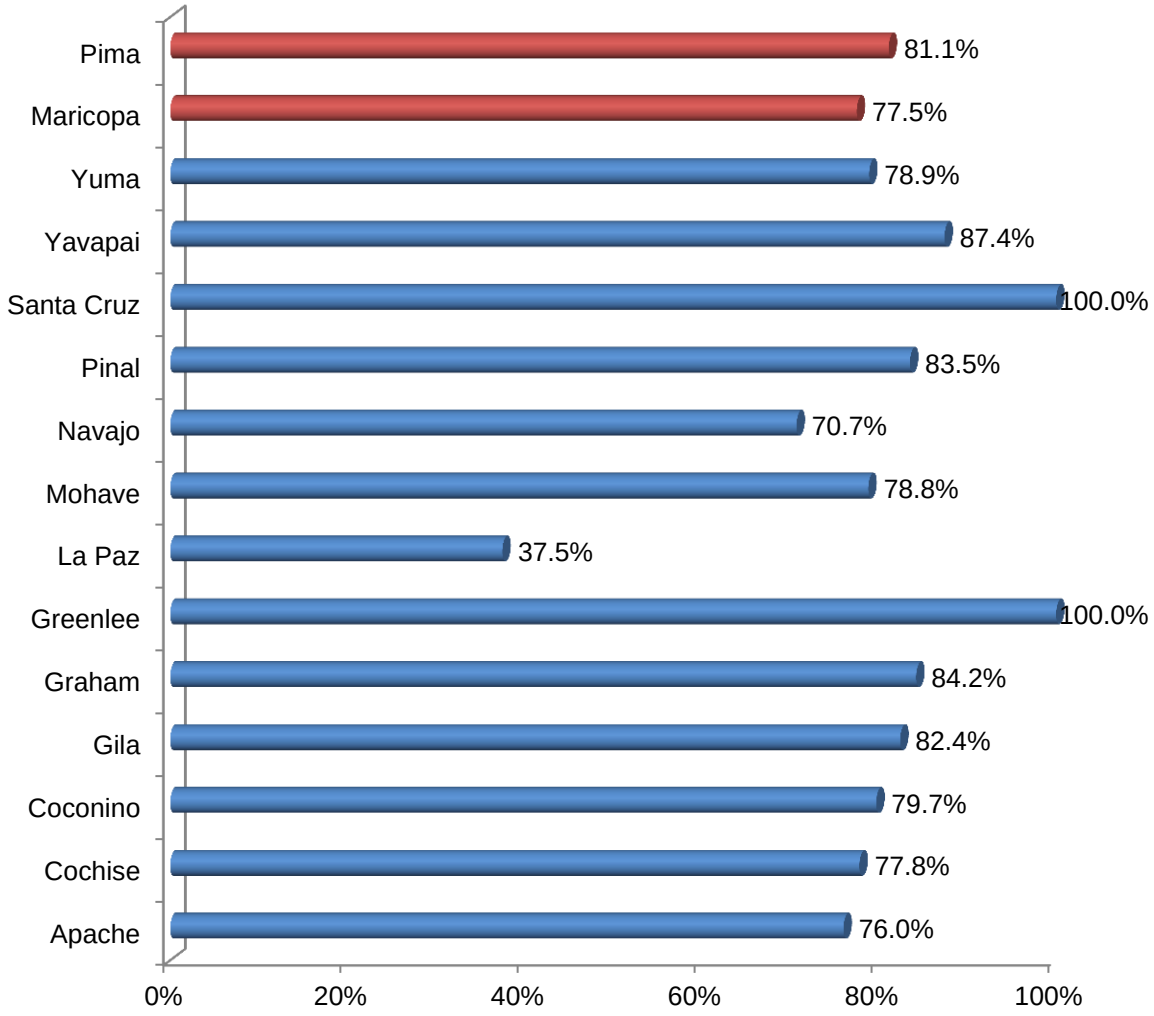
Note: Rates = % of physicians within each practice type. 1,196 respondents were missing type of practice.

The distribution of EMR users by County is described in Figure 5. We characterize Maricopa and Pima counties as urban areas because they include the largest metropolitan areas in Arizona. However, both counties are quite large and both include areas where population density is quite low.

The percentage of physicians who use EMRs ranges from 37.5% in La Paz County to 100% in Greenlee County. The number of practicing physicians ranges from 1 to 3,918 (Maricopa).

The utilization rate in Maricopa County is the second lowest in the state. The relatively high adoption rates in many of the rural counties is likely the result of aggressive campaigns, including financial incentives, that have been directed to rural health care providers by CMS and the State of Arizona.

Figure 5. EMR Utilization by County 2012-2013 (N = 6,420)



Source: AMB, ABOE Survey Data, 2012-2013.

Note: Approximately 1,468 respondents did not identify a method of storing medical records and 388 were of unknown county. Pima and Maricopa Counties (red) represent the urban areas. All other counties in blue represent the rural areas.

The Utilization of Electronic Medical Records

Trends in the utilization of EMRs are described in Table 9. A serious problem with the new reporting software for the survey in 2009-2011 required the application of utilization rates from the paper surveys to the electronic survey data. The paper surveys represented a substantial portion of the total responses in that time period, but the potential agreement between the paper and electronic results could not be validated. The overall results for that period can be interpreted with a reasonable level of confidence, but the results for some individual characteristics are subject to uncertainty. The most directly comparable results are between 2007-2009 and 2012-2013.

Table 9. Methods of Storing Medical Records by Renewal Period

Method	*2012-2013 N = 5,709*		*2009-2011 N = 2,137; W = 8,996*		*2007-2009 N = 6,387*	
	Number Yes	*% of total*	*Weighted Yes*	*% of total*	*Number Yes*	*% of total*
Paper Files Only	686	12.0%	3,140	37.3%	2,911	45.6%
EMR Only	374	6.5%	1,565	17.4%	859	13.4%
Scanned Images Only	71	1.2%	204	2.3%	205	3.2%
Paper + Scanned Images Only	362	6.3%	404	4.5 %	393	6.2%
EMR + Paper Only	149	2.6%	559	6.2%	484	7.6%
EMR + Scanned Images Only	1,834	32.1%	1,411	15.7%	742	11.6%
Paper + Scanned Images + EMR	2,233	39.1%	1,126	12.5%	793	12.4%
EMR alone or in combination*	4,590	80.4%	4,700	52.3%	2,878	45.1%

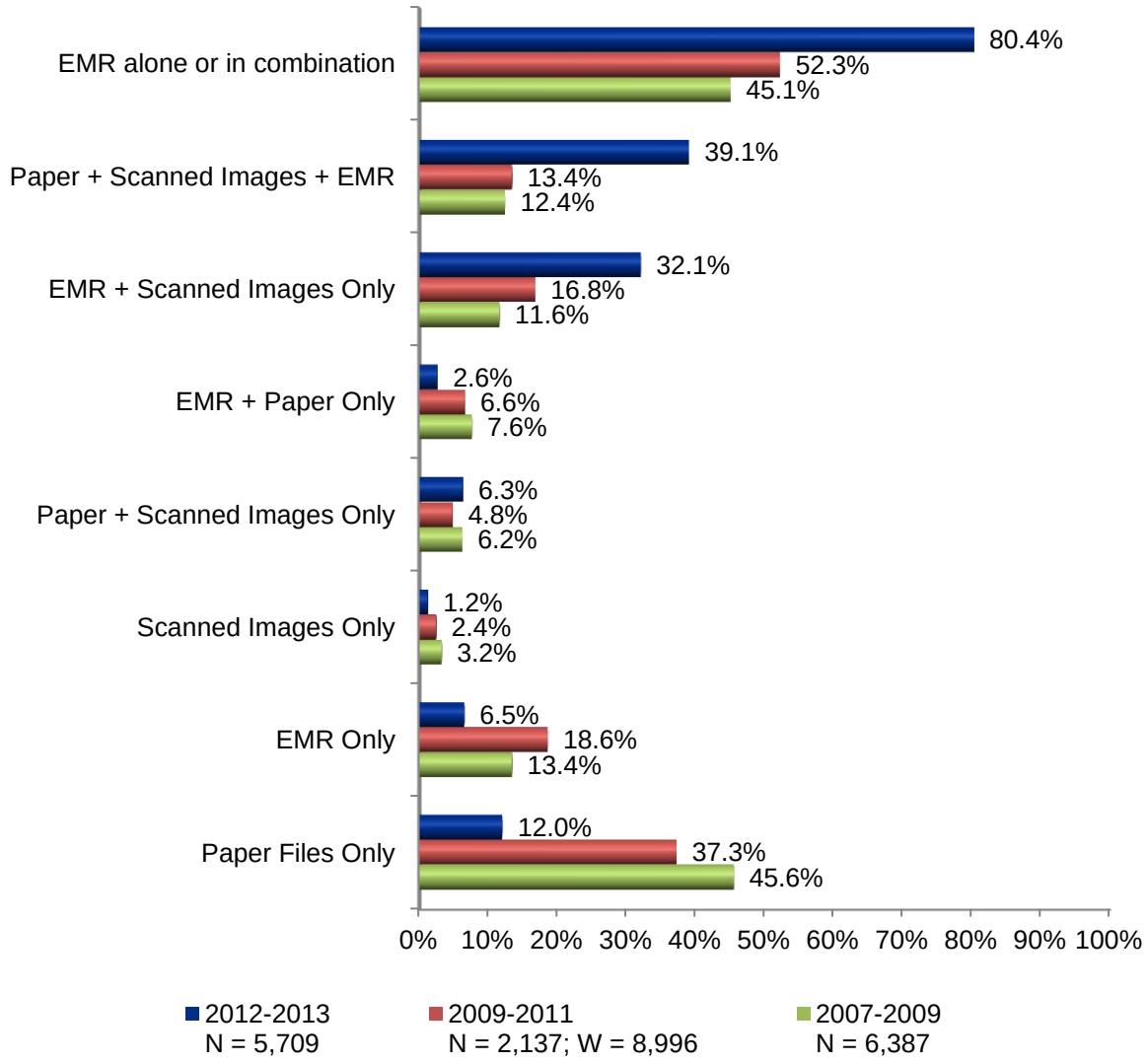
Source: AMB, ABOE Survey Data, 2007-2009; 2009-2011; 2012-2013.

Note: The 2011 weight = 4.21. The 2011 estimates are subject to substantially more uncertainty than the other renewal period data.

Respondents who did not identify a method of storing medical records (missing): 390 for 2007-2009 and 2,567 for 2012-2013.

*Data on "EMR alone or in combination" is not mutually exclusive from other categories.

Figure 6. Methods of Storing Medical Records by Renewal Period



Source: AMB, ABOE Survey Data, 2007-2009; 2009-2011; 2012-2013.

Note: Respondents who did not identify a method of storing medical records (missing): 390 for 2007-2009 and 2,567 for 2012-2013.

*Data on "EMR alone or in combination" is not mutually exclusive from other categories.

The uncertainty in the 2009-2011 estimates notwithstanding, the trend to increasing reliance on EMRs, often in combination with paper or scanned medical records, is quite clear. The percentage of physicians using EMRs increased from approximately 45% in 2007-2009 to approximately 80% in 2012-2013. The trend in Arizona is consistent with trends in the use of EMRs in the United States. The percentage of office based physicians using some form of EMR in the United States increased from 48% in 2009 to 72% in 2012 (Hsiao and Hing 2012).

The national data from the NAMC survey are not strictly comparable since they represent only a portion of the physicians included in our survey. The exclusions include physicians in federal facilities where the utilization rates of EMRs approach 96% and a number of specialty practices (Hsiao and Hing 2012). The results from the NAMC survey estimate, however, that more than 82% of physicians in office based practices in Arizona used some form of EMR in 2012.

The use of paper records alone in Arizona declined from nearly 46% to 12% between 2007-2009 and 2012-2013. Utilization of EMRs in combination with scanned files increased nearly threefold from 12% to 32%. The use of EMRs in combination with paper and scanned files increased by a slightly larger multiple, suggesting that many of the new adopters of EMRs were physician practices that had previously begun a transition from paper records to scanned records. The process is one of gradual transition from paper records and scanned records to EMRs rather than the complete translation of existing records to EMRs. Our data do not address the transition from paper to EMRs, but one can imagine strategies that create EMRs for new patients or previous patients if they continue to seek care, while leaving the records of patients who may not return for care in their original format.

Another possible influence is the absence of electronic networks for the exchange of clinical information. In a summary of several surveys reported in *Information Week*, 80% of organizations with EMRs also use paper records (Terry 2012). The *Information Week* article, citing various sources, reports that many practices with EMRs receive faxes and paper documents from other practices because electronic interfaces are not available. Many of the documents are scanned or entered into the EMRs. The reliance on scanning in conjunction with EMRs suggests another reason for the proliferation of scanned documents in firms with EMRs.

A Multivariate Model of the Determinants of EMR Adoption & Information Exchange

We use multivariate logistic regression models to: (1) estimate the influence of various characteristics on the use of EMRs; and (2) measure the extent to which the characteristics of EMR users affect the extent to which they exchange information with others. The odds ratios are a measure of the influence of a particular characteristic, such as age, on use of an EMR, “all else equal”. An “all else equal” effect is the marginal influence of a measured characteristic, such as age, holding the effects of all other characteristics (e.g., type of practice, gender, location, specialty etc.) constant. The variables added to the 2012-2013 results affect all the

estimated coefficients by changing the content of the variables that provide the “all else equal” interpretations of the results.

To use an example from Table 10 below, physicians age 25 to 34 are, all else equal, 3.7 times *more* likely to utilize EMRs in their practice than physicians age 65 and older. An odds ratio less than 1.0 indicates that physicians in a particular group are *less* likely than those in the comparison group to utilize EMRs.

The first set of results estimate the probability of being an EMR user, comparing EMR users to all physicians. The second and third columns of results compare the number of physicians with EMRs who exchange information to all physicians who use EMRs.

There are no significant differences, all else equal, between Osteopathic and Allopathic physicians.

The odds ratios for types of practice can be ranked in terms of the odds that physicians use EMRs in each work setting relative to federal health care systems. None of the practice types reach as high a utilization rate as federal facilities, but there are important differences among the types of practices.

Physicians in hospital owned group practices are most likely, all else equal, to use EMRs, with physicians in academic settings (presumably teaching hospitals) effectively tied with community health centers for second place. The odds are slightly lower for physicians in state or privately owned hospital systems. The odds of physicians using EMRs in the remaining practice settings are markedly lower than those in the top five. The odds ratios in the remaining types of practice range from 0.135 for physician owned group practices to 0.05 for solo practitioners.

The effects of age are measured relative to physicians in the 65+ age group. The odds of EMR use is at a maximum in the 25-34 year age group (3.71) and only slightly lower among physicians age 35-44 (3.38). The odds drop sharply for the 45-54 year age to 2.36 and drop to 1.68 among physicians 55-64 years of age. An inverse relationship between physician age and EMR use has been observed in every period from 2007-2013.

One can speculate that differences in age represent differences in the culture of the medical profession, established work habits, facility with computerized applications, and training. An additional correlate of age, which is especially important for solo practitioners and small physician owned practices, is that the relatively short durations before retirement make the

Return on Investment (ROI) to implement EMRs too low. The cost of purchasing a system is the most important single barrier cited by physicians in the NHCS Physician Workflow Survey (Jamoom, et al. 2012).

Table 10. Predictors of Being an EMR User/Partially or Fully Connected EMR User, 2012-2013

Variable	*2012-2013*		
	Odds Ratio (EMR User) N=6,534	*Odds Ratio (Partially Connected EMR User) N=5,094*	*Odds Ratio (Fully Connected EMR User) N=5,094*
DO (vs. MD)	0.97	0.95	1.29
Type of Practice (vs. Federal Government)			
Physician Owned Solo Practice	0.05*	3.32*	1.00
Physician Owned Group Practice	0.14*	3.39*	0.66
Hospital/Med School Group Practice	0.41*	1.71*	0.51
Community or Rural Health Center	0.37*	2.22*	0.37*
Private Hospital System	0.26*	1.25	0.29*
Non-Hospital Private Outpatient Facility	0.13*	1.84*	0.54
Medical School, University Research Center	0.37*	1.73*	0.10*
State or County Hospital	0.26*	1.42*	1.10
Other	0.10*	1.62*	0.46
Age (vs. 65 and older)			
25 to 34	3.71*	0.83	2.00
35 to 44	3.38*	1.07	1.68
45 to 54	2.36*	1.16	1.66
55 to 64	1.68*	1.08	1.32
Gender (Female vs. Male)	0.84*	0.98	0.71
Location (vs. all other AZ counties)			
Maricopa County	0.88	0.88	0.80
Pima County	0.97	0.90	0.76
Specialty (vs. Hospital Based Specialists)			
Primary Care	1.21*	4.17*	6.69*
Medical Care	1.01	3.67*	3.23*
Pediatric Care	1.29	3.35*	3.79*
Surgical Care	0.86	2.18*	1.51

Source: AMB, ABOE Survey & Licensing Data, 2012–2013.

Note: 1,742 observations were deleted due to missing values. *Statistically significant at p less than or equal to 0 .05.

Women physicians are slightly less likely, all else equal, to use an EMR than are male physicians.

Physicians who practice in the urban counties of Maricopa and Pima are neither more nor less likely than physicians in the other counties of Arizona to use EMRs.

The odds ratios for the influence of each specialty are measured relative to physicians in a hospital based specialties. All else equal, primary care is the only specialty that has a significant influence on the use of EMRs relative to hospital based specialties.

Exchanges of Information

The results in the second and third columns of Table 10 estimate the odds ratios for the exchange of information among physicians who use EMRs. The six functions defined on this survey for the exchange of information are *Patient Care Summary, Prescriptions (e-prescribing), Lab Test Results, Reminders for Guideline Based Interventions, Public Health Reports,* and *Quality Metrics (HEDIS, AQA etc.).*

The "Partially Connected" physicians are defined as users of at least one of their EMR's functions to exchange information with others. The "Fully Connected" physicians are those who use all six functions to exchange information to others.

Approximately 2,171 or 42.6% of physicians with EMRs are "Partially Connected" and only 136 or 2.7% of physicians with EMRs are "Fully connected". The small sample of fully connected users is not, in our opinion, sufficient for stable estimates. We present results for the fully connected group but defer discussion until a larger sample is available.

The only significant influences on the exchange of information are the type of practice and physician specialty.

The practice types that are most likely to exchange information are the physician owned group practice, with solo practice a close second relative to federal government practices. Physicians in community health centers are the next most likely to exchange information with others. Private hospital systems are the only practice type that is not significantly different from federal organizations.

All the specialty groups have large significant effects on connectivity, with primary care the most influential. One can speculate that the results for primary care reflect the effects of the Medicaid and Medicare incentive programs but that suggestion requires additional study.

The results suggest that the characteristics of individual physicians (age, gender) that are significant influences on the use of EMRs do not influence the exchange of information once an EMR is adopted. Older physicians are, for example, least likely to adopt EMRs, but once an EMR is adopted, there are no significant age related differences in the extent to which physicians exchange EMR data with others.

It appears that the exchange of information depends primarily on the environment in which physicians work. As we indicated in the previous section, a major obstacle to the exchange of information is the absence of electronic networks (health information exchanges) that are necessary for exchanges to occur. The extent to which connectivity is determined by intra-organizational factors versus the availability of health information networks will require additional study.

Our results include exchanges within a practice or a single hospital system and exchanges between organizations. Exchanges among different organizations such as between hospital systems or among physician owned solo or group practices are much less frequent.

Trends 2007-2013

An advantage of the ongoing CHiR survey is the ability to track trends in the use of EMRs and an array of associated characteristics over time. Improvements in the electronic version of the survey were achieved at the costs of some loss of between-year comparability for some questions. The survey questions for previous years included, for example, only two specialty groups rather than the five classifications in current use. The categories for types of practice were also expanded and the content was changed to eliminate some internal inconsistencies. Other important questions, such as the types of medical records in use (EMR, paper, scanned and combinations) are the same and comparisons of EMR utilization rates over time are appropriate.

The definitions of partially and fully connected are completely changed with the availability of much more detailed survey questions on the availability and use of the functions embedded in EMR software packages. The changes limit comparability of the multivariate results over time. Inferences at a very general level are possible, including longitudinal differences among the

effects of physicians' ages, differences between allopathic and osteopathic physicians, and urban versus rural physicians.

Table 11. Multivariate Predictors of Being an EMR User/Connected EMR User, 2007-2011

Variable	*2009-2011*		*2007-2009*	
	Odds Ratio (EMR User)	*Odds Ratio (Fully Connected EMR User)*	*Odds Ratio (EMR User)*	*Odds Ratio (Fully Connected EMR User)*
Type of Practice (vs. Government)				
Group Practice	0.38*	0.43*	0.28	0.13
Community Health Center	0.66	0.45*	0.23	0.08
Hospitalist	0.52	0.80	0.54	0.46
Solo Practice	0.11*	0.09*	0.08	0.02
Academic Teaching/Research	1.10	1.19	0.76	0.72
DO (vs. MD)	1.02	1.14	1.60*	1.04
Age (vs. 65 and older)				
25 to 34	2.63*	1.99	3.16*	2.12*
35 to 44	3.19*	1.85*	2.49*	1.69*
45 to 54	2.36*	1.75*	2.12*	1.90*
55 to 64	1.35	1.24	2.07*	1.92*
Gender (Female vs. Male)	0.75*	0.84	0.92	0.94
Location (vs. all AZ counties except Maricopa and Pima)				
Maricopa County	0.98	0.93	1.12	1.28
Pima County	0.92	0.92	1.18	0.89
Primary Care (vs. Specialty Care)	1.20	1.85*	1.20*	0.89

Source: AMB, ABOE Survey Data, 2007- 2009; 2009-2011.

Note: 1,284 observations were deleted due to missing values.

*Statistically significant at p less than or equal to 0 .05.

The inverse relationship between physician ages and the use of EMRs occurs in all the years. In 2012-2013 physicians age 25-34 are 3.71 times as likely to use EMRs as are physicians age 65+. The likelihood of EMR use declines in each subsequent age group with physicians age

55-64 only 1.7 times as likely to use EMRs as the 65+ age group. The negative relationship between physician age and the use of EMRs is one of the most striking features of the results from previous years as well.

Age is not the only influence on the use of EMRs, but the gap in utilization rates between older and younger physicians will gradually disappear as the younger physicians replace retiring older physicians.

Osteopathic physicians were more likely than allopathic physicians to have EMRs in 2007-2009, but there are no significant differences between DOs and MDs in 2009-2011 or in 2012-2013.

There are no significant differences in EMR use between Maricopa and Pima County physicians or between them and physicians practicing in more rural counties (the omitted group).

Utilization of EMR Functions

The functions included in EMR software packages vary among vendors. In addition, the selection of functions included varies among physicians. The results describe the extent to which key functions are included in physicians' EMRs; the extent to which physicians use those functions; and the extent to which information is exchanged with others by physicians who use the functions. Specifically we examine inclusion, use and exchange for each of the following:

- Patient Care Summary
- Prescription Function
- Lab Results Function
- Reminders Intervention Function
- Public Health Reports Function
- Quality Metrics Function

There is variation in the extent to which the functions are included in EMR software. Although there are some variations by type of function, approximately 4,900 physicians answered the question.

Table 12. Utilization of Available EMR Functions*

EMR Functions	*Included in EMR*	*Used by the Respondent Number/Percent*		*Exchanged with Other Providers Number/Percent*	
Lab Results	3,720	3,434	92.3%	1,305	35.1%
Patient Care Summary	3,765	3,440	91.4%	1,224	32.5%
Prescription "e-prescribing"	3,523	3,145	89.3%	1,678	47.6%
Reminders for Interventions	2,296	1,872	81.5%	452	19.7%
Quality Metrics (HEDIS, AQA, etc.)	1,463	1,139	77.9%	514	35.1%
Public Health Reports	1,701	1,286	75.6%	526	30.9%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: *The data in this table effectively treat *"Don't Know"* answers as *"No"* since the questions ask for the respondent's experience, not for the practices of other physicians in the same organization.

The data in this table only include those physicians that answered *"Yes"* to the Include question for each EMR function. Furthermore, the data only includes those that answered both the Used and Exchanged questions for each EMR functions; if either question was left blank the physician was excluded from the table for that function.

The most frequently used functions are the *Patient Care Summary and Lab Results* functions. The latter probably reflects the long standing practice of electronic reporting by Sonora Quest Laboratories. The pre-existing reporting systems simplified the inclusion of laboratory results in EMR software.

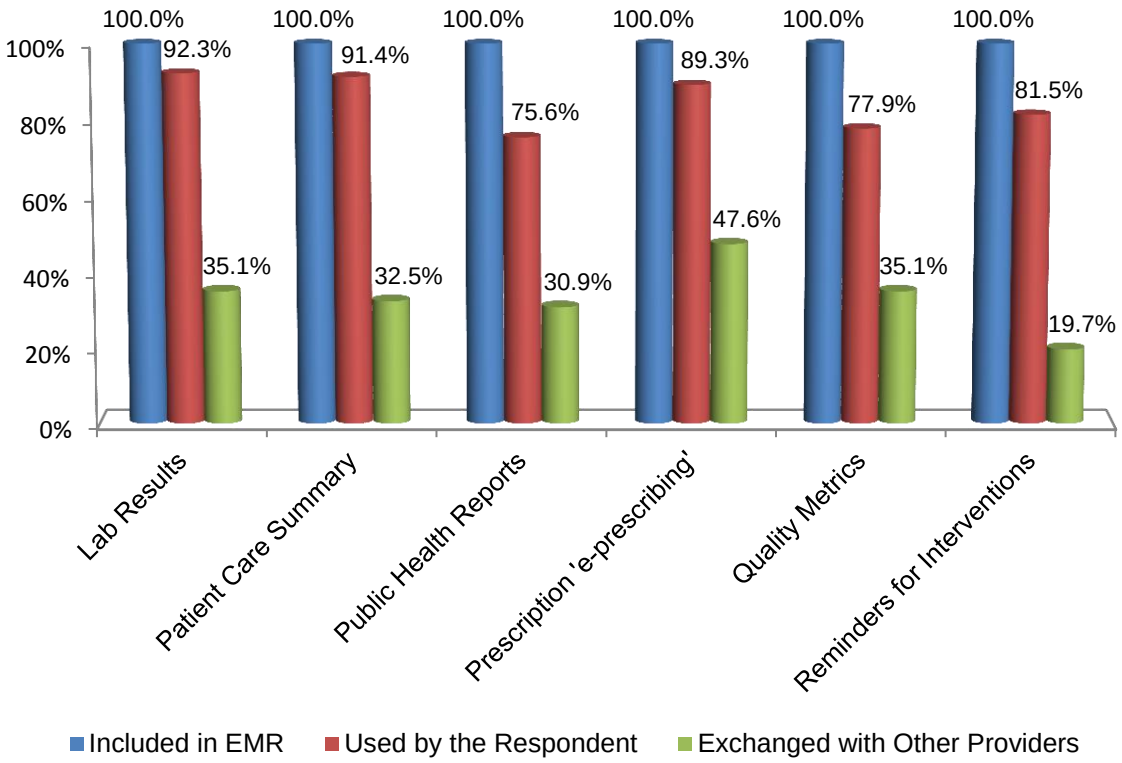
The third most prevalent function is E-*prescribing* and the information is, as expected, the most likely to be exchanged since by its nature, electronic transfer is required. It is curious, however, that less than one-half of those who use the function also exchange the information.

The *Quality Metrics f*unction is least often included in EMRs among the six functions with the *Public Health Reports* function only slightly more prevalent. *Reminders for Interventions* are more prevalent and are used by more than 80% of physicians with access to the function but the information is the least likely of the functions to be exchanged. Presumably this reflects the absence of electronic mechanisms for corresponding with patients.

The use of EMRs is the necessary condition for the realization of the benefits of EMRs, but it is not sufficient to reach that goal without adequate methods of exchanging information. The very low percentages of physicians who exchange their EMR data with others are a significant obstacle to achieving the benefits of EMRs.

.

Figure 7. Summary Utilization of Available EMR Functions



Source: AMB, ABOE Survey Data, 2012–2013.

Note: The data in this table only include those physicians that answered *"Yes"* to the Include question for each EMR function. Furthermore, the data only includes those that answered both the Used and Exchanged questions for each EMR functions; if either question was left blank the physician was excluded from the table for that function.

Quality metrics and required reports such as reportable diseases are reported by other methods, including email, faxes and separate electronic networks. Although the information is not lost, EMRs would be a more efficient and timelier means of delivery. The marked disparity between the use of EMRs and the sharing of information is a consistent feature of all the previous CHiR surveys, although the previous results are less detailed.

It is also likely that the results overstate exchanges of information that occur between physicians in different practices or different hospital systems. Our results include exchanges within a practice or a single hospital system and exchanges between organizations. Exchanges between different organizations such as hospital systems or among physician owned practices are much less frequent.

The most important obstacle to the inter-organization transfer of electronic health information is the shortage of Health Information Exchanges (HIEs). The history of HIEs linking different organizations is one of frequent failure, largely traceable to the absence of viable business models (E Health Initiative 2012). The lack of HIEs also forces practices with EMRs to exchange information via fax, requiring the recipients to continue to use paper or scanned documents in addition to their EMRs (Terry 2012).

The Health Information Network of Arizona (HINAZ) is striving to solve the problems that have hampered the expansion of HIEs, but it does not yet provide service to the majority of Arizona physicians.

HINAZ has the following participants (Bharathan, K, Executive Director of HINAZ 2013):

- 11 hospitals, including 4 Critical Access Hospitals
- 7 health plans
- 3 community health centers
- 1 reference laboratory
- 7 clinics
- 3 long term care facilities
- 1 county corrections department

One promising feature of HINAZ is the involvement of the seven health plans. The economic benefits of exchanging patient information directly accrue to payers. The unnecessary costs of duplicate testing, treatments required because of prescription errors, and other information related problems are borne by the organizations that assume economic risk, including insurers and health care organizations that provide capitated care. Thus, they are also the primary economic beneficiaries of exchanges of information that reduce avoidable negative outcomes of care.

Utilization of EMRs by Vendor

The 2012-2013 survey includes, for the first time, questions enabling physicians to evaluate their EMRs on usability, functionality and a number of other important characteristics. The

results are, however, subject to the possibility that the rankings by physicians in the second year (2013-2014) of the two renewal cycle could differ from these first year (2012-2013) results. The questions are new so we cannot judge the likelihood of differences between the two years.

The distribution of EMR brands by number of users is described in Figures 8 and 9. One peculiar feature of the results is the large number of EMR users who do not know the brand of software they are using (Table 13). Large surveys always include responses that are erroneous. These responses result from misunderstandings of the question because of a respondent's inattention or from poorly designed questions.

Table 13. EMR Users Unaware of EMR Vendor Name by Type of Practice, 2012-2013 (N = 631)

Type of Practice	*Number of Physicians*	*Percent*
Physician Owned Solo Practice	58	9.1%
Physician Owned Group Practice	190	30.1%
Hospital/Medical School Group Practice	83	13.1%
Community or Rural Health Center	34	5.4%
Federal Government Hospital or Clinic	104	16.5%
Private Hospital System	40	6.3%
Non-Hospital Private Outpatient Facility	33	5.2%
Medical School, University Research Center	24	3.8%
Health Insurer/Pharmacy/Health Related Organization without Provision of Care	0	0
State or County Hospital System	2	0.3%
Other	63	10.0%
Total	631	100.0%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: N represents the number of physicians who answered "Don't Know" for this survey question.

The survey question that asked for the vendor or brand name of the EMR used by a respondent included 21 brand names and a category for “Other” with an associated blank for the name to be written in by the respondent. Slightly more than 950 physicians answered “Other” and an additional 631 physicians who used EMRs did not know the brand name of their EMR.

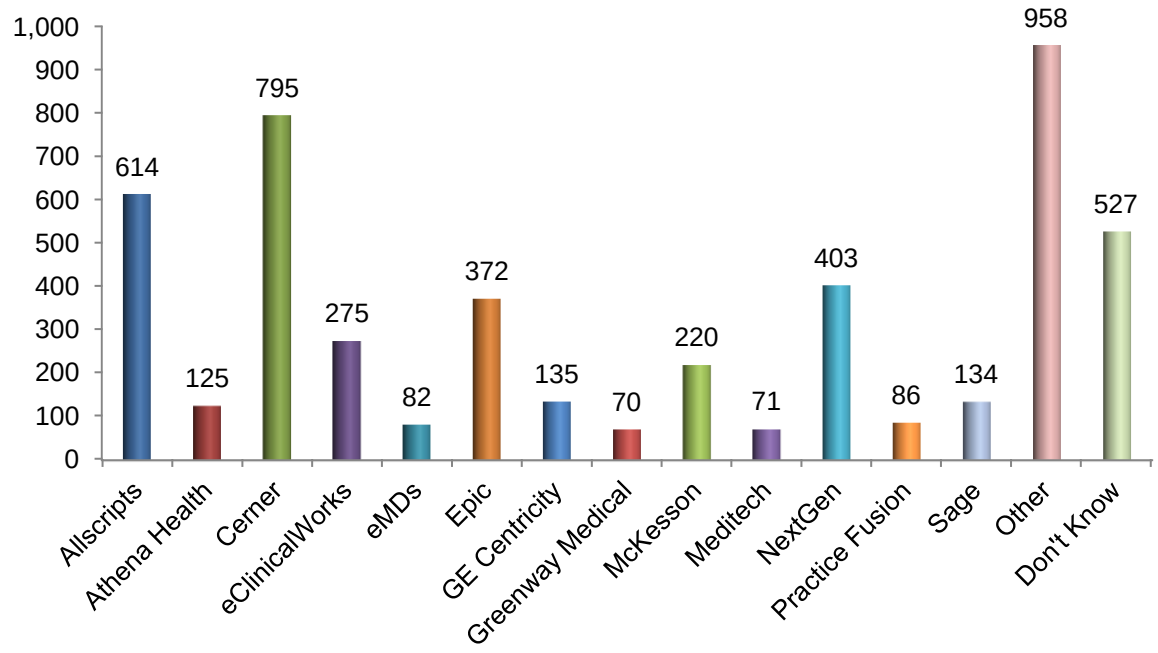
Physicians who answered “Other” were given the opportunity to enter the name of their EMR software as a text field in the survey instrument. Text entries are inherently cumbersome to characterize and convert to data. The text entries are being analyzed by reviewing the brand names in the “write in” section of the question and will be included in the next report in this series. The analysis to date reveals a very large number of different EMR software packages that typically have very few users. The results are an example of the challenges to be faced in standardizing EMR software and providing for interoperability.

Previous years’ results show that only approximately one-third of physicians using EMRs were either the decision maker or participated in the choice of an EMR package.

We expected that the “Don’t Know” responses should disproportionately be found in large organizations such as hospital systems but nearly 67% of the “don’t know” respondents worked outside of hospital settings. It was most surprising that 9.1% of solo practitioners could not identify their EMRs.

One implication of the results is that many physicians using EMRs are not communicating their evaluations of their EMRs to the EMR vendors. In large hospital systems, the feedback may be provided by physicians in management or information technology (IT) roles, but in smaller organizations, it appears that valuable information concerning the performance of EMRs is being lost.

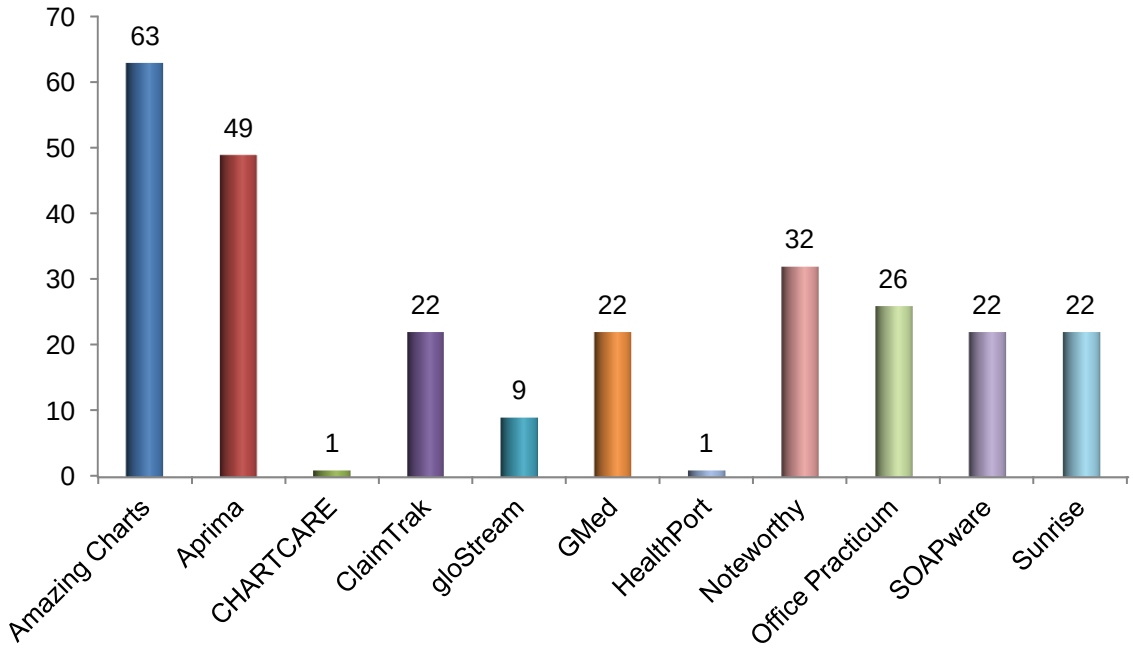
Figure 8. EMR Use by Vendor ≥ 70 Users



Source: AMB, ABOE Survey Data, 2012–2013.

Note: The "Other" vendor includes all vendors contracted with government hospitals/clinics. 2,820 physicians did not respond to the survey question on vendor name.

Figure 9. EMR Use by Vendor < 70 Users



Source: AMB, ABOE Survey Data, 2012–2013.

Note: 2,820 physicians did not respond to the survey question on vendor name.

Physicians' Evaluation of EMR Software

The results in this section describe how Arizona physicians rank their EMR software on five criteria, namely:

- Ease of use
- Effect on physician productivity
- Effect on staff productivity
- Reliability
- Performance vs. promise

Each physician rates the EMR that she or he uses on a scale from 1 to 5, where 1 represents "Awful" and 5 represents "Outstanding". The intermediate values are not defined but the mid-point in the range can be thought of as approximating "acceptable" or a neutral evaluation. Rankings greater than 3 can be interpreted as positive. A ranking greater than "3" for physician or staff productivity indicates, for example, that an EMR has increased productivity, while rankings less than "3" suggest that an EMR has reduced productivity.

This section begins with a description of the rankings assigned to each of the five criteria described above. It then summarizes the results for each vendor in Table 25. Our discussion focuses on the summary results with a few comments on the more detailed information. Physicians practicing in government settings are excluded from these results but will be included in the next report in this series.

The rankings across all EMRs are a representation of a general evaluation of EMRs of several different types by different types of practices and physicians. Thus, without further clarification, individual EMR packages should not be interpreted as substitutes for one another. Many EMRs, such as *eClinicalWorks* are general purpose products while the *Gmed* EMR is specifically designed for gastroenterology specialists. Appendix E summarizes EMRs by vendor and intended use.

The fact that an EMR designed for primary care physicians might be ranked lower than an EMR designed for only one specialty does not imply that the primary care physicians could or should adopt the specialty EMR. Similarly, the finding that EMR brand A has a higher rating than EMR

brand B should not imply that brand A is a better buy than brand B without reference to the cost (and thereby the cost effectiveness) of the two brands. We hope to further classify the EMR packages by their intended use to permit within group comparisons as part of the final report for the current renewal cycle.

The survey does not ask if the physician respondent is using an EMR that replaced an EMR package that was not acceptable. In such cases, the rankings of the current EMR could reflect a choice that solved the problems with the previous EMR and would, presumably be more positive than a first time EMR that was acceptable but perhaps not as well suited to the physician's specific needs. Such situations are extremely costly but the information on the prevalence of these problems in Arizona is not known.

The results presented next are restricted to the ten EMR packages that have the largest number of users because of the difficulty of presenting results for the very large number of vendors that serve physicians in Arizona. A more complete summary is presented in Table 25.

A great deal of attention has been given to the shortcomings of EMRs, but physicians' average rankings are equal to or slightly above the midpoint in the 1-5 scale. The results are generally consistent with results from the NCHS Survey of physicians in office-based practices. The NCHS results for 2011 show that 38% of the physicians were very satisfied with their EMRs and 46% were somewhat satisfied (Jamoom, et al. 2012).

Table 14. Ranking of All EMRs by Ease of Use (N = 4,640) (Weighted Mean Rank = 3.3)

Ranking	*Number of Physicians*	*Percent*
1 (Awful)	337	7.2%
2	608	13.1%
3	1,666	35.9%
4	1,394	30.0%
5 (Outstanding)	635	13.6%

Source: AMB, ABOE Survey Data, 2012–2013.

As indicated in Table 14, the weighted mean rank for the ease of using an EMR is 3.3. Only 20.3% of physicians give their EMR a rank less than 3 while 43.6% rate their EMR as greater than 3. The distribution suggests that physicians are positive about the ease with which their

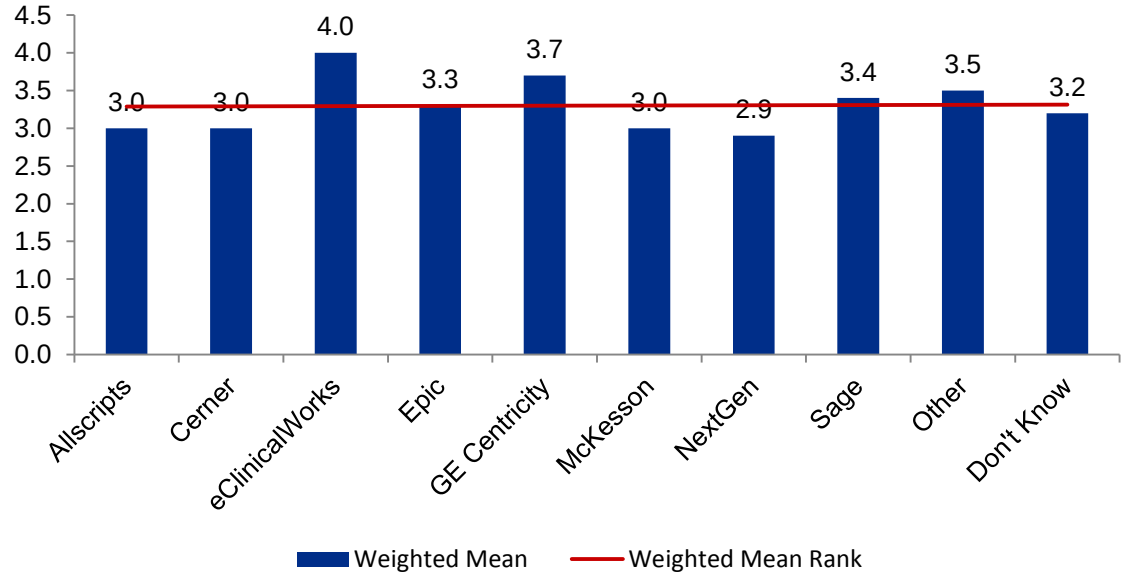
EMRs can be used. With minor variations, this distribution is characteristic of the rankings for the other criteria used to evaluate EMRs.

Table 15. Ease of Use by Top 10 Vendors

Vendor	*1 Awful*	*2*	*3*	*4*	*5 Outstanding*	*Total*	*Weighted Mean*
Allscripts	43 7.9%	100 18.4%	245 45.2%	120 22.1%	33 6.0%	541 13.7%	3.0
Cerner	88 12.0%	133 18.1%	237 32.4%	207 28.3%	66 9.0%	731 18.5%	3.0
eClinicalWorks	1 0.3%	11 4.1%	58 21.8%	118 44.3%	78 29.3%	266 6.7%	4.0
Epic	17 5.2%	36 11.1%	128 39.6%	108 33.4%	34 10.5%	323 8.2%	3.3
GE Centricity	4 3.2%	8 6.5%	32 26.2%	58 47.5%	20 16.3%	122 3.0%	3.7
McKesson	25 12.0%	35 16.8%	78 37.5%	51 24.5%	19 9.1%	208 5.2%	3.0
NextGen	43 11.4%	85 22.7%	133 35.5%	92 24.5%	21 5.6%	374 9.4%	2.9
Sage	3 2.3%	8 6.2%	62 48.8%	41 32.2%	13 10.2%	127 3.2%	3.4
Other	50 5.8%	81 9.3%	285 33.0%	274 31.7%	172 19.9%	862 21.8%	3.5
Don't Know	29 7.5%	42 10.9%	186 48.3%	80 20.7%	48 12.4%	385 9.7%	3.2
Top 20 Total	303 7.6%	539 13.6%	1,444 36.6%	1,149 29.1%	504 12.7%	3,939 100.0%	3.3

Source: AMB, ABOE Survey Data, 2012–2013.

Figure 10. Weighted Mean Rank of Ease of Use by Top 10 Vendors



Source: AMB, ABOE Survey Data, 2012–2013.

Figure 10 shows that *eClinicalWorks* is the most highly ranked EMR in terms of ease of use, followed by *GE Centricity,* followed closely by a cluster of EMRs with rankings either at the group weighted mean of slightly below or above the mean. The exception is *NextGen* with a ranking of 2.9. Tables 16-24 detail the ranks that physicians assigned to EMRs from the 10 most widely used EMRs.

The introduction of an EMR into a practice typically requires investments in physician and staff time to learn new procedures and make the transition from paper or scanned records to the EMR. In some instances, an EMR package does not fit well into a practice and must be replaced. Both situations imply a loss of physician and staff productivity and both are often cited in critiques of EMRs. Increases in productivity attributable to the use of EMRs are much less discussed. The physician rankings of the effect of EMRs on physician and staff productivity, however, reveal an almost exact balance between increases and reductions in productivity creating an average rank approximately equal to the mid-point in the scale.

We do not know from the current results whether the rankings would be substantially different if we separated physicians dealing with recently introduced EMRs from those with EMRs in use for longer periods of time. We suspect that productivity, on average, would increase with the duration for which an EMR had been used. That is a topic worthy of additional analysis.

Table 16. Ranking of All EMRs by Physician Productivity (N = 4,619) (Weighted Mean Rank =3.0)

Ranking	*Number of Physicians*	*Percent*
1 (Awful)	566	12.2%
2	911	19.7%
3	1,530	33.1%
4	1,108	24.0%
5 (Outstanding)	504	10.9%

Source: AMB, ABOE Survey Data, 2012–2013.

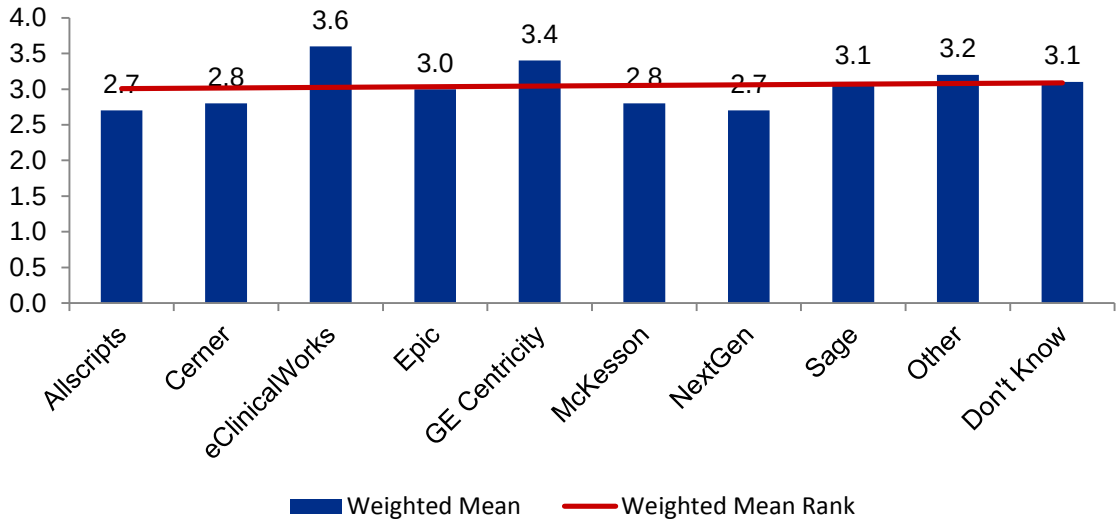
The average rankings across all brands tend to smooth out some of the differences among individual EMR packages. Among the ten vendors with the most users, the *eClinicalWorks* and *GE Centricity* EMR receive the most positive rankings in terms of physician productivity. *Allscripts* and *NextGen* are tied for the least positive ranking for physician productivity. The ranking for *McKesson* is only very slightly higher.

Table 17. Physician Productivity by Top 10 Vendors

Vendor	*1 Awful*	*2*	*3*	*4*	*5 Outstanding*	*Total*	*Weighted Mean**
Allscripts	92 17.0%	138 25.5%	184 34.0%	97 17.9%	30 5.5%	541 13.7%	2.7
Cerner	122 16.6%	162 22.1%	234 32.0%	154 21.0%	59 8.0%	731 18.6%	2.8
eClinicalWorks	8 3.0%	31 11.7%	62 23.4%	109 41.2%	54 20.4%	264 6.7%	3.6
Epic	34 10.5%	68 21.1%	110 34.1%	83 25.7%	27 8.3%	322 8.2%	3.0
GE Centricity	8 6.5%	13 10.6%	39 31.9%	42 34.4%	20 16.3%	122 3.1%	3.4
McKesson	29 14.0%	51 24.7%	72 34.9%	32 15.5%	22 10.6%	206 5.2%	2.8
NextGen	69 18.4%	102 27.2%	111 29.6%	71 18.9%	21 5.6%	374 9.5%	2.7
Sage	9 7.1%	24 19.0%	46 36.5%	38 30.1%	9 7.1%	126 3.2%	3.1
Other	88 10.2%	143 16.7%	276 32.2%	217 25.3%	131 15.3%	855 21.8%	3.2
Don't Know	40 10.5%	53 13.9%	166 43.6%	80 21.0%	41 10.7%	380 9.6%	3.1
Top 20 Total	499 12.7%	785 20.0%	1,300 33.1%	923 23.5%	414 10.5%	3,921 100.0%	3.0

Source: AMB, ABOE Survey Data, 2012–2013.

Figure 11. Weighted Mean Rank of Physician Productivity by Top 10 Vendors



Source: AMB, ABOE Survey Data, 2012–2013.

Table 18. Ranking of All EMRs by Staff Productivity (N = 4,597) (Weighted Mean Rank = 3.1)

Ranking	*Number of Physicians*	*Percent*
1 (Awful)	469	10.2%
2	837	18.2%
3	1,604	34.9%
4	1,172	25.5%
5 (Outstanding)	515	11.2%

Source: AMB, ABOE Survey Data, 2012–2013.

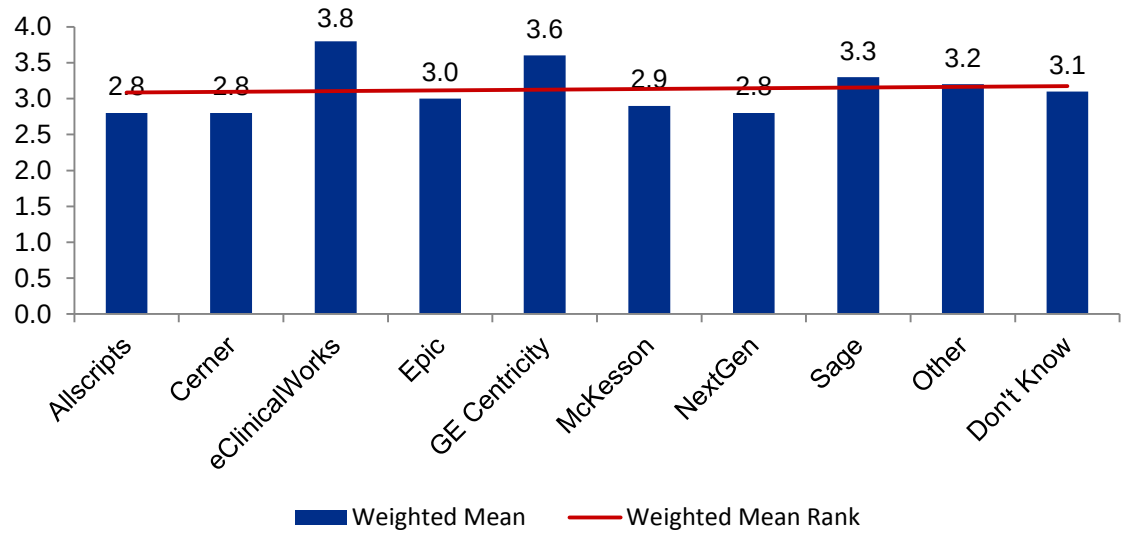
The *eClinicalWorks* and *GE Centricity* EMRs are the most highly ranked in terms of staff productivity, just as they were the most highly ranked for physician productivity. The *Allscripts, Cerner* and *NextGen* EMRs are tied for the lowest rankings. The ranking for *McKesson* is only very slightly higher.

Table 19. Staff Productivity by Top 10 Vendors

Vendor	*1 Awful*	*2*	*3*	*4*	*5 Outstanding*	*Total*	*Weighted Mean*
Allscripts	66 12.2%	127 23.6%	208 38.6%	99 18.4%	38 7.0%	538 13.7%	2.8
Cerner	118 16.1%	168 23.0%	243 33.2%	148 20.2%	53 7.2%	730 18.7%	2.8
eClinicalWorks	1 0.3%	21 8.0%	68 25.9%	117 44.6%	55 20.9%	262 6.7%	3.8
Epic	33 10.3%	71 22.2%	115 36.0%	77 24.1%	23 7.2%	319 8.1%	3.0
GE Centricity	3 2.4%	11 9.0%	36 29.7%	51 42.1%	20 16.5%	121 3.1%	3.6
McKesson	26 12.6%	46 22.4%	72 35.1%	40 19.5%	21 10.2%	205 5.2%	2.9
NextGen	54 14.5%	89 23.9%	128 34.5%	75 20.2%	25 6.7%	371 9.5%	2.8
Sage	5 3.9%	12 9.5%	55 43.6%	42 33.3%	12 9.5%	126 3.2%	3.3
Other	78 9.1%	131 15.4%	277 32.5%	233 27.4%	131 15.4%	850 21.8%	3.2
Don't Know	38 10.0%	54 14.3%	167 44.2%	80 21.1%	38 10.0%	377 9.6%	3.1
Top 20 Total	422 10.8%	730 18.7%	1,369 35.1%	962 24.6%	416 10.6%	3,899 100.0%	3.1

Source: AMB, ABOE Survey Data, 2012–2013.

Figure 12. Weighted Mean Rank of Staff Productivity by Top 10 Vendors



Source: AMB, ABOE Survey Data, 2012–2013.

Table 20. Ranking of All EMRs by Reliability, (N = 4,604) (Weighted Mean Rank = 3.5)

Ranking	*Number of Physicians*	*Percent*
1 (Awful)	215	4.6%
2	473	10.2%
3	1,466	31.8%
4	1,680	36.4%
5 (Outstanding)	770	16.7%

Source: AMB, ABOE Survey Data, 2012–2013.

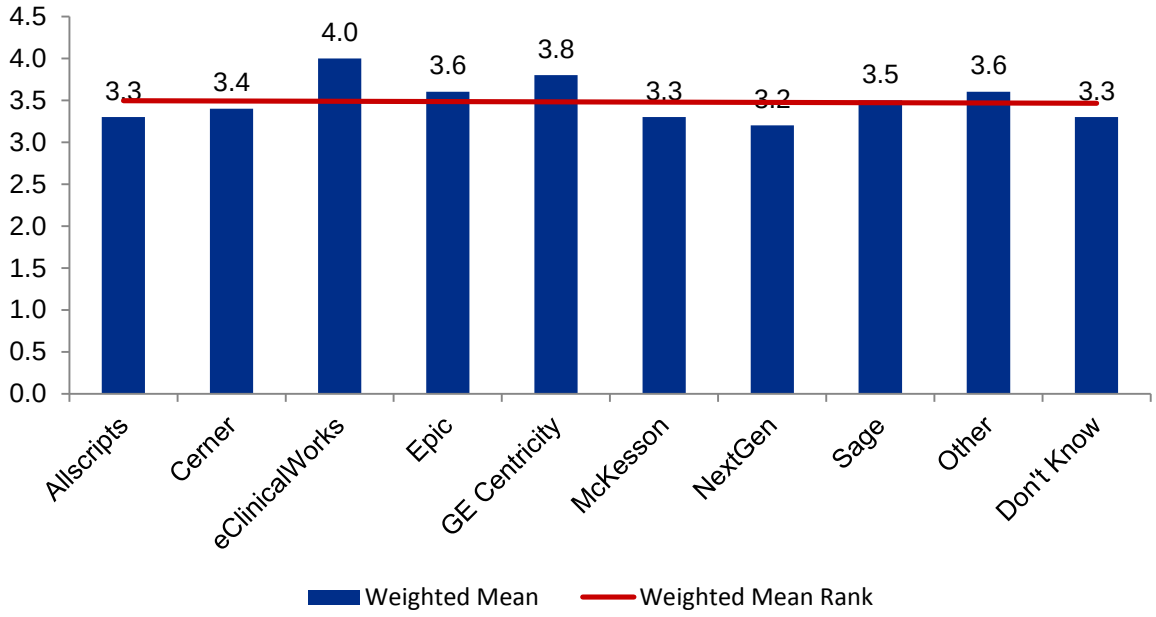
Once again, *eClinicalWorks* and *GE Centricity* are the highest ranking EMRs, in this case in terms of reliability. The rankings for reliability are, however, higher in absolute terms for most of the EMRs relative to the rankings for productivity. The lowest ranking is for *NextGen* with *Allscripts* only very slightly higher.

Table 21. Reliability by Top 10 Vendors

Vendor	*1 Awful*	*2*	*3*	*4*	*5 Outstanding*	*Total*	*Weighted Mean*
Allscripts	30 5.5%	71 13.1%	207 38.3%	180 33.3%	52 9.6%	540 13.8%	3.3
Cerner	42 5.7%	75 10.2%	232 31.8%	296 40.6%	84 11.5%	729 18.6%	3.4
eClinicalWorks	1 0.3%	7 2.6%	58 21.8%	123 46.4%	76 28.6%	265 6.7%	4.0
Epic	6 1.8%	34 10.5%	98 30.5%	129 40.1%	54 16.8%	321 8.2%	3.6
GE Centricity	1 0.8%	4 3.3%	31 25.6%	62 51.2%	23 19.0%	121 3.0%	3.8
McKesson	21 10.1%	30 14.5%	66 32.0%	54 26.2%	35 16.9%	206 5.2%	3.3
NextGen	28 7.4%	52 13.9%	132 35.2%	132 35.2%	30 8.0%	374 9.5%	3.2
Sage	4 3.1%	11 8.7%	46 36.5%	47 37.3%	18 14.2%	126 3.2%	3.5
Other	40 4.7%	83 9.7%	239 28.0%	302 35.4%	187 21.9%	851 21.7%	3.6
Don't Know	22 5.8%	48 12.7%	159 42.1%	102 27.0%	46 12.2%	378 9.6%	3.3
Top 20 Total	195 4.9%	415 10.6%	1,268 32.4%	1,427 36.4%	605 15.4%	3,910 100.0%	3.5

Source: AMB, ABOE Survey Data, 2012–2013.

Figure 13. Weighted Mean Rank of Reliability by Top 10 Vendors



Source: AMB, ABOE Survey Data, 2012–2013.

Table 22. Ranking of All EMRs by Performance vs. Promise (N = 4,517) (Weighted Mean Rank = 3.1)

Ranking	*Number of Physicians*	*Percent*
1 (Awful)	485	10.7%
2	718	15.9%
3	1,691	37.4%
4	1,158	25.6%
5 (Outstanding)	465	10.3%

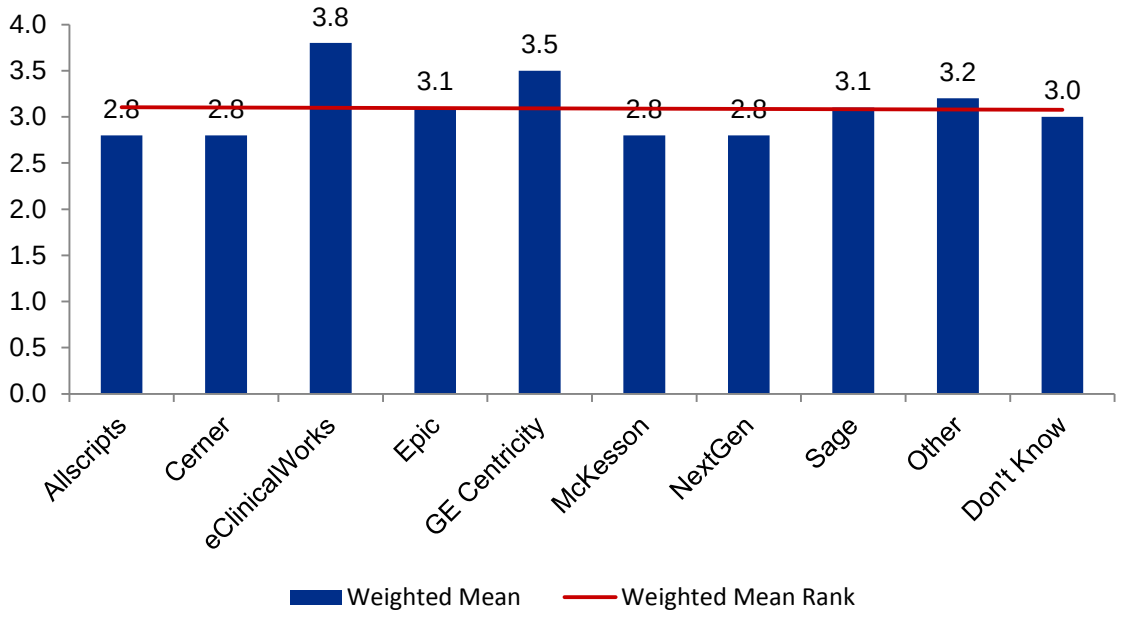
Source: AMB, ABOE Survey Data, 2012–2013.

Table 23. Performance vs. Promise by Top 10 Vendors

Vendor	*1 Awful*	*2*	*3*	*4*	*5 Outstanding*	*Total*	*Weighted Mean*
Allscripts	65 12.2%	113 21.3%	230 43.4%	98 18.5%	23 4.3%	529 13.7%	2.8
Athena Health	119 16.7%	140 19.6%	247 34.6%	162 22.7%	44 6.1%	712 18.5%	2.8
Cerner	3 1.1%	17 6.4%	73 27.8%	117 44.6%	52 19.8%	262 6.8%	3.8
eClinicalWorks	32 10.0%	49 15.4%	123 38.8%	85 26.8%	28 8.8%	317 8.2%	3.1
Epic	7 5.8%	9 7.5%	38 31.9%	47 39.4%	18 15.1%	119 3.1%	3.5
McKesson	31 15.2%	36 17.7%	85 41.8%	37 18.2%	14 6.8%	203 5.2%	2.8
NextGen	53 14.6%	85 23.4%	140 38.5%	66 18.1%	19 5.2%	363 9.4%	2.8
Sage	6 4.8%	23 18.6%	54 43.9%	32 26.0%	8 6.5%	123 3.2%	3.1
Other	84 10.0%	108 12.8%	293 34.9%	234 27.9%	119 14.2%	838 21.8%	3.2
Don't Know	36 9.7%	50 13.5%	181 49.1%	70 19.0%	31 8.4%	368 9.5%	3.0
Top 20 Total	436 11.3%	630 16.4%	1,464 38.1%	948 24.7%	356 9.2%	3,834 100.0%	3.0

Source: AMB, ABOE Survey Data, 2012–2013.

Figure 14. Weighted Mean Rank of Performance vs. Promise by Top 10 Vendors



Source: AMB, ABOE Survey Data, 2012–2013.

Table 24. Summary of All EMR Ranking Criteria

Criterion	*Weighted Mean*	*Number of Physicians*
Ease of Use	3.3	4,640
Effect on Physician Productivity	3.0	4,619
Effect on Staff Productivity	3.1	4,597
Reliability	3.5	4,604
Performance vs. Promise	3.1	4,517
Mean of the Weighted Means	3.3	--

Source: AMB, ABOE Survey Data, 2012–2013.

The mean rankings for the five criteria suggest that ease of use and reliability are more highly ranked than criteria such as effects of EMRs on productivity or perceptions of performance versus vendor promises. The differences are small and one must recognize that physicians who were not involved in the decision to implement a system may not be aware of the promises that accompanied the purchase of the system. Physicians using established systems may not have experienced the transitory effects or, if involved, may have their responses colored by recall. The net effect of these influences is not known.

The results in Table 25 summarize the scores for each of the five criteria and the mean score that characterizes the overall ranking of each EMR package. The results include 25 vendors although results for *HealthPort* and *Chartcare* are excluded to avoid identifying individual physicians.

Table 25. Summary of EMR Ranking Weighted Means by 25 Vendors (N = 4,599)

EMR/EHR	*Mean Rank*	*Ease of Use*	*Doc Productivity*	*Productivity*	*Reliability*	*Performance vs. Promise*	*Total Respondents*
Allscripts	2.9	3.0	2.7	2.8	3.3	2.8	541
Amazing Charts	3.6	3.8	3.3	3.5	3.8	3.8	59
Aprima	3.1	3.3	2.9	3.2	3.4	3.0	46
Athena Health	3.4	3.6	3.0	3.3	3.9	3.3	122
Cerner	3.0	3.0	2.8	2.8	3.4	2.8	732
ClaimTrak	2.6	2.8	2.6	2.6	2.5	2.3	22
eClinicalWorks	3.8	4.0	3.6	3.8	4.0	3.8	266
eMDs	3.6	3.7	3.4	3.5	3.8	3.4	80
Epic	3.2	3.3	3.0	3.0	3.6	3.1	323
GE Centricity	3.6	3.7	3.4	3.6	3.8	3.5	122
gloStream	3.8	4.0	3.9	4.0	3.8	3.4	9
GMed	3.7	4.0	3.5	3.8	3.9	3.4	21
Greenway Medical	3.4	3.5	3.1	3.4	3.8	3.2	56
McKesson	3.0	3.0	2.8	2.9	3.3	2.8	208
Meditech	2.9	2.8	2.7	2.7	3.2	2.8	67
NextGen	2.9	2.9	2.7	2.8	3.2	2.8	374
Noteworthy	3.3	3.3	3.4	3.3	3.6	3.1	29
Office Practicum	3.7	3.8	3.5	3.7	4.0	3.8	26
Practice Fusion	3.7	4.0	3.2	3.3	3.9	3.9	82
Sage	3.3	3.4	3.1	3.4	3.5	3.1	127
SOAPware	3.8	4.0	3.6	3.7	4.0	3.6	22
Sunrise	3.4	3.3	3.4	3.4	3.7	3.2	16
Other	3.4	3.5	3.2	3.2	3.6	3.2	862
Don't Know	3.1	3.2	3.1	3.1	3.3	3.0	385
Average	3.3	3.4	3.1	3.3	3.5	3.2	--

Source: AMB, ABOE Survey Data, 2012–2013.

The top ranked EMRs are *eClinicalWorks, gloStream* and *SOAPware*, each with a rank equal to 3.8. One reason for their high rankings is that each received a score of 4 on the ease of use

criterion and *eClinicalWorks* and *SOAPware* also were ranked as a 4 on reliability. There were five other EMRs with overall scores of 3.6 - 3.7, sufficiently close to the top ranked three EMRs to be considered effectively the same ranking.

The lowest ranked EMR was *ClaimTrak* with a very narrow range of scores for each of the five criteria.

The next section considers the extent to which physicians were aware of incentives to adopt EMRs and the extent to which applications for incentives were made. Many physicians in large organizations do not make these decisions and as the results indicate, a rather large number of survey respondents did not answer the incentive related questions.

EMR Adoption Incentives

The costs of implementing an EMR system are one of the most significant obstacles to EMR adoption and the problem is especially difficult for relatively small health care organizations. Economic incentives have been effective in increasing the rate of adoption nationally. A 2010 study of e-prescribing shows, for example, that nearly 40 percent of e-prescribers had adopted e-prescribing in response to a federal incentive program (Joseph, et al. 2013).

There are a number of conditions defining eligibility for Medicare or Medicaid incentives (Center for Medicare & Medicaid Services 2013). The basic eligibility criteria for Medicare are:

- Subsection (d) hospitals that are paid under the inpatient prospective payment system (PPS)
- Critical Access Hospitals (CAH)
- Medicare Advantage (MA-Affiliated) Hospitals

The Medicaid eligible hospitals include:

- Acute care hospitals with at least 10% Medicaid patient volume
- Children's hospitals

Eligible professionals for Medicaid incentives include:

- Physicians
- Nurse Practitioners
- Certified nurse-midwives
- Dentists
- Physician assistants who furnish services in a federally qualified community health center or rural health clinic led by a physician assistant.

The available data do not include sufficient detail on the organizations in which physicians practice to adequately distinguish between eligible and non-eligible physicians. The results in this section are, therefore, limited by the fact that physicians who are unaware of incentives or who do not receive incentives may, in fact, be in environments to which the incentives do not apply. We hope to improve this analysis in future reports.

The incentive payments made by Medicare and Medicaid (AHCCCS) in Arizona are summarized in Tables 26 and 27. As noted, we do not have the data needed to link adoptions to incentives, but it is true that the recent increases in the rate of adoption of EMRs are correlated with the incentive payments made to health care providers.

Table 26. Total Arizona Medicare and Medicaid EHR Incentive Payments by Provider Type (January 2011 – June 2013)

Provider Type	*Number of Providers*	*Amount of Incentive Payments*
Medicare Eligible Professionals	3,864	$62,869,105
Medicaid Eligible Professionals	2,308	$47,037,595
Total Eligible Professionals	6,172	$109,906,700
Medicaid Eligible Hospitals	2	$4,580,961
Dually Eligible Hospitals	83	$151,885,780
Total Eligible Hospitals	85	$156,466,741
Total EPs and EHs	6,257	$266,373,441

Source: (Johnson, Harootunian and Mayer 2013).

Table 27. Summary of AHCCCS Payments to Eligible Professionals by Type as of July, 31 2013

Eligible Professionals	*Number of Providers*
Physicians (non-Pediatric)	1,384
Physicians (Pediatricians)	577
Physician Assistants (FQHC)	5
Nurse Practitioners	293
Certified Nurse Midwives	71
Dentists	109
Total Eligible Professional Payments*	2,439

Source: (Johnson, Harootunian and Mayer 2013).

Note: *There were 3,200 payments attested, but 2,439 (76%) were paid.

The success in incentivizing physicians to adopt EMRs will continue, and there are physicians as yet unaware of the opportunities. The data in Table 26 must be interpreted, however, with the understanding that physicians in large organizations are often unaware of decisions regarding the use of EMRs or the receipt of incentives. Thus, some physicians who are unaware of the incentives will be practicing in organizations that have received incentive payments. Others may practice in settings that are ineligible for incentives. We will more fully analyze these relationships when the current renewal cycle is completed.

Table 28. Medicare/Medicaid Incentive Payments (N = 6,195)

Aware of Incentive Payments	Number of Physicians	Percent
No	1,182	19.1%
Yes	5,013	80.9%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results. 1,761 physicians did not respond to this question.

The data in Table 27 support our speculation concerning the relationship between physicians' awareness of incentives and the organization in which they practice. The largest percentages of physicians not knowledgeable about incentives are employed in State or County hospital systems, with Medical Schools (not generally not eligible for incentives) a close second. Solo

practice physicians are the group most aware of the incentive programs with only approximately 12% of them who are not aware.

The number of physicians in practices that have applied for Medicare incentive payments is described in Tables 30 through 33.

Table 29. Medicare/Medicaid Incentive Payments by Type of Practice by Decision Maker (N = 5,990)

Type of Practice	*Aware of Incentive Payments*					
	Sole decision maker		*Decided by others*		*Shared decision*	
	Yes	*No*	*Yes*	*No*	*Yes*	*No*
	Number of Physicians (Percent)	*Number of Physicians (Percent)*	*Number of Physicians (Percent)*	*Number of Physicians (Percent)*	*Number of Physicians (Percent)*	*Number of Physicians (Percent)*
Physician Owned Solo Practice	1,052 (88.1%)	138 (11.5%)	2 (0.1%)	1 (0.0%)	0 (0.0%)	0 (0.0%)
Physician Owned Group Practice	1,301 (58.9%)	144 (6.5%)	508 (23.0%)	157 (7.1%)	89 (4.0%)	8 (0.3%)
Hospital/Medical School Group Practice	35 (3.7%)	14 (1.4%)	598 (63.9%)	241 (25.7%)	45 (4.8%)	2 (0.2%)
Community or Rural Health Center	2 (0.6%)	1 (0.3%)	218 (70.3%)	68 (21.9%)	20 (6.4%)	1 (0.3%)
Private Hospital System	19 (4.0%)	7 (1.4%)	297 (63.5%)	126 (26.9%)	17 (3.6%)	1 (0.2%)
Non-Hospital Private Outpatient Facility	16 (8.7%)	4 (2.1%)	115 (62.8%)	38 (20.7%)	8 (4.3%)	2 (1.0%)
Medical School, University Research Center	1 (0.3%)	0 (0.0%)	162 (62.3%)	84 (32.3%)	12 (4.6%)	1 (0.3%)
Health Insurer/Pharmacy/Health Related Organization without Provision of Care	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
State or County Hospital System	0 (0.0%)	0 (0.0%)	31 (58.4%)	18 (33.9%)	4 (7.5%)	0 (0.0%)
Other	41 (10.7%)	15 (3.9%)	205 (53.6%)	91 (23.8%)	27 (7.0%)	3 (0.7%)
Total	2,467 (41.1%)	323 (5.3%)	2,136 (35.6%)	824 (13.7%)	222 (3.7%)	18 (0.3%)

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results. 1,966 physicians were excluded from this table due to missing data, including 1,761 missing Awareness of Incentive Payments; 1,196 missing the Type of Practice; and 1,701 missing the Decision Maker.

Table 30. Applications for Medicare Incentives (N = 4,944)

Applied for Medicare Incentives	*Number of Physicians*	*Percent*
No	1,882	38.1%
Yes	3,062	61.9%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results.

Table 31. Applications for Medicare Incentives by Type of Practice (N = 4,940)

Type of Practice	*Applied for Medicare Incentives*			
	Yes		*No*	
	Number of Physicians	*Percent*	*Number of Physicians*	*Percent*
Physician Owned Solo Practice	524	49.0%	546	51.0%
Physician Owned Group Practice	1,365	70.7%	564	29.2%
Hospital/Medical School Group Practice	482	68.9%	218	31.1%
Community or Rural Health Center	174	66.9%	86	33.1%
Private Hospital System	192	56.5%	148	43.5%
Non-Hospital Private Outpatient Facility	81	57.4%	60	42.6%
Medical School, University Research Center	102	60.0%	68	40.0%
Health Insurer/Pharmacy/Health Related Organization without Provision of Care	0	0	0	0
State or County Hospital System	14	40.0%	21	60.0%
Other	127	43.1%	168	56.9%
Total	3,061	62.0%	1,879	38.0%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results.

Table 32. Applications for Medicaid Incentives (N = 4,845)

Applied for Medicaid Incentives	*Number of Physicians*	*Percent*
No	2,417	49.9%
Yes	2,428	50.1%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results. 3,111 physicians did not respond to this question.

Table 33. Applications for Medicaid Incentives by Type of Practice (N = 4,841)

Type of Practice	*Applied for Medicaid Incentives*			
	Yes		*No*	
	Number of Physicians	*Percent*	*Number of Physicians*	*Percent*
Physician Owned Solo Practice	359	34.0%	697	66.0%
Physician Owned Group Practice	992	52.4%	902	47.6%
Hospital/Medical School Group Practice	430	63.8%	244	36.2%
Community or Rural Health Center	181	71.0%	74	29.0%
Private Hospital System	172	51.7%	161	48.3%
Non-Hospital Private Outpatient Facility	68	49.6%	69	50.4%
Medical School, University Research Center	100	59.5%	68	40.5%
Health Insurer/Pharmacy/Health Related Organization without Provision of Care	0	0.0%	0	0.0%
State or County Hospital System	12	35.3%	22	64.7%
Other	112	38.6%	178	61.4%
Total	2,426	50.1%	2,415	49.9%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results.

Meaningful Use

Table 34. Is the Vendor Helping You Achieve Meaningful Use?

Vendor	*No*		*Yes*		*Total*	
	Number of Physicians	*Percent*	*Number of Physicians*	*Percent*	*Number of Physicians*	*Percent*
Allscripts	70	18.2%	315	81.8%	385	100.0%
Amazing Charts	12	24.5%	37	75.5%	49	100.0%
Aprima	7	20.0%	28	80.0%	35	100.0%
Athena Health	8	8.7%	84	91.3%	92	100.0%
Cerner	52	19.3%	218	80.7%	270	100.0%
CHARTCARE	0	0.0%	0	0.0%	0	0.0%
ClaimTrak	1	25.0%	3	75.0%	4	100.0%
eClinicalWorks	30	14.7%	174	85.3%	204	100.0%
eMDs	11	16.9%	54	83.1%	65	100.0%
Epic	16	10.8%	132	89.2%	148	100.0%
GE Centricity	7	8.0%	80	92.0%	87	100.0%
gloStream	1	11.1%	8	88.9%	9	100.0%
GMed	4	20.0%	16	80.0%	20	100.0%
Greenway Medical	10	19.6%	41	80.4%	51	100.0%
HealthPort	0	0.0%	0	0.0%	0	0.0%
McKesson	29	24.2%	91	75.8%	120	100.0%
Meditech	5	22.7%	17	77.3%	22	100.0%
NextGen	37	13.8%	232	86.2%	269	100.0%
Noteworthy	4	18.2%	18	81.8%	22	100.0%
Office Practicum	0	0.0%	19	100.0%	19	100.0%
Practice Fusion	6	9.5%	57	90.5%	63	100.0%
Sage	12	10.8%	99	89.2%	111	100.0%
SOAPware	3	21.4%	11	78.6%	14	100.0%
Sunrise	1	16.7%	5	83.3%	6	100.0%
Other	77	15.7%	414	84.3%	491	100.0%
Don't Know	24	20.2%	95	79.8%	119	100.0%
Total	427	16.0%	2,248	84.0%	2,675	100.0%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results. 4,940 physicians did not respond to the meaningful use question, and 2,820 physicians did not identify their EMR.

Table 35. EMR Vendor Helping Meet Meaningful Use by Type of Practice (N = 3,014)

Type of Practice	*Yes*		*No*	
	Number of Physicians	*Percent*	*Number of Physicians*	*Percent*
Physician Owned Solo Practice	436	78.7%	118	21.3%
Physician Owned Group Practice	1,145	84.4%	211	15.3%
Hospital/Medical School Group Practice	366	81.2%	85	18.8%
Community or Rural Health Center	144	83.2%	29	16.8%
Private Hospital System	152	86.9%	23	13.1%
Non-Hospital Private Outpatient Facility	60	80.0%	15	20.0%
Medical School, University Research Center	66	71.7%	26	28.3%
Health Insurer/Pharmacy/Health Related Organization without Provision of Care	0	0.0%	0	0.0%
State or County Hospital System	11	84.6%	2	15.4%
Other	105	84.0%	20	16.0%
Total	2,485	82.4%	529	17.6%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results.

The overall survey results suggest that nearly three-quarters of the respondents were not aware of the support offered by the Arizona Regional Extension Center (REC). The result is, however, misleading because many physicians do not participate in decisions to adopt EMRs. The results in Table 36 separate physicians according to their role in decision making. The most relevant group is physicians who are the sole decision makers. These physicians are often the owners of group practices and, of course, physicians in solo practice. Approximately 66% of the sole decision makers are not aware of the REC support. An additional 24.3% are aware of the support but are not working with REC.

Further analysis of the results will be completed to classify the physicians by their eligibility for REC support. The results are also limited by the number of physicians who either did not

respond to the decision maker question and/or the question on the awareness of support. The survey includes a question that offers physicians the opportunity to submit a request for information to the REC. Lists of the requesters are periodically delivered to the REC for further action.

Table 36. Support from Regional Health Extension Center by Decision Maker (N =5,752)

Aware of Support Offered by AZ Regional Extension Center	*Decision Maker*					
	Decided by others		*Shared decision*		*Sole decision maker*	
	Number of Physicians	*Percent*	*Number of Physicians*	*Percent*	*Number of Physicians*	*Percent*
No	2,491	88.7%	169	73.2%	1,790	66.0%
Yes, but not working with them at present	314	11.2%	62	26.8%	659	24.3%
Yes, working with them	4	0.1%	0	0.0%	263	9.7%
Total	2,809	100.0%	231	100.0%	2,712	100.0%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results. 2,204 physicians were excluded from this table due to missing data, including 2,028 missing Awareness of Support Offered; and 1,701 missing the Decision Maker.

Plans to Install EMRs

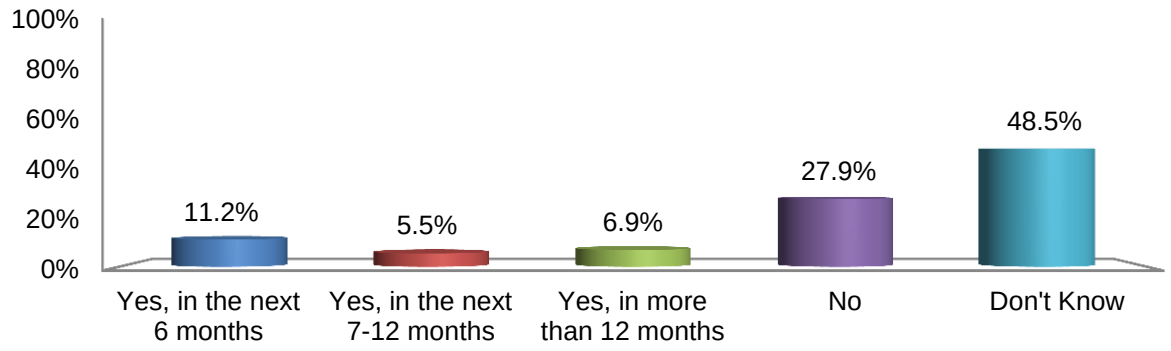
Table 37. Non-EMR Users Plans for Adoption of EMRs (N = 2,645)

Future Plans to Adopt EMRs	*Number of Physicians*	*Percent*
Don't Know	1,282	48.5%
No	739	27.9%
Yes, in more than 12 months	183	6.9%
Yes, in the next 7-12 months	146	5.5%
Yes, in the next 6 months	295	11.2%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results. 2,028 physicians did not respond to this question.

Figure 15. Non-EMR Users Plans for Adoption of EMRs (N = 2,645)



Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings have been excluded from these results.

Table 38. Plans to Install EMRs by Vendor (N = 1,552)

Vendor	*Number of Physicians*	*Percent*
Allscripts	94	6.0%
Amazing Charts	5	0.3%
Aprima	3	0.1%
Athena Health	12	0.7%
Cerner	144	9.2%
CHARTCARE	0	0.0%
ClaimTrak	0	0.0%
eClinicalWorks	19	1.2%
eMDs	6	0.3%
Epic	317	20.4%
GE Centricity	0	0.0%
gloStream	0	0.0%
GMed	0	0.0%
Greenway Medical	3	0.1%
HealthPort	1	0.0%
McKesson	30	1.9%
Meditech	4	0.2%
NextGen	72	4.6%
Noteworthy	5	0.3%
Office Practicum	1	0.0%
Practice Fusion	0	0.0%
Sage	14	0.9%
SOAPware	1	0.0%
Sunrise	0	0.0%
Other	188	12.1%
Don't Know	633	40.7%
Total	1,552	100.0%

Source: AMB, ABOE Survey Data, 2012–2013.

Note: Physicians practicing in government settings are excluded from these results.

The Target Population

The data presented to this point are good profiles of EMR users. It remains to describe the physicians who have not adopted EMRs. They are the targets of incentives that seek to increase EMR utilization. Their numbers are estimated in Table 39 by applying the population weights (W = 1.1 per respondent) for 2012-2013, which is the first year of a two year renewal cycle. The weights for the two previous completed renewal cycles are 1.97 per respondent in 2007-2009 and 1.30 in 2009-2011.

The population of Non-EMR users in each county is described in Table 39. The estimates can change because they are based on the 2012-2013 data which represent approximately one-half of the two year renewal cycle. There are approximately 1,200 physicians who do not currently use EMRs. The target population ranges from 3 physicians in La Paz County to 845 physicians in Maricopa County.

The projected target population when the current renewal cycle is complete is estimated in Table 39 by simply assuming that the results for the 2013-2014 survey duplicate the 2012-2013 results. That is that the physicians not yet surveyed, because they have yet to renew their licenses, are reasonably well represented by the 2012-2013 respondents subject to several assumptions.

The simplifying assumptions exclude, for example, the likely possibility that physicians renewing in the second year of the renewal cycle will adopt EMRs at a higher rate than the physicians in 2012-2013. This assumption disregards the information presented subsequently in this report on physician's intentions to adopt EMRs. It is likely, therefore, that the projected target population for 2012-2014 is somewhat overstated.

The estimates of target populations by county are a guide to the prioritization of some types of incentives designed to expand the use of EMRs. The smaller the target population in a county is, the lower the priority for a project with a fixed budget. Some of the potentially low yield areas also are the areas where time and travel costs of some interventions will be relatively high. If, for example, an initiative includes the IT support services on an ongoing basis, counties such as Apache, Gila or La Paz offer small payoffs and relatively high costs in terms of travel time for support personnel.

Table 39. The Target Population of Physicians without EMRs by County, 2012-2013

Location	*2012-2013 One Half of Renewal Cycle*				*The Projected Target Population Complete Renewal Cycle 2012-2014*
	All Survey Respondents (N)	*Survey Respondents Non-EMR Users (N)*	*Survey Respondents EMR Users (N)*	*The Target Population (W*N)*	
Apache	16	5	11	6	12
Cochise	58	10	48	11	22
Coconino	159	28	131	31	62
Gila	32	4	28	4	9
Graham	16	2	14	2	4
Greenlee	1	0	1	0	0
La Paz	5	3	2	3	7
Maricopa	3,918	768	3,150	845	1,690
Mohave	135	27	108	30	59
Navajo	42	13	29	14	29
Pima	1,090	180	910	198	396
Pinal	93	13	80	14	29
Santa Cruz	12	0	12	0	0
Yavapai	156	16	140	18	35
Yuma	122	19	103	21	42
Total	6,141	1,092	5,049	1,197*	2,396

Source: AMB, ABOE Survey Data, 2012-2013.

Note: Table does not include fully retired physicians or physicians practicing in government settings. 2,028 respondents did not identify a method of storing medical records and 182 were of unknown/missing county.

The target population is calculated as the number of non-EMR users multiplied by the population weight (1.1). *rounding errors

The results also suggest consideration of different approaches to increase EMR utilization for different geographic areas. We know from our multivariate results, for example, that the rate of EMR use is, all else equal, at its lowest among older physicians. It seems equally likely that the required investments and the relatively short period for the return on investment will make their potential rates of adoption much lower than among younger physicians. Age and other criteria can be added to the definition of the target population to sharpen the focus of planned interventions.

Progress in the expansion of EMR use in each county can be measured by comparing the 2012-2013 targets to the estimates from previous renewal cycles. We rely on comparisons between 2007-2009 and 2012-2013 because of the variability in the county-specific results for 2009-2011.

Table 40. The Target Population of Physicians without EMRs by County, 2009-2011 vs. 2007-2009

Location	*2009-2011*			*2007-2009*		
	All Survey Respondents (W)	*Survey Respondents Non-EMR Users (W)*	*Target Population (W*N)*	*All Survey Respondents (N)*	*Survey Respondents Non-EMR Users (N)*	*Target Population (W*N)*
Apache	54	27	35	17	8	16
Cochise	110	42	55	76	43	85
Coconino	231	108	140	176	100	197
Gila	49	17	22	31	21	41
Graham	26	14	18	19	11	22
Greenlee	9	9	12	5	4	8
La Paz	9	9	12	9	6	12
Maricopa	5,229	2,859	3,717	4,371	2,500	4,925
Mohave	188	113	147	184	118	232
Navajo	105	46	60	68	36	71
Pima	1,965	857	1,114	1,376	771	1,519
Pinal	153	90	117	94	49	97
Santa Cruz	47	15	20	18	14	28
Yavapai	262	122	159	163	102	201
Yuma	149	92	120	135	99	195
Total	8,586	4,420	5,746	6,742	3,882	7,648

Source: AMB, ABOE Survey Data, 2007-2009; 2009-2011.

Note: Table does not include fully retired physicians. 342 respondents did not identify a method of storing medical records in 2007-2009.

The target population is calculated as the number of non-EMR users multiplied by the population weight (1.97 in 07-09 and 1.3 in 09-11).

Table 41. Trends in the Target Population of Physicians without EMRs by County, 2012-2013 vs. 2007-2009

Location	*Non- Users of EMRs as a Percent of Physicians*	
	2012-2013	*2007-2009*
Apache	31.3%	47.1%
Cochise	17.2%	56.6%
Coconino	17.6%	56.8%
Gila	12.5%	67.7%
Graham	12.5%	57.9%
Greenlee	0%	57.9%
La Paz	60.0%	66.7%
Maricopa	19.6%	57.2%
Mohave	20.0%	64.1%
Navajo	31.0%	52.9%
Pima	16.5%	56.0%
Pinal	14.0%	52.1%
Santa Cruz	0%	77.8%
Yavapai	10.3%	62.6%
Yuma	15.6%	73.3%
Total	17.8%	57.6%

Source: AMB, ABOE Survey Data, 2007-2009; 2009-2011; 2012-2013.

The results in Table 39 document a substantial reduction in the percentage of physicians who do not use EMRs. On average, across all counties, there was more than a three-fold reduction in the percentage of physicians without access to an EMR between 2007-2009 and 2012-2013. The reduction was larger in many of the rural counties than in either Maricopa or Pima County.

The 2012-2013 data represent one-half of a renewal cycle while the 2007-2009 results are from a full cycle. It is possible, therefore, that the results described here could change when the data from the complete cycle are available. It is unlikely that the results for the larger counties will change significantly but some deviations for the smaller counties are possible.

Nevertheless, the differences between the two time periods are so consistent and so substantial that we do not expect subsequent variations in the yet to be collected data to alter the substance of our conclusions.

Physicians and health care organizations with EMRs that are not yet connected to a health information exchanges are part of a different target population. As the results on individual physician use show, EMR use continues to increase but the ability to exchange information languishes. AHCCCS and ASET are addressing the problem with incentive payments to unconnected providers. The data in Table 42 described the most recent set of awardees, many of which serve rural areas of the state of Arizona.

Table 42. Grant Awards to Rural Providers to Plan for HIE

Unconnected Providers Sub-Grantee Award Information	
Sub-Grantee	*Funds Requested*
A New Leaf, Inc.	$50,000
CONMED Health Management	$50,000
Copper Queen Community Hospital	$50,000
Flagstaff Medical Center, Inc.	$98,007
Jewish Family and Children's Service, Inc.	$100,000
La Paz Hospital, Inc.	$50,000
Little Colorado Medical Center	$99,955
North Country Healthcare, Inc.	$100,000
People of Color Network, Inc.	$100,000
Quality Care Network	$100,000
Sierra Vista Regional Health Center, Inc.	$50,000
Symphony of Mesa and Springdale Village	$40,385
Terros, Inc.	$100,000
Villa Maria Care Center, LLC/CopperSands, Inc.	$42,210
Total Awarded Funds	$1,030,557

Source: (Johnson, Harootunian and Mayer 2013).

Summary & Conclusion

The CHiR reports on the use of EMRs offer a view of how the prevalence of EMRs has changed over the last six years. The results very clearly indicate that EMRs are rapidly becoming the standard approach to the maintenance of medical records. There is still considerable reliance on the use of scanned records and paper records in combination with EMRs. The use of scanned or paper records represents the transition from these traditional methods to electronic systems as the sole method of storing medical information.

The most important challenge to the future of EMRs is the need to develop Health Information Exchanges that can permit the secure transmission of EMR data among different health care providers. The development of HIEs has an unhappy history in the United States and it is not at all clear that the problem of an adequate business model for HIEs has yet emerged. Unless HIEs can be sustained, the potential benefits of ERMs will not be realized.

The percentage of Arizona physicians using electronic medical records (EMRs) increased from approximately 45% in 2007-2009 to approximately 80% in 2012-2013. The current trend suggests that, with very few exceptions, Arizona physicians will be using EMRs by 2018. The results from 2007-2013 show that utilization of EMRs is lowest among older physicians and physicians in solo practices. The findings are similar to the results of national surveys.

The increased use of EMRs in Arizona reflects the gradual replacement of retiring older physicians by younger physicians and the consolidation of solo practices into larger group practices or hospital based practices. The use of EMRs increased more rapidly in the rural counties of Arizona than in the urbanized areas. The Medicare and Medicaid incentives and the support from organizations such as the REC are often directed to organizations with the most need, including smaller practices which typify rural medicine.

The most important obstacle to inter-organizational transfers of electronic health information is the shortage of Health Information Exchanges (HIEs). The Health Information Network of Arizona (HINAZ) is one such HIE. Although HINAZ currently serves only thirty-three participants, it continues to expand and its future is hopeful.

This report is the first in the CHiR series to include physician rankings of EMRs by brand. EMRs were ranked on a 1-5 scale where 1=awful and 5=outstanding. Twenty five different EMR packages were ranked on each of five criteria.

Media articles and discussions among HIE professionals suggest that physicians are very dissatisfied with their EMRs. The results presented here differ, indicating that physicians are somewhat positive about their EMRs with rankings averaging slightly more than the midpoint in the 1-5 scale. A more accurate conclusion may be that physicians seek to improve individual elements of their EMRs, but recognize that EMRs offer advantages not available from scanned records or paper medical records.

We plan to implement new survey questions at the end of the current renewal cycle in April 2014. Many of the new questions will focus on the use of and obstacles to the exchange of information among physicians who use EMRs. The new survey will include an enhanced focus on Medicaid providers.

References

Arizona Health Care Cost Containment System. "AHCCCS HIE/EHR utility project: provider focus groups." Phoenix: s.n., 2007, 2007.

Bharathan, K, Executive Director of HINAZ. "Communication to the authors." September 6, 2013.

Center for Medicare & Medicaid Services. *Eligible Hospital Information.* August 20, 2013. http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Eligible_Hospital_Information.html (accessed September 2013).

Centers for Medicare & Medicaid Services. *EHR Incentive Programs.* June 26, 2013. http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Eligible_Hospital_Information.html (accessed September 2013).

Chaudhry, B, et al. "Systematic review: impact of health information technology on quality, efficiency, and costs of medical care." *Ann Intern Med* 144, no. 10 (May 2006): 742-52.

E Health Initiative. *2012 report on health information exchange: supporting healthcare.* E Health's Eighth Annual Survey, 2012, 48 pp.

Health Resources and Services Administration (HRSA). "National county-level health resource information database, area resource file." 2007.

Hing, E S, C W Burt, and D A Woodwell. *Electronic medical record use by office-based physicians and their practices: United States, 2006.* s.1.: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2007.

Hsiao, Chun-Ju, and Esther Hing. *Use and characteristics of electronic health record systems among office-based physician practices: United States, 2001-2012.* NCHS data brief, no. 111, Hyattsville, MD: National Center for Health Statistics, 2012.

Hsiao, Chun-Ju, Esther Hing, Thomas C Socey, and Bill Cai. *Electronic medical record/electronic health record systems of office-based physicians: United States, 2009 and preliminary 2010 state estimates.* National Center for Health Statistics: Health E-Stat, 2010.

Hsiao, Chun-Ju, Hing Esther, Socey C Thomas, and Cai Bill. *Electronic health record systems and intent to apply for meaningful use incentives among office-based physician practices:*

United States, 2001-2011. National Center for Health Statistics Data Brief No. 79 (revised 2/2/12), November 2011, 1-7.

Jamoom, E, P Beatty, A Bercovitz, David Woodwell, Kathleen Palso, and Elizabeth Rechtsteiner. *Physician adoption of electronic health record systems: United States, 2011.* NCHS data brief, no 98, Hyattsville, MD: National Center for Health Statistics, 2012.

Jha, Ashish, et al. "How common are electronic health records in the United States? A summary of the evidence." *Health Affairs* 25, no. 6 (2006): w496-w507.

Jha, Ashish, et al. "Use of electronic health records in U.S. hospitals." *N Engl J Med* 361, no. 4 (2009): 421-2.

Johnson, William G, G Harootunian, and Lorie Mayer. *Physician adoption & ranking of electronic medical records March 2012 – April 2013.* Center for Health Information & Research, Arizona State University, Phoenix: Presentation to the 40th Annual Rural Health Conference, Section on Developments in Arizona Rural Health -- HIT, 2013.

Johnson, William G, Yue Qiu, Gevork Harootunian, and Miwa Edge. *The use of electronic medical records and physicians' attitudes towards a health information exchange.* Phoenix (AZ): Arizona State University, Center for Health Information & Research, 2010.

Joseph, S B, M J Sow, M F Furukawa, S Posnack, and J C Daniel. "E-prescribing adoption and use increased substantially following the start of a federal incentive program." *Health Affairs* 32, no. 7 (July 2013): 1221-1227.

Sequist, Thomas D, Theresa Cullen, Howard Hays, Maile M Taualii, Steven R Simon, and David W Bates. "Implementation and use of an electronic health records within the Indian Health Service." *J Am Med Inform Assoc* 14 (2007): 191-197.

Simon, Steven R, et al. "Correlates of electronic health record adoption in office practices: a statewide survey." *J Am Med Inform Assoc* 14, no. 1 (2007): 110-117.

Terry, Ken. "Doctors can't tear themselves away from paper records." *Information Week*, March 2012.

Appendix A: Comparison to National Surveys

The results of a national survey of EMR use and attitudes toward the adoption of EMRs by physicians with the American Medical Association (AMA) memberships were published on July 3, 2008 (DesRoches, et al. 2008; Jha, DesRoches, et al. 2009). The results cannot be strictly compared to the results reported here because of differences in the structure of the sample and some differences in methods. The sample design does not, for example, provide estimates for Arizona and is limited to members of the AMA.

The ASU study queries all physicians who renew their Arizona licenses. The practice began in 1992 and with a few interruptions has continued. The data are not, therefore, a sample but rather a census of all physicians. Some characteristics, drawn from the information required for licensing, are obtained for all physicians while the survey questions are voluntary and obtained from those physicians who choose to respond. Fully retired physicians were not asked to respond to the survey questions.

The national survey results are restricted to non-federal, allopathic physicians directly involved in patient care who are members of the AMA. Doctors of Osteopathy were excluded. Other exclusions included physicians working in federally owned hospitals, those who requested not to be contacted; radiologists; anesthesiologists; pathologists; psychiatrists; no known address; medical school students and physicians not providing patient care.

The NCHS released the preliminary results of a mail survey of a national sample of office based physicians in December 2008. The survey, conducted from April through August 2008 shows that 38.4% of physicians used full or partial EMR systems in their office based practices. Approximately 20.4% of the physicians used systems that included orders for prescriptions, orders for tests, results of lab or imaging tests and clinical notes (Hsiao and Hing, Use and characteristics of electronic health record systems among office-based physician practices: United States, 2001-2012 2012). As indicated in Table A – 1 below, our results are much closer to the NCHS study than the NEJM study. The difference between the two national studies is surprisingly large give the apparent similarities in sample design.

Table A - 1. Comparison of CHIR Survey vs. National EMR Surveys (under revision 9/13/13)

Study	*Data Source*	*Sample Size*	*Characteristics of Sample, Exclusions*	*Percent of Physicians with EMR**	*Definition of basic EMR*	*Definition of connected EMR*	*Definition of fully functional EMR*
Hing et al. (2007)	2006 National Ambulatory Medical Care Survey	1,311	Sample consists of non-federal, office-based physicians who see patients in an office setting.	29.2% (B) 12.4% (F)	Use of full or partial electronic records	NA	Can electronically order prescriptions & tests, report results to lab or radiology; manage clinical notes
DesRoches et al. (2008)	Survey created by the study team and Research Triangle Institute	2,758	Sample consists of US physicians who provide direct patient care. Exclusions: D.O.s, residents, physicians in federally owned hospitals, retired physicians, radiologists, anesthesiologists, pathologists, psychiatrists, hospitalists, part-time, physicians who worked < 20 hour per week.	13% (C) 4% (F)	NA	EMR can store demographic data, problem lists, medication lists, and clinical notes; can order prescriptions; can view laboratory results and imaging results. (Study authors refer to this type of record as a "basic EMR")	All capabilities listed in previous column, plus enhanced order-entry management and clinical-decision support
AHCCCS/ CHIR (2009)	Survey created by study team and Arizona Hospital and Health Care Association; Licensing data from Arizona Medical Board and Arizona Board of Osteopathic Examiners	10,813	This sample includes Arizona-based physicians who provide direct patient care and exclude the following: DOs, residents, retired/semi-retired, physicians in government settings, radiologists, anesthesiologists, pathologists, psychiatrists, hospitalists. Specialty exclusions were for Primary Specialty. (exclusions not part of full survey..applied to compare to DesRoches.	40.8% (B) 19.9% (C) 6.1% (F)	Use of electronic files as method of storing medical records	EMR that is connected to at least one of the following: hospital, radiology, lab, pharmacy	EMR that is connected to all of the following: radiology, lab, pharmacy

*B = basic EMR, C = connected EMR, F = fully functional EMR

Table A - 2. Comparison of CHIR Survey vs. National EMR Surveys (cont.)

Study	*Data Source*	*Sample Size*	*Characteristics of Sample, Exclusions*	*Percent of Physicians with EMR**	*Definition of basic EMR*	*Definition of connected EMR*	*Definition of fully functional EMR*
Jamoom et al. (2012)	2011 Physician Workflow Survey	3,180	Sample consists of non-federal, office-based physicians who see patients in an office setting. Excludes: radiologists, anesthesiologists and Pathologists	54%	Electronic medical records or electronic health records not including billing records	NA	?
CHIR/AHCCCS (2012)	Survey created by CHIR and AHCCCS; Licensing data from Arizona Medical Board and Arizona Board of Osteopathic Examiners		Sample consists of all Arizona physicians with active licenses who renewed their license between November 1, 2009 and November 1, 2011. Exclusions: non-Arizona physicians, fully retired physicians.	44.5% (B) 24.1% (C) 9.3% (F			
	Survey created by study team and Arizona Hospital and Health Care Association; Licensing data from Arizona Medical Board and Arizona Board of Osteopathic Examiners	10,813	Arizona-based physicians who provide direct patient care and exclude the following: DOs, residents, retired/semi-retired, physicians in government settings, radiologists, anesthesiologists, pathologists, psychiatrists, hospitalists. Specialty exclusions were for Primary Specialty.	40.8% (B) 19.9% (C) 6.1% (F)	Use of electronic files as method of storing medical records	EMR that is connected to at least one of the following: hospital, radiology, lab, pharmacy	EMR that is connected to all of the following: radiology, lab, pharmacy
			Sample consists of all Arizona physicians with active licenses who renewed their license between November 1, 2009 and November 1, 2011. Exclusions: non-Arizona physicians, fully retired physicians.	44.5% (B) 24.1% (C) 9.3% (F)			

Appendix B: The Survey Instrument (2007-2011)

1. How would you best characterize your practice? (PLEASE DO NOT CHECK MORE THAN TWO)

- ◯ Fully retired (skip to end)
- ◯ Semi-retired/On Leave
- ◯ Med school, intern, resident, fellow
- ◯ Community health center
- ◯ Group Practice
- ◯ Solo Practice
- ◯ Hospitalist
- ◯ Government (VA, IHS, etc.)
- ◯ Administrative Medicine
- ◯ Academic/Teaching/Research
- ◯ Locum Tenens

2. Which of the following are available at your practice location? (CHECK ALL THAT APPLY)

◯ Email ◯ Internet ◯ Fax ◯ Medifax ◯ None of the above

3. How do you submit your bills to payers? (CHECK ALL THAT APPLY)

◯ Email ◯ Internet ◯ Fax ◯ US Mail ◯ Don't Know ◯ N/A

4. Are patients' medical records in your practice/organization stored as:

a. Paper files ◯ Yes ◯ No

Scanned images of paper files ◯ Yes ◯ No

Electronic files ◯ Yes (continue) ◯ No (If no, go to question #5)

◯ The records are stored on a PC/server located in my organization

◯ The records are stored on a server to which I connect via the internet

◯ I don't know where they are stored

b. Is your EMR system connected to: (CHECK ALL THAT APPLY)

◯ Hospital ◯ Pharmacy ◯ Lab ◯ Radiology Center ◯ None of these

Are you the person who decided to purchase an electronic medical record system?

◯ Sole Decisionmaker ◯ Shared Decision ◯ Decided by Others

What is a reasonable amount to pay for an electronic medical record system (per individual provider within a practice setting)?

◯ $5,000-$10,000/provider ◯ $10,000-$20,000/provider ◯ >$20,000/provider

GO TO QUESTION #6

5. Are you the person who would decide to purchase an electronic medical record system?

a. ◯ Sole Decisionmaker ◯ Shared Decision ◯ Decided by Others

b. What best describes the barriers to adoption of electronic medical records in your practice/organization?

◯ Cost ◯ Insufficient Return on Investment ◯ Time/Training ◯ Lack of Interoperability ◯ Attitudes

c. Would you consider an internet-based system (patient records stored offsite) rather than one where the records are stored in your office PC or server? ◯ Yes ◯ No

d. What is a reasonable amount to pay for an electronic medical record system (per individual provider within a practice setting)? ◯ $5,000-$10,000/provider ◯ $10,000-$20,000/provider ◯ >$20,000/provider

6. Would you be willing to participate in a web-based system that permits the exchanges of medical records among health care providers? ◯ Yes ◯ No (if no, SKIP TO #7)

a. Who would you trust to manage the health information exchange system? (CHECK ALL THAT APPLY)

- ◯ Commercial Vendor
- ◯ Hospital System
- ◯ State of Arizona (AHCCCS)
- ◯ Health Insurer/Managed Care Plan
- ◯ Regional Health Information Organization (RHIO)
- ◯ Other

7. ◯ PLEASE SEND ME A COPY OF THE RESULTS

Thank you for completing this survey.

Appendix C: The Survey Instrument (2012-2014)

Since 1991, the Arizona Physician Survey has, with the cooperation of physicians, their licensing boards and their professional associations, collected important information on the physician workforce. The current survey focuses on the use of medical records that are electronic (often called electronic medical records (EMRs) or electronic health records (EHRs)). Your participation is encouraged by the *Arizona Medical Association* and the *Arizona Osteopathic Medical Association*. Your answers are confidential and results are published only in aggregate form.

1. Which one of the following **best** describes your employment status ?(check one)
    a. Actively employed in Arizona in direct patient care ☐Yes ☐No {if yes ask:}
        i. I usually treat _____patients in a typical work week.
        ii. I usually work _____hours/day, _____days/week, and _____weeks/year.
    b. Actively employed in Arizona but not in direct patient care ☐Yes ☐No
    c. Actively employed outside of Arizona ☐Yes ☐No {*skip to separate survey questions*}
    d. Semi-retired/on leave ☐Yes ☐No *{go to end fill all intermediate questions with DNA}*
    e. Retired ☐Yes ☐No {go to end fill all intermediate questions with DNA}

2. Which one of the following **best** describes the organization in which you practice
    a. a physician owned solo practice ☐Yes ☐No *{if yes, auto fill 3a=yes; skip to 4}*
    b. A physician owned group practice ☐Yes ☐No
    {if yes then ask}
        i. Approximately how many physicians are associated with this practice?
            1. 2-5 physicians ☐Yes ☐No
            2. 6-50 physicians ☐Yes ☐No
            3. 51-94 physicians ☐Yes ☐No
            4. 95 or more physicians ☐Yes ☐No
    c. A hospital or medical school physician group practice ☐Yes ☐No
    if yes then ask}
        i. Approximately how many physicians are associated with this practice?
            1. 2-5 physicians ☐Yes ☐No
            2. 6-50 physicians ☐Yes ☐No o
            3. 51-94 physicians ☐Yes ☐No
            4. 95 or more physicians ☐Yes ☐No
    d. A community or rural health center(e.g. federally qualified CHC) ☐Yes ☐No
    {if yes then ask}
        i. Approximately how many physicians are associated with this center?
            1. 2-5 physicians ☐Yes ☐No
            2. 6-50 physicians ☐Yes ☐No
            3. 51-94 physicians ☐Yes ☐No
            4. 95 or more physicians ☐Yes ☐No
    e. Federal Government hospital or clinic (e.g. VA, IHS etc.) ☐Yes ☐No { *if yes skip to 5}*
    f. State or County hospital system ☐Yes ☐No *if yes skip to 4}*
    g. Private Hospital system ☐Yes ☐No

h. Private Outpatient Facility not part of a hospital system (e.g. Urgent Care center, insurer owned clinic, etc.) ☐Yes ☐No
{if yes then ask}
    i. Approximately how many physicians are associated with this facility?
        1. 2-5 physicians ☐Yes ☐No
        2. 6-50 physicians ☐Yes ☐No
        3. 51-94 physicians ☐Yes ☐No
        4. 95 or more physicians ☐ Yes ☐ No
i. Medical school ,university, research center ☐ Yes ☐ No
j. Public or private health Insurer, pharmaceutical company or other health related organization that does not provide care. ☐ Yes ☐ No *{if yes then skip to end; auto code intermediate questions as DNA}*
k. Other_____

3. Which of the following **best** describes your primary role in the organization in which you practice? *{(if 2d=yes or 2e=yes or 2f=yes) then set 3b=yes)}*
    a. Owner , partner, part-owner ☐ Yes ☐ No
    {if yes then ask}
        i. Approximately how many of each of the following providers are associated with this practice?
            1. ____ PAs
            2. ____RNs
            3. ____NPs
            4. ____Other Licensed Health Care Providers
    b. Employee/contractor/locum tenens ☐ Yes ☐ No
    c. Faculty ☐ Yes ☐ No
    d. Student (include residents, fellows etc.) ☐ Yes ☐ No

4. Which of the following are available at your practice location? (check all that apply)
    a. Email ☐ Yes ☐ No
    b. Internet (FTP etc.) ☐ Yes ☐ No
    c. Fax ☐ Yes ☐ No
    d. US Mail ☐ Yes ☐ No
    e. Don't know ☐ Yes ☐ No

5. How does the organization in which you practice submit bills/claims to insurers or other payers? (check all that apply)
    a. Email ☐ Yes ☐ No
    b. Internet (FTP etc.) ☐ Yes ☐ No
    c. Fax ☐ Yes ☐ No
    d. US Mail ☐ Yes ☐ No
    e. Don't know ☐ Yes ☐ No

6. How does the organization in which you practice store its medical records? (Check all that apply);
    a. Paper ☐ Yes ☐ No
    b. Scanned images of paper records ☐ Yes ☐ No
    c. Electronic files (an electronic version of a patient's medical history, including progress notes, problems, medications and other information used in treatment.) ☐ Yes ☐ No *{if yes then ask}*
        i. What is the name of your EMR/EHR system

Allscripts ☐ Yes ☐ No
Amazing Charts ☐ Yes ☐ No
Aprima ☐ Yes ☐ No
Athena Health ☐ Yes ☐ No
GE Centricity ☐ Yes ☐ No
Cerner ☐ Yes ☐ No
CHARTCARE ☐ Yes ☐ No
eClinicalWorks ☐ Yes ☐ No
Epic ☐ Yes ☐ No
eMDs ☐ Yes ☐ No
Epic ☐ Yes ☐ No
GE ☐ Yes ☐ No
Greenway Medical ☐ Yes ☐ No
HealthPort ☐ Yes ☐ No
McKesson ☐ Yes ☐ No
Meditech ☐ Yes ☐ No
NextGen ☐ Yes ☐ No
Noteworthy ☐ Yes ☐ No
Office Practic.com ☐ Yes ☐ No
Sage ☐ Yes ☐ No
SOAP ware ☐ Yes ☐ No
Other_____ ☐ Yes ☐ No
Don't know ☐ Yes ☐ No

7. On a scale of 1 (awful) to 5 (outstanding), how would you rate your EMR/EHR system in terms of:
   a. Ease of use ☐1 ☐2 ☐3 ☐4 ☐5
   b. Effect on your productivity ☐1 ☐2 ☐3 ☐4 ☐5
   c. Effect on staff productivity ☐1 ☐2 ☐3 ☐4 ☐5
   d. Reliability ☐1 ☐2 ☐3 ☐4 ☐5
   e. Performance versus vendor's promises ☐1 ☐2 ☐3 ☐4 ☐5

8. *{if 6c=yes} then ask:* Does the EMR/EHR system include the following functions? (CHECK ALL THAT APPLY) *{if 6c ne yes then auto fill DNA and skip to 8}*

Functions	**Is the Function Included in the EMR?**	**Do You Use the Function?**	**Do you exchange this information using your EMR/EHR to organizations outside your practice?"**
Patient Care Summary	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Prescriptions (e-prescribing)	☐ Yes ☐ No ☐ Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Lab Test Results	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Reminders for Guideline Based Interventions	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Public Health Reports: immunizations, notifiable diseases	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Quality Metrics (HEDIS, AQA etc.)	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know

9. {if 6c=yes and (3a=yes or 3b=yes or 3c=yesor 3d=yes) then ask}: Are you aware of the incentive payments from Medicare and Medicaid to physicians who adopt EMRs/EHRs that meet **meaningful use criteria**?
    a. ☐ Yes ☐ No {if no skip to c}
    b. Have you applied OR are you planning to apply for the meaningful use incentives offered by Medicare and Medicaid? Medicare ☐Yes ☐No Medicaid ☐Yes ☐ No {if both No *skip to c}*
    c. Is your EMR/EHR vendor helping you to meet the **meaningful use criteria**?
        i. ☐ *Yes*
        ii. ☐ *No*
    d. Are you aware of the support offered by the Arizona Regional Extension Center?
        i. ☐ *Yes :workin*g with them {go to wind up question}
        ii. ☐ Yes but not working with them at present
        iii. ☐ No

        If you would like more information on the Arizona Regional Extension Center you can contact them at 602-688-7200 or *her@azhec.org* Or
        Would you like us to submit a request with your name and address but not reveal any other information included on this survey? ☐ Yes ☐ No

{ if (3a=yes then code 9ai=yes skip to wind up question); else ask:

10. Are you the person who would decide to purchase an EMR/EHR system?
    a. Sole decision maker ☐Yes ☐No
    b. Shared decision ☐Yes ☐No
    c. Decided by others ☐Yes ☐No
11. Are there plans for installing an EMR/EHR system in the future?
    a. ☐No
    b. ☐Don't know
    c. ☐Yes, in the next ☐6 months ☐7-12 months ☐more than 12 months
        i. {if yes}What system are you planning to install?

Allscripts ☐Yes ☐No	Greenway Medical ☐Yes ☐No
Amazing Charts ☐Yes ☐No	HealthPort ☐Yes ☐No
Aprima ☐Yes ☐No	McKesson ☐Yes ☐No
Athena Health ☐Yes ☐No	Meditech ☐Yes ☐No
Centricity ☐Yes ☐No	NextGen ☐Yes ☐No
Cerner ☐Yes ☐No	Noteworthy ☐Yes ☐No
CHARTCARE ☐Yes ☐No	Office Practic.com ☐Yes ☐No
eClinicalWorks ☐Yes ☐No	Sage ☐Yes ☐No
Epic ☐Yes ☐No	SOAP ware ☐Yes ☐No
eMDs ☐Yes ☐No	Other_____
GE Centricity ☐Yes ☐No	Don't Know ☐Yes ☐No

Thank you very much for providing a physician's evaluation of the use and value of electronic health records. Any additional comments are most welcome:

_____

SURVEY QUESTIONS FOR PHYSICIANS WITH AZ LICENSES WHO DO NOT PRACTICE IN ARIZONA

1. When did you leave Arizona?
    a. ☐ I left Arizona in _____,(year) or
    b. ☐ I have never practiced in Arizona

    c. ☐I serve patients in multiple states via Telemedicine
    d. ☐ Travel among states at different times of year
        The states in which I serve patients
        i. ☐include Arizona
        ii. ☐ do not include Arizona

Please rate the importance of *each of the following* as an influence on your choice to practice in your current country/state/territory rather than Arizona

Code #	Factor	Important	Not Important	Does Not Apply
1.	To be Closer to Family/Friends……..	☐	☐	☐
2.	Better Elementary/Secondary Schools	☐	☐	☐No school age kids
3.	Better Climate	☐	☐	☐
4.	Better salary/compensation/career opportunity	☐	☐	☐
5.	Unable to find a position in my field in Arizona	☐	☐	☐
6.	Lower Medical Malpractice Premiums	☐	☐	☐
7.	Career Opportunity for Spouse/Partner	☐	☐	☐No spouse/partner
8.	Better Lifestyle	☐	☐	☐
9.	Better Political Climate	☐	☐	☐
10.	Transferred by the Military	☐	☐	☐
11.	To continue training (residency, fellowship)	☐	☐	☐
14.	To Practice near my Residency location	☐	☐	☐
15.	Availability of Part-time Positions/Locum Tenens	☐	☐	☐
16.	Fulfill loan repayment obligation	☐	☐	☐
17.	If other important factor, specify_____			

_____

2. Are you planning to return to practice in Arizona?
    ☐Yes ☐No
    {if yes then ask}
    a. When do you plan to return?
        i. ☐Upon completion of postgraduate training
        ii. ☐In the next 5 years.
        iii. ☐Other
3. Which one of the following **best** describes the organization in which you practice?
    a. A physician owned solo practice ☐Yes ☐No *{if yes, auto fill 3a=yes; skip to 4};*
    b. A physician owned group practice ☐Yes ☐No
    {if yes then ask}
        i. Approximately how many physicians are associated with this group?
            1. 2-5 physicians ☐Yes ☐No
            2. 6-50 physicians ☐Yes ☐No
            3. 51-94 physicians ☐Yes ☐No
            4. 95 or more physicians ☐Yes ☐No
    c. A hospital or medical school physician group practice ☐Yes ☐No
    {if yes then ask}
        i. Approximately how many physicians are associated with this center?

1. 2-5 physicians ☐Yes ☐No
2. 6-50 physicians ☐Yes ☐No
3. 51-94 physicians ☐Yes ☐No
4. 95 or more physicians ☐Yes ☐No

d. A community or rural health center(e.g. federally qualified CHC) ☐Yes ☐No
{if yes then ask}
   i. Approximately how many physicians are associated with this center?
      1. 2-5 physicians ☐Yes ☐No
      2. 6-50 physicians ☐Yes ☐No
      3. 51-94 physicians ☐Yes ☐No
      4. 95 or more physicians ☐Yes ☐No

e. Federal Government hospital or clinic (e.g. VA, HIS etc.) ☐Yes ☐No { *if yes skip to 5}*
f. State or County hospital system ☐Yes ☐No {*if yes skip to 4}*
g. Private Hospital system ☐Yes ☐No
h. Private Outpatient Facility not part of a hospital system (e.g. Urgent Care center, insurer owned clinic,) ☐Yes ☐No
{if yes then ask}
   i. Approximately how many physicians are associated with this facility?
      1. 2-5 physicians ☐Yes ☐No
      2. 6-50 physicians ☐Yes ☐No
      3. 51-94 physicians ☐Yes ☐No
      4. 95 or more physicians ☐Yes ☐No

i. Medical school ,university, research center ☐Yes ☐No
j. Public or private health Insurer, pharmaceutical company or other health related organization that does not provide care. ☐Yes ☐No *{if yes then skip to end; auto code intermediate q's as DNA}*
k. Other_____ ☐Yes ☐No

4. Which of the following **best** describes your primary role in the organization in which you practice? *{(if 5d=yes or 5e=yes or 5f=yes) then set 6a=yes)}*
   a. Owner, partner, part-owner ☐Yes ☐No
   {if yes then ask}
      i. Approximately how many of each of the following providers are associated with this practice:
         1. ____PAs
         2. ____RNs
         3. ____NPs
         4. ____Other licensed health care providers
      ii. Employee/contractor/locum tenens ☐Yes ☐No
      iii. Faculty ☐Yes ☐No
      iv. Student (include residents, fellows etc.) ☐Yes ☐No

5. Which of the following are available at your practice location? (check all that apply)
   a. Email ☐Yes ☐No
   b. Internet (FTP etc.) ☐Yes ☐No
   c. Fax ☐Yes ☐No
   d. US Mail ☐Yes ☐No
   e. Don't Know ☐Yes ☐No

6. How does the organization in which you practice submit bills/claims to insurers or other payers? (check all that apply)
   a. Email ☐Yes ☐No
   b. Internet (FTP etc.) ☐Yes ☐No
   c. Fax ☐Yes ☐No
   d. US Mail ☐Yes ☐No
   e. Don't Know ☐Yes ☐No

7. How does the organization in which you practice store its medical records? (Check all that apply);

a. Paper ☐Yes ☐No
b. Scanned images of paper records ☐Yes ☐No
c. Electronic files (an electronic version of a patient's medical history, including progress notes, problems, medications and other information used in treatment.) ☐Yes ☐No
{if yes then ask}
    i. What is the name of your EMR/EHR system*?*
        1. Allscripts ☐Yes ☐ No
        2. Amazing Charts ☐ Yes ☐No
        3. Aprima ☐Yes ☐ No
        4. Athena Health ☐ Yes ☐No
        5. Centricity ☐Yes ☐No
        6. Cerner ☐Yes ☐ No
        7. CHARTCARE ☐ Yes ☐No
        8. eClinicalWorks ☐ Yes ☐No
        9. Epic ☐Yes ☐No
        10. eMDs ☐Yes ☐No
        11. GE ☐Yes ☐No
        12. Greenway Medical ☐Yes ☐No
        13. HealthPort ☐Yes ☐No
        14. McKesson ☐Yes ☐No
        15. Meditech ☐Yes ☐ No
        16. NextGen ☐Yes ☐ No
        17. Noteworthy ☐Yes ☐No
        18. Office Practic.com ☐Yes ☐No
        19. Sage ☐Yes ☐No
        20. SOAP ware ☐Yes ☐No
        21. Other_____ _____ ☐Yes ☐ No
        22. Don't Know ☐Yes ☐No

8. On a scale of 1 (awful) to 5 (outstanding), how would you rate your EMR/HER system in terms of:
    a. Ease of use ☐1 ☐2 ☐3 ☐4 ☐5
    b. Effect on your productivity ☐1 ☐2 ☐3 ☐4 ☐5
    c. Effect on staff productivity ☐1 ☐2 ☐3 ☐4 ☐5
    d. Reliability ☐1 ☐2 ☐3 ☐4 ☐5
    e. Performance versus vendors promises ☐1 ☐2 ☐3 ☐4 ☐5

Thank you very much for providing valuable insights into physicians' choice of practice locations and the use and value of electronic health records. Any additional comments are most welcome:

_____

AHCCCS Gov Paper Survey Version 2012

Name_____ License No._____

Since 1991, the Arizona Physician Survey has, with the cooperation of physicians, their licensing boards and their professional associations, collected important information on the physician workforce. The current survey focuses on the use of medical records that are electronic (often called electronic medical records (EMRs) or electronic health records (EHRs)). Your participation is encouraged by the *Arizona Medical Association* and the *Arizona Osteopathic Medical Association*. Your answers are confidential and results are published only in aggregate form.

1. Which **one** of the following **best** describes your employment status ?(check one)
   a) Actively employed in Arizona in direct patient care ☐Yes {if yes ask:}
      i. I usually treat _____patients in a typical work week.
      ii. I usually work _____hours/day, _____days/week, and _____weeks/year.
   b) Actively employed in Arizona but not in direct patient care ☐Yes
   c) Actively employed outside of Arizona ☐Yes
   d) Retired/Semi-retired/on leave ☐Yes

2. Which **one** of the following **best** describes the organization in which you practice
   a) a physician owned solo practice ☐Yes
      i. A physician owned group practice ☐Yes ***If yes****:* Approximately how many physicians are associated with this practice?
         a. 2-5 physicians ☐ 6-50 physicians ☐ 51+physicians ☐
   b) A hospital or medical school physician group practice ☐Yes
      i. ***If yes***: Approximately how many physicians are associated with this practice?
         a. 2-5 physicians ☐ 6-50 physicians ☐ 51+ physicians ☐
   c) A community or rural health center(e.g. federally qualified CHC) ☐Yes
   d) Federal Government hospital or clinic (e.g. VA, IHS etc.) ☐Yes
   e) State or County hospital system ☐Yes
   f) Private Hospital system ☐Yes
   g) Private Outpatient Facility not part of a hospital system (e.g. Urgent Care center, insurer owned clinic, etc.) ☐Yes
   h) Medical school ,university, research center ☐ Yes
   i) Public or private health Insurer, pharmaceutical company or other health related organization that does not provide care. ☐ Yes
   j) Other_____

3. Which of the following **best** describes your primary role in the organization in which you practice?
   a) Owner, partner, part-owner ☐ *{if yes then ask}* Approximately how many of each of the following providers are associated with this practice?
      i. ____ PAs ____RNs ____NPs

ii. ____Other Licensed Health Care Providers

b) Employee/contractor/locum tenens ☐
c) Faculty ☐
d) Student (include residents, fellows etc.) ☐

4. Which of the following are available at your practice location? (check all that apply)
   a) Email ☐ Yes ☐ No
   b) Internet (FTP etc.) ☐ Yes ☐ No
   c) Fax ☐ Yes ☐ No
   d) US Mail ☐ Yes ☐ No
   e) Don't know ☐ Yes ☐ No

5. How does the organization in which you practice store its medical records? (**Check all that apply);**
   a) *Paper* ☐ Yes ☐ No
   b) *Scanned i*mages of paper records ☐ Yes ☐ No
   c) *Electronic files* (an electronic version of a patient's medical history, including progress notes, problems, medications and other information used in treatment.)

   ☐ Yes ☐ No

   1. *{if yes then ask}* What is the name of your EMR/EHR system?
      1. Allscripts ☐
      2. Amazing Charts ☐
      3. Aprima ☐
      4. Athena Health ☐
      5. GE Centricity ☐
      6. Cerner ☐
      7. CHARTCARE ☐
      8. eClinicalWorks ☐
      9. Epic ☐
      10. eMDs ☐
      11. Epic ☐
      12. GE ☐
      13. Greenway Medical ☐
      14. HealthPort ☐
      15. McKesson ☐
      16. Meditech ☐
      17. NextGen ☐
      18. Noteworthy ☐
      19. Office Practic.com ☐
      20. Sage ☐
      21. SOAP ware ☐
      22. Other_____
      23. Don't know ☐ Yes ☐ No

   2. On a scale of **1 (awful) to 5 (outstanding**), how would you rate your EMR/EHR system in terms of:
      1. Ease of use ☐1 ☐2 ☐3 ☐4 ☐5
      2. Effect on your productivity ☐1 ☐2 ☐3 ☐4 ☐5
      3. Effect on staff productivity ☐1 ☐2 ☐3 ☐4 ☐5
      4. Reliability ☐1 ☐2 ☐3 ☐4 ☐5
      5. Performance versus vendor's promises ☐1 ☐2 ☐3 ☐4 ☐5
   3. Does the EMR**/**EHR system include the following functions? **(CHECK ALL THAT APPLY)**

Functions	Is the Function Included in the EMR?	Do You Use the Function?	Do you exchange this information using your EMR/EHR to organizations outside your practice?"
Patient Care Summary	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Prescriptions (e-prescribing)	☐ Yes ☐ No ☐ Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Lab Test Results	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Reminders for Guideline Based Interventions	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Public Health Reports: immunizations, notifiable diseases	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know
Quality Metrics (HEDIS, AQA etc.)	☐Yes ☐No ☐Don't Know {If yes then go to next row}	☐ Yes ☐ No	☐Yes ☐No ☐Don't Know

6. Are you aware of the incentive payments from Medicare and Medicaid to physicians who adopt EMRs/EHRs that meet ***meaningful use criteria***?
   a) ☐ Yes ☐ No
   b) Have you applied OR are you planning to apply for the meaningful use incentives offered by Medicare and Medicaid? Medicare ☐Yes ☐No Medicaid ☐Yes ☐No

   {if both No *skip to c}*

   c) Is your EMR/EHR vendor helping you to meet the ***meaningful use criteria****?*
      1. ☐ *Yes*
      2. ☐ *No*
7. Are you aware of the support offered by the Arizona Regional Extension Center?
      1. ☐ *Yes :working* with them {go to wind up question}
      2. ☐ Yes but not working with them at present
      3. ☐ No
8. If you would like more information on the Arizona Regional Extension Center you can contact them at 602-688-7200 or *her@azhec.org* Or would you like us to submit a request with your name and address but not reveal any other information included on this survey? ☐ Yes ☐ No

Appendix D: Comparison of Respondents to Non-Respondents by Renewal Period, 2007-2011

Characteristic	*2009-2011*					*2007-2009*				
	Respondents N = 12,181		*Non-Respondents N = 3,607*		*P-Value*	*Respondents N =6,777*		*Non-Respondents N =6,594*		*P-Value*
Gender					N.S.					<0.05
Female	3,325	28.3%	932	26.4%		1,791	27.3%	1,640	25.9%	
Male	8,418	71.7%	2,595	73.6%		4,769	72.7%	4,689	74.1%	
Total	11,743	100.0%	3,527	100.0%		6,560	100.0%	6,329	100.0%	
Age Group										
25-34	749	6.2%	372	10.3%	<0.01	438	6.5%	758	11.5%	<0.01
35-44	3,682	30.2%	840	23.3%	<0.01	1,976	29.2%	2,024	30.7%	<0.01
45-54	3,422	28.1%	720	20.0%	<0.01	2,012	29.7%	1,855	28.1%	<0.05
55-64	2,873	23.6%	758	21.0%	<0.01	1,590	23.5%	1,328	20.1%	
65+	1,455	11.9%	916	25.4%		758	11.2%	627	9.5%	
Total	12,181	100.0%	3,606	100.0%		6,774	100.0%	6,592	100.0%	
Specialty					<0.01					<0.01
Primary Care	5,753	47.3%	1,566	43.7%		2,945	43.6%	2,501	38.2%	
Specialty Care	6,401	52.7%	2,016	56.3%		3,812	56.4%	4,053	61.8%	
Total	12,154	100.0%	3,582	100.0%		6,757	100.0%	6,554	100.0%	
Location					N.S.					N.S.
Maricopa County	7,990	65.6%	2,365	65.6%		4,371	64.5%	4,421	67.0%	
Pima County	2,416	19.8%	757	21.0%		1,376	20.3%	1,250	19.0%	
All Other Counties	1,775	14.6%	485	13.5%		1,030	15.2%	923	14.0%	
Total	12,181	100.0%	3,607	100.0%		6,777	100.0%	6,594	100.0%	

Source: AMB, ABOE Administrative/Survey Data, 2007-2009; 2009–2011.

Note: Percentages are calculated on numbers of cases with non-missing values. A p-value of .05 or less implies only a 5% probability of declaring the relationship significant when in fact it is not. N.S. =no significant difference.

Appendix E: EMR Software Descriptions

Table A - 3. Intended Use of EMR Software by Vendor

EMR Vendor	*Intended Use*
Allscripts	Different versions for solo/mid-size practices vs. large/multi practices; Access info anywhere on any device; Connected to pharmacies, labs, payers & patients; Practice management/claims processing; Templates for >20 specialties
Amazing Charts	For solo or multi-clinician practices; Includes office flow, charting, scheduling, messaging, e-prescribing, reporting, billing & templates
Aprima	Transcription/dictation; e-prescribing; diagnosis & payer Info; electronic lab orders & results; patient portal; patient compliance alerts; Meaningful Use stage 2 certified
Athena Health	Quality mgmt for Meaningful Use, pay-for-performance; cloud-based full-service solution; interfaces w/pharmacies, hospitals, registries and HIEs
Cerner	Clinical summary; chart search; e-prescribe; computer assisted coding; electronic orders & results; pre-completed notes for documentation; electronic immunization download/upload; Meaningful Use
ClaimTrak	Solution for clinicians & administrators; clinical forms for assessments, treatment plans, progress notes, discharge summaries, medication administration, etc.; access and manage all aspects of caseloads; electronic billing, scheduling, reports; document scanning to records
eClinicalWorks	Caters to all size private practices, CHCs & hospitals; supports >50 specialties; patient mgmt system; clinical decision support; access lab/test results; registry & quality measure reporting; exchange data electronically; e-prescribing; meets Meaningful Use
eMDs	Adaptable to multiple clinical settings & sizes; clinical decision support; customizable templates & patient flow sheets; e-prescribing
Epic	Meaningful Use stage 2 certified; accommodates >40 specialties; chart review; order management; documentation; clinical & financial decision support; telemedicine options
GE Centricity	Caters to physician practices of all sizes; Fully interoperable; meets Meaningful Use; automated workflows; ICD-9/ICD-10 compatible; clinical decision support; e-prescribing
gloStream	Customizable to individual physicians in a multi-physician setting; Cloud-based; Meaningful Use certified; e-prescribing; labs/orders; scheduling and tasking; note taking
GMed	Caters to small, large & surgery centers and hospitals for gastro, cardio & urology practices; customizable workflow; interoperable; clinical decision support
Greenway Medical	Combined EHR/Practice Management solution integrating clinical/financial/administrative functions for primary care & >30 specialties in all types/sizes of practices; interoperable; Meaningful Use certified;
McKesson	Certified Meaningful Use stage 1; separate web-based solutions for different types/sizes of practices; complete medical billing, scheduling & clinical functionality
Meditech	Integrated medical and practice management solution for all types/sizes of practices which includes scheduling, labs, registration, EHRs, billing, ordering, reporting
NextGen	Certified Meaningful Use stage 2; scalable; ICD-10 ready; accommodates 25 specialties; patient workflows/summaries; health information exchange
Noteworthy	Certified Meaningful Use stage 1; full EHR/PM solution scalable for all physician practices
Office Practicum	Pediatric only EHR solution that includes encounters/flow sheets; prescriptions/diagnostic tests; vaccine recording/forecasting; billing; practice management

Table A - 4. Intended Use of EMR Software by Vendor (cont.)

EMR Vendor	*Intended Use*
Practice Fusion	Free, web-based EHR/PM solution for >25 specialties; scalable to all practice types/sizes; includes e-prescribing; charting; scheduling mobile access; labs/imaging; patient health record; Meaningful Use certified
Sage	Certified Meaningful Use; scalable for practice size and multiple specialties; charting; scheduling; orders; labs; e-prescribing; quality measure reporting; HL7 interoperable
SOAPware	scheduling; coding; integrate data from specific medical devices; order entry; e-prescribing; patient education/maintenance; additional practice management tools
Sunrise	EHR solution specifically for hospitals and health systems; addresses Meaningful Use; contains interoperable, fully connected care with order entry, clinical decision support, e-prescribing/medication management

Source: EMR Vendors' individual websites.

Appendix F: CHiR Health Care Workforce Reports and Articles

Butler MJ, Harootunian G, Johnson WG. (June 2013). Are low income patients receiving the benefits of electronic health records? A statewide survey. *Health Informatics Journal*. 19(2):91-100 doi:10.1177/1460458212460846 PMID: 23715209

Friedman AL, Basco WT, Hotaling AJ, Pletcher BA, Rimsza ME, Shipman SA, et al. (2007). Enhancing the diversity of the pediatrician workforce. *Pediatrics.* 119(4):833-7. PMID: 17403859.

Furukawa MF, Ketcham JD, Rimsza ME. (2007). Physician practice revenues and use of information technology in patient care. *Medical Care.* 45(2):168-76. PMID: 17224780.

Johnson WG, Harootunian G. (December 2012). W*hat Happened to the Shortage of Registered Nurses: The Arizona Experience 2008-2012.* (Prepared under contract for the Arizona Hospital and Healthcare Association.) Phoenix (AZ): Arizona State University, Center for Health Information & Research.

Johnson WG, Qiu Y, Harootunian G, Edge M. (2010). *The use of electronic medical records and physicians' attitudes towards a health information exchange.* Phoenix (AZ): Arizona State University, Center for Health Information & Research.

Johnson WG, Wilson BL, Edge M, Qiu Y, Oliver EL, Russell KM. (April 2009). *The Arizona health care workforce: nurses, pharmacists, & physician assistants.* (Prepared under contract with the Arizona Hospital and Healthcare Association.) Phoenix, AZ: Center for Health Information & Research.

Johnson WG, Bannister WM, Russell KM, Edge M, Gray H, Merritt R. (June 2008). *Arizona physician trends: reasons for leaving Arizona*. Phoenix (AZ): Arizona State University, Center for Health Information & Research.

Johnson WG, Rimsza ME, Garcy AM, Grossman M. (2005) *The Arizona physician workforce study - part I: the numbers of practicing physicians 1992-2004.* Tempe (AZ): Arizona State University, Center for Health Information and Research.

Johnson WG, Ptak BA, Casper K, Madsen B. (March 1996). The survey of physicians in residencies in Arizona academic year 1993-1994: a report to the Arizona Council for Graduate Medical Education. Tempe (AZ): Arizona State University.

Johnson WG, Meenan RT, Klett D, Ott J, Liddon M, Schneller ES. (1994). *The 1992 survey of physicians: a report to the Arizona Council for Graduate Medical Education*. Tempe (AZ): Arizona State University.

Johnson WG, Meenan RT, Preuss N, Schneller ES. (1993). The survey of medical residents: a report to the Arizona Council for Graduate Medical Education. Tempe (AZ): Arizona State University.

Qiu Y, Johnson WG. (August 2009). *Arizona primary care workforce report*. Phoenix (AZ): Center for Health Information & Research, Arizona State University.

Rimsza ME, Johnson WG, Speicher M, Grossman M. (2006) *The Arizona physician workforce study: part II*. Tempe (AZ): Arizona State University, Center for Health Information and Research.

Rimsza ME, Johnson WG, Speicher M, Grossman M. (2005). *The Arizona psychiatric physician workforce study*. Tempe (AZ): Arizona State University, Center for Health Information and Research.

Schneller ES, Preuss N, Johnson WG, Klett D. (1993). The survey of medical residency programs: a report to the Arizona Council for Graduate Medical Education. Tempe (AZ): Arizona State University.

Wilson BL, Johnson WG. (July/August 2009). Using innovation to assess nursing workforce in Arizona: a collaborative approach. *Nursing Economics.* 27(4):233-238.