Oklahoma State Department of Health

State of Oklahoma

State Innovation Model Design Grant

Oklahoma State Health System Innovation Plan

Appendices

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Appendix A: Baseline Health Workforce Landscape – Providers

Baseline Health Workforce Landscape – Providers

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June 2015

INTRODUCTION

Providers are the backbone of the health care delivery system. This draft baseline assessment looks at the geographic distribution of select provider organizations in Oklahoma in order to provide insight regarding workforce adequacy and distribution. The assessment is organized into five sections based on the type of provider. Section one, Physicians, looks at both allopathic and osteopathic physicians in the state with a focus on primary care providers. The second section, Nurses, focuses on licensed nursing workforce in one of three professional categories: registered nurses, advanced practice registered nurses, and licensed practical nurses. Section three, Physician Assistants, focuses on the trained and licensed individuals who practice as part of a team of health care providers and function under the supervision of physician. Dentists and Psychologists are addressed in sections four and five, respectively.

METHODOLOGY

The Oklahoma State Department of Health (OSDH) supplied the data used to complete this draft baseline assessment. OSDH acquired the data from the appropriate state licensing agencies, except for dentists, which were obtained from the National Provider Identifier (NPI) database. The data was supplied in seven Microsoft Excel Workbooks, with each profession stored in a separate workbook. The data required substantial preprocess with Google Refine to standardize the postal addresses that were used for geocoding. ESRI's ArcGIS v10.2 for Desktop and ArcGIS World Geocode Service were used to geocode the addresses. For all professions combined, 58,938 address records were geocoded with 49,584 records matched at the street address or point address level. The remaining 9,354 records were matched to the appropriate city, ZIP code, or street name. Thirty-five records did not contain enough information to geocode and were eliminated from further analysis.

PHYSICIANS

Oklahoma is home to 7,839 active physicians (or 20.4 physicians/10,000 population). An additional 446 physicians are currently completing their graduate medical education (or residency training) in the state. Osteopathic physicians (DOs) comprise 26 percent (1,618) of the active physician workforce with allopathic physicians (MDs) filling the remaining 74 percent (6,221). Around 46 percent (3,618 or 9.4 physicians/10,000 population) of the active physicians in the state practice in one of the primary care specialties (family medicine/general practice; internal medicine; obstetrics & gynecology; and pediatrics). Table 1 shows that family medicine/general practice is the most prevalent primary care specialty choice followed by internal medicine, pediatrics, and obstetrics and gynecology. Oklahoma has one of the lowest primary care physician to population ratios in the country. The United Health Foundation ranked Oklahoma 48th in access the primary care physicians in their 2015 edition of America's Health Rankings.[1] It is well documented that populations who have greater access to primary care physicians generally live longer, healthier lives.[2]

Primary Care Specialty	Active Physicians
Family Medicine/General Practice	1,680
Internal Medicine	1,064
Obstetrics & Gynecology	384
Pediatrics	490

Table 1. Primary Care Specialty Choice Among Active Physicians (MD & DO) in Oklahoma, 2014

The primary care specialties represent three of the top five specialty choices among active physicians in the state. Only emergency medicine with 443 active physicians and anesthesiology (440) outrank any one of the primary care specialties. Table 2 lists top ten specialty choices among active physicians in the state.

Specialty	Active Physicians
Family Medicine/General Practice	1,680
Internal Medicine	1,064
Pediatrics	490
Emergency Medicine	443
Anesthesiology	440
Obstetrics & Gynecology	384
Psychiatry	315
Diagnostic Radiology/Radiology	311
General Surgery	293
Orthopedic Surgery	268

Table 2. Top Ten Specialty Choices Among Active Physicians (MD & DO) in Oklahoma, 201

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[1] America's Health Rankings (2015, May 10). Retrieved from http://www.americashealthrankings.org/OK
[2] Starfield, B., Shi, L., & Macinko, J. (2005). Contribution of Primary Care to Health Systems and Health. *The Milbank*

A complete demographic analysis of Oklahoma's physician workforce is limited by the lack of data. The physician dataset provided did not contain racial/ethnic data for physicians. Second, age and gender data were available only for allopathic physicians. The average age of active allopathic physicians is 55 years old. As Table 3 shows, allopathic physicians born in the 1950s are the largest cohort and closely followed by those born in the 1960s. While close to 75 percent of the active allopathic physician workforce is male, the number of female physicians entering the workforce is increasing.[3] And, like national trends, younger female allopathic physicians in Oklahoma are opting to enter one of the primary care specialties. The lack of age and gender data for the osteopathic physicians precludes a complete understanding of the true demographic composition of Oklahoma's physician workforce.

Decade of Birth	Active Physicians	Male	Female	Active Primary Care Physicians	Male	Female
Prior to 1920	1	1	0	1	1	0
1920s	48	46	2	25	25	0
1930s	289	271	18	112	100	12
1940s	925	819	106	340	298	42
1950s	1,685	1,299	386	692	497	195
1960s	1,544	1,122	422	677	432	245
1970s	1,397	899	498	681	383	298
1980s	332	181	151	217	111	106

Table 3. Birth Cohorts for Active Allopathic (MD) Physicians in Oklahoma, 2014

The geography of the active physician workforce in Oklahoma is one of maldistribution. Every county in the state, except for Grant County, is home to at least one active physician. Over 5,200 physicians practice in Oklahoma County (3,011) and Tulsa County (2,258). At the other extreme, two counties, Dewey and Harmon, only have one active physician each (see Figure 1 & Figure 2). Thirty-three counties have 10 or fewer active physicians.

[3] Hedden, L., Barer, M.L., Cardiff, K., McGrail, K.M., Law, M.R., & Bourgeaut, I.L. (2014). The implications of the feminization of the primary care physician workforce on service supply: a systematic review. *Human Resources forHealth*. 12: 32.

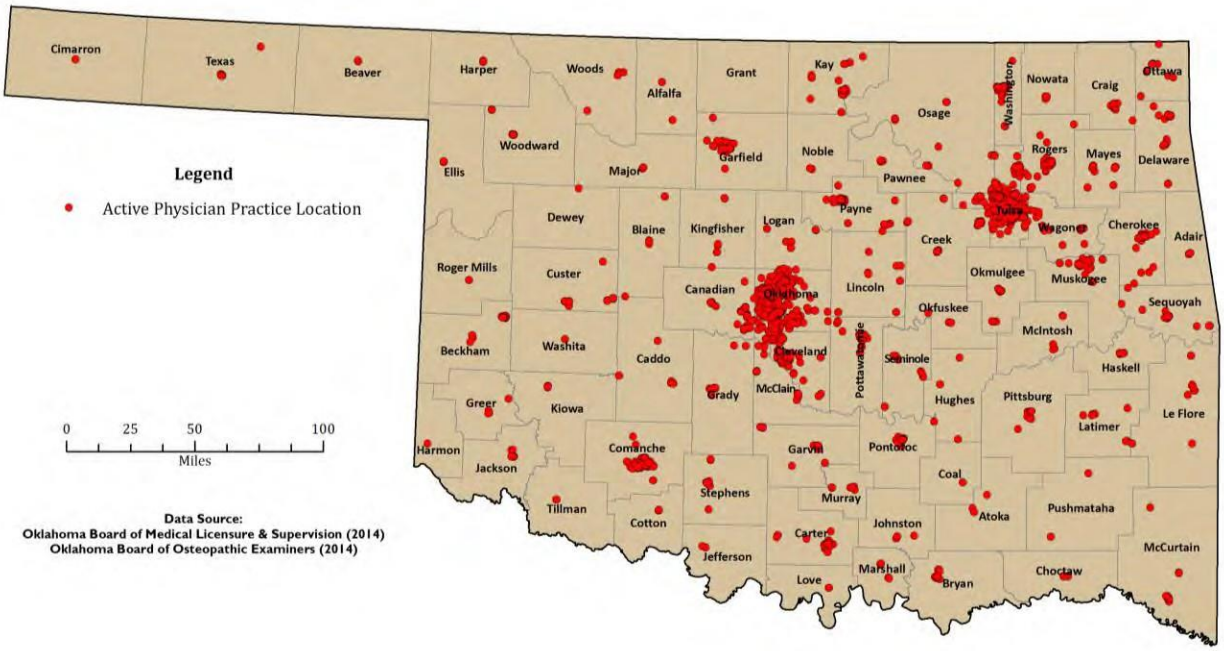

Figure 1. Active Physician (MD & DO) Practice Locations in Oklahoma, 2014

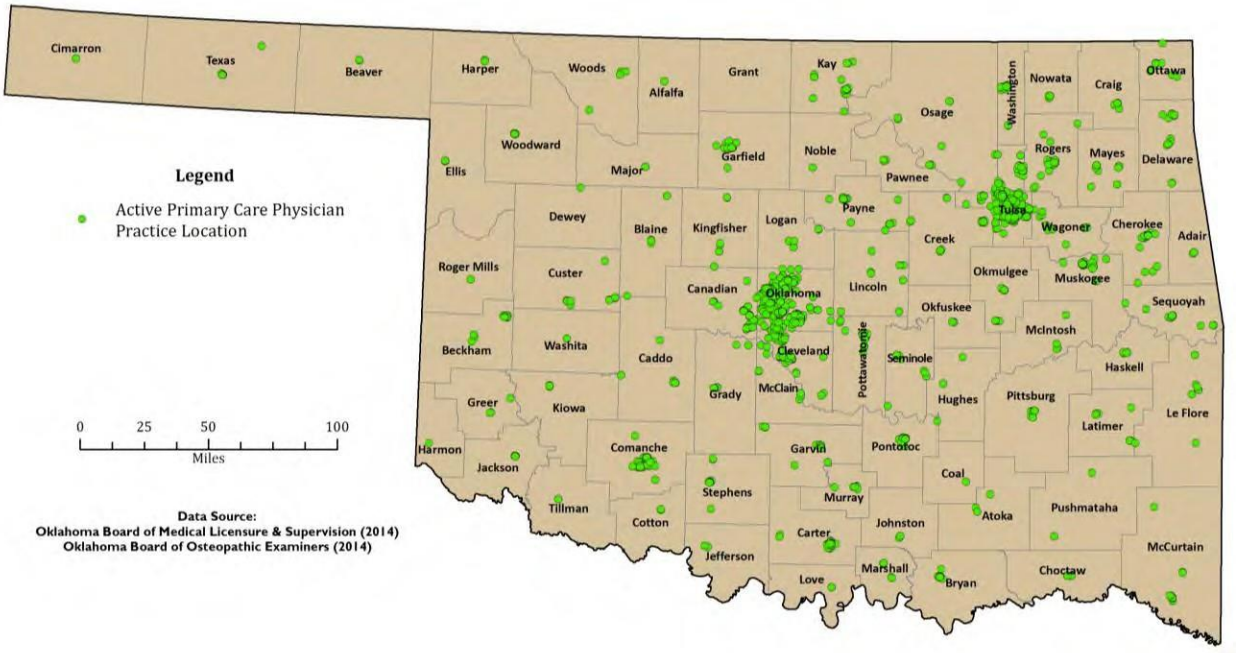

Figure 2. Active Primary Care Physician (MD & DO) Practice Locations in Oklahoma, 2014

Much of this maldistribution falls along the rural/urban divide. Using the county-level rural/urban classification system developed by the OSU Center for Rural Health, the number of active physicians in rural Oklahoma totals 1,731 (or 11.4 physicians/10,000 population). Urban Oklahoma is home to 6,108 active physicians (26.3/10,000 population). Further, for primary care, rural Oklahoma has 1,023 (6.7 physicians/10,000 population) active primary care physicians versus 2,595 (11.2 physicians/10,000 population) active primary care physicians in urban Oklahoma. Table 4 summarizes the distribution of the active physician workforce across metropolitan statistical areas (MSA) in Oklahoma. MSAs are geographic areas defined by a core urban area with population of 50,000 or more, the county containing the urban core, and adjacent counties that have a high level of commuting to the urban core for work. Close to 80 percent of all active physicians and over 74 percent of primary care physicians practice in a MSA.

Metropolitan Statistical Areas (MSA)	Active Physicians (Rate/10,000 Population)	Active Primary Care Physicians (Rate/10,000 Population)
Oklahoma City MSA	3,468 (26.3)	1,383 (10.5)
Tulsa MSA	2,464 (25.6)	1,147 (11.9)
Lawton MSA	245 (18.7)	116 (8.8)
Ft. Smith, Ark. MSA	53 (5.8)	38 (4.2)
Remainder of the State	1,609 (11.9)	934 (6.9)

Table 4. Distribution of Active Physicians (MD & DO) Practice Locations by MSAs in Oklahoma, 2014

Rural Urban Commuting Areas (RUCA) are often used in health services research to classify urban and rural areas. RUCAs are based on Census tract-level commuting patterns that are the result of economic relationships between rural areas and urban areas. Because of their relatively small geographic scale, and that they are subdivided into 33 different categories, RUCAs provide a level of detail that is not apparent in larger scale geographies such as counties. To facilitate interpretation, the 33 different RUCA categories can be combined into logical groupings. Table 5 shows the distribution of active physicians in Oklahoma across four different categories based on the Census tract associated with each physicians practice location. The per capita rates across all four categories mimics those presented above for rural and urban Oklahoma. The dearth of physicians in rural Oklahoma is particularly acute in the state's small rural towns and isolated rural towns.

Category	Active Physicians (Rate/10,000 Population)	Active Primary Care Physicians (Rate/10,000 Population)
Urban	6,571 (24.7)	2,281 (8.3)
Large Rural City/Town	931 (16.6)	487 (8.7)
Small Rural Town	238 (9.0)	164 (6.2)
Isolated Small Rural Town	99 (5.1)	86 (4.4)

Table 5. Active Physicians (MD & DO) in Oklahoma by categorized RUCAs, 2014

NURSES

The nursing workforce in Oklahoma is divided into three distinct licensed groups: registered nurses (RN); licensed practical nurses (LPN); and advanced practice registered nurses (APRN) (a/k/a nurse practitioners). The Oklahoma Board of Nursing licenses all of the aforementioned nursing professionals. And, like the physician data, these data reflect all licensed individuals and may not reflect the number or distribution of nurses involved in direct patient care. The licensed nursing workforce in Oklahoma totals 47,167 (see Table 6).

License Type	Total Licensed
Registered Nurse	32,351
Licensed Practical Nurse	12,814
Advanced Practice Registered Nurses	2,002

Table 6. Licensed Nurses in Oklahoma by Type, 2014

1.1. Registered Nurses

RNs account for 69 percent of all licensed nurses in the state. Almost 60 percent of the RNs work in Oklahoma County (11,379) and Tulsa County (7,814). The seven RNs practicing in Roger Mills County are the fewest in any one county (see Figure 3). Practice location information was not available for 22 RNs.

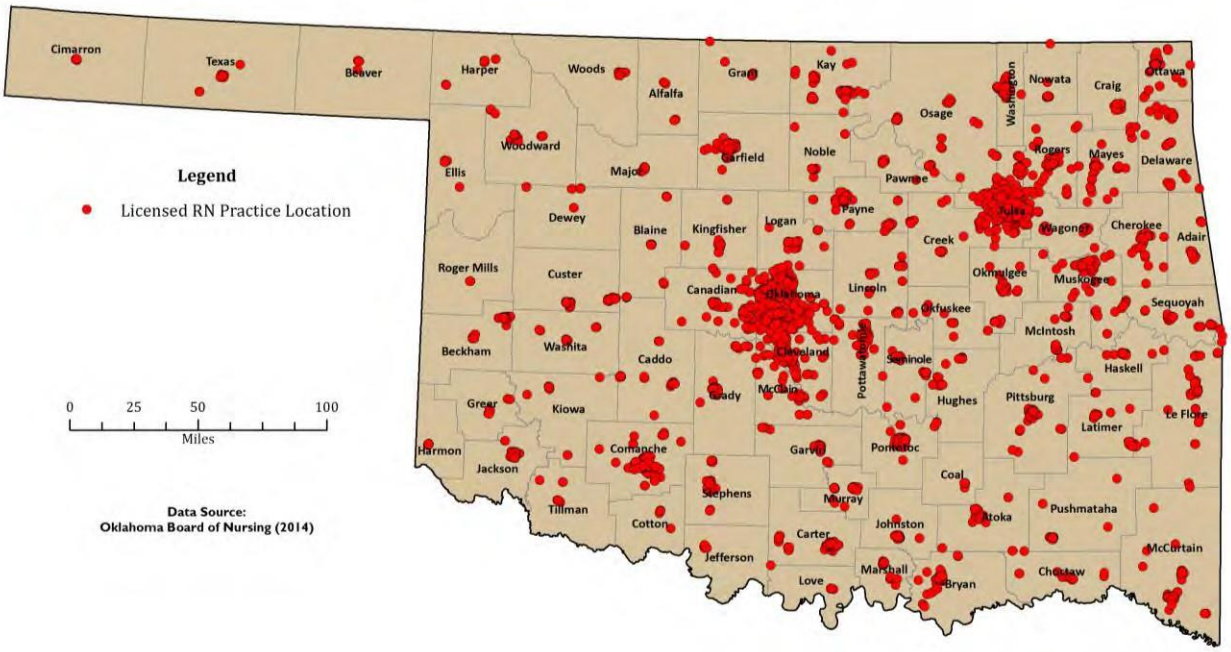

Figure 3. Licensed Registered Nurse Practice Locations in Oklahoma, 2014

Almost 64 percent of all RNs practice in a hospital setting (see Table 7). The second most popular practice setting for RNs are home health agencies.

Practice Setting	Number of Licensed RNs
Hospital	20,557
Home Health	2,668
Other	2,558
Long-term/Extended Care	1,707
Ambulatory Care Setting	1,521
Academic Setting	891
Community Health	820
Public Health	481
School Health	397
Insurance/Utilization Review	249

Table 7. Top ten practice settings among licensed RNs in Oklahoma, 2014

The geographic distribution of RNs is skewed to the state's urban areas. Over 71 percent (23,008) of RNs practice in an urban county with the remaining 9,343 practicing in a rural county.

1.2. Advanced Practice Registered Nurses

Advanced Practice Registered Nurses (APRN) account for 4 percent of licensed nurses in Oklahoma. Over half practice in Oklahoma County or Tulsa County. APRNs practice in all but four Oklahoma counties; Cimarron, Harper, Jefferson, and Roger Mills (see Figure 4).

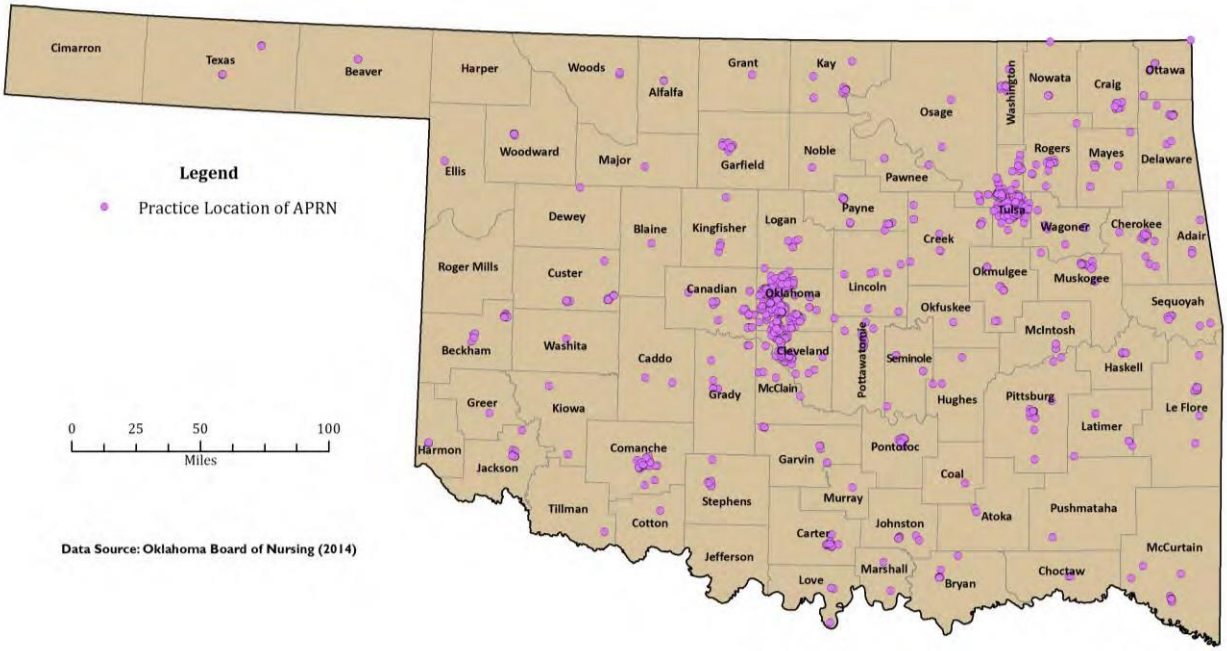

Figure 4. Practice Locations of APRNs in Oklahoma, 2014

The source data provided contained a variable describing the employment setting of APRNs. Approximately 26 percent of APRNs practice in a hospital. Table 8 lists the top ten practice settings for APRNs.

Practice Setting	Number of Licensed APRNs
Hospital	861
Ambulatory Care Setting	453
Other	375
Community Health	133
Academic Setting	70
Public Health	34
Long-term/Extended Care	30
Correctional Facility	12
Unknown	13
Home Health	11

Table 8. APRNs by Practice Setting, 2014

The most popular specialty choice among APRNs in Oklahoma is family medicine (834) followed by nurse anesthetist (438). Fifty APRNs are nurse midwives. Like physician assistants, APRNs are becoming an increasing important component of the primary care delivery system. Around 68 percent (or 1,373) of APRNs in Oklahoma specialize in primary care. APRNs represent 25 percent of all primary care providers in Oklahoma. Over 35 percent of primary care APRNs practice in rural Oklahoma.

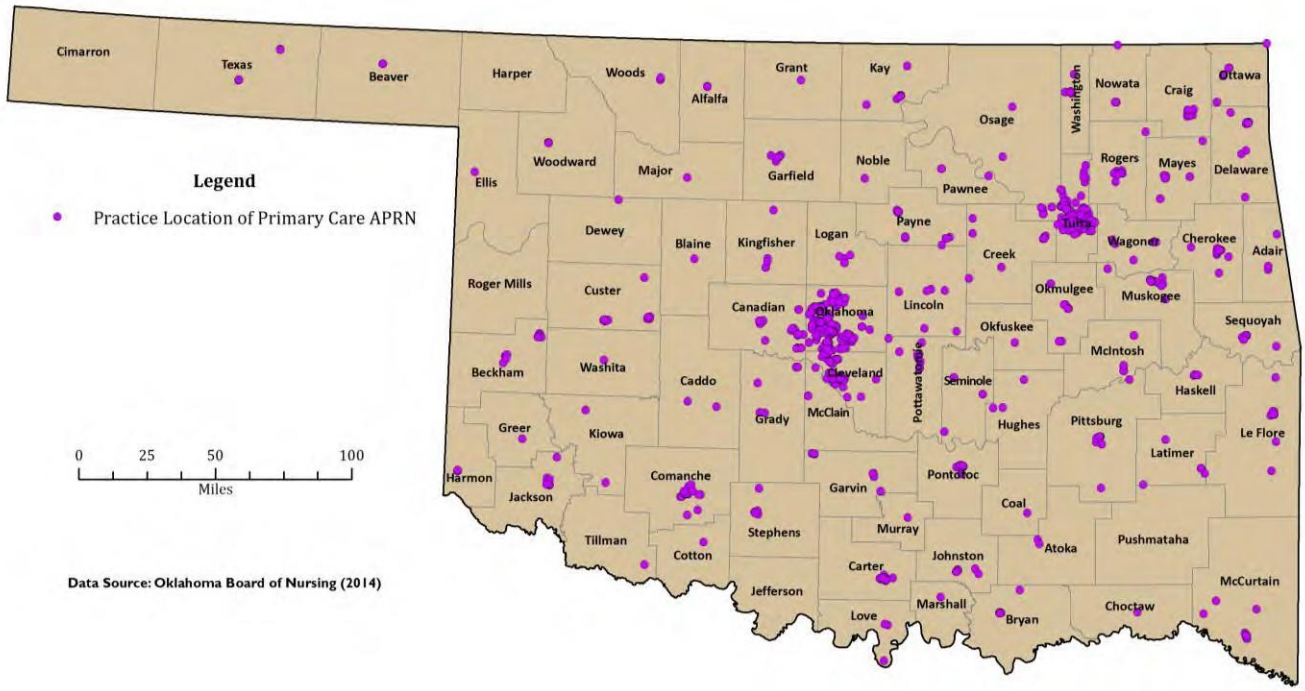

Figure 5. Practice Locations of Primary Care APRNs in Oklahoma, 2014

1.3. Licensed Practical Nurses

The remaining 27 percent of the licensed nurses in Oklahoma are LPNs. Of the 12,814 licensed LPNs, nurses were not employed in nursing or had an unknown practice setting. Most of the remaining 12,774 LNPs are concentrated in Oklahoma County (2,581) and Tulsa County (1,926). Cimarron County in the panhandle has the fewest LPNs with only four practicing in the county. Figure 6 shows the distribution of the LPN work force.

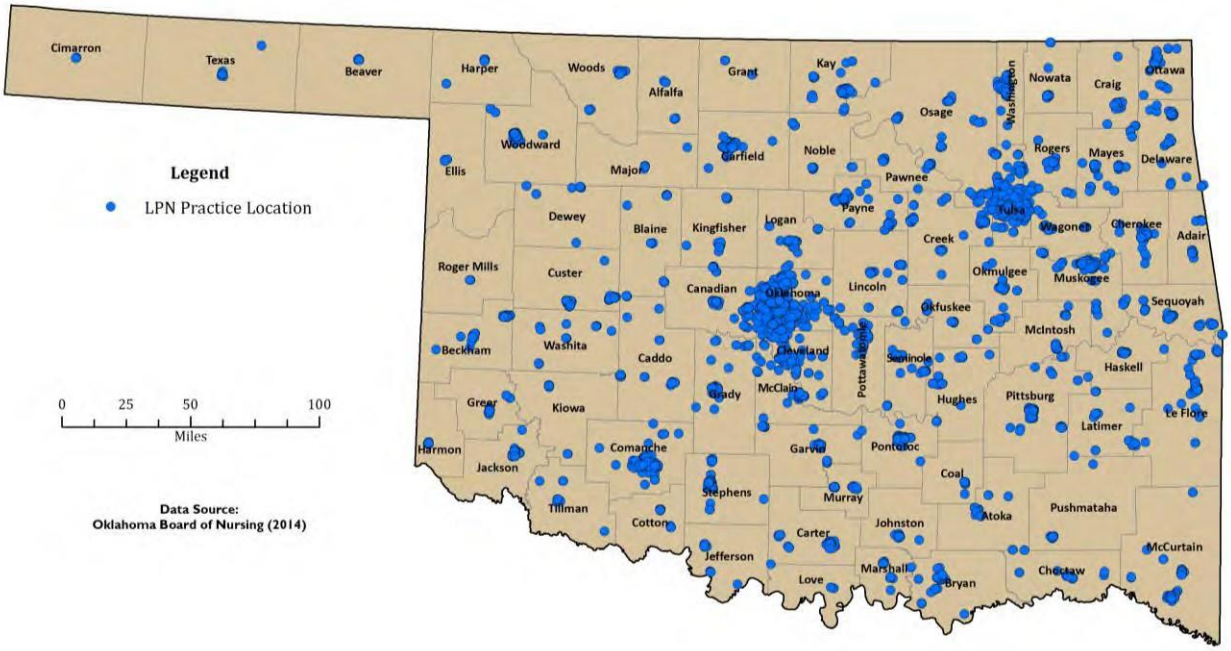

Figure 6. LPN Practice Locations in Oklahoma, 2014

The source data that we were provided contained two variables that described the employment characteristics of LPNs. The practice setting variable describes settings where LPNs practice (see Table). A plurality (32 percent) of LPNs are employed in long-term/extended care facilities. 21 percent of LPNs are employed in hospitals.

Practice Setting	Number of LPNs
Long-term/Extended Care	4,086
Hospital	2,721
Other	2,051
Home Health	1,953
Community Health	632
Ambulatory Care	570
Public Health	214
Correctional Facility	167
School Health	122

Occupational Health	96

Table 9. Top ten practice settings for LPNs in Oklahoma, 2014

In terms of position title, close to 77 percent of LPNs are classified as a Staff Nurse. Table lists all of the position titles for the LPN workforce in Oklahoma.

Position	Number of LPNs
Staff Nurse	9,866
Other	1,686
Nurse Manager	519
Nurse Faculty	403
Nurse Executive	106
Consultant	65
Nurse Researcher	16
Unknown	3

Table 10. Position title for LPNs in Oklahoma, 2014

Interestingly, the hours worked was reported for LPNs. Most LNPs (11,065) work full-time (over 35 hours/week). For the part-time employed nurses, most (1139) worked 20 to 34 hours/week. The remaining 568 worked less than 19 hours/week.

1.4. Physician Assistants

Physician assistants (PAs) fill an important role in the delivery of team-based health care. Working under the supervision of a licensed physician, PAs can specialize in a variety of different medical practice areas, including primary care. Oklahoma is home to 1,193 active PAs (see Figure 7). As with most other health care professions, PA practices are concentrated in Oklahoma County (431) and Tulsa County (223). There are no PAs practicing in 8 counties (Beaver, Cotton, Ellis, Grant, Harmon, Murray, Texas, and Washita). Along the rural/urban continuum, 851 PAs practice in urban areas while the remaining 342 practice in rural Oklahoma.

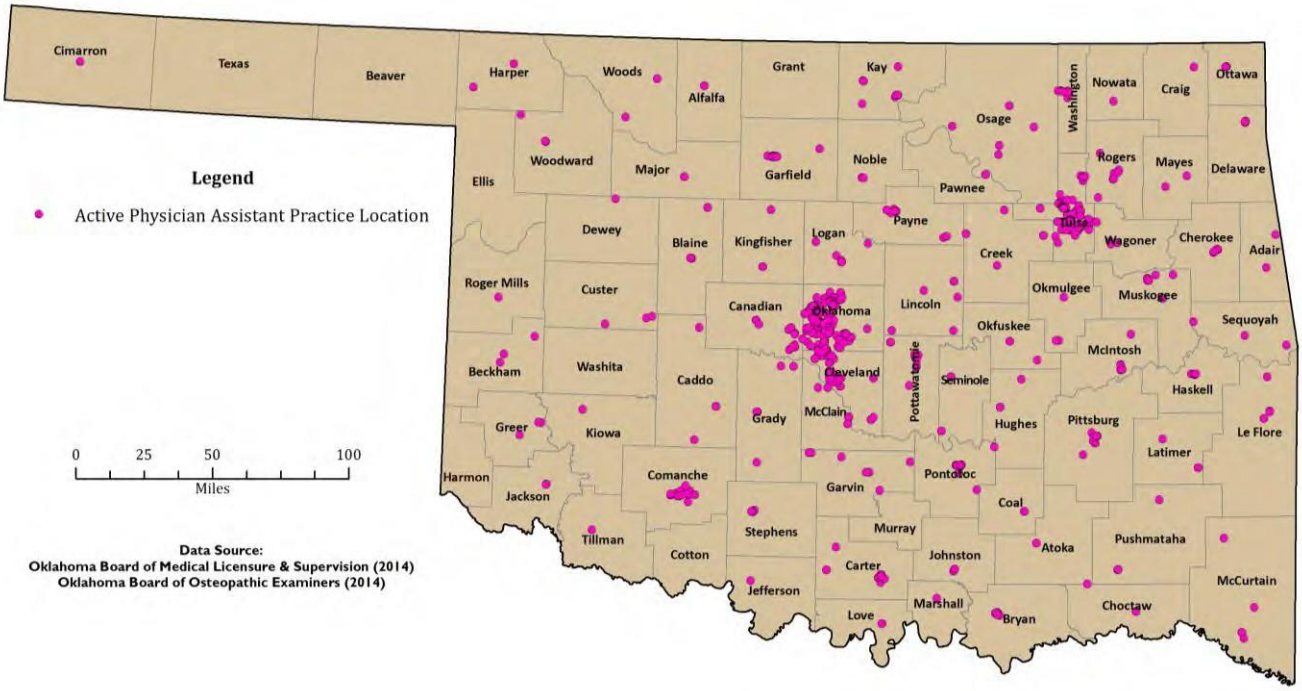

Figure 7. Active PA Practice Locations in Oklahoma, 2014

The dataset that we were provided did not contain information about specialty choice among the PAs practicing in Oklahoma. However, research conducted by the National Commission on the Certification of Physician Assistants shows that 34.2 percent of PAs in Oklahoma specialize in one of the primary care disciplines.[4]

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[4] 32013 Statistical Profile of Certified Physician Assistants (2015, June 15) Retrieved from https://www.nccpa.net/Upload/PDFs/2013StatisticalProfileofCertifiedPhysicianAssistants- AnAnnualReportoftheNCCPA.pdf

The age and gender characteristics of the PA workforce are depicted in (Figure 8). Females comprise 62 percent of the PA workforce. Females are the largest portion of every age cohort less than 60 years with the exception of a single female octogenarian PA. The PA workforce is relatively young, as compared to physicians, with an average age of 42 years old.

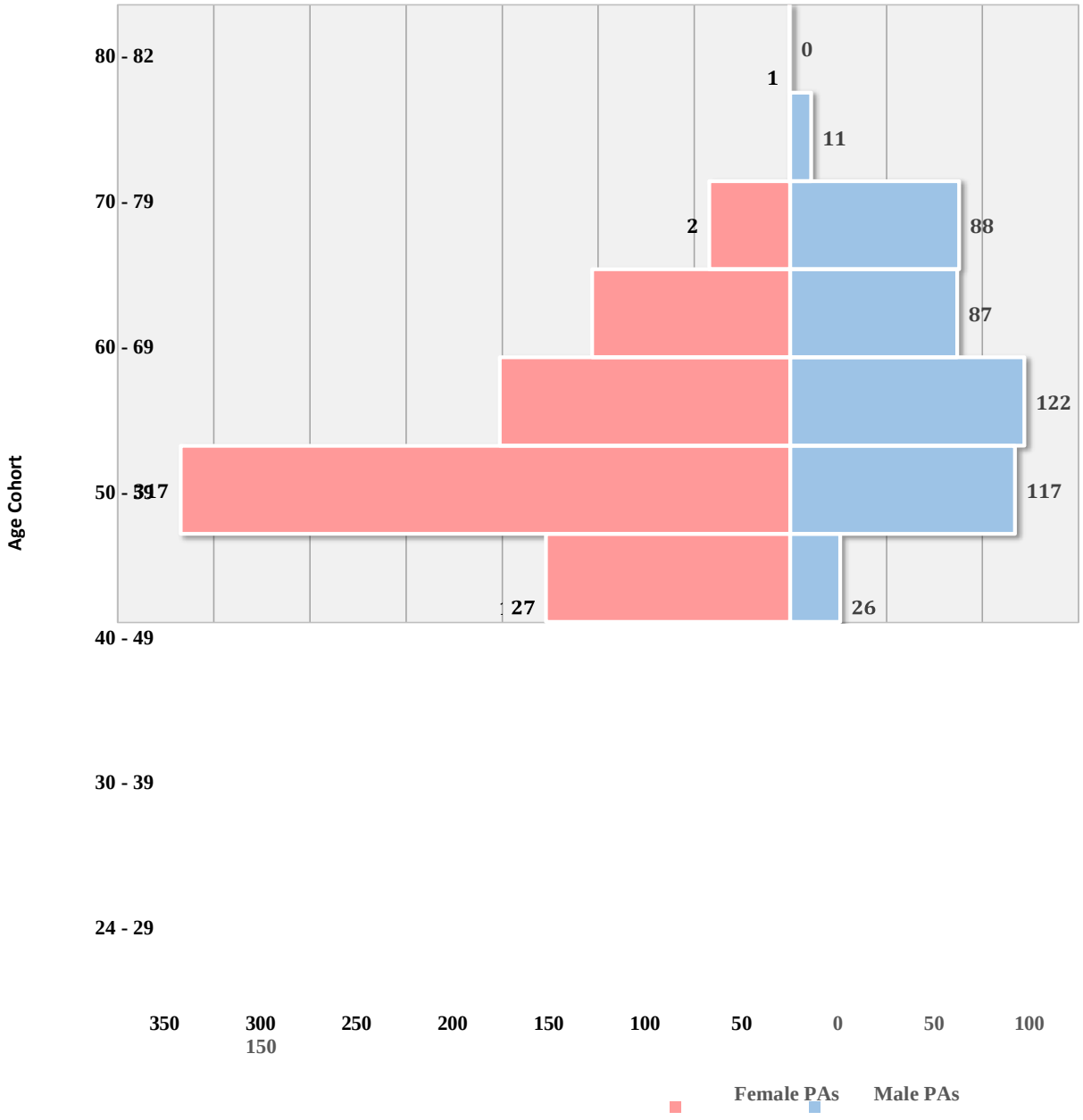

Figure 8. Population Pyramid of Active PA Workforce in Oklahoma, 2014

1.5. Dentists

Dentists practice in all but four counties (Cimarron, Cotton, Grant, and Harmon) in Oklahoma. The workforce totals 1,756 licensed dentists. Close to 1,000 dentists practice in Oklahoma County (543), Tulsa County (338), and Cleveland County (118). The remainder are scattered around the state with most located in the larger rural communities (see Figure 9). As a whole, 552 dentists practice in rural Oklahoma, as defined by the OSU Center for Rural Health, for a rate of 3.6 dentists per 10,000 population. The rate in urban Oklahoma is 5.2 dentists per 10,000 population. Over 78 percent of licensed dentists are male. Further, only 42 dentists specialize in pediatric dentistry (see Figure 10).

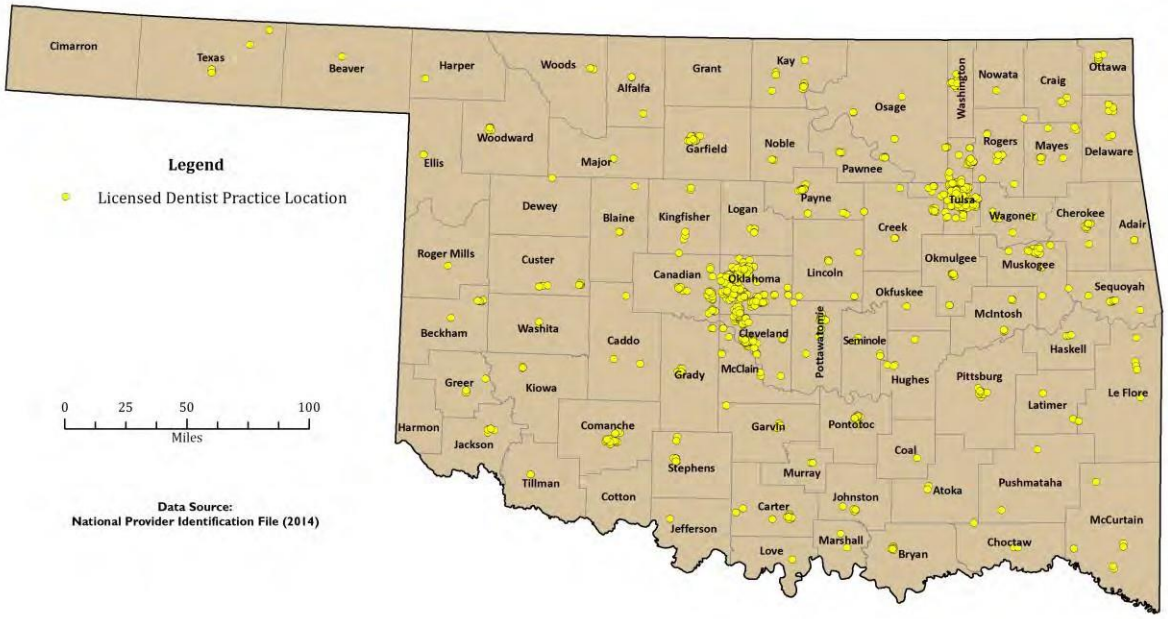

Figure 9. Licensed Dentist Practice Locations in Oklahoma, 2014

Figure 10. Licensed Pediatric Dentist Practice Locations in Oklahoma, 2014

1.6. Psychologists

Oklahoma is experiencing a behavioral health care crises.[5] Not only in terms of the number of citizens seeking or needing treatment, but also in terms of workforce capacity. Psychologists are an import part of a well-functioning behavioral health care workforce. Oklahoma is home to 571 licensed psychologists. Over 56 percent of licensed psychologists practice in Oklahoma County (185) or Tulsa County (136). Licensed psychologists practice in 31 of the state's 77 counties (see Error! Reference source not found.).

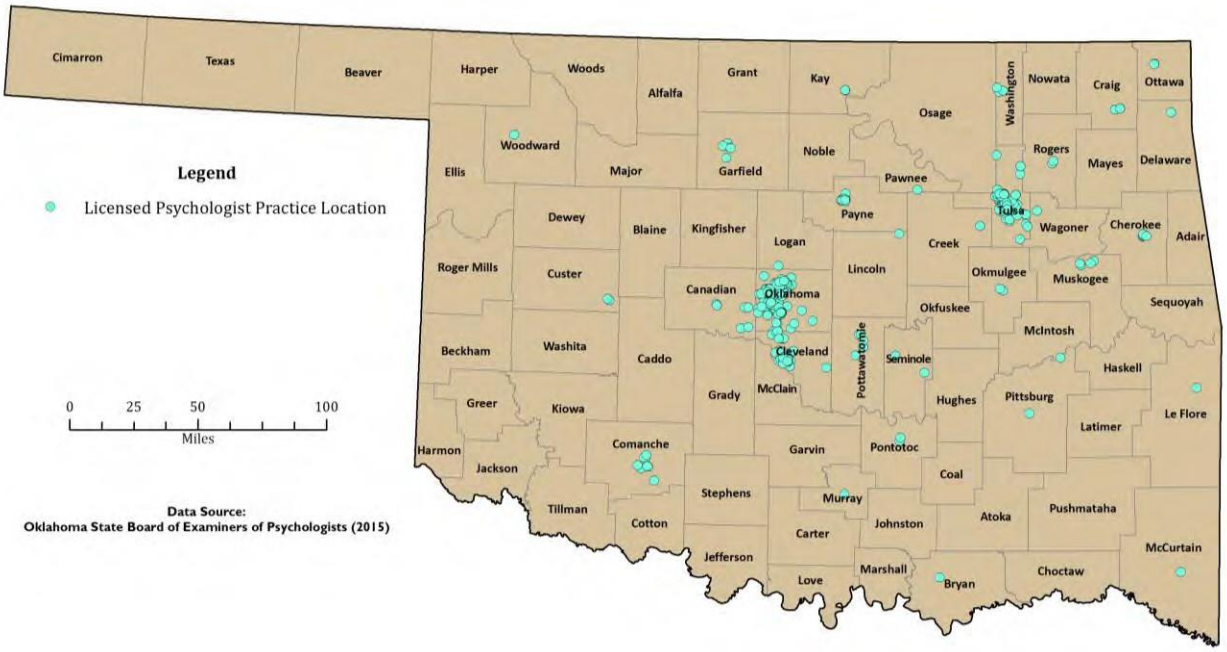

Figure 11. Licensed Psychologist Practice Locations in Oklahoma, 2015

At a more regional scale, only 88 (or 15 percent) licensed psychologists practice in rural counties as defined by the OSU Center for Rural Health. This translates to a rate of 0.6 licensed psychologists per 10,000 residents (the rate in urban Oklahoma is 2.1 psychologists per 10,000 residents). The actual rate is probably higher than reported above. Telehealth technologies are increasingly used to deliver some behavioral health treatments.[6] It is likely that some psychologists in Oklahoma are delivering treatment via this modality and reaching rural patients. Unfortunately, the licensure data does not capture such events or note if providers offer telehealth services.

With regard to specialty mix, 45 percent (or 282) of licensed psychologists specialize in clinical psychology and 38 percent (218) specialize in counseling. Only 36 psychologists specialize in school psychology.

Appendix B: Baseline Health Workforce Landscape – Provider Organizations

Baseline Health Workforce Landscape – Provider Organizations

Prepared by
OSU Center for Rural Health
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May 2015

INTRODUCTION

Provider organizations are a vital component of the health care workforce landscape. They serve as centers of employment for health care workers and the locales for the delivery of care. This draft baseline assessment looks at select provider organizations in Oklahoma and how they are distributed, geographically, across the state. Typically, these are larger organizations or businesses that employ a number of health care professionals. The workforce employed by these provider organizations ranges from physicians to entry-level paraprofessionals. It should be noted that individual professional practices were not necessarily included in this assessment. Some individual practices are included due to the nature of the data, but no attempt was made to systematically include them all.

This draft assessment is organized into six sections based on the nature of care delivered by the provider organizations. Section one, ***Hospitals***, looks at those organizations that provide inpatient medical care and other related services for surgery, acute medical conditions or injuries. The second section, ***Ambulatory & Independent/Group Practices***, focuses on organizations that provide outpatient services. Section three, ***Long-term Care***, addresses organizations that provide long-term care, post-acute care and rehabilitative services. ***Home & Community Based Services*** form the fourth section which focuses on organizations that provide opportunities for individuals to receive health care services in their own home or community. Section five, ***Health Care Informatics***, focuses on organizations that use health information technology to improve care, provide data, resources, devices, and methods required to optimize the acquisition, storage retrieval, and use of information in health and biomedicine. The final section, ***Other Organizations***, includes those entities that do not necessarily fit in one of the above categories, but are important provider organizations.

METHODOLOGY

The data used to complete this draft baseline assessment was supplied by the Oklahoma State Department of Health (OSDH) and the Health Resources Services Administration (HRSA) Data Warehouse. The data from OSDH contained 2,658 records of organizational providers. Each record contained the necessary fields to conduct geocoding operations. ESRI's ArcGIS v10.2 for Desktop and ArcGIS World Geocode Service were used to geocode the addresses. 2,447 records matched at the street address or point address level. The remaining 211 records were rematched manually to achieve total match scores of over 80 for all of the records. Twenty-two organizational providers did not have an Oklahoma address and were eliminated from further analysis. Data from the HRSA Data Warehouse contained 1,290 records all of which were spatially referenced and did not require geocoding. The data provided by both organizations often "overlapped," meaning identical (or near identical) content was contained in both datasets. Deference was given to the dataset that provided the most useful analysis.

Given the nature of the supplied data, this is primarily a geographic assessment. Each section contains maps that typically show the distribution of organizational providers and total number of providers by community. These maps permit readers to understand better the spatial distribution of the provider organizations and the relative concentration of providers among the various communities in the state. Much can be learned from this type of assessment. It also represents a vital starting point for future analysis.

[5] Healthy Oklahoma 2020 (2015, May 14). Retrieved from http://ohip2020.com/
[6] Novotney, A. (2011). A new emphasis on telehealth: How can psychologists stay ahead of the curve - and keep patients safe? *American Psychological Association*. 42(6): 40.

HOSPITALS

1.1. Short-term Hospitals

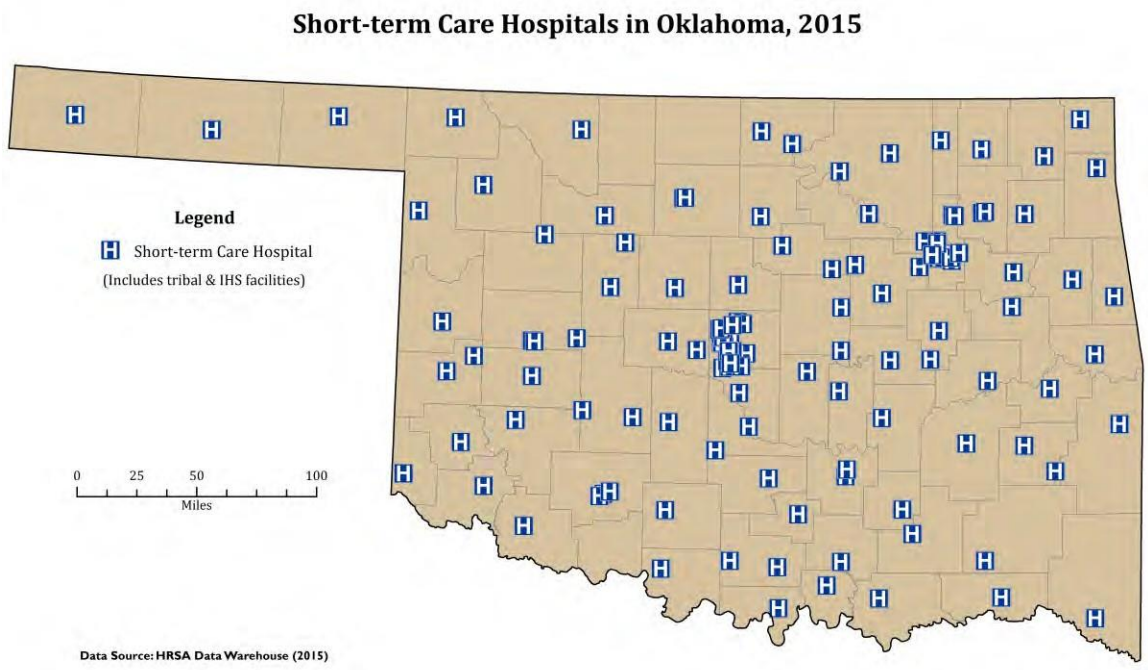

Figure 1. Short-term Hospitals in Oklahoma, 2015

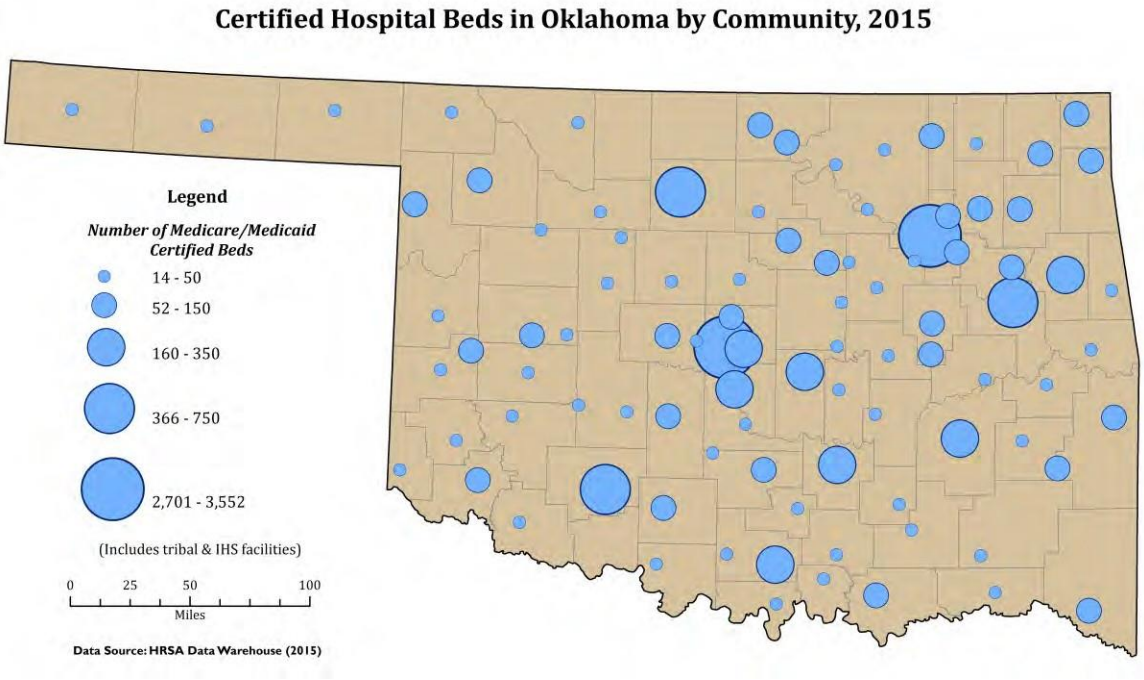

Figure 2. Certified Hospital Beds in Oklahoma by Community, 2015

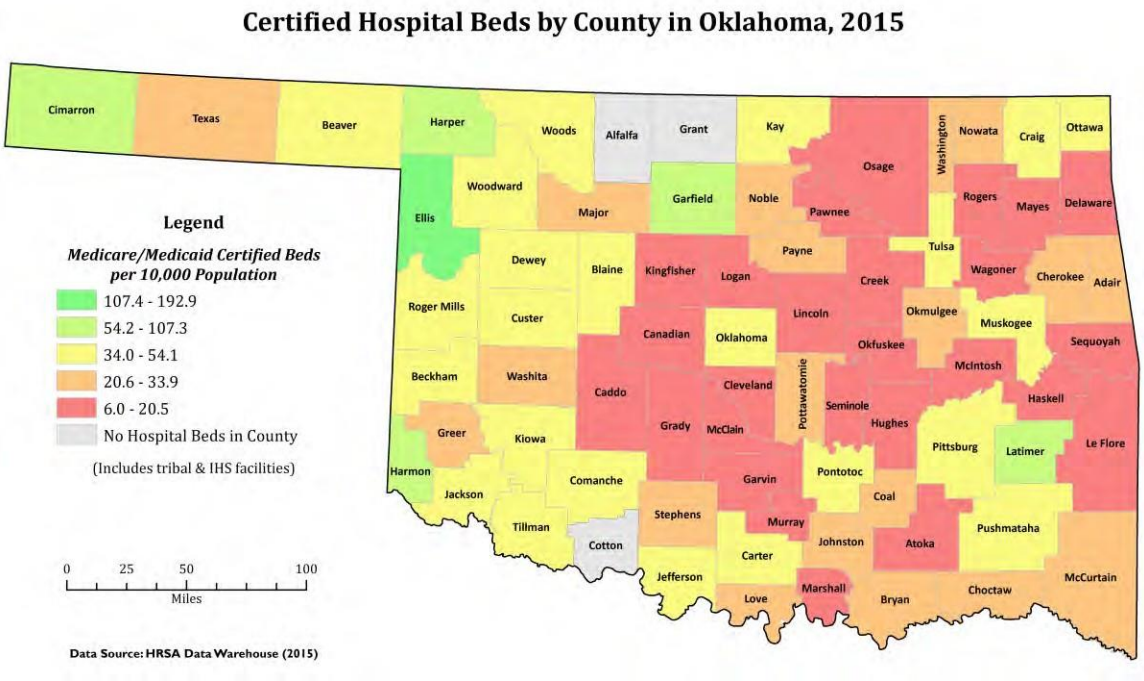

Figure 3. Certified Hospital Beds by County in Oklahoma, 2015

1.2. Psychiatric Hospitals

Figure 4. Psychiatric Hospitals in Oklahoma, 2015

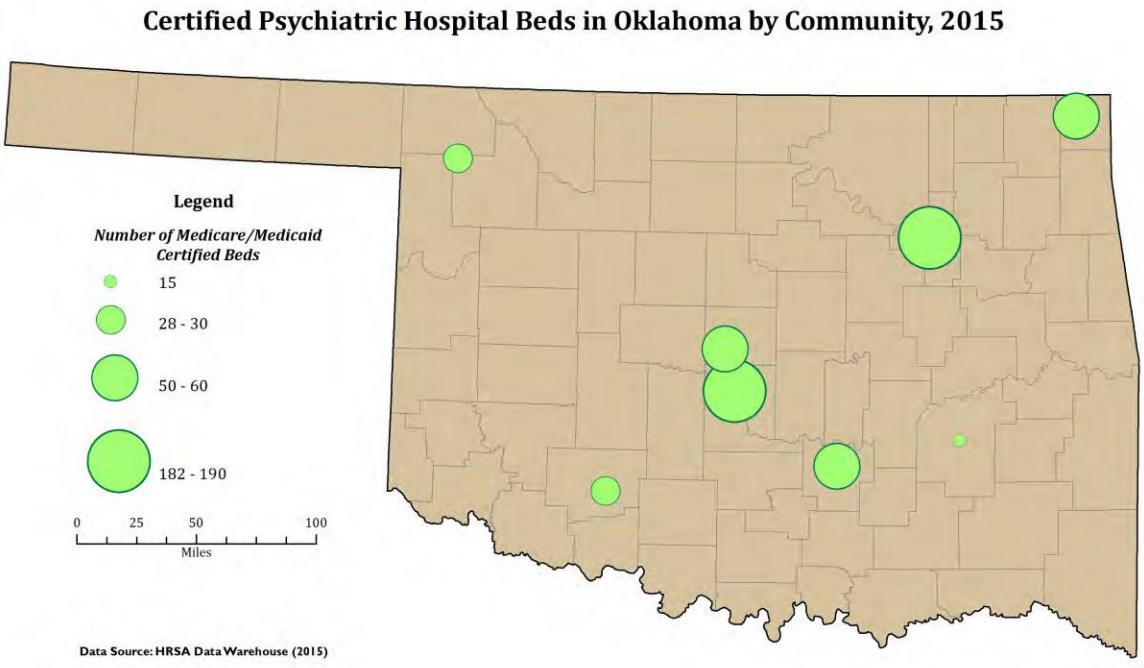

Figure 5. Certified Psychiatric Hospital Beds in Oklahoma by Community, 2015

AMBULATORY & INDEPENDENT/GROUP PRACTICES

1.3. Ambulatory Surgical Centers

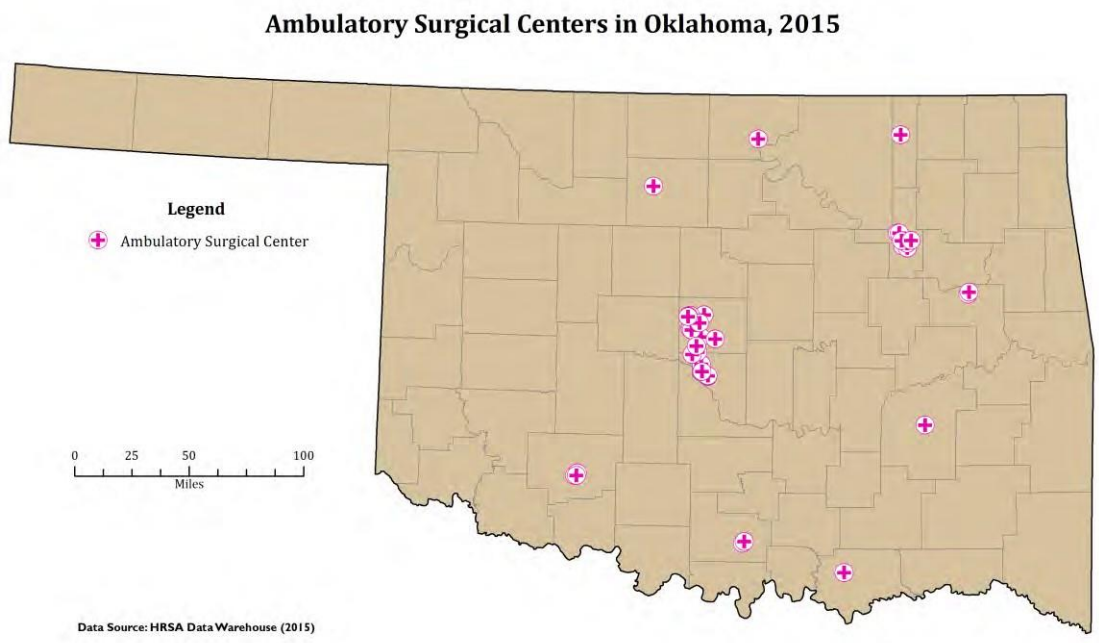

Figure 6. Ambulatory Surgical Centers in Oklahoma, 2015

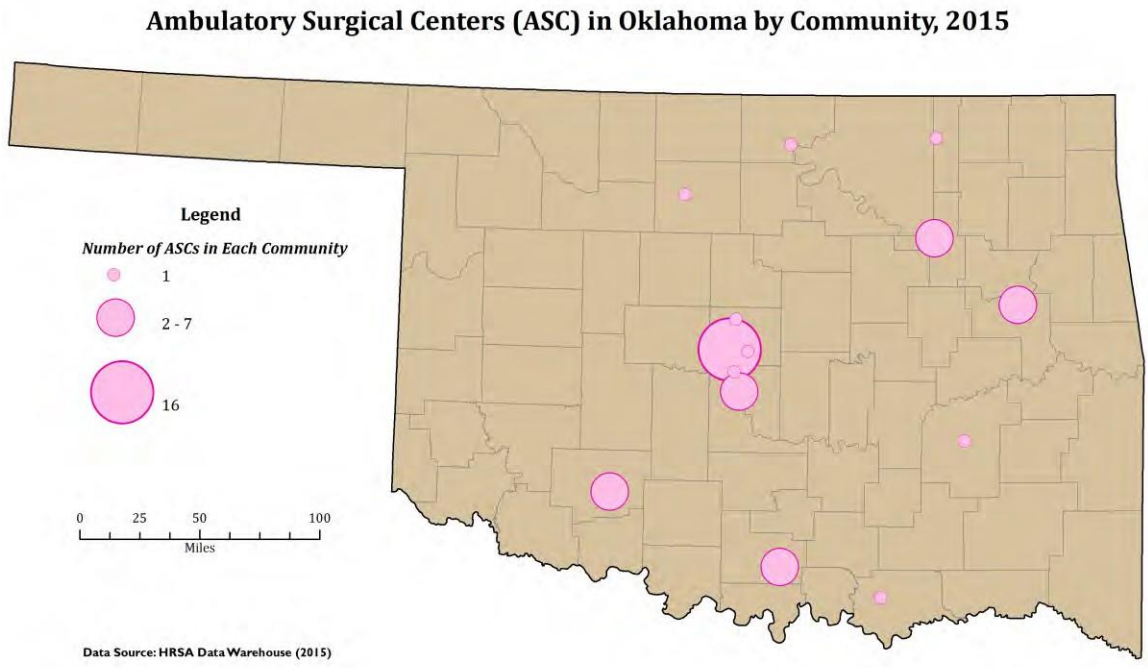

Figure 7. Ambulatory Surgical Centers (ASC) in Oklahoma by Community, 2015

1.4. End Stage Renal Disease Facilities

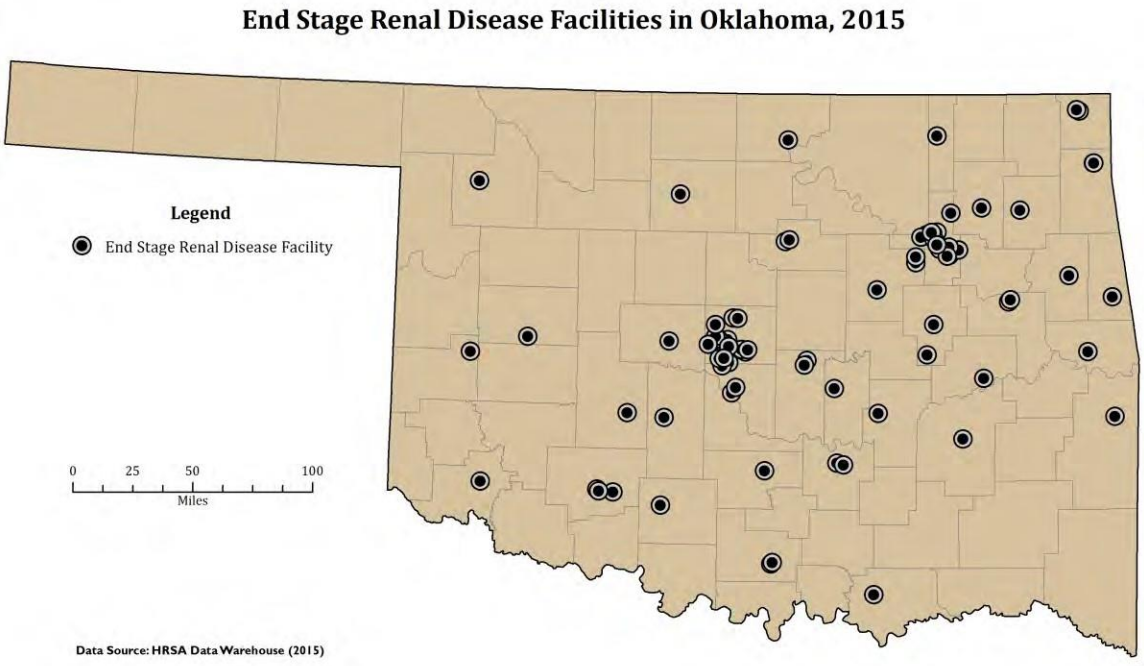

Figure 8. End Stage Renal Disease Facilities in Oklahoma, 2015

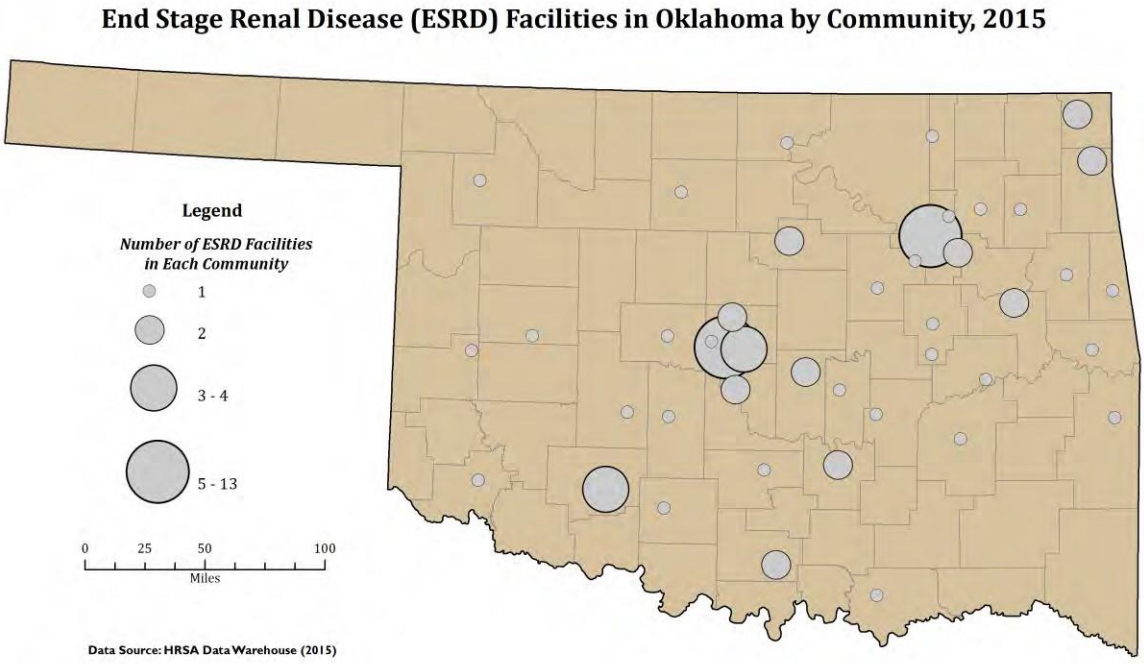

Figure 9. End Stage Renal Disease (ESRD) Facilities in Oklahoma by Community, 2015

1.5. Federally Qualified Health Centers

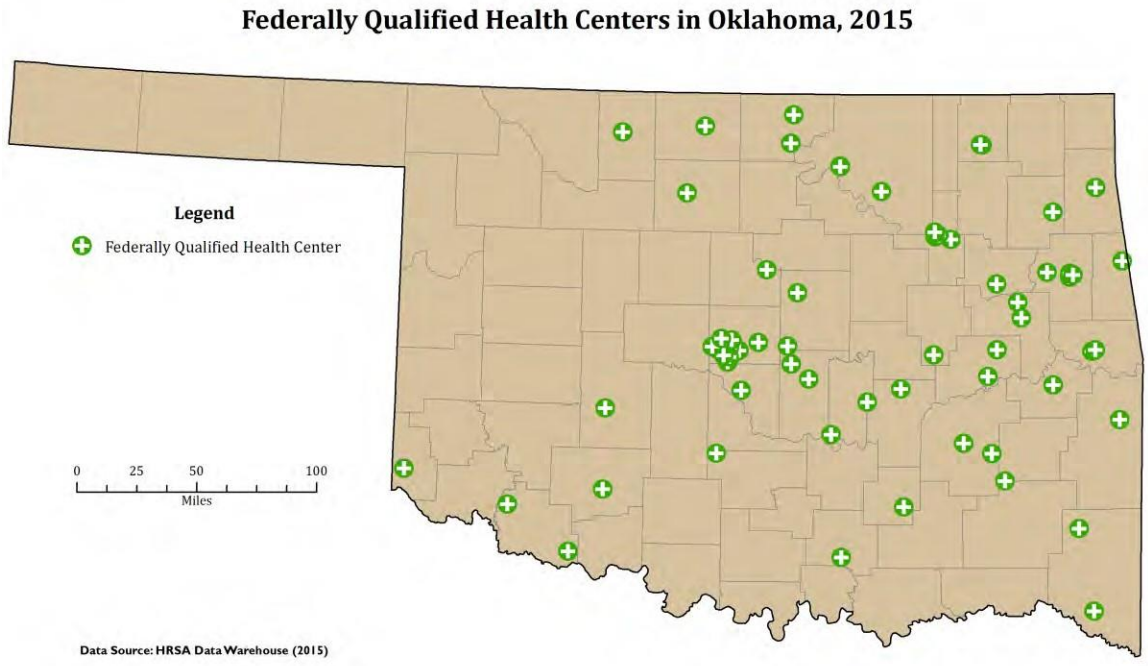

Figure 10. Federally Qualified Health Centers in Oklahoma, 2015

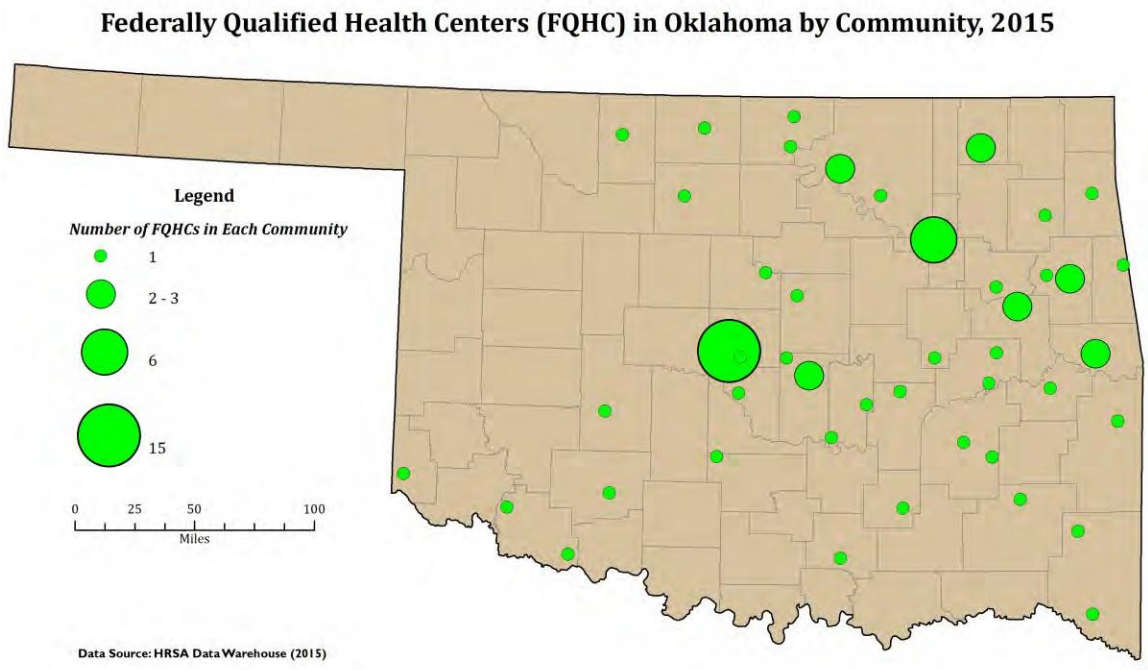

Figure 11. Federally Qualified Health Centers (FQHC) in Oklahoma by Community, 2015

1.6. Free Clinics

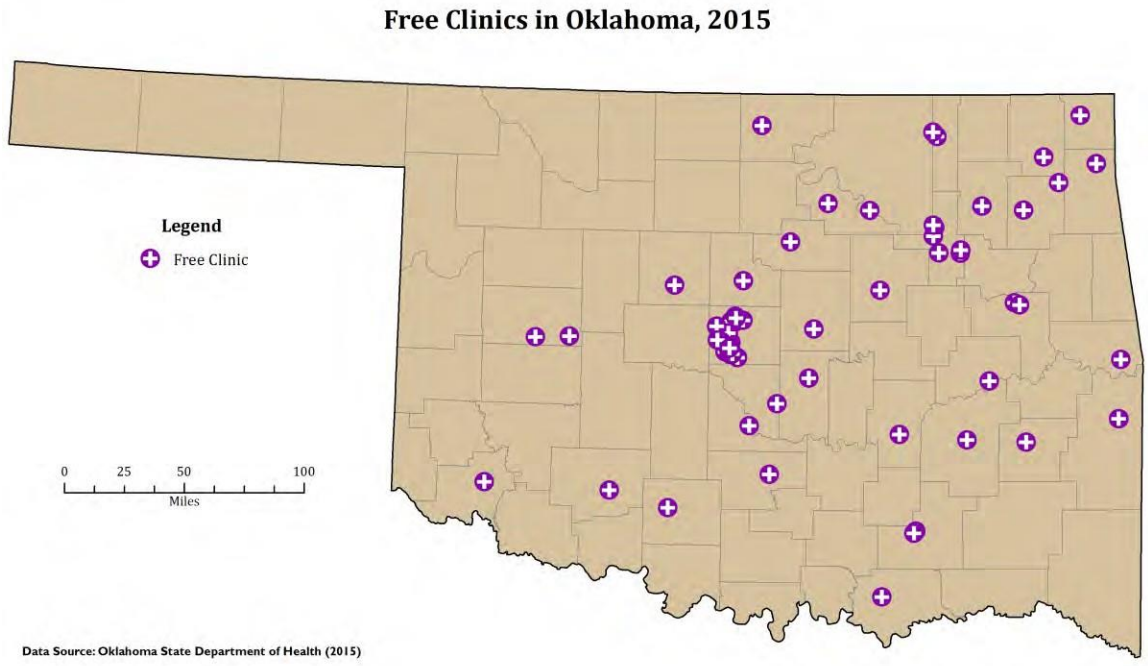

Figure 12. Free Clinics in Oklahoma, 2015

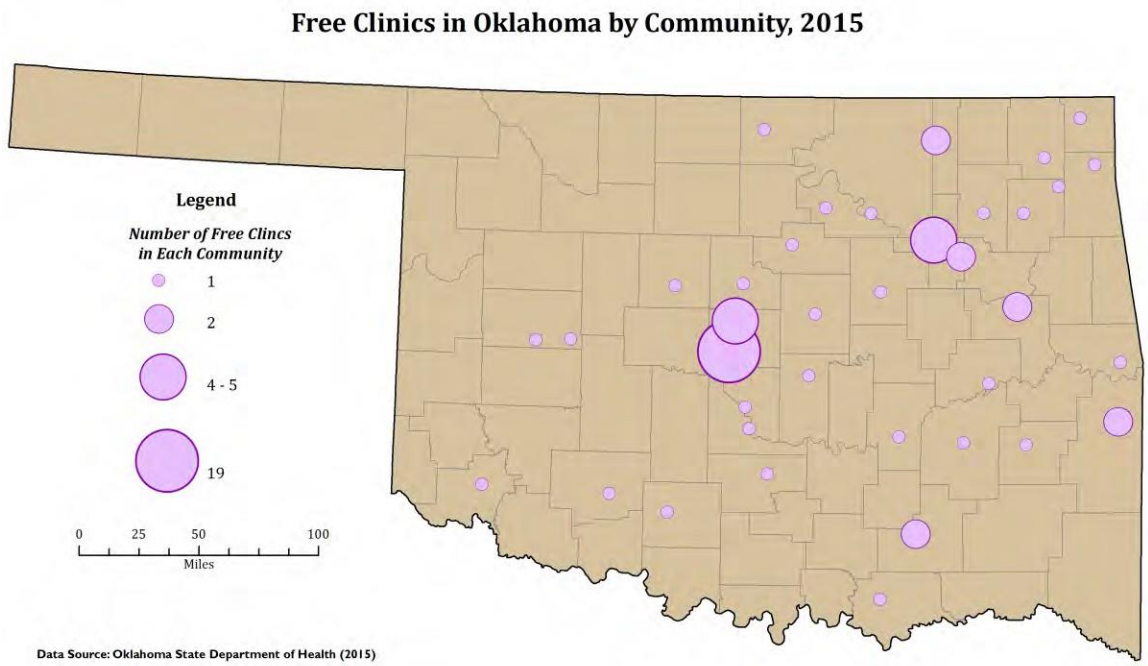

Figure 13. Free Clinics in Oklahoma by Community, 2015

1.7. Outpatient Physical Therapy/Speech Pathology

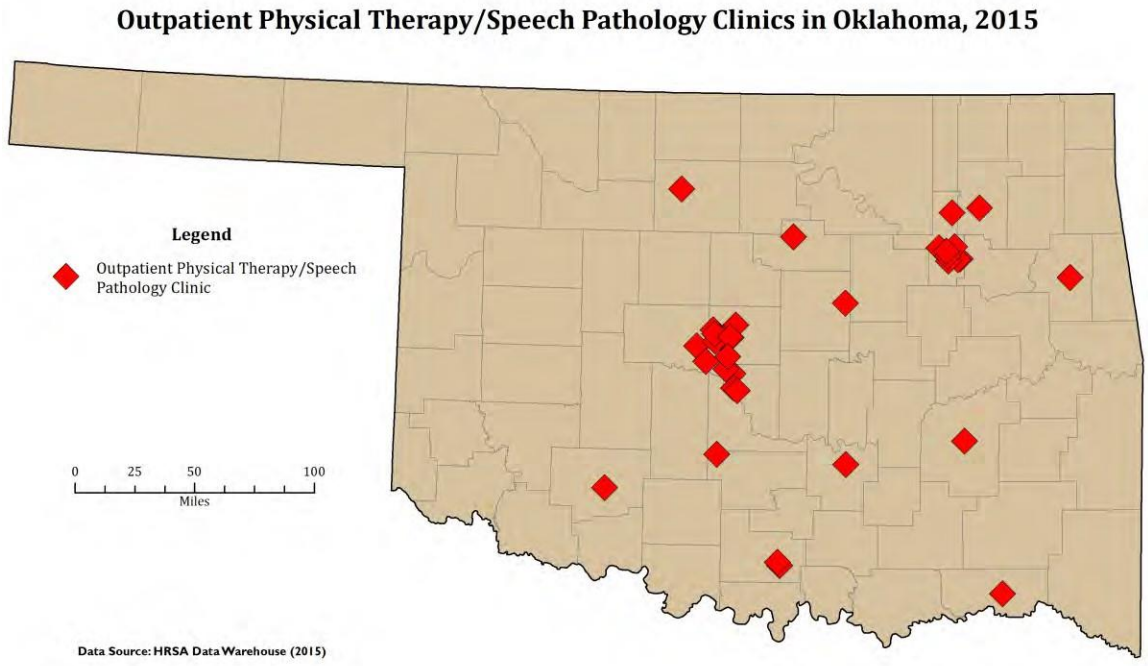

Figure 14. Outpatient Physical Therapy/Speech Pathology Clinics in Oklahoma, 2015

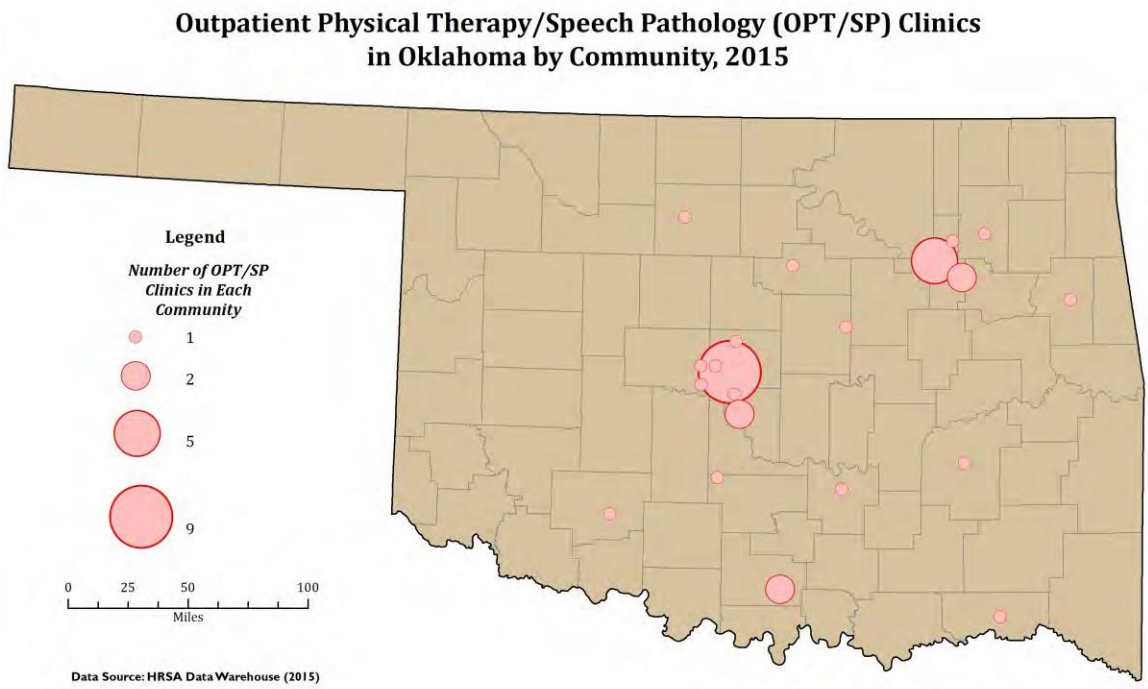

Figure 15. Outpatient Physical Therapy/Speech Pathology (OPT/SP) Clinics

1.8. Retail Pharmacies

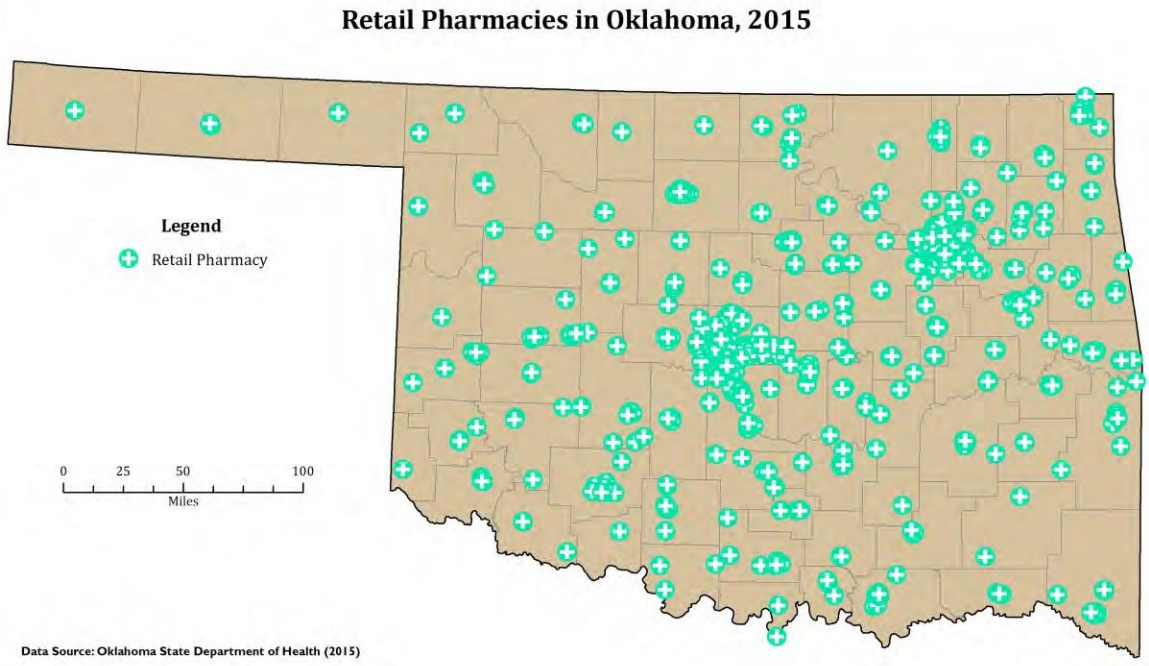

Figure 16. Retail Pharmacies in Oklahoma, 2015

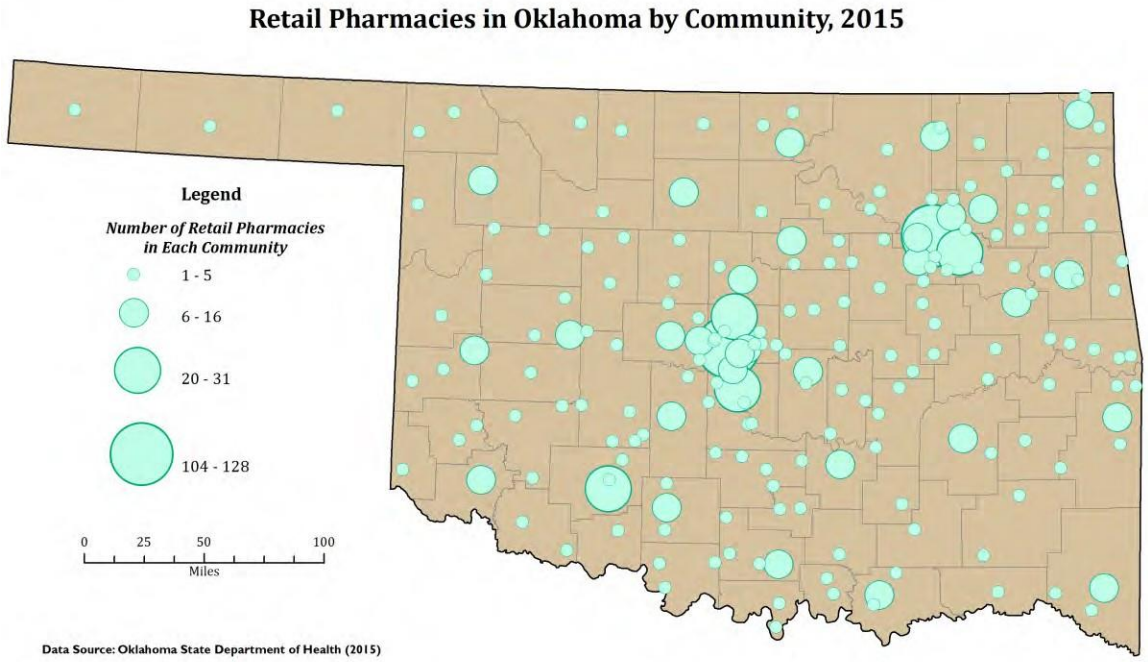

Figure 17. Retail Pharmacies in Oklahoma by Community, 2015

1.9. Rural Health Clinics

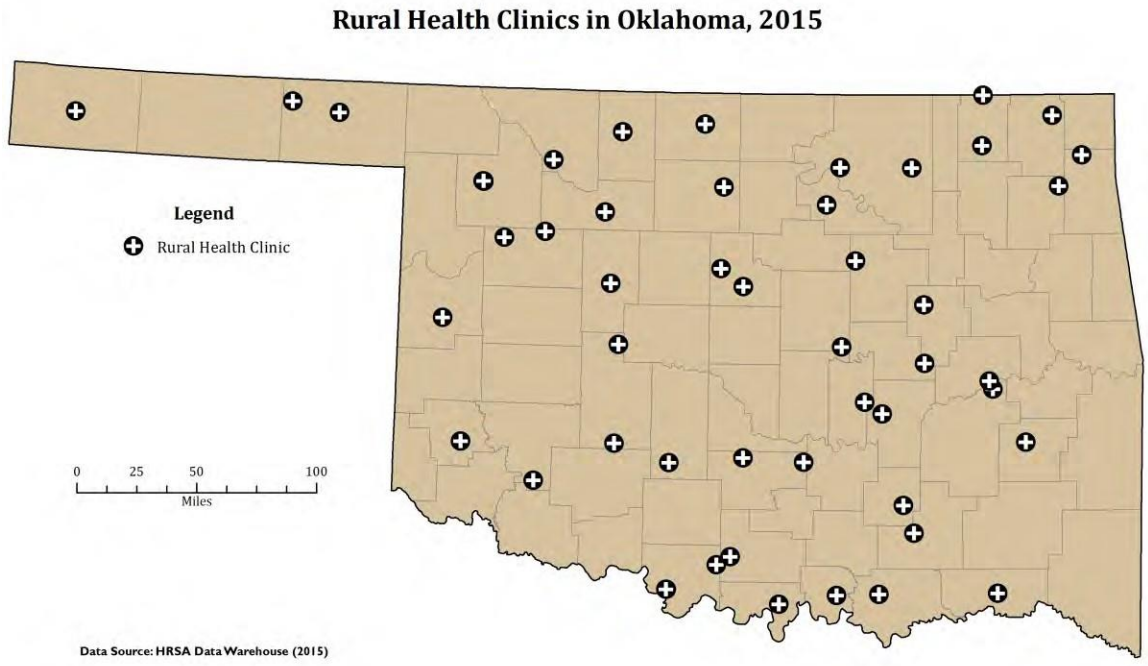

Figure 18. Rural Health Clinics in Oklahoma, 2015

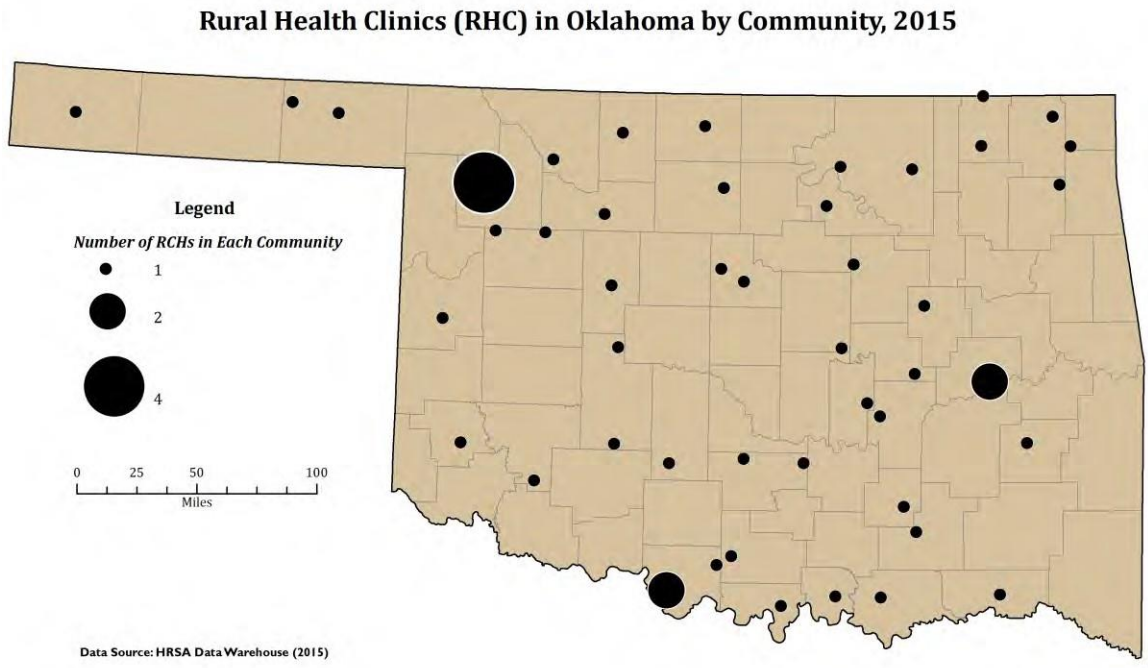

Figure 19. Rural Health Clinics (RHC) in Oklahoma by Community, 2015

1.10. Urgent Care Clinics

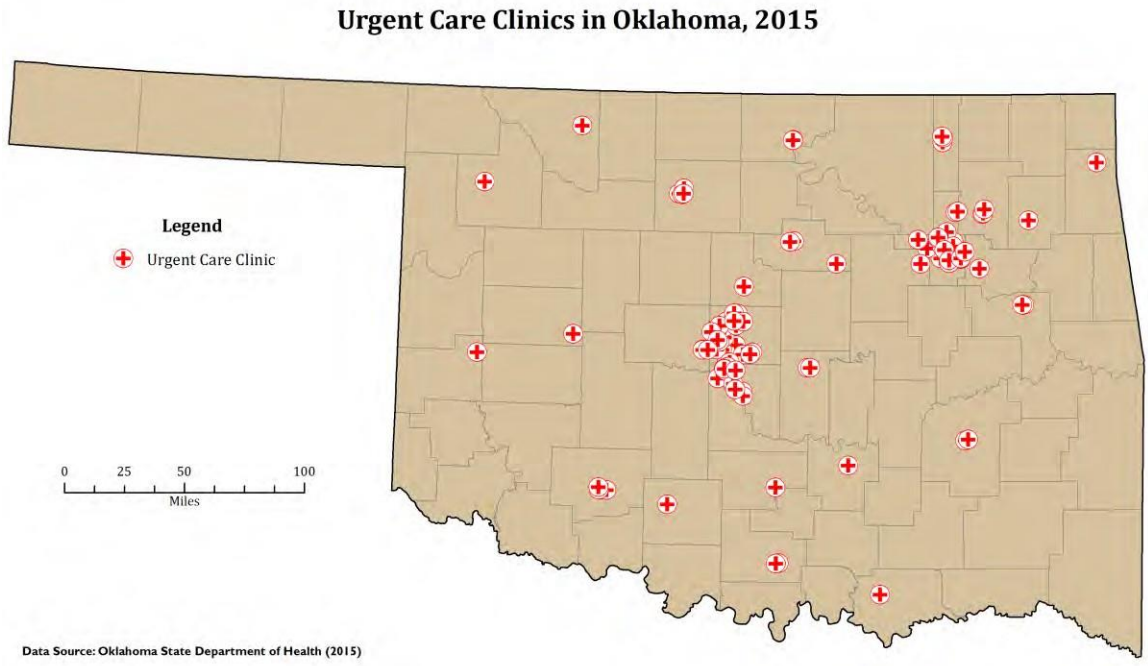

Figure 20. Urgent Care Clinics in Oklahoma, 2015

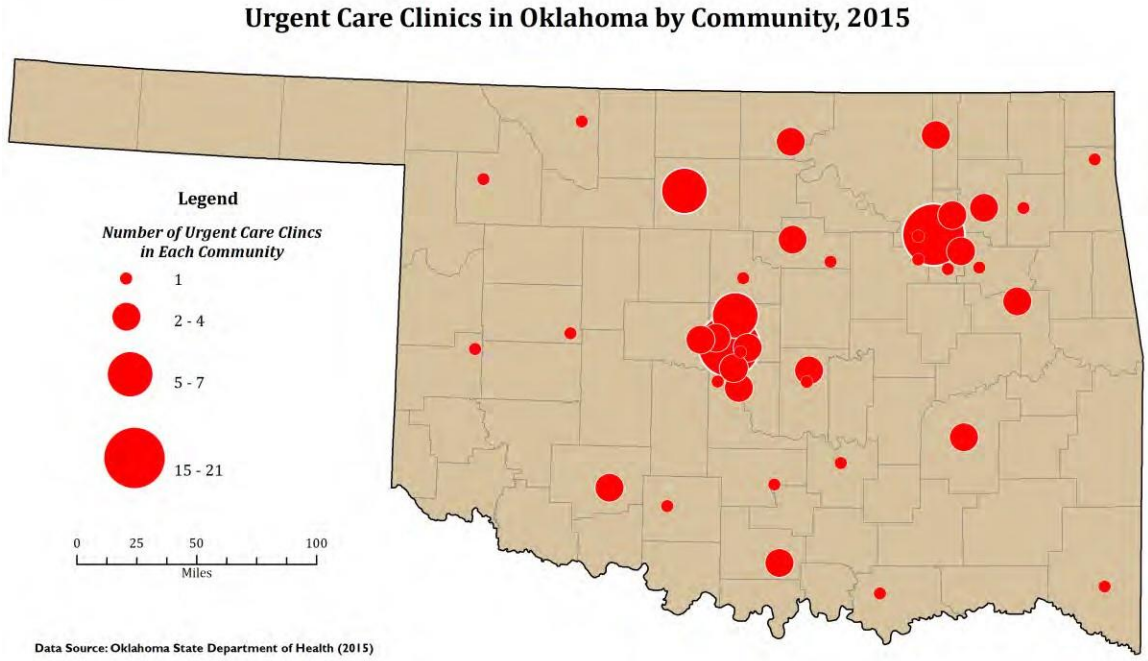

Figure 21. Urgent Care Clinics in Oklahoma by Community, 2015

LONG-TERM CARE

1.11. Intermediate Care Facilities

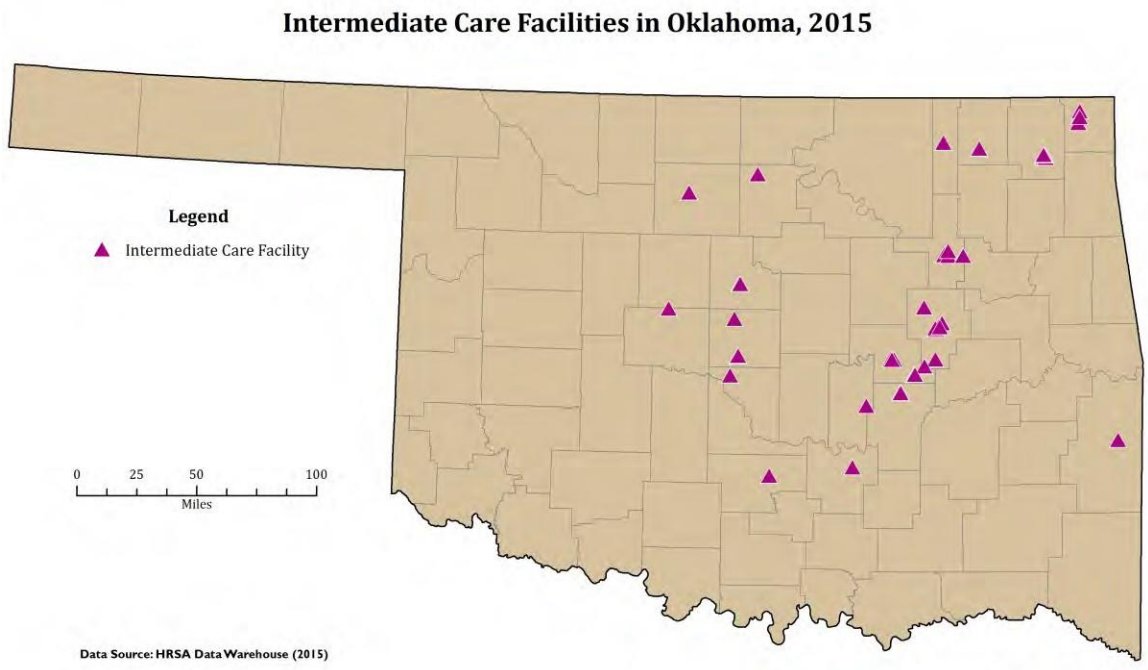

Figure 22. Intermediate Care Facilities in Oklahoma, 2015

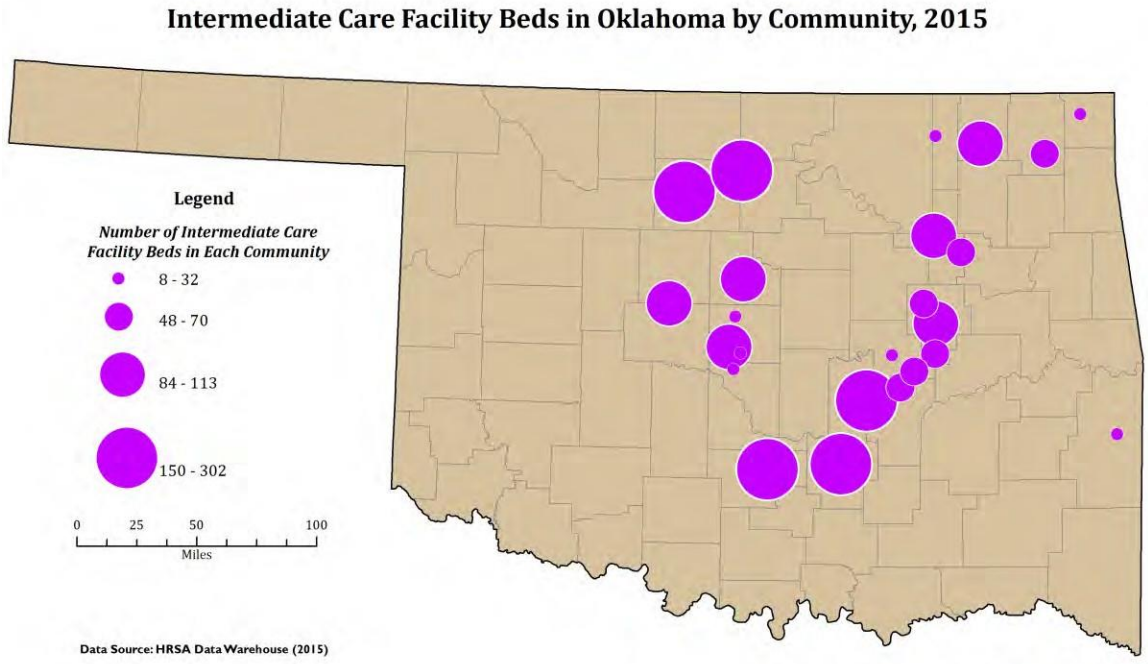

Figure 23. Intermediate Care Facilities in Oklahoma by Community, 2015

1.12. Long-term Care Hospitals

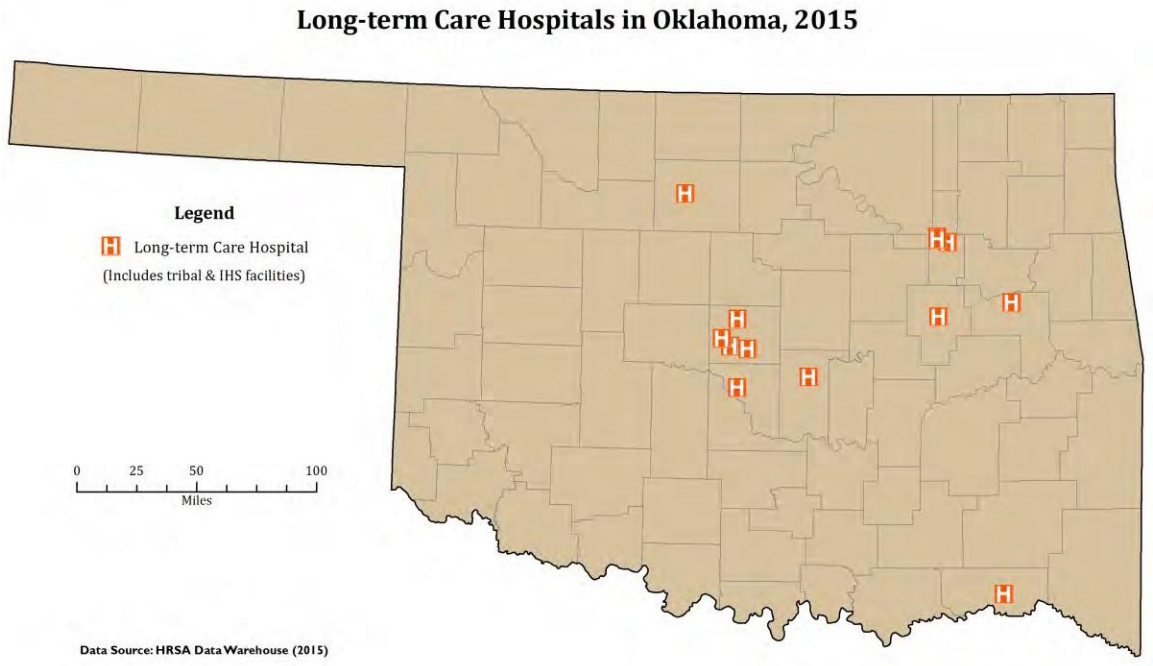

Figure 24. Long-term Care Hospitals in Oklahoma, 2015

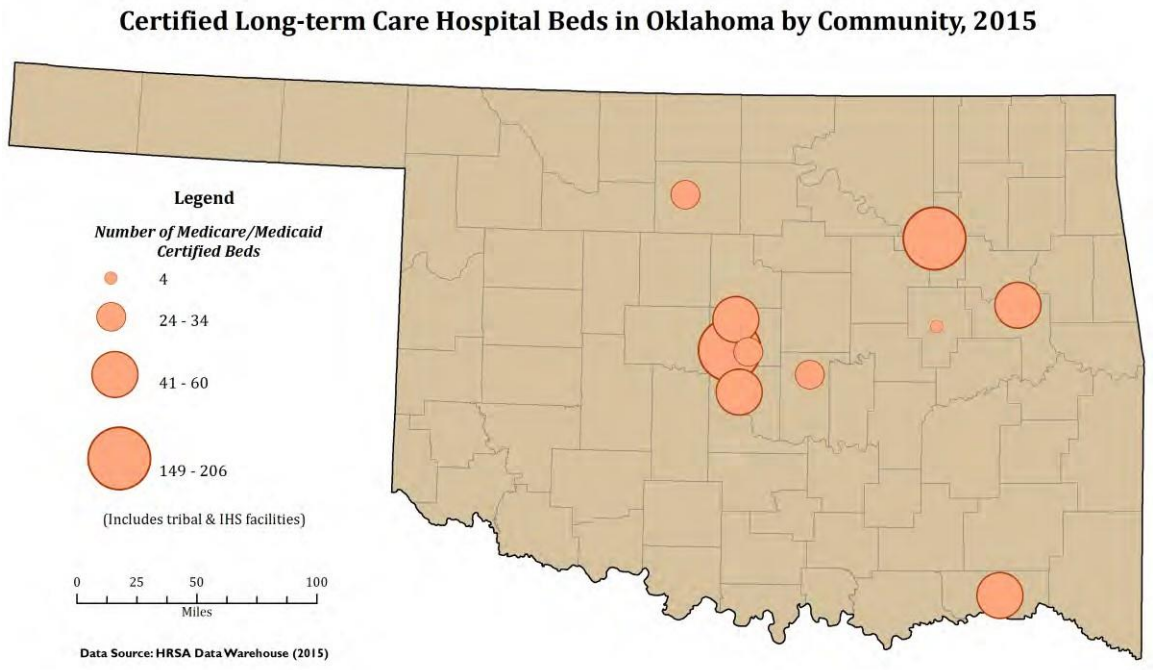

Figure 25. Certified Long-term Care Hospital Beds in Oklahoma by Community, 2015

1.13. Nursing Homes

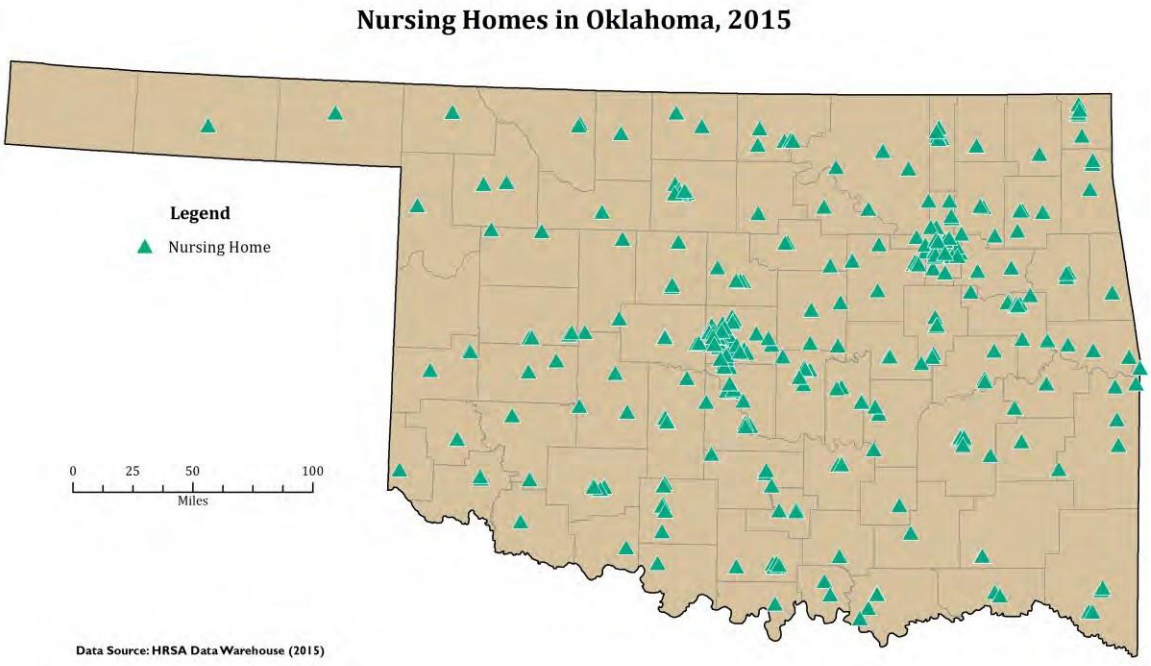

Figure 26. Nursing Homes in Oklahoma, 2015

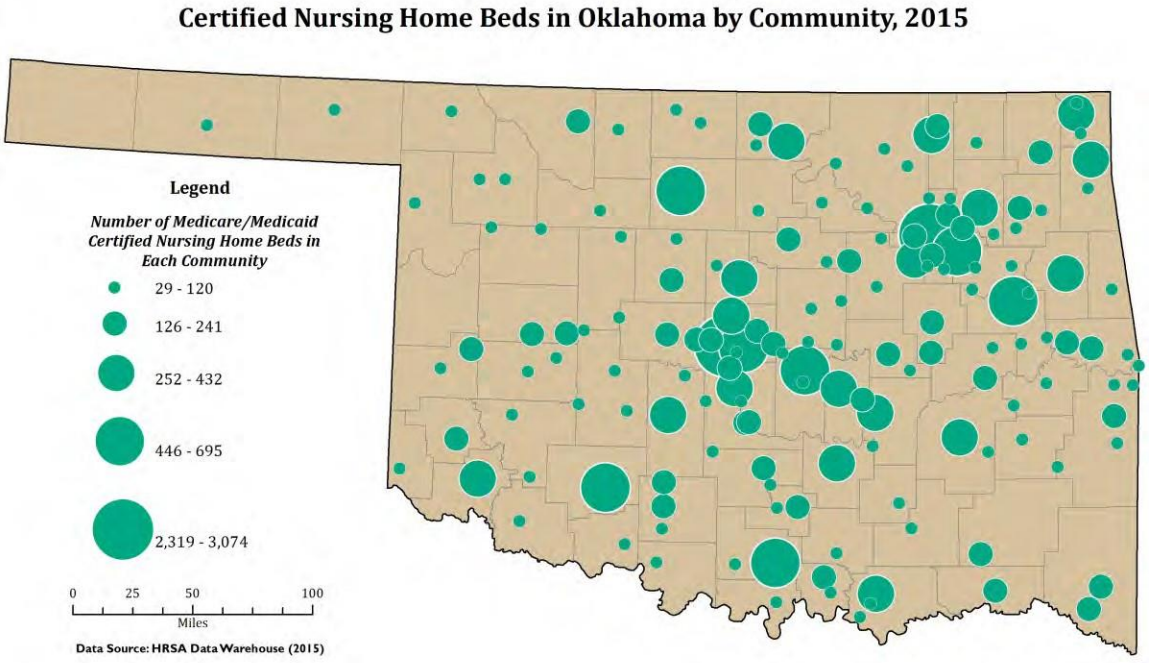

Figure 27. Certified Nursing Home Beds in Oklahoma by Community, 2015

1.14. Psychiatric Residential Treatment Facilities

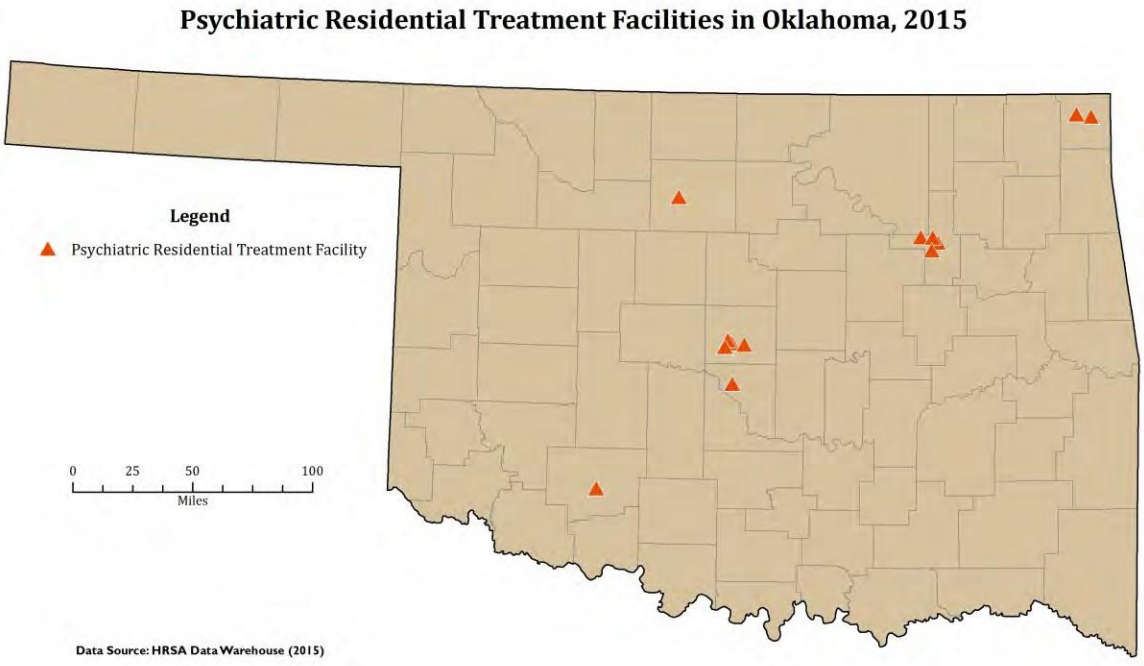

Figure 28. Psychiatric Residential Treatment Facilities in Oklahoma, 2015

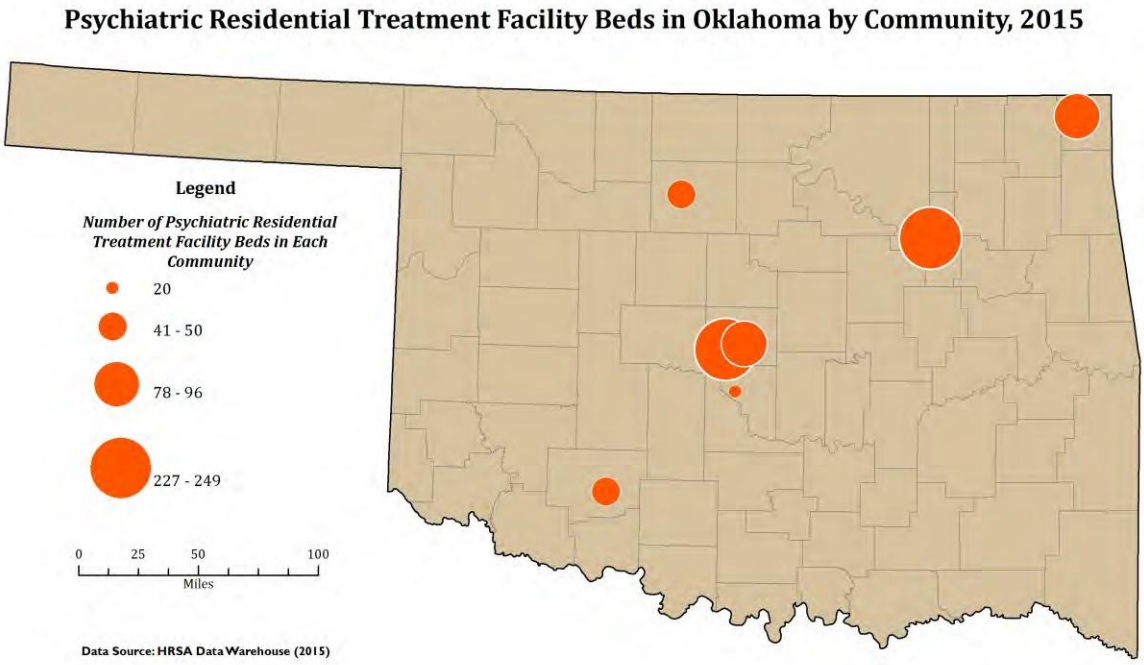

Figure 29. Psychiatric Residential Treatment Facility Beds in Oklahoma by Community, 2015

HOME & COMMUNITY BASED SERVICES

1.15. Community Mental Health Facilities

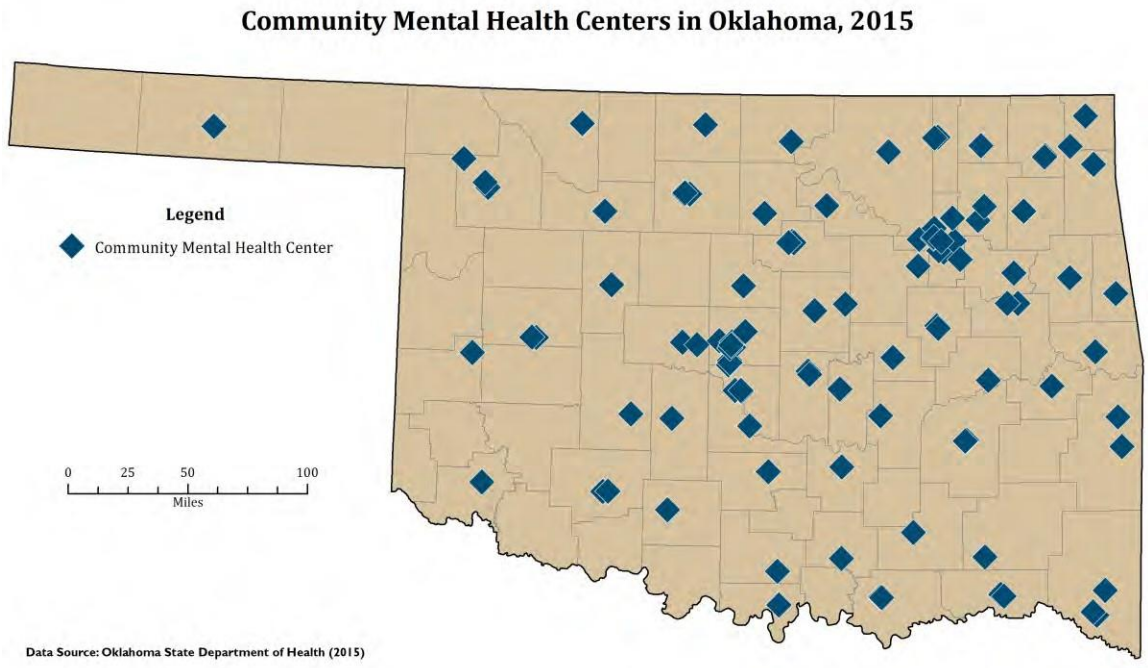

Figure 30. Community Mental Health Centers in Oklahoma, 2015

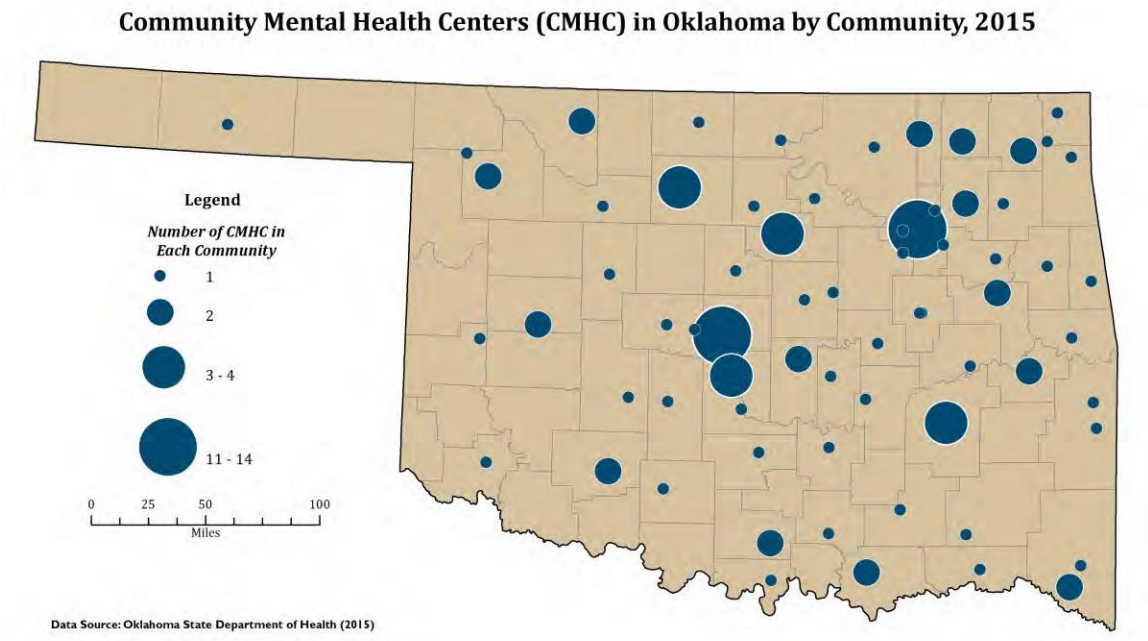

Figure 31. Community Mental Health Centers (CMHC) in Oklahoma by Community, 2015

1.16. Home Health Agencies

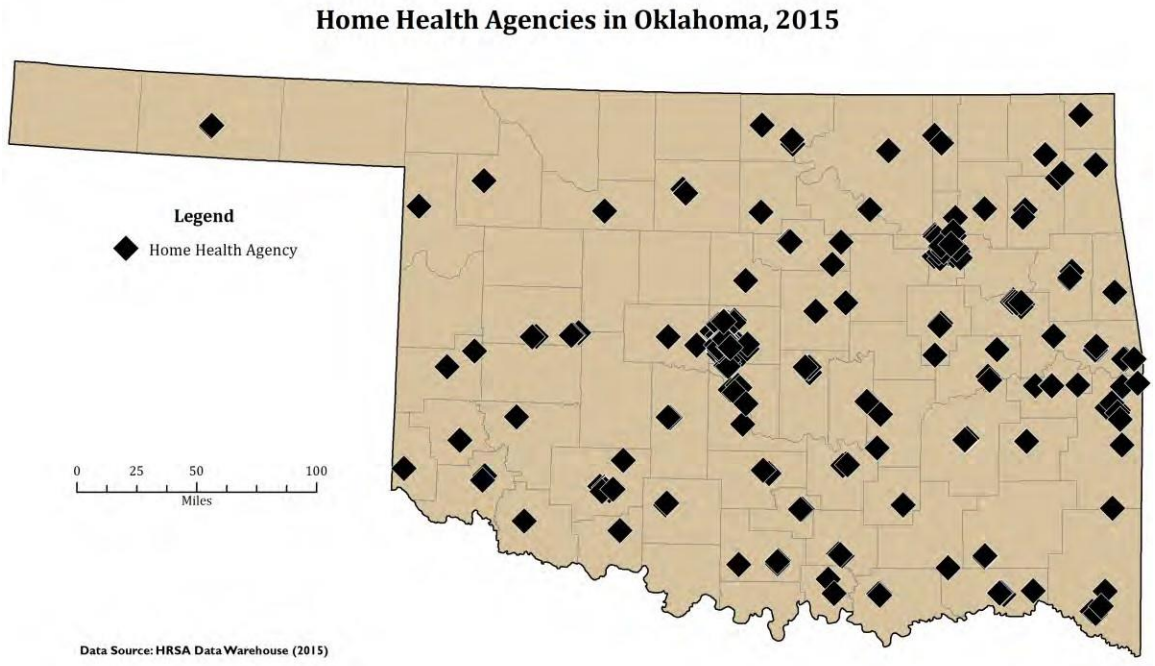

Figure 32. Home Health Agencies in Oklahoma, 2015

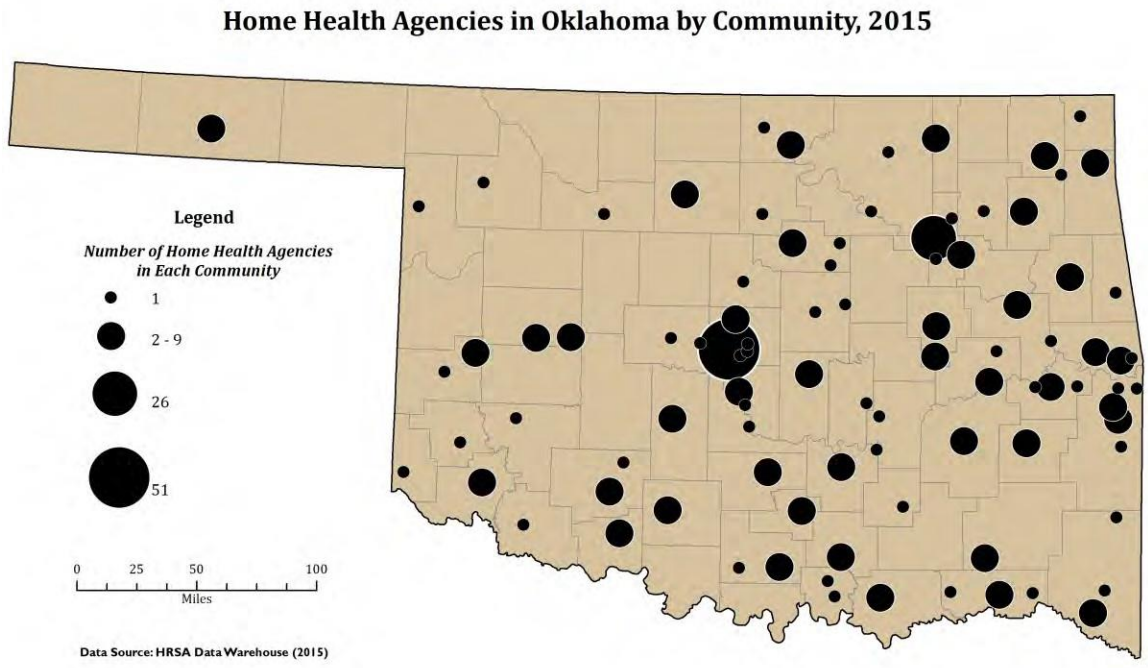

Figure 33. Home Health Agencies in Oklahoma by Community, 2015

1.17. Hospice Providers

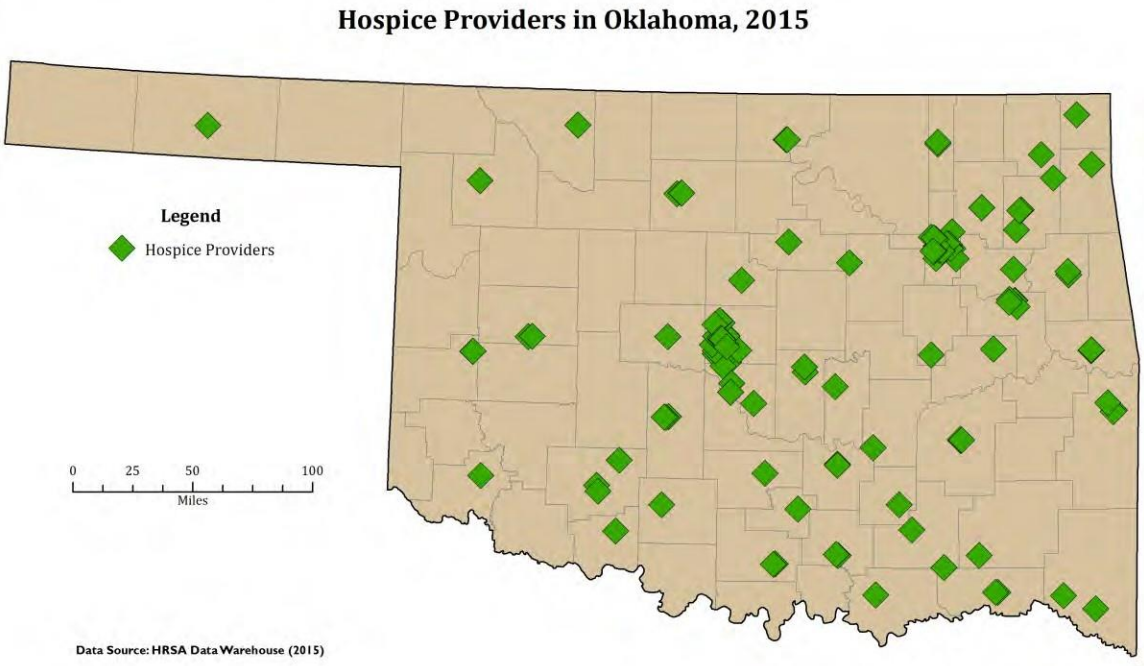

Figure 34. Hospice Providers in Oklahoma, 2015

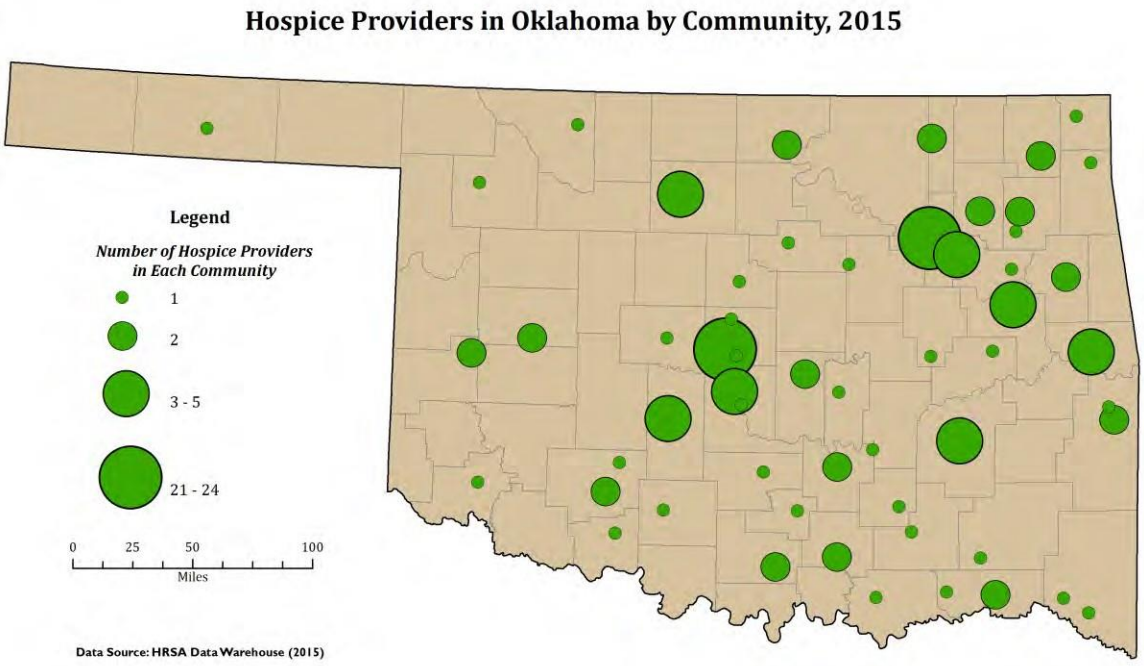

Figure 35. Hospice Providers in Oklahoma by Community, 2015

1.18. ‘Class B’ Hospice Providers

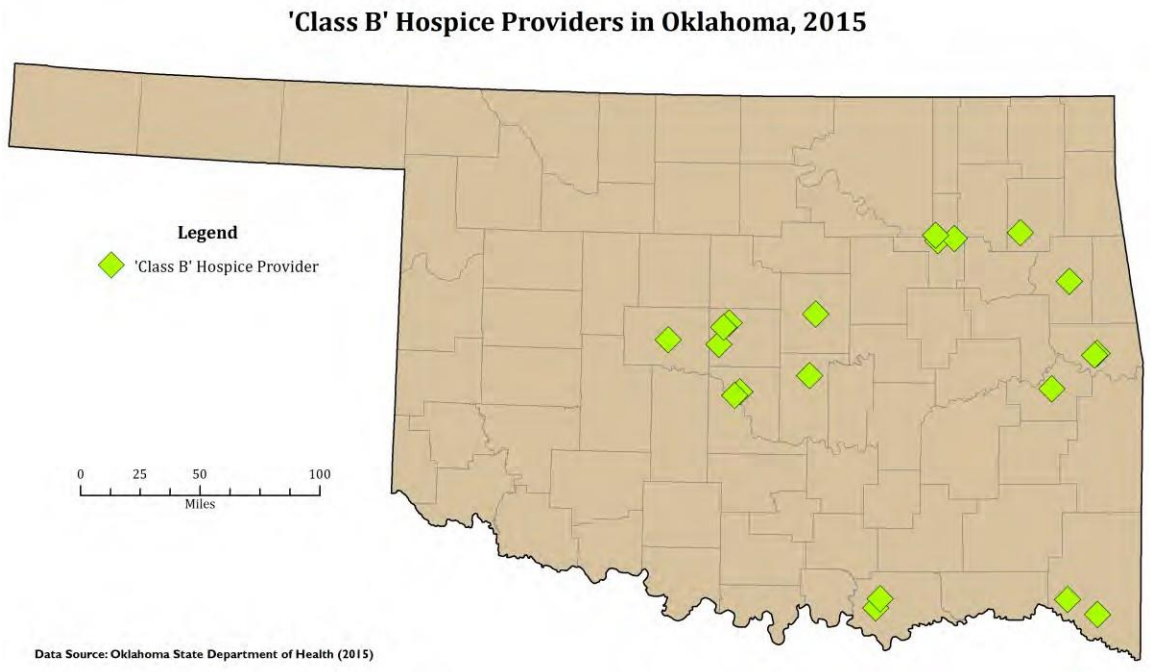

Figure 36. 'Class B' Hospice Providers in Oklahoma, 2015

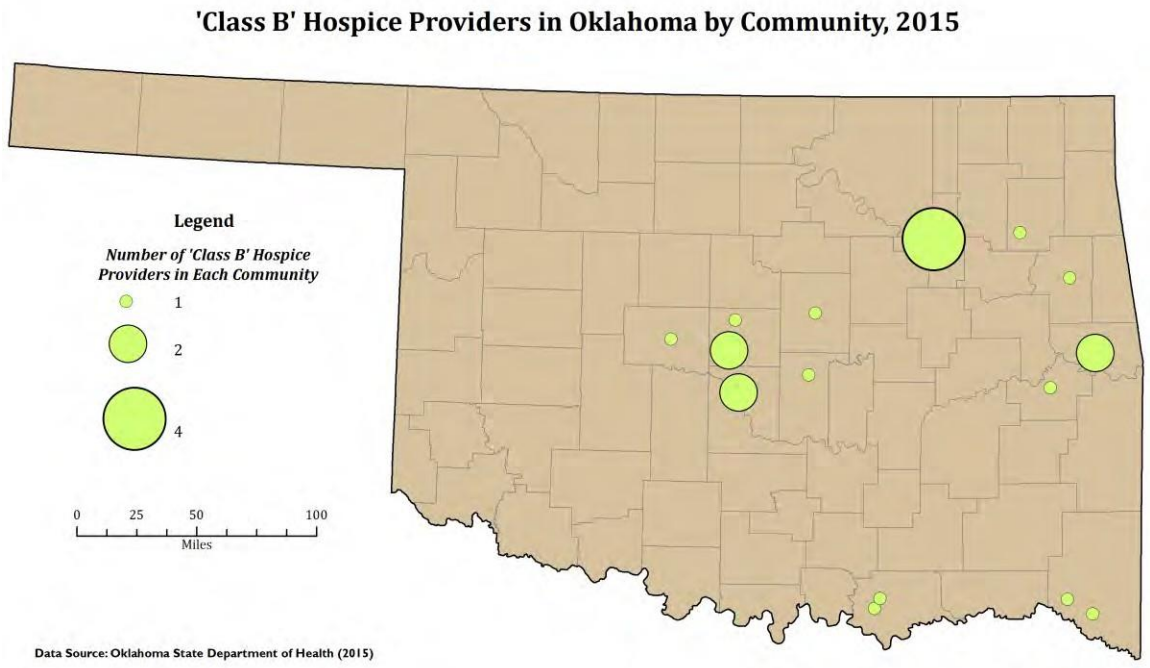

Figure 37. 'Class B' Hospice Providers in Oklahoma by Community, 2015

HEALTH CARE INFORMATICS

1.19. Health Information Exchanges

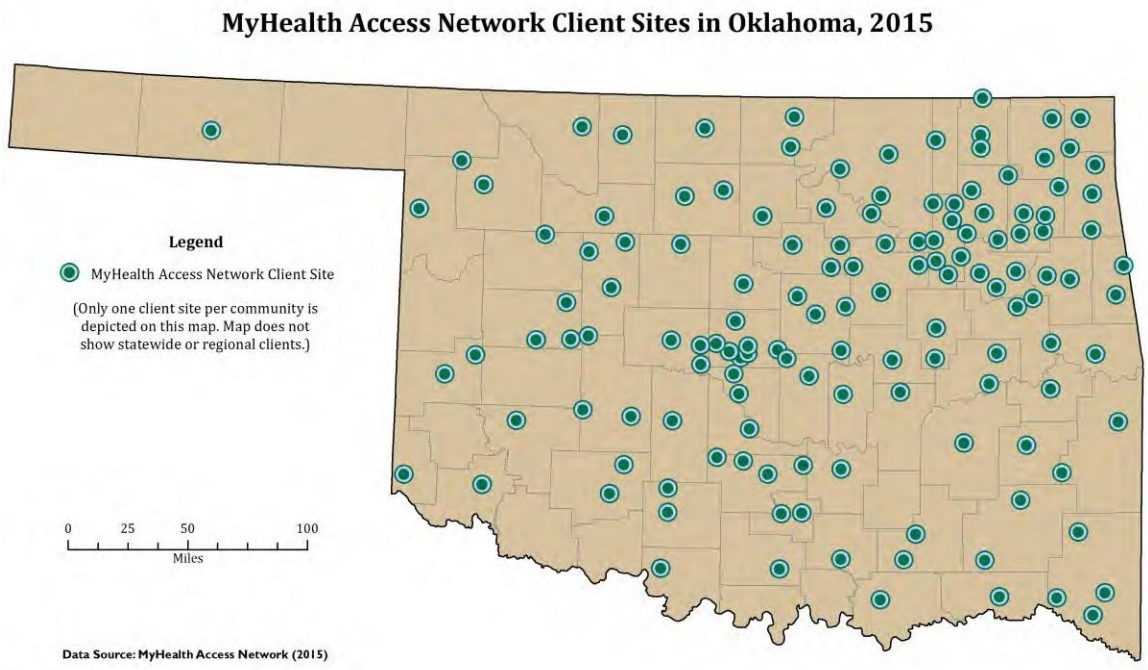

Figure 38. MyHealth Access Network Client Sites in Oklahoma, 2015

OTHER ORGANIZATIONAL PROVIDERS

1.20. Indian Health Services Facilities

Figure 39. Native American Health Care Facilities in Oklahoma, 2015

1.21. Portable X-ray Suppliers

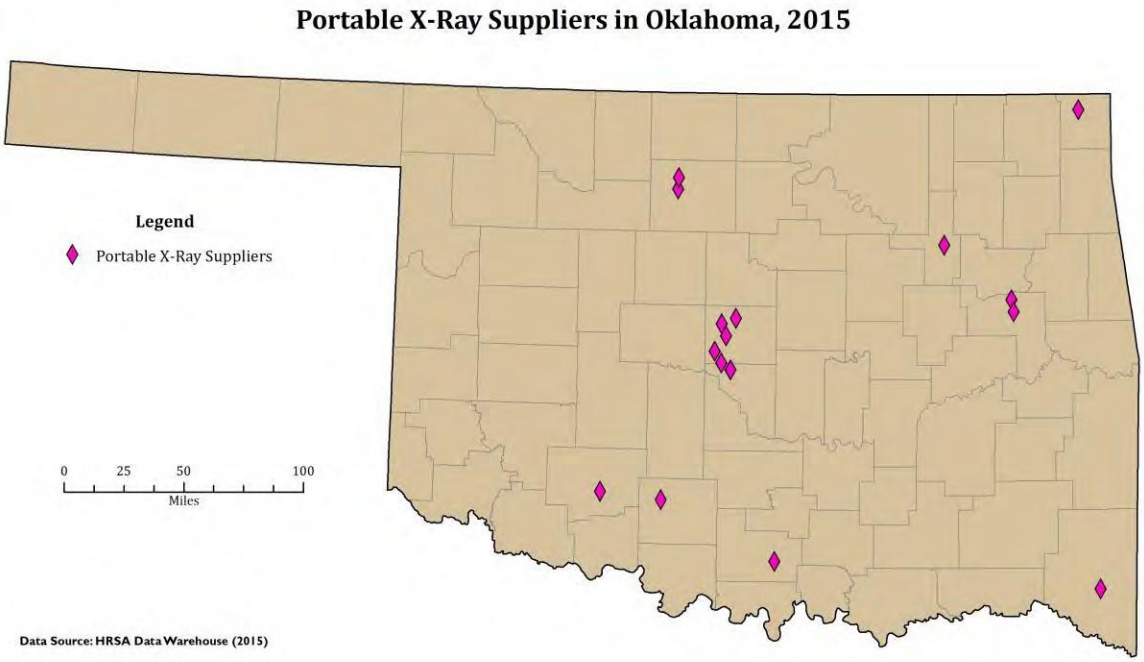

Figure 40. Portable X-Ray Suppliers in Oklahoma, 2015

1.22. Tissue Banks & Organ Procurement Organizations

Figure 41. Tissue Banks & Organ Procurement Organizations in Oklahoma, 2015

1.23. Veterans Administration Facilities

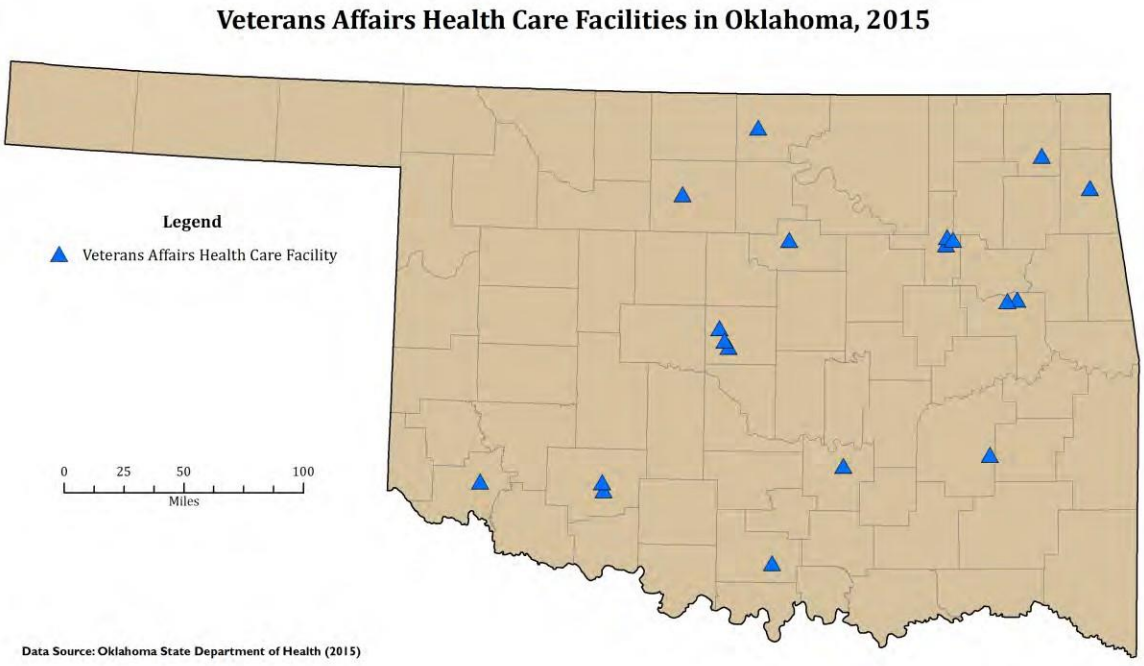

Figure 42. Veterans Administration Facilities in Oklahoma, 2015

1.24. Workplace Drug & Alcohol Testing Facilities

Figure 43. Workplace Drug & Alcohol Testing Facility

Figure 44. Workplace Drug & Alcohol Testing Facilities in Oklahoma by Community, 2015

Appendix C: Stakeholder Organizations

Collectively, the Oklahoma SIM project and OHIP initiative have engaged nearly 100 stakeholder organizations across Oklahoma, as seen in the table below.

Table 1: Stakeholder Organizations Engaged

STAKEHOLDER ORGANIZATION NAME	WEBSITE
Absentee Shawnee Tribe	http://www.asthealth.org/tags/little-axe-health-center
Ada Area Chamber of Commerce	http://adachamber.com/
Blue Cross Blue Shield of Oklahoma	http://www.bcbsok.com/
Central Communities Health Access Network	http://www.cc-han.com/
Cherokee County Community Health Coalition (Turning Point)	N/A
Cherokee Nation	http://www.cherokee.org/Services/Health/AboutHealthServices.aspx
Chickasaw Nation	https://www.chickasaw.net/our-nation/find-locations/chickasaw-nation-medical-center.aspx
Choctaw Nation	http://www.cnhsa.com/
Cleveland County Healthy Community Coalition (Turning Point)	http://www.myhealthycommunity.com/
CommunityCare of Oklahoma Health Insurance Plans	http://www.ccok.com/
Coordinated Care Oklahoma Health Insurance Exchange	http://www.coordinatedcare-ok.com/
Dewberry Architects	http://www.dewberry.com/home
Employees Group Insurance Division	https://www.ok.gov/sib/
GlobalHealth, Inc. HMO	http://www.globalhealth.com/
Greater Oklahoma City Chamber	http://www.okcchamber.com/
Haskell County Coalition (Turning Point)	http://haskellcocoalition.wordpress.com/partners/
Health Alliance for the Uninsured	http://hauonline.org/
Health Educators North Dyad	N/A
Health Educators South Dyad	N/A

Hillcrest Healthcare System	http://www.hillcrest.com/
Homeless Alliance	http://homelessalliance.org/
Hospitality House of Tulsa	http://www.tulsahospitalityhouse.org/
Indian Health Services	https://www.ihs.gov/
INTEGRIS Health	https://integrisok.com/
Jackson County Community Health Action Team (Turning Point)	N/A
Kingfisher Community Collaborative (Tuning Point)	http://www.kingfisherfamiliesfirst.org/
LeadingAge Oklahoma	http://leadingageok.org/
McCurtain County Coalition for Change (Turning Point)	https://www.facebook.com/pages/Mccurtain-County-Coalition-for-Change/168447963340862
Mental Health Association Oklahoma	http://mhaok.org/
Muscogee Creek Nation	http://creekhealth.org/index.php/component/content/article?id=75
Muskogee Wellness Initiative (Turning Point)	https://www.facebook.com/MuskogeeWellness
My Health Access Network	http://myhealthaccess.net/
National Committee for Quality Assurance	http://www.ncqa.org/
Northeastern Tribal Health System	https://www.nthsclinic.com/
Oklahoma Academy of Family Physicians	http://www.okafp.org/
Oklahoma Association of Health Plans	http://www.okhealthplans.org/
Oklahoma Board of Medical Licensure and Supervision	http://www.okmedicalboard.org/
Oklahoma Board of Nursing	http://nursing.ok.gov/
Oklahoma Care Coordination Alliance	N/A
Oklahoma Chapter of the American Academy of Pediatrics	http://www.okaap.org/
Oklahoma Chapter of the Healthcare Financial Management Association	http://www.ohfma.org/
Oklahoma City Area Inter-Tribal Health Board	http://www.ocaithb.org/
Oklahoma City Association of Health Underwriters	http://www.okahu.org/
Oklahoma City County Health Department	https://www.occhd.org/eng
Oklahoma Department of Career and Technology Education	https://www.okcareertech.org/
Oklahoma Department of Commerce	http://okcommerce.gov/

Oklahoma Department of Human Services	http://www.okdhs.org/Pages/default.aspx
Oklahoma Department of Mental Health and Substance Abuse	http://ok.gov/odmhsas/
Oklahoma Employment Security Commission	https://www.ok.gov/oesc_web/
Oklahoma Family Network	http://oklahomafamilynetwork.org/okfn/
Oklahoma Foundation for Medical Quality	http://www.ofmq.com/
Oklahoma Health Care Authority	https://www.okhca.org/
Oklahoma Health Care Authority Medical Advisory Committee	http://www.okhca.org/about.aspx?id=192
Oklahoma Hospital Association	http://www.okoha.com/
Oklahoma Nurses Association	http://www.oklahomanurses.org/
Oklahoma Office of Management and Enterprise Services	https://www.ok.gov/OSF/
Oklahoma Primary Care Association	https://okpca.publishpath.com/default.aspx?OriginalDomain=www.okpca.org
Oklahoma Restaurant Association	http://www.okrestaurants.com/
Oklahoma State Chamber	http://www.okstatechamber.com/
Oklahoma State Department of Health	https://www.ok.gov/health/
Oklahoma State Medical Association	http://www.okmed.org/web/Online/
Oklahoma State Regents for Higher Education	http://www.okhighered.org/
Oklahoma State University, Center for Health Systems Innovation	http://chsi.okstate.edu/
Oklahoma State University, College of Osteopathic Medicine, Center for Health Sciences	http://www.healthsciences.okstate.edu/com/
Oklahoma State University, College of Osteopathic Medicine, Center for Rural Health	http://www.healthsciences.okstate.edu/ruralhealth/
Oklahoma State University, Oklahoma Office of Rural Health	http://www.healthsciences.okstate.edu/ruralhealth/orh.cfm
Oklahoma State University, School of Healthcare Administration	http://www.healthsciences.okstate.edu/hca/
Oklahoma Tobacco Settlement Endowment Trust	https://www.ok.gov/tset/
Oklahoma Turning Point Council	http://www.okturningpoint.org/
Ottawa County Health Department	https://www.ok.gov/health/County_Health_Departments/Ottawa_County_Health_Department/
Physician Manpower Training Commission	http://www.pmtc.ok.gov/

Pittsburgh County Local Services Coalition (Turning Point)	http://roycealverson.wix.com/pclsc
QuikTrip Corporation	http://www.quiktrip.com/
Rural Health Association of Oklahoma	http://www.rhao.org/Wordpress/
Sooner Health Access Network at the University of Oklahoma-Tulsa	http://soonerhan.ouhsc.edu/
Southwestern Oklahoma State University, College of Pharmacy	http://www.swosu.edu/academics/pharmacy/faculty-staff/administration.aspx
St. Anthony's Health System, Sisters of Mary Health	http://www.saintsok.com/Pages/default.aspx
St. John's Health System	http://www.stjohnhealthsystem.com/
State of Arkansas, Health Care Payment Improvement Initiative	http://www.paymentinitiative.org/Pages/default.aspx
State of Oregon, Oregon Health Authority, Transformation Center	http://www.oregon.gov/oha/Transformation-Center/pages/index.aspx
Stillwater Medical Center	http://www.stillwater-medical.org/
Telehealth Alliance of Oklahoma	http://www.taoklahoma.org/
TMF Health Quality Institute	https://www.tmf.org/
Tribal Public Health Advisory Committee	N/A
Tulsa City-County Health Department	http://www.tulsa-health.org/
Tulsa Regional Chamber of Commerce	https://www.tulsachamber.com/
United Way of Central Oklahoma	http://www.unitedwayokc.org/
University of Oklahoma, College of Medicine, Department of Family and Preventive Medicine	https://www.oumedicine.com/familymedicine
University of Oklahoma, College of Medicine, Department of Pediatrics, Oklahoma LEND (Leadership Education in Neurodevelopmental and Related Disabilities)	https://www.oumedicine.com/pediatrics/department-sections/developmental-behavioral-pediatrics/child-study-center/programs-and-clinical-services/lend
University of Oklahoma, College of Pharmacy, Pharmacy Management Consultants	https://www.oumedicine.com/ouphysicians
University of Oklahoma, Health Sciences Center, Heartland Telehealth Resource Center	http://www.ouhsc.edu/at/CenterforTelemedicine/Resources.aspx
University of Oklahoma, Health Sciences Center, Oklahoma Healthy Aging Initiative	http://www.ouhsc.edu/ohai/Home.aspx
University of Oklahoma, Health Sciences Center, Stephenson Cancer Center, Cancer Health Disparities Research Program	http://stephensoncancercenter.org/Research/ResearchPrograms/CancerHealthDisparities/ProgramLeader.aspx

University of Oklahoma, Health Sciences Center, Stephenson Cancer Center, Oklahoma Tobacco Research Center	http://www.ouhsc.edu/otrc/
University of Oklahoma, School of Community Medicine, Department of Medical Informatics	http://www.ou.edu/tulsa/residency/medical-informatics.html
Variety Care, Inc.	http://www.varietycare.org/
WellOK	http://www.wellok.org/
Yeaman Plus Associates	http://www.yeamanandassociates.com/

Appendix D: SIM Transformation Resource Inventory

(This section of the report will be updated at a future date).

Appendix E: RCO Certification Criteria

Entities wishing to form a Regional Care Organization must submit an application to the State Governing Board describing their capacity and plans for meeting the goals of the Oklahoma State Innovation Model initiative, including being prepared to enroll and deliver services to all eligible individuals within the RCO's service area on the "go-live" date. Applicants must describe their demonstrated experience and capacity for:

1) Managing financial risk and establishing financial reserves
2) Meet minimum financial requirements set by the State Governing Body (e.g., maintaining a level of restricted reserves and net worth)
3) Operating within a fixed global budget
4) Utilizing best practices in the management of finances, contracts, claims processing, payment functions, and provider networks
5) Assembling an adequate network of providers to deliver timely, quality care to enrolled individuals
6) Coordinating and integrating the delivery of physical healthcare, mental substance abuse services, and other required services delineated by the State Governing Body
7) Developing and implementing alternative payment methodologies that are based on healthcare quality and improved health outcomes
8) Rewarding providers for achieving quality outcome benchmarks
9) Engaging community members and healthcare providers in improving the health of the community, including through the coordination, use, and development of social service resources
10) Participate in statewide interoperability through connecting to a Health Information Exchange that is participating with the eHealth exchange and sharing data for RCO participants within the Health Information Network. The RCO will also demonstrate having the ability to report timely on standardized outcome and quality measures required by the State Governing Body to participating providers.

RCOs will also be required to implement policies and procedures that protect member rights and assure each member receives integrated person-centered care and services designed to provide choice, independence, and dignity. To meet this requirement, an RCO application must describe, a minimum, the following:

1) A mechanism to monitor and protect against underutilization of services and inappropriate denials
2) Planned or established policies and procedures that protect member rights
3) Planned or established mechanisms for a complaint, grievance, and appeals resolution process, including how that mechanism will be communicated to members and providers

4) A strategy for ensuring health equity and elimination of avoidable gaps in healthcare quality and outcomes, as measured by gender, race, ethnicity, language, disability, sexual orientation, age, mental health and addiction status, geography, and other cultural and socioeconomic factors

Governance of the RCOs will be crucial to their success and ensure key stakeholders from the community are given an opportunity to direct their care. RCO applicants must have a plan in place to meet governance requirements that, at minimum:

1) Clearly describe how the governance structure makeup reflects community needs and supports the goal of health transformation, the criteria used to select governance structure members, and how it will assure transparency in governance

2) Identify key leaders who are responsible for successful implementation and sustainable operation of the RCO

3) Describe how its governance structure will reflect the needs of members with complex healthcare needs, such as those with severe and persistent mental illness and multiple chronic conditions

The RCO will be governed by an RCO Board, along with a Board of Accountable Providers and Community Advisory Board as described previously. RCO applicants must identify a governing body for the RCO that includes:

1) Persons that share in the financial risk of the organization, and who must constitute a majority of the governing body

2) The major components of the healthcare delivery system

3) At least three healthcare providers in active practice, including an Oklahoma licensed physician, a nurse, and a mental health or substance abuse treatment provider

4) At least two members from the community at large, to ensure the organization's decision-making is consistent with the values of the members and the community

5) At least one member of the Community Advisory Board

Each RCO must convene a Community Advisory Board and describe how it will be administered to achieve the goals of community involvement and development, the integration of social and environmental determinants of health to improve health outcomes, adoption and participation in updating of the community health assessment and community health improvement plan. The RCO Community Advisory Board must include representatives from:

1) Consumer, patient, and advocates, forming a majority of the membership

2) Non-profit community organizations

3) County health departments from the counties served by the RCO

4) Tribal nations in the RCO service area

5) FQHCs operating within the service area

Each RCO must convene a Board of Accountable Providers and describe how it will be administered to, at minimum, assure that best clinical practices and innovative approaches are being used and are culturally appropriate, ensure the integration of provider expertise to improve health outcomes, reduce administrative burden on providers and their practices, and ensure providers share in the savings and incentives achieved through a move to value-based payment system. The RCO Board of Accountable Providers must include representatives from:

1) Provider types, or their representative organizations, active in the healthcare delivery system

2) Tribal health system providers in the RCO service area

3) FQHCs providers operating within the service area

Appendix F: EOC Certification Criteria

The section that follows details criteria for the five EOCs selected for the Oklahoma Model:

- Asthma
- Perinatal Care
- Total Joint Replacement
- Chronic Obstructive Pulmonary Disease
- Congestive Heart Failure

Asthma Algorithm Summary	
Trigger	A trigger for an asthma episode is an emergency department, observation room, or inpatient visit for treatment of an acute exacerbation of asthma
PAP	The PAP is the inpatient or outpatient facility where the acute exacerbation that starts the episode is treated
Episode exclusions	Episodes meeting one or more of the following criteria will be excluded: • Inconsistent enrollment (i.e. not continuously enrolled) during the episode • Claims during the episode that are covered by a third party • Dual coverage of primary medical services by Medicaid and Medicare • PAP is a FQHC • PAP's practice location is outside AR, LA, MO, MS, OK, TN, or TX • Billing provider ID of the PAP is not available • Claims information during the episode is missing or miscoded • Younger than five (<5) years of age • Left against medical advice or discontinued care • Dies in the hospital during the episode • Comorbidities for which the medical risk cannot be reliably understood or measured[1] (e.g., HIV, cystic fibrosis, lung cancers)
Episode window	Episodes begin on the first day of a trigger and end 30 days after discharge or until the end of a readmission where the patient had entered the hospital within the 30 day post-discharge period
Claims included	All claims for the trigger hospitalization are included in the calculation of episode spend. During the 30 day post-trigger window, inpatient, outpatient, professional, and pharmacy claims that are related to the acute exacerbation are included in the calculation of episode spend

Quality measures	Quality measures "to pass": Percent of valid episodes where the patient has a follow-up visit with a physician during the post-trigger window. The minimum threshold is 38% Percent of valid episodes where the patient receives an appropriate medication determined by a filled prescription for an asthma controller medication during the episode window or within 30 days before the episode. The minimum threshold is 59%. Quality measures "to track": Percent of valid episodes with a repeat acute exacerbation during the 30-day post-trigger window
Adjustments	For the purpose of determining a PAP's performance, the episode spend is adjusted to reflect risk and/or severity factors of the patient
Example trigger codes	Diagnosis codes include*: range of asthma-related codes (e.g. 493.00, 493.10, 493.20, 493.90, 493.20) Diagnosis codes contingent upon a diagnosis with asthma in the 365 days preceding the trigger include[1]: select codes (e.g. 786.00, 786.05, 786.07, 786.09)
Example episode exclusion codes	Diagnosis codes include*: 042.0, 042.1, 042.2, 042.9, 162.0, 162.2, 162.3, 162.4, 162.5, 162.8, 162.9, 277.00, 277.01, 277.02, 277.03, 277.09, 273.4, 343.0, 343.1, 343.2, 343.3, 343.4, 343.8, 343.9, 494.0, 494.1, 586, V42.1, V42.6, V42.7 Procedure codes include*: 31500, E0424, E0425, G8569 Revenue codes: 0200, 0201, 0202, 0203, 0206, 0209 Discharge status: 07, 20 Provider type (if provider type is PAP): 49 PAPs with business address in state other than: AR, LA, MO, MS, OK, TN, TX

Example included claims codes	Diagnosis codes include*: 460, 465.8, 465.9, 466.0, 491.20, 491.21, 491.22, 493.00, 493.01, 493.02, 493.10, 493.11, 493.12, 493.90, 493.91, 493.92, 518.81 Procedure codes include*: 71010, 71034, 71035, 71275, 71550, 71551, 71552, 82003, 82800, 82803, 82810, 8744, 9215, 9390, 9391, 9393, 9394 HIC3 codes include*: A1D, B3K, B4X, B6M, J5D, P5F, Q7E, W1W

*Not an exhaustive list.

Source: AR Healthcare Payment Improvement Initiative\

Perinatal Care Algorithm Summary	
Triggers	A live birth on a facility claim
PAP assignment	For each episode, the Principal Accountable Provider (PAP) is the provider or provider group that performs the delivery.
Exclusions	Episodes meeting one or more of the following criteria will be excluded: A. Limited prenatal care (i.e., pregnancy-related claims) provided between start of episode and 60 days prior to delivery B. Delivering provider did not provide any prenatal services C. Episode has no professional claim for delivery D. Pregnancy-related conditions: amniotic fluid embolism, obstetric blood clot embolism, placenta previa, severe preeclampsia, multiple gestation ≥3, late effect complications of pregnancy/childbirth, puerperal sepsis, suspected damage to fetus from viral disease in mother E. Comorbidities: cancer, cystic fibrosis, congenital cardiovascular disorders, DVT/pulmonary embolism, other phlebitis and thrombosis, end-stage renal disease, sickle cell, Type I diabetes
Episode time window	Episode begins 40 weeks prior to delivery and ends 60 days after delivery; for the initial performance period, only deliveries on or after Jan 1, 2013 will be eligible for episodes
Claims included	All medical assistance with a pregnancy-related ICD-9 diagnosis code is included. Medical assistance related to neonatal care is not included.
Quality measures	Quality measures "to pass":

	1. HIV screening – must meet minimum threshold of 80% of episodes 2. Group B streptococcus screening (GBS) – must meet minimum threshold of 80% of episodes 3. Chlamydia screening – must meet minimum threshold of 80% of episodes <u>Quality measures "to track":</u> 1. Ultrasound screening 2. Screening for Gestational Diabetes 3. Screening for Asymptomatic Bacteriuria 4. Hepatitis B specific antigen screening 5. C-Section Rate
Adjustments	For the purposes of determining a PAP's performance, the total reimbursement attributable to the PAP is adjusted to reflect risk and/or severity factors captured in the claims data for each episode in order to be fair to providers with high-risk patients, to avoid any incentive for adverse selection of patients and to encourage high-quality, efficient care. Episode reimbursement attributable to a PAP for calculating average adjusted episode reimbursement are adjusted based on these selected risk factors. Over time, Medicaid may add or subtract risk factors in line with new research and/or empirical evidence.
Trigger codes	Each episode is anchored around a live birth. The live birth is identified by a claim with either of the following procedure codes and a ICD-9 V-code for live birth CPT procedure codes: 59618, 59620, 59622, 59514, 59515, 59510, 59610, 59612, 59614, 59409, 59410, 59400 ICD-9 procedure code: 74, 74.1, 74.2, 74.4, 74.99, 72, 72.1, 72.21, 72.29, 72.31, 72.39, 72.4, 72.51-72.54, 72.6, 72.71, 72.79, 72.8, 72.9, 73.5, 73.59 ICD-9 V-code for live birth: v270, v272, v273, v275, v276
Exclusion codes	List of prior diagnoses and meds that would disqualify a patient from the episode

	ICD-9: 250.01, 250.03, 250.11, 250.13, 250.21, 250.23, 250.31, 250.33, 250.41, 250.43, 250.51, 250.53, 250.61, 250.63, 250.71, 250.73, 250.81, 250.83, 250.91, 250.93, 282.6x, 277.0x, 641.0x, 641.1x, 642.5x, 648.5x, 651.1x, 651.2x, 651.4x-651.9x, 652.6x, 655.3x, 670.2x, 670.3x, 671.3x-671.5x, 673.1x, 673.8x, 674.0x, 677.7x, 585.6, 228.x, 209.7x, 209.0x-209.3x, 209.7x, 140.x-208.x, 230.x-239.x These codes represent the set of business and clinical exclusions described previously
Codes to assign PAP	CPT codes for delivery: 59409, 59410, 59514, 59515, 59612, 59614, 59620, 59622 ICD9 procedure codes for delivery: 74, 74.1, 74.2, 74.4, 74.99, 72, 72.1, 72.21, 72.29, 72.31, 72.39, 72.4, 72.51, 72.52, 72.53, 72.54, 72.6, 72.71, 72.79, 72.8, 72.9, 73.5, 73.59 CPT codes for global bundle: 59400, 59510, 59610, 59618, 59425-59426
Reporting codes	CPT codes associated with each reporting metric CPT codes for HIV test: 80055, 84181, 84182, 86701, 86702, 86703, 87300, 87390, 87391, 87534, 87535, 87536, 87537, 87538, 87539 CPT codes for GBS test: 86403, 87070, 87071, 87075, 87077, 87081, 87147, 87149, 87449, 87653, 87797, 87798, 87800, 87801, 87802 CPT codes for Chlamydia test: 87110, 87270, 87320, 87451, 87490, 87491, 87492, 87797, 87798, 87799, 87800, 87801, 87810 CPT codes for bacteriuria test: 81002, 87086 CPT codes for gestational diabetes test: 82950 CPT codes for Hep B test: 80055, 80074, 86704, 86705, 86706, 86707, 87340, 87341, 87350, 87515, 87516, 87517 CPT codes for ultrasound: 76801, 76802, 76810, 76811, 76812, 76813, 76814, 76815, 76817, 76805, 76816, 76818, 76819, 76825, 76826, 76827, 76828 CPT codes for C-section: 59510, 59514, 59515, 59618, 59620, 59622

Included claim codes	List of ICD-9 and AHFS codes that should be included in episode ICD-9: 640-648, 650, 652, 655, 656, 659, 661, 670, 677, 6410-6413, 6418-6427, 6429-6432, 6438-6442, 6450-6453, 6460-6489, 6522, 6555, 6557, 6563, 6568, 6595, 6597, 6598, 6612, 64000, 64001, 64003, 64080, 64081, 64083, 64090, 64091, 64093, 64100, 64101, 64103, 64110, 64111, 64113, 64120, 64121, 64123, 64130, 64131, 64133, 64180, 64181, 64183, 64190, 64191, 64193, 64200-64204, 64210-64214, 64220-64224, 64230-64234, 64240-64244, 64250-64254, 64260-64264, 64270-64274, 64290-64294, 64300, 64301, 64303, 64310, 64311, 64313, 64320, 64321, 64323, 64380, 64381, 64383, 64390, 64391, 64393, 64400, 64403, 64410, 64413, 64420, 64421, 64500, 64501, 64503, 64510, 64511, 64513, 64520, 64521, 64523, 64600, 64601, 64603, 64610-64614, 64620-64624, 64630, 64631, 64633, 64640-64644, 64650-64654, 64660-64664, 64670, 64671, 64673, 64680-64684, 64690-64694, 64700-64704, 64710-64714, 64720-64724, 64730-64734, 64740-64744, 64750-64754, 64760-64764, 64780-64784, 64790-64794, 64800-64804, 64810-64814, 64820-64824, 64830-64834, 64840-64844, 64850-64854, 64860-64864, 64870-64874, 64880-64884, 64890-64894, 64900-64904, 64910-64914, 64920-64924, 64930-64934, 64940-64944, 64950, 64951, 64953, 64960-64964, 64970, 64971, 64973, 64981, 64982, 65100, 65101, 65103, 65110, 65111, 65113, 65120, 65121, 65123, 65130, 65131, 65133, 65140, 65141, 65143, 65150, 65151, 65153, 65160, 65161, 65163, 65170, 65171, 65173, 65180, 65181, 65183, 65190, 65191, 65193, 65200, 65201, 65203, 65210, 65211, 65213, 65220, 65221, 65223, 65230, 65231, 65233, 65240, 65241, 65243, 65250, 65251, 65253, 65260, 65261, 65263, 65270, 65271, 65273, 65280, 65281, 65283, 65290, 65291, 65293, 65300, 65301, 65303, 65310, 65311, 65313, 65320, 65321, 65323, 65330, 65331, 65333, 65340, 65341, 65343, 65350, 65351, 65353, 65360, 65361, 65363, 65370, 65371, 65373, 65380, 65381, 65383, 65390, 65391, 65393, 65400-65404, 65410-65414, 65420, 65421, 65423, 65430-65434, 65440-65444, 65450-65454, 65460-65464, 65470-65474, 65480-65484, 65490-65494, 65500, 65501, 65503, 65510, 65511, 65513, 65520, 65521, 65523, 65530, 65531, 65533, 65540, 65541, 65543, 65550, 65551, 65553, 65560, 65561, 65563, 65570, 65571, 65573, 65580, 65581, 65583, 65590, 65591, 65593, 65600, 65601, 65603, 65610, 65611, 65613, 65620, 65621, 65623, 65630, 65631, 65633, 65640, 65641, 65643, 65650, 65651, 65653, 65660, 65661, 65663, 65670, 65671, 65673, 65680, 65681, 65683, 65690, 65691, 65693, 65700, 65701, 65703, 65800, 65801, 65803, 65810, 65811, 65813, 65820, 65821, 65823, 65830, 65831, 65833, 65840, 65841, 65843, 65880, 65881, 65883, 65890, 65891, 65893, 65900, 65901, 65903, 65910, 65911, 65913, 65920, 65921, 65923, 65930, 65931, 65933, 65940, 65941, 65943, 65950, 65951, 65953, 65960-65964, 65970, 65971, 65973, 65980, 65981, 65983, 65990, 65991, 65993, 66000, 66001, 66003, 66010, 66011, 66013, 66020, 66021, 66023, 66030, 66031, 66033, 66040, 66041, 66043, 66050, 66051, 66053, 66060, 66061, 66063, 66070, 66071, 66073, 66080, 66081, 66083, 66090, 66091, 66093, 66100, 66101, 66103, 66110, 66111, 66113, 66120, 66121, 66123, 66130, 66131, 66133, 66140, 66141, 66143, 66190, 66191, 66193, 66200, 66201, 66203, 66210, 66211, 66213, 66220, 66221, 66223, 66230, 66231, 66233, 66300, 66301, 66303, 66310, 66311, 66313, 66320, 66321, 66323, 66330, 66331, 66333, 66340, 66341, 66343, 66350, 66351, 66353, 66360, 66361, 66363, 66380, 66381, 66383, 66390, 66391, 66393, 66400, 66401, 66404, 66410,

66411, 66414, 66420, 66421, 66424, 66430, 66431, 66434, 66440, 66441, 66444, 66450, 66451, 66454, 66460, 66461, 66464, 66480, 66481, 66484, 66490, 66491, 66494, 66500, 66501, 66503, 66510-66512, 66514, 66520, 66522, 66524, 66530, 66531, 66534, 66540, 66541, 66544, 66550, 66551, 66554, 66560, 66561, 66564, 66570-66572, 66574, 66580-66584, 66590-66594, 66600, 66602, 66604, 66610, 66612, 66614, 66620, 66622, 66624, 66630, 66632, 66634, 66700, 66702, 66704, 66710, 66712, 66714, 66800-66804, 66810-66814, 66820-66824, 66880-66884, 66890-66894, 66900-66904, 66910-66914, 66920-66924, 66930, 66932, 66934, 66940-66942, 66944, 66950, 66951, 66960, 66961, 66970, 66971, 66980-66984, 66990-66994, 67000, 67002, 67004, 67010, 67012, 67014, 67020, 67022, 67024, 67030, 67032, 67034, 67080, 67082, 67084, 67100-67104, 67110-67114, 67120-67124, 67130, 67131, 67133, 67140, 67142, 67144, 67150-67154, 67180-67184, 67190-67194, 67200, 67202, 67204, 67300-67304, 67310, 67311, 67312, 67313, 67314, 67320-67324, 67330-67334, 67380-67384, 67400-67404, 67410, 67412, 67414, 67420, 67422, 67424, 67430, 67432, 67434, 67440, 67442, 67444, 67450-67454, 67480, 67482, 67484, 67490, 67492, 67494, 67500-67504, 67510-67514, 67520-67524, 67580-67584, 67590-67594, 67600-67604, 67610-67614, 67620-67624, 67630-67634, 67640-67644, 67650-67654, 67660-67664, 67680-67684, 67690-67694, 67800, 67801, 67803, 67810, 67811, 67813, 67900-67904, 67910-67914, ex. 464, V1321, V1329, V1521, V1522, V220-V222, V230-V234, V2341, V2342, V2349, V235, V237, V238, V2381- V2389, V239-V242, V260-V262, V2621 , V2622, V2629, V263, V2631-V2635, V2639, V2641, V2642, V2649, V265, V2651, V2652, V2681, V2682, V2689, V269-V277, V279, V28, V280-V286, V2881, V2882, V2889, V289, V617, V6511, V7240-V7242, V824, V8901-V8905, V8909

AHFS: 040000, 040404, 040408, 040412, 040416, 040420, 040492, 040800, 049200, 080800, 081202, 081206, 081207, 081208, 081212, 081216, 081218, 081220, 081224, 081228, 081404, 081408, 081416, 081428, 081432, 081492, 081600, 081604, 081692, 081804, 081808, 081820, 081824, 081828, 081832, 081840, 081892, 082000, 082400, 083004, 083008, 083092, 083600, 084000, 089200, 100000, 120400, 120804, 120808, 121200, 121204, 121208, 121212, 121600, 121604, 121608, 122000, 122004, 122008,122012, 122020, 122092, 129200, 160000, 200404, 200408, 201204, 201214, 201218, 201220, 201600, 202400, 202808, 202816, 240400, 240404, 240408, 240492, 240600, 240604, 240605, 240606, 240608, 240692, 240800, 240816, 240820, 240832, 240892, 241200, 241208, 241212, 241292, 241600, 242000, 242400, 242800, 242808, 242892, 243204, 243208, 243220, 243240, 260000, 280400, 280404, 280416, 280492, 280804, 280808, 280812, 280892, 281000, 281204, 281208, 281212, 281216, 281220, 281292,281604, 281608, 282000, 282004, 282092, 282404, 282408, 282492, 282800, 283228, 283604, 283608, 283612, 283616, 283620, 283632, 284000, 289200, 320000, 340000, 360000, 360400, 361800, 362600, 363000, 363200, 363400, 363600, 363800, 364000, 364400, 365200, 365600, 365800, 366000, 366100, 366600, 366800, 367000, 368400, 368800, 368812, 368820, 368824, 368828, 368840, 380000, 400400, 400800, 401000, 401200, 401800, 401817, 401818, 401819, 401892, 402000, 402400, 402800, 402808,402810, 402812, 402816, 402820, 402824, 402828, 402892, 403600, 404000, 440000, 480000, 480404, 480800, 481008, 481024, 481032, 481600, 482400, 483200, 483600, 489200, 520200, 520404, 520416, 520420, 520492, 520808, 520820, 520892, 521200,

521600, 522400, 522800, 523200, 523600, 524004, 524008, 524012, 524020, 524028, 529200, 560400, 560800, 561000, 561200, 561400, 561600, 562000, 562200, 562208, 562220, 562292, 562400, 562812, 562828, 562832, 562836, 563200, 563600, 564000,569200, 600000, 640000, 680400, 680800, 681200, 681604, 681612, 681800, 682002, 682003, 682004, 682005, 682006, 682008, 682016, 682020, 682028, 682212, 682400, 682800, 683004, 683008, 683200, 683604, 683608, 720000, 760000, 780000, 800400, 800800, 801200, 812120, 812200, 812240, 840404, 840406, 840408, 840412, 840416, 840492, 840600, 840800, 841200, 841600, 842000, 842400, 842404, 842408, 842412, 842416, 842800, 843200, 845004, 845006, 848000, 849200, 861200, 861600, 880400,880800, 881200, 881600, 882000, 882400, 882800, 920000, 920400, 920800, 921200, 921600, 922000, 922400, 922800, 923200, 923600, 924000, 924400, 925600, 929200, 940000, 960000

Note:

- Medicaid Perinatal Care episode v1.0
- Last Modified: 10/18/2012

Total Joint Replacement Algorithm Summary	
Triggers	A surgical procedure for total hip replacement or total knee replacement.
PAP assignment	For each episode, the Principal Accountable Provider (PAP) is the orthopedic surgeon performing the total joint replacement procedure.
Exclusions	Episodes meeting one or more of the following criteria will be excluded: A. Beneficiaries who are under the age of 18 at the time of admission B. Beneficiaries with the following comorbidities diagnosed in the period beginning 365 days before the episode start date and concluding on the date of admission for the joint replacement surgery: 1) select autoimmune diseases, 2) HIV, 3) End–Stage Renal Disease, 4) liver, kidney, heart, or lung transplants, 5) pregnancy, 6) sickle cell disease, 7) fractures, dislocations, open wounds and/or trauma C. Beneficiaries with either of the following discharge statuses: 1) left against medical advice or 2) expired during hospital stay D. Beneficiaries who do not have continuous Medicaid enrollment for the duration of the episode
Episode time window	Episode begins 30 days prior to date of admission for the inpatient hospitalization for the total joint replacement surgery and end 60 days after the date of discharge.
Claims included	1. From 30 days prior to the date of admission to the date of the surgery: All evaluation and management, hip- or knee-related radiology and all labs/imaging/other outpatient services 2. During the triggering procedure: all medical, inpatient and outpatient services 3. From the date of the surgery to 30 days after the date of discharge: All cause readmissions, non–traumatic revisions, complications, all follow–up evaluation & management, all emergency services, all home health and therapy, hip/knee radiology and all labs/imaging/other outpatient procedures 4. From 31 days to 90 days after the date of discharge: Readmissions due to infections and complications as well

	as hip or knee–related follow–up evaluation and management, home health and therapy and labs/imaging/other outpatient procedures
Quality measures	Quality measures "to track": 1. 30-day, all cause readmission rate 2. Frequency of use of prophylaxis against post–op Deep Venous Thrombosis (DVT) / Pulmonary Embolism (PE) (pharmacologic or mechanical compression) 3. Frequency of post–op DVT/PE 4. 30-day wound infection rate
Adjustments	For the purposes of determining a PAP's performance, the total reimbursement attributable to the PAP is adjusted for total joint replacement episodes involving a knee replacement to reflect that knee replacements have higher average costs than hip replacements. Additionally, over time, Medicaid may add or subtract additional risk or severity factors in line with new research and/or empirical evidence.
Trigger codes	Each episode is triggered by a surgical procedure for total hip replacement or total knee replacement. The procedure is identified by a claim with either of the following procedure codes and ICD–9 diagnosis codes. Hip Replacement: CPT codes 27130, 27447; ICD–9 codes 81.51, 81.54 Knee Replacement: CPT code 27447; ICD–9 code 81.54 Exclusion from Hip or Knee Replacement (disqualifying triggers): ICD–9 codes 800.xx–829.xx, 860.0–869.1, 850.0–854.1, 925.x–929.x, 170.x, 996.xx, V52.xx
Exclusion codes	List of prior diagnoses and meds that would disqualify a patient from the episode

	Comorbidity codes for exclusion: ICD–9 codes 279, 042, 585.x, V45.1, V56.xx, 630–669.94, V22–V24.99, V27–V27.99, V42.0, V42.1, V42.6, V42.7, 718.35, 718.38, 820.00–920.9, 827.0–827.1, 835.0–835.13, 928.01, 928.11, 959.7, 282.6 These codes represent the set of business and clinical exclusions described previously
Codes to assign PAP	PAP is the orthopedic surgeon performing the joint replacement surgery and is identified by the triggers outlined above
Reporting codes	30-day wound Infection rate: any claim in the 30 day period following the date of discharge with code for wound infection – CPT codes 10180; ICD–9 codes 998.59, 038.0–038.9 Revisions: any claim following the date of discharge with a code for revision – CPT codes 27134, 27137, 27138, 27486, 27487, 27488 Complications: any claim in the 90 day period following the date of discharge with code for complications – CPT codes 10180, 12020, 12021, 13160, 35860; ICD–9 codes 998.30–998.81, 998.83–998.9, 996.40–996.49, 997.32–997.39, 038.0–038.9 All-cause readmissions: any hospitalization in the 30 day period following the date of discharge
Included claim codes	List of ICD–9 and CPT codes that should be included in episode are as follows: <u>ICD–9 Codes</u> Hip Replacement: 81.51, 81.54 Knee Replacement: 81.54

Osteoarthritis and joint degeneration after care: 710–721, 725–733, 736, 738, 739, 755, V54.81, V58.31, V58.32, V58.78, V43.64, V43.65

Complications / Wound Infections / Sepsis: 998.30–998.81, 998.83–998.9, 996.40–996.49, 997.32–997.39, 038.0–038.9

DVT and PE: 451.0–451.2, 453.4–453.42, 454.0–454.9, 444.22

CPT Codes

HIP Replacement: 27130, 27447

Knee Replacement: 27447

Hip / Knee Radiology: 73500–73550, 73560–73580, 73700–73702, 73721–73723

Home Health: T1021, T1021-TD (modifier), T1021-TE (modifier)

Personal Care: T1019-U3 (modifier)

Physical Therapy: 97001, 97110, 97150, 97110-UB (modifier), 97150-UB (modifier), S9131, S9131-UB (modifier) Occupational Therapy: 97003, 95530, 97150-U2 (modifier), 97530-UB (modifier), 97150-UB-U1 (modifiers 1,2) Revisions: 27134, 27137, 27138, 27486–27488

Complications / Wound Infections / Sepsis: 10180, 12020, 12021, 13160, 35860

Note:

- Medicaid TJR episode v1.0
- Last Modified: 11/13/2012

Chronic Obstructive Pulmonary Disease Algorithm Summary	
Trigger	A trigger for a COPD episode is an emergency department, observation room, or inpatient visit for treatment of an acute exacerbation of COPD
PAP	The PAP is the inpatient or outpatient facility where the acute exacerbation that starts the episode is treated
Episode exclusions	Episodes meeting one or more of the following criteria will be excluded: A. Inconsistent enrollment (i.e. not continuously enrolled) during the episode B. Claims during the episode that are covered by a third party C. Dual coverage of primary medical services by Medicaid and Medicare D. PAP is a FQHC E. PAP's practice location is outside AR, LA, MO, MS, OK, TN, or TX F. Billing provider ID of the PAP is not available G. Claims information during the episode is missing or miscoded H. Younger than thirty five (<35) years of age I. Left against medical advice or discontinued care J. Dies in the hospital during the episode K. Comorbidities for which the medical risk cannot be reliably understood or measured (e.g., HIV, cystic fibrosis, lung cancers). Comorbidities are identified during the episode or during 365 days before the episode unless noted otherwise.
Episode window	Episodes begin on the first day of a trigger and end 30 days after discharge or until the end of a readmission where the patient had entered the hospital within the 30 day post-discharge period

Claims included	All claims for the trigger hospitalization are included in the calculation of episode spend. During the 30 day post-trigger window, inpatient, outpatient, professional, and pharmacy claims that are related to the acute exacerbation are included in the calculation of episode spend
Quality measures	Quality measures "to pass": Percent of valid episodes where the patient has a follow-up visit with a physician during the post-trigger window. The minimum threshold is 36%. Quality measures "to track": Percent of valid episodes with a repeat acute exacerbation during the 30-day post-trigger window
Adjustments	For the purpose of determining a PAP's performance, the episode spend is adjusted to reflect risk and/or severity factors of the patient
Example trigger codes	Diagnosis codes include*: range of asthma-related codes (e.g. 491.0, 491.1, 491.2, 4912.0, 4912.1, 4912.2)
Example episode exclusion codes	Diagnosis codes include*: 042.0, 042.1, 042.2, 042.9, 162.0, 162.2, 162.3, 162.4, 162.5, 162.8, 162.9, 277.00, 277.01, 277.02, 277.03, 277.09, 273.4, 343.0, 343.1, 343.2, 343.3, 343.4, 343.8, 343.9, 494.0, 494.1, 586, V42.1, V42.6, V42.7 Procedure codes include*: 31500, G8569 Revenue codes: 0200, 0201, 0202, 0203, 0206, 0209 Discharge status: 07, 20

	Provider type (if provider type is PAP): 49 PAPs with business address in state other than: AR, LA, MO, MS, OK, TN, TX
Example included claims codes	Diagnosis codes include*: 465.8, 465.9, 466.0, 491.20, 491.21, 491.22, 493.00, 493.01, 493.02, 493.10, 493.11, 493.12, 493.90, 493.91, 493.92, 518.81 Procedure codes include*: 71010, 71034, 71035, 71275, 71550, 71551, 71552, 82003, 82800, 82803, 82810, 8744, 9215, 9390, 9391, 9393, 9394 HIC3 codes include*: A1D, B3K, B4X, B6M, J5D, P5F, Q7E, W1W

*Not an exhaustive list.

Source: AR Healthcare Payment Improvement Initiative

Congestive Heart Failure Algorithm	
Triggers	Inpatient admission with a primary diagnosis code for heart failure
PAP assignment	For each episode, the Principal Accountable Provider (PAP) is the admitting hospital for the trigger hospitalization
Exclusions	Episodes meeting one or more of the following criteria will be excluded: A. Beneficiaries do not have continuous Medicaid enrollment for the duration of the episode B. Beneficiaries under the age of 18 at the time of admission C. Beneficiaries with any cause inpatient stay in the 30 days prior to the triggering admission D. Beneficiaries with any of the following comorbidities diagnosed in the period beginning 365 days before the episode start date and concluding on the episode end date: 1) End-Stage Renal Disease, 2) organ transplants, 3) pregnancy, 4) mechanical or left ventricular assist device (LVAD) or 5) intra-aortic balloon pump (IABP) E. Beneficiaries with diagnoses for malignant cancers in the period beginning 365 days before the episode start date and concluding on the episode end date. The following types of cancers will not be criteria for episode exclusion: colon, rectum, skin, female breast, cervix uteri, body of uterus, prostate, testes, bladder, lymph nodes, lymphoid leukemia, monocytic leukemia. F. Beneficiaries who received a pacemaker or cardiac defibrillator in 6 months prior to the start of the episode or during the episode G. Beneficiaries with any of the following statuses upon discharge: 1) transferred to acute care or inpatient psych facility, 2) left against medical advice or 3) expired
Episode time window	Episodes begin at inpatient admission for heart failure. Episodes end at the latter of 30 days after the date of discharge for the triggering admission or the date of discharge for any inpatient readmission initiated within 30 days of the initial discharge. Episodes shall not exceed 45 days post-discharge from the triggering admission.

Claims included	1. Inpatient facility and professional fees for the initial hospitalization and for all cause readmissions 2. Emergency or observation care 3. Home health services 4. Skilled nursing facility care due to acute exacerbation of CHF (services not included in episode for patients with SNF care in 30 days prior to episode start) 5. Durable medical equipment
Quality measures	Quality measures "to pass": 1. Percent of patients with LVSD who are prescribed an ACEI or ARB at hospital discharge – must meet minimum threshold of 85%. Quality measures "to track": 1. Frequency of outpatient follow-ups within 7 and 14 days after discharge 2. For qualitative assessments of left ventricular ejection fraction (LVEF), proportion of patients matching: hyperdynamic, normal, mild dysfunction, moderate dysfunction, severe dysfunction 3. Average quantitative ejection fraction value 4. 30-day all cause readmission rate 5. 30-day heart failure readmission rate 6. 30-day outpatient observation care rate – utilization metric
Adjustments	No adjustments are included in this episode type
Trigger codes	Each episode is triggered by an inpatient admission with a primary diagnosis code for heart failure.

	ICD-9 Heart failure primary diagnosis codes: 428.xx, 40201, 40211, 40291, 40401, 40411, 40491
Exclusion codes	List of prior diagnoses and meds that would disqualify a patient from the episode ICD-9 / CPT / HCPCS codes within 1 year (prior to trigger): 585.5, 585.6, 586.xx, V42.xx, 0048T, 0049T, 33975–33980, Q0491–Q0505, 33970, 33971, 33973, 33974, 140.xx–152.xx, 155.xx–173.xx, 175.xx, 176.xx, 179.xx, 181.xx, 183.xx, 184.xx, 187.xx, 189.xx–195.xx, 197.xx–203.xx, 205.xx, 207.xx–209.xx, 231.xx, 237.xx, 239.xx, V22.xx, 59120, 59121, 59130, 59135, 59136, 59140, 59141, 59150, 59151, 59160, 59200, 59300, 59320, 59325, 59350, 59400, 59409, 59410, 59412, 59414, 59425, 59426, 59510, 59514, 59515, 59525, 59610, 59612, 59614, 59618, 59620, 59622, 59812, 59820, 59830, 59840, 59841, 59850–59852, 59855–59857, 59866, 59871, 59897–59899, 76801–76821, 76825, 630.xx–679.xx ICD-9 / CPT / HCPCS comorbidities within 6 months (prior to trigger): 33215–33217, 33220, 33224, 33225, 33240, 33245, 33249, 93282–93284, 93287, 93289, 93295, 93296, 93741–93745, K0532, K0606–K0609, G0297, G0298, G0299, G0300 These codes represent the set of business and clinical exclusions described previously
Codes to assign PAP	Admission hospital is principal accountable provider (see trigger codes above)
Reporting codes	Outpatient visit within 7 to 14 days: any outpatient professional claim within 7 to 14 days of date of discharge All-cause readmissions: any hospitalization in the 30 day period following the date of discharge Heart failure readmission: any hospitalization in the 30 day period following the date of discharge with a primary diagnosis of heart failure (see triggers above)
Included claim codes	List of ICD-9 and CPT codes that should be included in episode

	Acute inpatient heart failure primary diagnosis codes: ICD-9 codes 428.xx, 40201, 40211, 40291, 40401, 40411, 40491 Post-acute skilled nursing facility (SNF): CPT codes 99304-99310, 99318 Post-acute skilled nursing professional: Revenue codes 190-193 Health home serves: HCPCS codes T1021, T1021-TE (modifier), T1021-TD (modifier) Durable medical equipment: HCPCS codes 4030F, E0601, E0561, E0562, E0470, A7030-A7039, A7044, A7046, K0532

Note:

- Medicaid CHF episode v1.0
- Last Modified: 11/13/2012

Appendix G: HIE Environmental Scan

Health Information Exchange

Statewide Environmental Scan Findings

Prepared for

Oklahoma State Department of Health

Center for Health Innovation and Effectiveness

August 25, 2015

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Introduction and Background

The Oklahoma Health Improvement Plan (OHIP) coalition, chaired by Commissioner Terry Cline, Oklahoma's Secretary of Health and Human Services, is a public-private partnership of stakeholders that oversees the state's progress toward improving Oklahoma's strategic health outcomes.

The OHIP goals and work plan were originally created in 2010. The Oklahoma State Department of Health (OSDH) published an update to the OHIP in 2015 to describe Oklahoma's goals for the next five years, also referred to as "Healthy Oklahoma 2020." As part of this process, the OHIP coalition has established goals in four core areas of work: 1) Health Efficiency and Effectiveness, 2) Health Information Technology (IT), 3) Health Workforce, and 4) Health Finance. A workgroup comprised of Oklahoma stakeholders has been established for each of the four core areas.

The OHIP Coalition also submitted a proposal for a State Innovation Model (SIM) grant on behalf of the state of Oklahoma to provide a state-based solution to Oklahoma's healthcare challenges. Oklahoma was successful and received the grant. The grant is administered by the Oklahoma State Department of Health, which in turn created the Oklahoma State Innovation Model (OKLAHOMA SIM) leadership team to manage and direct the work detailed in the SIM grant. The OKLAHOMA SIM's goal is to improve health, provide better care, and reduce health expenditures for Oklahomans.

To support the Health IT workgroup, OSDH engaged Milliman to perform a statewide environmental scan of existing health information exchanges (HIE), to describe the status of health information exchanges within the state, and to develop a proposal to implement a statewide interoperable health information network. As part of this work, Milliman conducted interviews with numerous stakeholders. The purpose of these interviews was to document existing HIE capabilities and to solicit input on possible future directions of Oklahoma's HIE efforts.

This report presents findings identified during the interviews and from review of HIE initiatives in Oklahoma and other states.

Caveats and Limitations

This report was prepared by Milliman, Inc. (Milliman) on behalf of the Oklahoma State Department of Health (OSDH) in accordance with the terms and conditions of the contract between OSDH and Milliman dated April 1, 2015.

This report has been prepared solely for the internal use of, and is only to be relied upon by, the Oklahoma State Department of Health. Although Milliman understands that this report may be distributed to third parties, Milliman does not intend to benefit, or create a legal duty to, any third-party recipient of its work. If this report is distributed to third parties it should be distributed only in its entirety.

Milliman developed this report with information received from OSDH, as well as upon discussions conducted with OSDH representatives and stakeholders who participated in interviews. Milliman did not audit the source of any data or information Milliman received, nor did Milliman perform independent verification. If the underlying data or information is inaccurate or incomplete, the results of our work may likewise be inaccurate or incomplete.

Methodology and Assumptions

In conducting this environmental scan, Milliman worked with representatives of the OKLAHOMA SIM team to identify selected organizations to interview about their experiences exchanging health information in the state.

Stakeholder Interviews

Milliman conducted in-person and telephone interviews with more than 20 individuals representing Oklahoma's existing HIEs, health delivery systems, payers, state agencies, and other key constituencies. Individuals participating in the in-person and telephone interviews included those shown in the table in "*Table 1: Interview Participants*."

Table 2: Interview Participants

Organization	Name	Role
Health Information Exchanges		
MyHealth Access Network	David Kendrick, M.D.	Chief Executive Officer
Coordinated Care Oklahoma	Brian Yeaman, M.D.	Chief Executive Officer
	Jason Kirby	Sales Consultant
	Joanna Walkingstick	Project Manager
	Jonathan Kolarik	Chief Clinical Informatics Officer
	Rodolfo Alvarez Del Castillo, M.D.	Chief Medical Officer
Healthcare Delivery Systems		
St. Anthony Hospital	Kevin Olson	Chief Information Officer
St. John Health System	Ann Paul	Vice President
	Bat Shunatona, M.D.	Medical Director
	Troy Cupps	ACO Operations Director
Payers		
Blue Cross and Blue Shield of Oklahoma	Joseph Cunningham, M.D.	Chief Medical Officer
Oklahoma Health Care Authority	Adolph Maren	Director, Electronic Health Operations
	Lisa Gifford	Chief of Business Enterprise Services
Other Stakeholders		
Oklahoma Department of Mental Health and Substance Abuse	Tracy Leeper	Decision Support Policy Analyst
	Becky Moore	Director of Informatics

Oklahoma State Department of Health	C. Alex Miley	OKLAHOMA SIM Project Director
	Isaac Lutz	Health Innovation Planning Manager
Choctaw Nation Health Services Authority	David Wharton	Chief Risk Officer, Health Informaticist
Oklahoma Foundation for Medical Quality	Ashley Rude	HIT Practice Advisor
	Ashley Wells	HIT Practice Specialist
	Lindsey Wiley	HIT Manager

The goal of these interviews was to document capabilities for HIEs focused on sharing clinical data, operations, and capabilities within the state. Interviewees were also asked how they exchange and apply clinical information in electronic health records (EHRs), and about their perspectives on possible approaches for future Oklahoma health information exchange efforts.

Industry Knowledge

Milliman conducted research about HIE initiatives in other states to identify common challenges and keys to success. In addition to the research Milliman performed for this project, this report was developed with consideration of the approaches Milliman consultants have observed elsewhere. Milliman has incorporated these best-practice learnings into this report.

Health Information Exchange Key Concepts

To facilitate a uniform understanding of the concepts and terms used throughout this report, common definitions for selected key terms are presented below.

- **Centralized Data Model:** A centralized data model refers to a database system design in which disparate data sets are merged and stored in a shared location. This model is generally thought by data professionals across industries to be a technical requirement for efficiently conducting population health analytics. Centralized data models are generally capable of faster and more reliable performance for end users and greater flexibility to support multiple applications than non-centralized models. This model may be perceived as being at higher risk of breach due to the volume of data in a single location.

- **Comprehensive Primary Care Initiative:** The Comprehensive Primary Care Initiative is a multi-year initiative with a goal to improve primary care in seven regions nationally, including Tulsa, Oklahoma. The program offers population-based care management payment to support five comprehensive primary care focus areas:

    1. Risk-stratified care management
    2. Access and continuity
    3. Planned care for chronic conditions and preventive care
    4. Patient and caregiver engagement

5. Coordination of care across the medical neighborhood

Multi-payer payment reform, continuous use of data to guide improvement, and meaningful use of health information technology are foundational precepts to the initiative.

- **Continuity of Care Document:** A Continuity of Care Document (CCD) is a clinical summary about a patient that has been standardized for electronic transmission. Meaningful Use Stage 1 requires that a CCD include patient information, allergies, medications, problems, procedures, and laboratory results. The set of information required for the CCD is expanded for subsequent Meaningful Use stages. Throughout this report we use the term CCD to generically refer to a clinical summary capable of being transmitted electronically that would minimally adhere to the Meaningful Use Stage 1 requirements.

- **Data Warehouse:** A data warehouse is a type of database designed to aggregate information from disparate source systems into a single repository. Data warehouses are designed for more efficient data aggregation and handling of large volumes of data, whereas traditional databases are typically constrained to a single application for rapidly transmitting information from point-to-point, such as an EHR.

- **eHealth Exchange:** eHealth Exchange (also referred to as "The Sequoia Project" and/or formerly referred to as the "Nationwide Health Information Network (NWHIN)" is a group of organizations sharing health information under a common framework and set of rules. Participants include federal agencies, states, Beacon communities, and health systems. eHealth Exchange provides an interoperable health information exchange service that enables disparate users to share information through what is often referred to as a "network of networks."

- **Federated Data Model:** A federated data model refers to a system design in which separate databases allow partial and controlled sharing of their data on demand. In a federated model, data is not stored in a central shared location. This model typically provides increased patient and provider privacy. A tradeoff of this model is the inability to conduct aggregate reporting and analytics. Federated data models may reduce trust concerns among stakeholders, lower the risk of breach, and may be developed more quickly than some centralized data models.

- **Health Information Exchange:** A health information exchange (HIE) is broadly defined as a system designed to pass health information from one party to another. Functionality such as patient or provider portals, reporting, and analytics may be added to increase utility.

- **Interoperability:** The term interoperability is frequently used in discussion and in literature, however, it is a term that may imply slightly different meanings to different users and audiences. In other words, it is a common term that may not be consistently interpreted. In this report, interoperability refers to a software system capability to send and receive information to and from other disparate systems.

- **Meaningful Use:** Meaningful Use is a federally sponsored program to accelerate the adoption of health information technology throughout the U.S. healthcare system, specifically the use of EHRs. Meaningful Use was conceptualized by the National Quality Forum (NQF) and founded on the principles of improved population health, care coordination, and patient engagement. Eligible providers receive federal funds to adopt EHR technology and demonstrate use of those systems in a meaningful way. The Meaningful Use program has three stages; most participants today are in Stage 1 or Stage 2.

- **ONC Certification:** Certification indicates that a system conforms to standards for health information technology (HIT) security and functionality as defined by the Office of the National Coordinator for Health Information Technology (ONC). The ONC has not yet published HIE certification standards, but has published standards for components that may be utilized by an HIE.

- **Population Health:** Population health refers to the health outcomes of a group of individuals, rather than the health outcome of a single individual. Population health management is an approach to health that seeks to improve the health income of the entire population. Use of data for analytics and measurement is an essential component of population health management.

These definitions and concepts are used throughout the remainder of this report.

Observations and Findings

In this section, we describe the primary health data sharing efforts in use in Oklahoma today, as identified during the statewide environmental scan interviews and research. Like many states, Oklahoma has a number of active data sharing efforts underway, which are in varying stages of development and which were initially created for different intended uses.

A. Active Oklahoma Data Sharing Efforts

The advent of mature, widely adopted healthcare information technology has created an opportunity for the healthcare industry to share information and coordinate care in an entirely new manner compared to what was possible just a few years ago. Technological advances have created the opportunity for healthcare providers to reduce redundant testing, better control chronic conditions through early identification of at-risk individuals, and streamline patient handoffs among organizations. With the appropriate technical infrastructure, providers can access most or all of their patients' health records and encounters almost instantaneously.

The opportunity to manage patients through care transitions, conduct population management programs, and develop complete views of a patient's medical history has led Oklahoma's healthcare community to develop numerous data sharing initiatives. Data is exchanged though HIEs and EHRs, as well as through a diverse set of other methods.

Oklahoma has already made substantial progress in healthcare data exchange as a result of its healthcare and business environment. Competition has spurred innovation and technological development within the state, and two competing HIEs have emerged. OSDH is also working on a shared-service state agency HIE. These efforts have the potential to create building blocks for a more connected, efficient, and effective healthcare system that will improve the lives and health of the population.

Health Information Exchanges

Two HIEs currently operate in Oklahoma: Coordinated Care Oklahoma (Coordinated Care) and MyHealth Access Network (MyHealth). The HIEs began as regional initiatives; Coordinated Care in Norman and Oklahoma City, and MyHealth in Tulsa. Each organization is currently in the process of expanding its reach across the state. While both HIEs share a stated goal of improving the lives of Oklahomans through better healthcare, each has a different vision of how to achieve that objective. Each organization's distinct characteristics, such as governance model, system capabilities, and scope of data included in its data set, are summarized and described in *"Table 2: Current Oklahoma HIE Features*."

Table 3: Current Oklahoma HIE Features

Feature	Coordinated Care Oklahoma	MyHealth Access Network
Organization Structure	Not-for-profit	Not-for-profit
Major Grants Awarded	None	Beacon Community grant
Revenue Model	Fee and subscription	Fee and subscription
Board Composition	Community- and member-based	Community- and member-based
Unique Patient Lives (est.)	4,700,000	4,000,000
Provider Locations (est.)	455	800
Data Model	Centralized hybrid	Centralized hybrid
CCD	Yes	Yes
Population Management Tools	Yes (Pentaho)	Yes (Pentaho)
Analytics	Yes (LightBeam)	Yes (IndiGo)
Patient Participation Model	Opt-out	Opt-out
Unique Features	Advanced directives	Patient portal
Training Model	Train the trainer	Train the trainer
Demographic Data	Yes	Yes
Clinical Data	Yes	Yes
Claims Data	Not at this time	Yes (selected payers)

In the following sections, we describe key elements of each of the existing HIEs in greater detail.

Coordinated Care Oklahoma

Coordinated Care has been in operation in the Norman and Oklahoma City areas since 2014. The organization was founded by local hospitals and providers with a goal of providing physicians secure access to health information for their patients for treatment purposes.

When a patient sees a new provider, whether for a regular visit, emergency department visit, or a move to a long-term care facility following a hospitalization, improvements in care can be achieved if a complete clinical record is available to the provider as they deliver care. Coordinated Care focuses on providing support for these transitions by delivering a complete clinical record at the point of care.

Governance and Sustainability

Coordinated Care is a not-for-profit organization. The HIE's start-up costs were funded by health systems and provider groups. Ongoing operations are funded by members through subscription fees, typically paid on a semi-annual basis. A large provider group seeking to join the HIE would need to negotiate an investor stake and permanent board position with the existing investors. Smaller healthcare organizations, such as rural hospitals, small provider groups, home health, hospice, long-term care facilities, and behavioral health

facilities, are charged only for the cost of establishing their connections and ongoing subscription fees. HIE members join for a term of three years with the option of a 60-day cancellation.

Coordinated Care's board is comprised of health systems, small provider groups, large provider groups, rural hospitals, post-acute care, and community participants. Coordinated Care has entered into an agreement with Yeaman and Associates, with Dr. Brian Yeaman serving as CEO, to provide organizational support, legal counsel, operations, finance and project management, and general oversight of the HIE.

Business Model

Coordinated Care's HIE includes patient data for over 4,700,000 unique patient lives and 800 provider sites, 455 of which actively contribute data to the HIE across the states of Oklahoma, Texas, and Missouri. The HIE provides a mechanism for member organizations' providers to inquire about a patient's healthcare by collecting and sharing patient demographic information, primary care provider, allergies, vital statistics, immunization data, problems and conditions, procedures, diagnostic results, labs, medications, discharge summaries, patient notes, and individual encounter records. Coordinated Care accepts and shares standardized and non-standardized data (such as a descriptive notes about the patient's condition) via the HIE, though analytics can only be run on standardized data.

There are two ways that HIEs typically store and provide access to health data: centralized data model and federated data model. Coordinated Care can accommodate both centralized and federated models. Once data from a federated model is viewed by a provider, it is stored in the centralized database and updated the next time that patient's information is queried. Access to Coordinated Care queries and data is provided on-demand. On-demand access means that, when users query the system, they are presented with the most recent EHR information available, although the data may or may not be stored in a single central repository or data warehouse.

Users access the HIE via a Cerner Corporation (Cerner) technology-based single sign-on, or via a web portal. For many EHRs, the users access the system through an EHR-integrated connection called a servlet, which expands the HIE information within the EHR system as a new window. Servlet technology enables a user to view Coordinated Care's consolidated patient views through the web. The bidirectional feed between the HIE and member organization loads a CCD from the HIE into their EHR upon request. This is advantageous to providers because it does not interrupt clinical workflow, allowing them to open their patient's aggregated record as if it were already integrated with their EHRs.

For EHRs that do not support this technology, access is provided through a web portal. The web portal offers view-only access for patient searches and analytics. Some EHRs can access the web portal via single sign-on, allowing the provider to click a link that opens Coordinated Care's web portal in a browser window after having automatically logged the provider in. Others require that a provider open a browser, navigate to the web portal, and log in to the portal. Seamless integration increases the likelihood that a provider will use the system during a visit, thus the advantage of integration and single sign-on is an increased usage rate.

Organizations wishing to join Coordinated Care can form a full connection with the HIE through their EHR, or can access the HIE only through the web portal. If the organization wishes to form a full connection, Coordinated Care consults with the organization to determine how best to build the connection. Coordinated Care reports that implementation of a typical connection takes six to eight weeks, but that individual connection times may vary depending on the provider, the specific EHR installation, and other related considerations.

Healthcare Analytics and Population Management Tool

Coordinated Care has focused its primary efforts around developing HIE tools that support patient transitions of care, presenting a complete medical record on-demand at the point and time of care.

Coordinated Care is also developing analytics capabilities via two vendors, Pentaho and LightBeam. LightBeam is Coordinated Care's primary analytics partner. The product provides an analytics warehouse that standardizes data for analysis. Pentaho provides risk stratification, population health management, and condition management reports to HIE users. Standards-based reports, such as HEDIS measures, and information on utilization, treatment, and clinical quality are also available.

In addition to providing a solution for health data integration at the point of care, Coordinated Care adds value for its members by integrating a tool called MyDirectives in the HIE. MyDirectives is a multistate electronic repository for a patient's portable advanced directives. Integration of this information can be valuable to providers in emergency medical situations and allows the care team to follow the patient's wishes, even in urgent settings where there would otherwise be a potential cost to delaying treatment to locate a patient directive. If a patient whose provider participates in Coordinated Care has filled out an advanced directive with MyDirectives, that information is available to all providers that participate in the HIE.

Policies and Procedures

Coordinated Care follows an opt-out model for sharing patient data for providers based in Oklahoma. In this model, patients are notified that their information will be shared over the exchange by member organizations and are given the opportunity to opt out of participation.

Coordinated Care also operates in Arkansas, Kansas, Louisiana, Missouri, and Texas. Operations spanning multiple states require special consideration due to variations among state regulations. For example, in Missouri, patients must explicitly opt in to have their records shared across the HIE. Missouri patients are notified that their information can be shared over the HIE and are given the opportunity to opt in. Because Coordinated Care includes Missouri-based providers in the HIE, a capability has been developed to overwrite the default opt-out setting if a patient has been seen in Missouri.

Coordinated Care reports low rates of patient opt-outs from provider groups in Oklahoma or Texas and says that approximately 90 percent to 95 percent of patients opt in from Missouri-based groups. Because of this, Coordinated Care believes that most patients are interested in the sharing of their records to facilitate coordinated and potentially higher-quality care.

Technology Evaluation

Coordinated Care uses Cerner as the HIE's primary technology vendor partner. Coordinated Care has, however, customized a CCD for its members. The decision to customize the CCD was made to strengthen the usefulness of the system in supporting care transitions and to allow connections to areas of healthcare which, such as home health and long-term care. The custom Coordinated Care CCD aggregates available clinical information into a single view. This model has a distinct advantage over most EHR technology, where users must separately view each instance of a patient's chart. In other words, each unique provider's chart for a patient is an "instance" and the treating provider must separately view each instance, rather than as a consolidated, patient-centric view as provided by Coordinated Care's CCD.

Coordinated Care's data model can be described as a centralized hybrid. Coordinated Care allows three types of connections:

1. A centralized connection hosted by Cerner that includes demographic information and clinical records.

2. A centralized connection hosted by Cerner for demographic information and a federated clinical record only accessed when a patient's chart is opened.

3. A fully federated connection that stores no information within the HIE's database.

Coordinated Care's connections are primarily the first and second connection types, with an equal distribution between the two. Centralizing patient demographic information enables accurate patient matching by building a master patient index (MPI), an operation that identifies which records throughout the system pertain to a single patient. An accurate MPI reduces the likelihood that data is missed when a patient's information is accessed via the HIE. It also reduces the probability that another individual's information is accidentally accessed by the provider. The MPI provides an efficient means to keep a patient's clinical information in the primary EHR and only accesses it when another provider needs it, rather than storing it in a centralized database. This arrangement is thought by some to maximize the security and privacy of patient records. The fully federated connection type is primarily used by healthcare organizations that lack sufficient EHR technology to be fully connected.

Coordinated Care's data model mirrors the HIE's primary intended purpose as a point-of-care clinical information source, a condition management tool, and population health management tool.

Vendor Procurement and Project Management

As Coordinated Care's technology partner, Cerner is responsible for most application development work. Lightbeam is Coordinated Care's analytics vendor. MyDirectives was selected as the vendor for the HIE's advanced directives capability. Yeaman and Associates provides a project manager to oversee vendor-based development efforts.

Marketing, Outreach, and Training

Coordinated Care's sales and marketing activities are conducted statewide. Coordinated Care Oklahoma participates in statewide conferences and initiatives to raise awareness of the HIE and its capabilities.

Coordinated Care operates its training function as a "train the trainer" model. This training approach is popular among technology vendors because it enables the client's team to spread adoption of the application on a timeframe that is right for the client organization; even following completion of the technology implementation. This method directly trains several individuals within a client organization to become experts on the technology. These individuals then conduct training sessions for the rest of the organization. Coordinated Care also offers web-based seminars and printed reference guides to supplement the primary training model.

Certifications

While the ONC does not provide certification standards for HIEs at this time, it does certify components that may be used with various HITs. MyDirectives, Coordinated Care's advanced directives technology provider, offers an ONC-certified advanced directive capability, which the HIE provides to its members.

MyHealth Access Network

MyHealth was started in 2009 with a goal to improve health, improve healthcare, and reduce costs by creating a complete view of all the care Oklahoma patients receive. Based in Tulsa, the MyHealth HIE collects patient information to create opportunities for early intervention with at-risk patients, assist in treatment decisions during the patient visit, and enable population management programs through analytics and reporting tools.

a. Governance and Sustainability

MyHealth is a not-for-profit organization. Dr. David Kendrick is the organization's CEO. The HIE was started as a result of a large stakeholder meeting convened to discuss Oklahoma's health outcomes.

In May 2010, MyHealth received an ONC Beacon Community grant to fund use of HIT to advance the vision of patient-centered care and to provide better population health and better patient care at a lower cost. The Beacon grant funded investments in infrastructure and technology to support the MyHealth platform and to expand its population management and clinical quality reporting capabilities. My Health's ongoing operations are funded by membership fees. MyHealth reported that its fee schedule is comparable to Coordinated Care Oklahoma's fee schedule although Milliman did not independently verify that claim.

MyHealth's board of directors is comprised of 20 members. The board represents a broad mix of constituencies, with participants from health systems, tribal organizations, patients, universities, private payers, clinicians, representatives from the community, public and allied health organizations, and one individual appointed by the governor. Health systems occupy six seats. This structure was designed so that decisions and initiatives require cross-stakeholder agreement and collaboration.

Business Model

The MyHealth HIE has records for over 4,000,000 patients, contributed to by over 260 member organizations across approximately 800 sites. MyHealth provides the capability to share and collect patient information intended to support care coordination, including demographic information, vital signs, medications, radiology, allergies, lab results, immunizations, social and family history, encounters and procedures, admissions, discharges, and transfers. To join MyHealth, organizations must be professionals in good standing in the healthcare industry with a demonstrated need, benefit from participation, and be approved by the MyHealth Board of Directors. Once granted membership, organizations participate in a technology evaluation to ensure connections are feasible and that the required data can be extracted from their HIT systems.

Authorized users may access patient data on-demand via the HIE by logging in to a web portal from their EHR using single sign-on. Providers have access to a consolidated CCD that summarizes and presents relevant point-of-care information. MyHealth leadership reported that most health system users access the portal when there has been a known care event, such as a hospitalization or for analytic purposes.

As a participant in the Comprehensive Primary Care (CPC) Initiative, My Health is expanding its HIE data model to include claims data for value-based assessment of care. The intent of the CPC Initiative program is to evaluate whether risk-stratified care management, access to care, planned care for chronic conditions, patient and caregiver engagement, and coordination of care across healthcare organizations can achieve improved outcomes. The results of this program are intended to inform future Medicare and Medicaid policy; and within the state of Oklahoma, is expected to be used in evaluating pay-for-performance program effectiveness for the state's payers.

The HIE's data sources for claims information are currently Blue Cross and Blue Shield of Oklahoma and the state Medicaid program, SoonerCare, which is administered by the Oklahoma Health Care Authority. Underlying this initiative is a clinical quality measurement program that was introduced and developed in partnership with Blue Cross and Blue Shield of Oklahoma.

Healthcare Analytics and Population Management Tool

MyHealth offers a suite of analytic reporting tools for population health management. Additional functionality available in the MyHealth provider portal includes health analytics for clinical quality

reporting and population health evaluation, risk assessment tools, identification of high utilizers of emergency departments, care transition, and care gaps reporting, as well as a direct messaging interface.

MyHealth provides three analytic and decision support tools; MyHealth Analytics, a Pentaho implementation; DocSite, a rules-based care gaps and care opportunities report; and Archimedes IndiGo, a risk-stratification and decision support system. MyHealth has also incorporated Tableau, an interactive data visualization product, into its analytics offerings. We note that these analytic and population management capabilities can be quite powerful, particularly when the inbound data is of high quality and predictable in format and structure. Lack of standardization in EHR workflows and charting is common among provider groups and is a likely barrier to be overcome before the robust reporting capabilities of MyHealth can be fully realized.

Policies and Procedures

MyHealth operates under an opt-out model in which participating organizations inform patients their data will be shared across the HIE to improve and streamline the care they receive unless they explicitly decide not to have it shared. MyHealth reports relatively low rates of patients opting out. As the HIE is currently focused on Oklahoma-based provider groups, it has not been necessary to develop an opt-in solution.

Technology Evaluation

MyHealth's technological capabilities have evolved over time as the needs of the HIE have changed. The HIE can be accessed via an independent web portal, or a single sign-on to a web-based portal from a link in the electronic health record (EHR) system. Clinical users can access a consolidated CCD that aggregates relevant clinical information from all data sources into a single view. The HIE's data model can be described as a centralized hybrid, which allows two types of connection for organizations to share data:

1. Centralized connection hosted by MyHealth that includes demographic information and clinical records.

2. Federated clinical connection hosted by MyHealth that enables data to be viewed in the portal, but prevents the data's inclusion with the HIE's analytic reporting suite.

Additionally, view-only access to demographic data and clinical records is available for members who do not have an EHR compatible with the technical requirements of data sharing.

The majority of MyHealth's data source connections are fully centralized. An advantage of a centralized data repository is that it enables the aggregated reporting necessary to build effective population health reports. In addition to the core technology platform, MyHealth's suite of additional reporting and systems uses the capabilities of a number of technology vendors. These capabilities create value for organizations that are interested in quality reporting, population management programs, and clinical decision support capabilities that are more comprehensive than transmission of the clinical record from point to point.

Vendor Procurement and Project Management

MyHealth has a number of vendor relationships due to the HIE's diverse set of reporting-related features. Vendor relationships exist with Archimedes, Cerner, Covisint, MedUnison (Doc2Doc), Microsoft Health Vault, and Verinovum, with future plans to incorporate technology from Direct Project. MyHealth manages vendors and delivery of technology projects under its Privacy Officer position to ensure that privacy, security, and other important data integrity requirements are monitored and maintained.

Marketing, Outreach, and Training

MyHealth operates a "train the trainer" model for aiding participants in adopting the technology. Additionally, MyHealth also offers web-based seminars and printed reference guides.

Certifications

MyHealth is deploying an ONC Stage 2-certified patient portal for use by its provider participants' patients. MyHealth also plans to deploy an Oklahoma Bureau of Narcotics and Dangerous Drugs (OBNDD)-certified Prescription Drug Monitoring Program (PDMP) in the near future.

Oklahoma State Department of Health

Oklahoma's state agencies handling health information have historically experienced challenges in sharing data across departments. To address this challenge, the Oklahoma Health and Human Services cabinet created the Deliverable Interoperable Components Utilizing Shared Services (DISCUSS) committee designed to collaboratively share resources among the Oklahoma Health and Human Services agencies for the development and implementation of shared information technology products, services, and technology frameworks. Membership of DISCUSS includes the Department of Health, Department of Human Services, Department of Mental Health and Substance Abuse Services, Department of Rehabilitation Services, and the Health Care Authority.

In 2015, DISCUSS members agreed to create a shared-services state agency HIE that would facilitate the sharing of the state's data across agencies and would link the disparate systems. State health data has a number of factors that influence how and when it can be shared. For example, birth and death information and sensitive patient registries cannot be shared with a public exchange. Other data, however, would most certainly benefit from clinical integration. One example of such data is clinical data services provided by county health departments and labs.

A system for sharing data among agencies is anticipated to create benefits for private entities in Oklahoma as well. For example, hospitals are required by law to report patient discharges to several agencies. Integration could mean that only one data feed would need to be sent to the state.

Due to the sensitive nature of part of the state's health data, state ownership of the data asset was deemed by DISCUSS to be imperative for patient privacy. The vision for interstate agency information sharing is to develop an MPI that identifies when disparate records are associated with the same person, and to allow access to consolidated information via a secure portal.

Orion Health was recently selected as the technology vendor to support this effort; the implementation effort is expected to take approximately two years. Once fully functional, this data warehouse is intended to integrate state agency data, reducing costs and increasing the effectiveness of state agency programs, as well as to simplify the reporting burden for hospitals and providers. The HIE could be connected via a network of exchanges or federated connections to other state healthcare organizations to share certain, limited data while benefiting from up-to-date information on critical diagnoses for state registries.

Through DISCUSS, the state is moving quickly to address a known gap in its data sharing capabilities. When the HIE is functional, it will serve a key role in serving Oklahoma's health information sharing needs.

Other Oklahoma Data Sharing Initiatives

Investments in developing shared databases and reporting interfaces may be the most direct manifestation of HIE initiatives in Oklahoma, but two other forces will begin to influence the market and shape Oklahoma's HIT landscape: (1) EHR interoperability development, and (2) a growing initiative to connect existing HIEs.

1. EHR Interoperability

Federal incentive programs such as Meaningful Use, have been a major driver of HIT investment. Meaningful Use participants must attest that they meet the requirements for each Meaningful Use stage in order to continue to receive EHR incentive program funds. Meaningful Use Stage 2 emphasizes interoperability. As providers prepare for Stage 2 attestation, many EHR vendors are investing significant time and energy to help them achieve their goal because so many of the Stage 2 objectives and measures require demonstrated adoption of the technology capabilities in the vendor systems.

ONC reports that there have been substantially fewer vendors requesting ONC Stage 2 certification thus far compared to Stage 1 requests. Two factors appear to be driving this decrease in applications for certification: developing the capability to meet Stage 2 requirements is technically challenging, and many of the early EHR companies are being acquired or going out of business as the market matures.

While sharing information among different EHR platforms has been a challenge, substantial progress has been made in sharing clinical records across installations of the same EHR system. Large care delivery systems make frequent use of this capability in instances where there are multiple discrete installations of the EHR across practices. This technology enables the patient's chart to "follow" them throughout the organization.

The current state of EHR interoperability has two general shortcomings. First, if a patient receives care at a hospital or clinic that is not part of the delivery system, there is no way to automatically incorporate data from that visit into the patient's primary chart. Second, EHRs do not typically consolidate patient information into a single view. This condition requires providers to open each location's record independently. Lack of a consolidated patient view severely limits the practical use of EHR interoperability technology in a patient visit. This is primarily due to the amount of time needed to completely review a record and the number of visits per day in a typical provider's schedule.

Most EHR interoperability is not yet mature enough that regular and effective usage in care delivery settings is actively occurring. However, the attention of EHR vendors to this capability suggests that, in the future, a more user-friendly application of this technology will be available.

2. Network of Networks

HIEs are most effective when the number of locations and patients covered by the system is maximized. In Oklahoma, this currently means stakeholders must either choose the information contained in a single HIE or pay increased costs to subscribe to both. Significant time, money, and effort goes into developing and connecting EHRs to an HIE, and the multi-year subscription agreements that most vendors require are evidence of this fact. The cost of switching HIEs is high.

Oklahoma's present HIE and information-sharing initiatives are regionally based, despite Coordinated Care's and MyHealth's continued expansion across the state. An initiative is underway to increase connectivity and health information sharing between Oklahoma's existing HIEs. Coordinated Care and MyHealth are exploring the option of joining an existing network of networks through an organization called eHealth Exchange, the largest HIE network in the country.

eHealth Exchange is a nationwide "network of networks" that has established a standard legal framework and technical specifications to allow member organizations to more easily establish federated connections to one another. Federated connections through an established third party have an advantage in that there is no need to invent or define the sharing interface. Current eHealth Exchange board members include organizations such as Epic, Kaiser Permanente, the American Medical Association, Workgroup for Electronic Data Interchange (WEDI), and the Healthcare Information and Management Systems Society (HIMSS), among others. Participants include federal agencies, states, Beacon communities, and health systems. Establishing connections to such a network would make Coordinated Care and MyHealth interoperable not only within the state of Oklahoma, but nationally with any other eHealth Exchange participant, once the connections are built.

All individuals interviewed by Milliman during this engagement expressed interest in connecting the existing HIEs and establishing a "network of networks." This approach is not without risks, however. Introducing an external third party as the critical connection point to Oklahoma's cross-system interoperability solution is a potential risk should eHealth Exchange's system ever fail. Healthcare data shared across eHealth Exchange will be limited to point-of-care clinical information, because the federated connection inhibits use of analytics or aggregation of information for reporting purposes.

Both EHR interoperability advances and initiatives to connect Oklahoma's HIEs to a "network of networks" advance the cause of healthcare information sharing throughout the state despite some potential drawbacks. These are positive developments in the HIT landscape for Oklahoma.

Current Environment

To understand perspectives and considerations regarding potential avenues to connect Oklahoma's health information, it is necessary to also understand the healthcare environment within the state. Milliman's findings about several key stakeholder groups are described in this section.

B. Reasons to Share Data

OSDH was interested in learning why organizations in Oklahoma are sharing healthcare data. Interview participants expressed a variety of motivations for exchanging healthcare information, including developing a more complete patient record, reducing duplicative testing, measuring clinical outcomes in pay for performance measurement, and an increased ability to manage patient populations in need of assistance, for example those with chronic conditions.

One major challenge facing the U.S. healthcare system today is that when a patient receives healthcare outside of a single "primary" care delivery system (such as receiving care at a hospital or clinic that is under different ownership), critical information about vital statistics, tests conducted, test results, diagnosis, and medications prescribed are not available to the patients' primary providers. Sharing critical clinical information at critical points (e.g., when a patient is hospitalized, transferred to a long-term care facility, or is being seen for a routine visit) can significantly influence both the cost and effectiveness of care.

By connecting clinical information across disparate delivery systems, participating providers are able to construct a longitudinal view of a patient's care that can improve decision making at the point of care, reduce readmission rates, reduce expensive duplicative testing, and enable population management programs that allow effective outreach and intervention to patients who are the most at-risk for major medical events.

The integration of claims and clinical data was important to a number of the interviewees. Many payer organizations try to align providers' financial incentives with providing treatment that keeps patients healthier and reduces billable events through pay-for-performance quality programs. One challenge with these programs is using a standard methodology to evaluate performance. Payers measure activity based on

claims data and providers measure this based on clinical information. Applying the same measures to these different data sets can yield conflicting accounts of performance. Utilizing a trusted third party to match claims and clinical data and report performance can improve both payers' and providers' abilities to trust the fidelity of the performance measure outcomes.

Data Sharing Concerns

OSDH also wanted to understand interviewees' concerns regarding sharing health information and related data. Interview respondents actually expressed few overt concerns about sharing healthcare data in a controlled and secure manner.

Oklahoma uses an opt-out model for patient permissions, meaning that most organizations will inform patients that their data will be shared unless patients specifically ask for their information to be excluded. Interviewees seemed comfortable with this model, and several individuals offered evidence that the vast majority of patients will consent to having their information shared if the purpose and manner in which it is shared is described to them.

Data sharing concerns were expressed by stakeholders representing smaller provider groups. While these stakeholders support the value of sharing data, their concerns related to the cost to connect to an HIE and the ongoing subscription fees. Of note, EHR vendors can charge fees to enable the technology that integrates single sign-on capabilities or to provide extracts to an HIE if the provider group's EHR is hosted by the vendor. The combination of these charges was reported to have the potential to double the initial connection costs of joining an HIE.

Nationally, concerns commonly expressed in states with HIE efforts similar to Oklahoma's include fears that information sharing increases the likelihood of a Health Insurance Portability and Accountability Act (HIPAA) compliance breach, challenges to opt-out models due to potential patient and/or provider privacy concerns, data security concerns, lack of trust in partnering organizations leading to low participation rates, and antitrust concerns related to the use of data to make contracting or purchasing decisions.

As Oklahoma's efforts to connect its healthcare ecosystem become more widely publicized, it is possible that concerns raised in other states will also be raised in Oklahoma.

Provider Environment

Oklahoma has a varied and complex healthcare provider environment, due to its unique population distribution, business environment, and special constituencies within the state, such as Native American tribal nations.

Oklahoma City and Tulsa both have well established, mature healthcare delivery organizations that invest in HIT. Due to the size and complexity of these healthcare organizations, many are making internal investments in population health management analytics tools. A limitation of these efforts is that these tools can only analyze data the systems can access, primarily for care provided within their clinics and facilities. This creates an incentive for these groups to share data outside of their organizations.

During the interview process, we also learned that many providers and critical access hospitals in rural Oklahoma are choosing to affiliate with, or being acquired by, larger care delivery organizations. This aggregation can help these rural providers afford HIE connections and other HIT that might otherwise be beyond their reach.

Oklahoma is home to 38 Native American tribal nations, 36 of which are federally recognized. Each one is a completely autonomous nation responsible for making decisions about the healthcare of their members. Indian Health Services (IHS) is a federal agency within the U.S. Department of Health and Human Services responsible for providing federal health services to Native Americans. This agency provides infrastructure and support to Oklahoma's tribal nations, though the individual nations operate independent health services, and these services are not broadly interoperable. IHS has initiated a data warehousing project that will enable some data sharing across health services organizations, but the warehouse is not yet distributing any information to the tribes.

Payer Environment

Oklahoma's health insurance market is relatively consolidated. Commercial payers are typically large, well-funded, and able to make investments in HIT to support corporate priorities.

According to the *Oklahoma Insurance Market Analysis* report, published by Milliman in August 2015, 49 percent of Oklahoma's population is covered by commercial insurance through an employer or other private insurer. Another 21 percent is covered by Medicaid, and 14 percent by Medicare, and two percent through other public sources. Approximately 14 percent of the state is uninsured. Oklahoma has generally higher rates of government-subsidized insurance and uninsured compared to other states.

Interviewees reported that managed care arrangements that use incentive payments to providers for performance based on agreed-upon quality measures are becoming more prevalent in Oklahoma. They cited a belief that a key element for success in these types of arrangements is using a trusted third party to measure performance, without which disagreements on the validity of results published by either the payer or provider group can be common and disruptive to meeting the overarching program goals.

Blue Cross and Blue Shield of Oklahoma has signed a participation agreement with MyHealth to send regular extracts of claims data to the HIE for the purposes of measuring pay-for-performance outcomes in its provider network. As a contracting prerequisite, network providers are required to be actively participating with MyHealth to ensure uniformity and thoroughness of reporting. This collaboration highlights the value that external repositories, such as HIEs, can bring to such programs.

Engaging payer organizations in the process of exchanging health information will be important as these organizations represent a large and consolidated stakeholder group within the state. The importance of payer engagement and participation will increase, as will their incentives to partner with HIEs and providers to improve the health of Oklahomans and reduce the overall cost of care.

Statewide Interoperable Health Information Network Options

Oklahoma intends to develop a statewide interoperable health information network to further its goals as part of the Healthy Oklahoma 2020 plan. There is a range of options to achieve this goal. To ensure that an appropriate option is selected, a number of important considerations must be evaluated. In this section, we discuss these options and considerations for the development of a statewide interoperable health information network.

C. Intended Use

The single most important consideration for Oklahoma when determining how to establish an interoperable health information network across the state is what uses the system should support. No other consideration is likely to have as much bearing on the system's technical design and viability. The database architecture, data model, and supplementary reporting and analytics are all a derivative of the intended use. Three general scenarios for using Oklahoma's health information network exist:

1. Point-of-care support
2. Clinical decision support
3. Claims/clinical analytics support

Each scenario includes the functional capabilities of the one preceding it. For example, an HIE that passes enough information to provide clinical decision support would also provide point-of-care support for its users. These capabilities are discussed in detail below.

1. Point-of-Care Support

In the point-of-care support scenario, information is exchanged among clinical locations for use in the patient visit. The transmitted data must include basic demographic information for patient matching and relevant clinical information, such as that which is found in a CCD.

Using an HIE in this manner has the potential to improve the quality of care. Better patient outcomes may be achieved by reducing errors and providing a more informed treatment plan. Combined clinical information can improve decisions made in-visit about testing, diagnosis, and treatment. This type of interchange can also be augmented with value-added services. Imaging and lab results are frequently shared, and some HIEs are incorporating additional data elements (e.g., advanced directives).

Clinical Decision Support

In a clinical decision support role, HIEs aggregate patient information for reporting. This reporting typically takes two forms: "within-visit" analytics to identify risk factors and potential testing needs at the time of care, and population-level analytics independent of a single patient visit to assist with population management. Using an HIE to assist with clinical decision support typically aggregates a patient's information from all locations within the HIE.

Population management reporting aggregates clinical information about all patients from all locations within the HIE for a specific parameter, such as a disease (e.g., diabetes, chronic heart failure), to aid in the identification of patients who are not currently being seen, proactively identifying those who are overdue for testing or who have a combination of factors that put them at-risk for a major medical event. This analysis enables the healthcare organization to reach out to the identified patients in an attempt to educate and/or provide them the needed care.

MyHealth's and Coordinated Care's tools (e.g., patient disease registries, emergency department utilization reports, and use of condition management analytics and reporting to identify high-risk patients and suggest high-value treatments) are examples of system use under this scenario. When carefully conducted and clearly presented, the results of analytics have the advantage of drawing the provider's attention to areas of interest for a given patient that might otherwise be overlooked in a visit, such as an overdue health screening or monitoring test.

Claims/Clinical Analytics Support

Using data in this manner for analytics typically combines information from payers and providers to evaluate care outcomes based on the entirety of a patient's clinical care. There are generally two progressive stages to a claims/clinical analytics. The first stage is a shared measurement framework in which performance is measured by one entity that all parties agree is the "trusted source." The second stage is to pair the combined claims and clinical data with cost information to draw conclusions about care outcomes and treatment protocol value, given the cost of providing these services.

Blue Cross and Blue Shield of Oklahoma's partnership with MyHealth to analyze and report on pay-for-performance measures for its network of providers is an example of the first stage in value-based assessment of care, establishing a trusted measurement framework. We note that, as of today, no cost data has been integrated into an HIE in Oklahoma; this exercise is more typically conducted in a framework referred to as an "all-payer claims database" or "value-based analytics database."

Governance Model

Governance refers to the process for developing the guidelines and rules for oversight and management of an organization or function. Throughout Milliman's interviews, participants stated that they had considered governance, a stance on information privacy, and information safeguards as much as an HIE's technical capabilities before agreeing to join or participate in a specific HIE. Ultimately, they viewed their decisions as an exercise in trust in the HIE and its leadership.

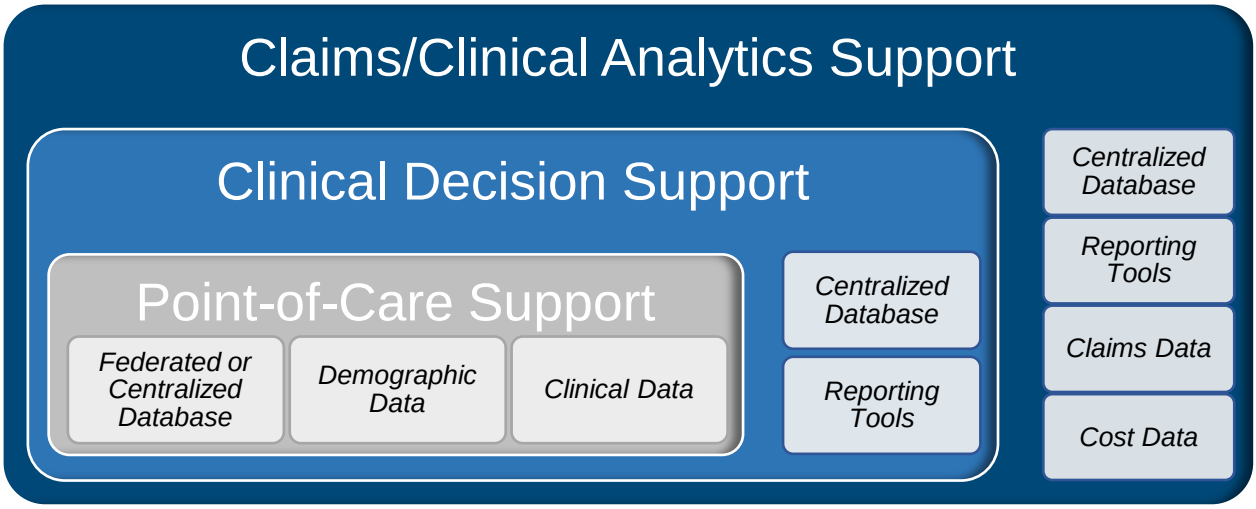
Experience gained from other HIE initiatives nationally suggests that agreeing upon or legislating what information is shared, and when and to whom it is accessible are key determinants for the utility of an exchange or network of exchanges. Important decisions that need to be made about the exchange's governance structure should include how the exchange is funded, who operates it, who owns it, and whether participation will be optional or required for healthcare organizations in the state.

Whether participation is optional or mandatory is an especially important consideration, as HIEs are most effective when they include a patient's entire healthcare footprint. The state will need to weigh the potential reporting, information security, and trust burden for organizations and individuals against the utility gained by having connections among all providers throughout the state for the sake of improving the health of the population.

Database Design and Data Model

The initial system architecture of a health information network for Oklahoma will have long lasting impacts. While technology can be upgraded and redeployed, doing so is a costly and time-intensive endeavor, made more complex as the number of stakeholders increases. The intended system use may dictate the database design, but system design options do exist. Additional layers of data and system capabilities can be developed over time, as shown in *"Table 3: Use Case Technical Requirements*."

Figure 1: Use Case Technical Requirements



An overview of technical requirements for each of the use cases is provided below.

2. Point-of- Care Support

For point-of-care support, either a centralized database or federated database architecture, may be used to transmit data. Successful HIEs exist under both centralized and federated database structures, both within the state and across the country. Consideration must be paid to any other intended uses of the system. Federated databases cannot effectively aggregate and report information, so they are primarily used to support point-of-care initiatives.

Both existing HIEs identify shared patient records by using basic demographic information to construct an MPI. Once a clinical record match has been established, the network allows access to relevant clinical data about a patient. Typical HIE data elements under this model include demographics, encounters, problem lists, medications, images, lab results, and diagnoses.

Clinical Decision Support

The principal distinction between HIEs used for clinical decision support and point-of-care reporting is the requirement of a centralized database and the need to have a reporting interface and analytic logic built. Clinical decision support uses the same types of information found in a point-of-care application. Clinical decision support adds reporting capabilities that look at the contents of the database in various ways to aid in the treatment of patients.

The capabilities of a centralized database are more robust than in a federated model, as reporting on any type of information stored in the database is possible. One trade-off can be system complexity and increased support costs.

Claims/Analytics Support

When using a health information network for claims analytics support, a centralized database must house clinical and claims data, which is then used to match patients via an MPI. Clinical information is then aggregated and quality measures are presented to the user through reporting tools. If the system is being utilized to derive value-based reports, cost data is attached to the quality measurements.

Careful consideration of the processes Oklahoma's statewide health information network should support at the beginning of formulating the HIE strategy has the potential to save substantial time and money. It can be challenging to decide on system capabilities, define what data elements will be collected, and select the format for data transfers to and from the HIE. However, it is Milliman's observation that making these determinations before proceeding with work to build the system can decrease the overall cost of the HIE by eliminating rework due to reconsideration of the options.

Statewide Health Information Network Options

Oklahoma has several potential options that could result in achieving the goal of a statewide interoperable health information network. Those options are to develop and connect existing exchanges, choose an existing HIE, or construct a state-sponsored HIE. Each has potential advantages and considerations, as summarized in "*Table 4: Health Information Network Options*" below.

Figure 2: Health Information Network Options

Option 1: Network of Exchanges	Option 2: Existing HIE	Option 3: State Sponsored HIE
• Least robust statewide capability • Moderate response to market needs; maximum stakeholder input • Moderate time to market	• Adoption of existing capability • Responsive to market needs; moderate stakeholder input • Shortest time to market	• Ability to customize statewide capability • Slower response to market needs • Longest time to market

3. Option 1: "Network of Exchanges"

Oklahoma's free market is currently moving toward a federated network of exchanges through eHealth Exchange. Such an arrangement would support the sharing of core clinical and demographic data for point-of-care use. Because participation is voluntary, this approach has the advantage of not unduly disrupting business processes within the state, and integration can be done gradually as it makes sense for HIEs to join. This solution would likely require a moderate timeframe to implement. Coordinated Care has passed eHealth Exchange's evaluation process and has established connections to other entities. MyHealth is in the process of undergoing evaluation by eHealth Exchange. This progress represents a potential existing path to establishing a network of exchanges throughout the state.

As connections to the network of exchanges are federated, data passed through eHealth Exchange cannot easily be used for analytics, population management, or value-based purchasing decisions. The voluntary nature of participation means that connections will undoubtedly be established on uncertain timeframes.

Current members of an HIE would still have the benefit of the features offered by their HIE, but data passed into the HIE system from eHealth Exchange would be limited in its usability for analytics as it would only represent patients that have been previously accessed by an HIE user and thus could be out of date. For healthcare organizations that value analytics and reporting, this option may be less desirable as it does not meaningfully expand the capability to manage patient populations. Thought must also be given to the fact that rural and small independent providers may require a subsidy to afford the costs of HIE membership.

An additional consideration is that eHealth Exchange would represent a critical node in Oklahoma's healthcare information network and, as such, could be a potential failure point that could disconnect the state should eHealth Exchange lose funding, suffer technical challenges, or shift strategic direction. Re-establishing existing connections among organizations would be relatively simple, as the technical infrastructure would persist, but further network growth would be inhibited. While this risk is similar for any "single solution" that spans the state, every additional node adds incrementally more complexity and risk.

Option 2: Existing HIE

Oklahoma could select one of the two HIEs already existing in the state as the statewide information network. This would remedy a number of the drawbacks of Option 1. The overall setup time for connecting the state should be reduced, as participants would need to map their data to a single entity and that entity would not need to do any further transformation or data exchange with a third party. If the selected HIE meets Oklahoma's desired use case(s), no further development would be required and the state would

benefit from a pre-built, tested, and functional set of system features. Such a solution has the advantage of requiring no time to develop the cross-state information exchange capability, as each participating location would need to establish a connection to the designated HIE.

Attention must be paid to the fact that rural and small independent providers may require a subsidy to afford the costs of even a single HIE. Furthermore, this approach could disrupt Oklahoma's business environment by creating a potential "winner" through direct state action and decreased competition. This may slow competitive innovation within the state related to HIEs and force stakeholders onto a single model of governance, which could reduce trust and thus participation. The drawbacks of this must be weighed against the benefits of a uniform and expeditious solution for the state.

Option 3: State-Sponsored HIE

Oklahoma could choose to invest in a state-sponsored HIE. Oklahoma has already declared the intent to develop a shared-services state agency HIE under OSDH, which could be expanded for this purpose, or Oklahoma could construct another HIE. In either case, state sponsorship would let the state provide a uniform experience and functionality suite that exactly matches the desired system capabilities. As a state-sponsored solution, discretion around the funding and fee structure could enable rural and small provider groups to afford potential fees for connections.

The complexity and cost of creating an HIE should not be underestimated. Development of such a software solution is certain to be a long, challenging process that could delay information access across the state. Furthermore, current HIE participants may let their membership in private HIEs expire in order to prioritize the state's efforts.

Summary

Oklahoma has a moderately mature private sector HIT infrastructure already developed and operating within the state. Stakeholders are aware of the benefits of sharing healthcare data and are interested in participating in the process of establishing a statewide network.

Market forces have led to the establishment of two HIEs, with work underway on a potential third state-sponsored model. Similar goals drive each of the health information sharing efforts in the state; however, the system construct, contents, and utility vary, as each organization has a different view of how best to achieve its goals. Maturing EHR system capabilities will support basic data exchange in the future, but investment in healthcare information exchanges and cross-network data sharing initiatives will be necessary for Oklahoma to improve the health of its citizens at the desired rate.

Ultimately, statewide healthcare data exchange is a requirement for achieving the vision laid out in the Healthy Oklahoma 2020 plan. Current health information technology is mature enough to provide the technical foundation necessary for data exchange. Stakeholders are ready to be a part of the process. Oklahoma has created a framework to make decisions about how best to achieve its goals.

Careful consideration of the many options is needed for Oklahoma to make cost- and capability-conscious decisions on how to proceed. These decisions are difficult, yet critical to support improved health for Oklahomans today and into the future.

Appendix H: VBA Draft Findings

Oklahoma Value-Based Analytics Roadmap

Discussion Draft

Prepared for

Oklahoma State Department of Health

Center for Health Innovation and Effectiveness

October 19, 2015

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Introduction and Background

The Oklahoma Health Improvement Plan (OHIP) Coalition, chaired by Commissioner of Health Terry Cline, who also serves as Oklahoma's Secretary of Health and Human Services (HHS), is a public-private partnership of stakeholders that oversees the state's progress toward improving Oklahoma's strategic health outcomes. Stakeholders include representation from healthcare providers, businesses, hospitals, long-term care, behavioral health, public health, private and public payers, and consumers. The purpose of the OHIP Coalition is to develop a comprehensive health improvement plan every five years.

The OHIP was first published in 2010 for the purpose of improving the physical, social, and mental well-being of Oklahomans. In 2015, the Oklahoma State Department of Health (OSDH) published an update to the OHIP to describe statewide health improvement goals for the next five years. This update is referred to as "Healthy Oklahoma 2020," and its purpose is to provide a strategic health improvement plan that addressed the crucial health needs in Oklahoma. As part of this process, the OHIP Coalition established goals in four core areas of work: 1) Health Efficiency and Effectiveness, 2) Health Information Technology (IT), 3) Health Workforce, and 4) Health Finance. A workgroup comprised of Oklahoma stakeholders has been established for each of the core areas.

To support the Health IT workgroup, OSDH engaged Milliman to develop a roadmap for establishing a Value-Based Analytics (VBA) tool in Oklahoma while highlighting key considerations and potential solutions based on the previous experiences of states with similar solutions. As part of this work, Milliman conducted research into VBA and other multi-payer claims database efforts across the country, evaluated existing Oklahoma system initiatives, and conducted interviews with subject matter experts.

This report presents findings identified during the interviews, findings from the review of VBA-like initiatives in other states, and a roadmap for Oklahoma's development of a VBA.

Caveats and Limitations

This report was prepared by Milliman, Inc. (Milliman) on behalf of the Oklahoma State Department of Health (OSDH) in accordance with the terms and conditions of the contract between OSDH and Milliman dated April 1, 2015.

This report has been prepared solely for the internal use of, and is only to be relied upon by, the Oklahoma State Department of Health. Although Milliman understands that this report may be distributed to third parties, Milliman does not intend to benefit, or create a legal duty to, any third-party recipient of its work. If this report is distributed to third parties it should be distributed only in its entirety.

In developing this report, we relied on data and other information provided by OSDH, from stakeholders interviewed, and from publicly available sources. We did not audit the source of any data or information Milliman received, nor did we perform independent verification. If the underlying data or other information is inaccurate or incomplete, the results of our assessment may likewise be inaccurate or incomplete.

Methodology

In developing this report, Milliman worked with representatives of the Oklahoma State Innovation Model (OKLAHOMA SIM) team to focus the research efforts on three primary sources of information expected to be informative for Oklahoma's potential development of a VBA model: interviews with external subject matter experts, a literature review, and Milliman's collective knowledge of industry best practices.

Interviews with Subject Experts

Milliman conducted interviews with external subject matter experts who provided perspectives on national VBA and VBA-like initiatives, including several individuals who have played instrumental roles in shaping the All-Payer Claims Database (APCD) Council, a national learning collaborative for states and stakeholders that are developing or interested in developing state claims databases. A list of individuals participating in the interviews is shown in the table in

Table 4: Interview Participants

Name	Role	Organization
Denise Love	Executive Director *and* Co-Chair	National Association of Health Data Organizations *and* APCD Council
Michael Lundberg	Executive Director	Virginia Health Information
Patrick Miller	Founder and Principal *and* Founder and Former Chair	Pero Consulting Group *and* APCD Council
Josephine (Jo) Porter	Interim Director *and* Co-Chair	Institute for Health Policy and Practice at the University of New Hampshire *and* APCD Council

The primary objective of these interviews was to collect information on existing national multi-payer claims database capabilities, their operational models, and possible strategies for developing a VBA in Oklahoma.

Literature Review

Milliman conducted research on publicly available information and evaluations of state, regional, and national efforts to establish capabilities similar to the OKLAHOMA SIM VBA roadmap goals. In our research, we consulted governmental websites and other authoritative grey literature from resources such as the APCD Council, the APCD Showcase, and the Centers for Medicare and Medicaid Services (CMS).

Industry Knowledge

In addition to the literature review, we consulted with Milliman consultants who have experience with APCD and VBA-like initiatives nationally to gain their perspectives on key criteria that should be considered in developing and operating these databases. Milliman has incorporated these best-practice learnings into this report.

Value-Based Analytics Key Concepts

To facilitate a uniform understanding of the concepts and terms used throughout this report, common definitions for selected key terms are presented below.

- **All-Payer Claims Database:** An APCD is a type of data warehouse that includes information from multiple payer organizations, usually for the purpose of analyzing aspects of the environment surrounding those claims. APCDs generally include data derived from member eligibility information, medical claims, and pharmacy claims, and may be expanded to include vision claims, provider information, and dental claims. Data typically come from both private and public payers.
- **Health Information Exchange:** A Health Information Exchange (HIE) is broadly defined as a system designed to pass health information from one party to another. Functionality such as portals, reporting, and analytics may be added to increase the utility of the system.

- **Participation Model:** The participation model of a system defines whether data-contributing organizations provide data on a voluntary or mandatory basis. Multi-payer claims databases have been established under both models.

- **Pharmacy Benefits Manager:** A pharmacy benefits manager (PBM) is a third-party administrator typically responsible for managing a prescription drug benefit, including processing prescription drug claims.

- **Population Health Management:** Population health management refers to the analysis of the health outcomes of a group of individuals, rather than focusing on the health outcome of a single individual. Population health management is an approach to health that seeks to improve the health outcomes of the entire population. Use of data for analytics and measurement is an essential component of population health management.

- **Third-Party Administrator:** A third-party administrator (TPA) is an organization that processes claims or performs other administrative functions on behalf of an organization that is assuming the underlying insurance risk. Self-insured companies frequently utilize TPAs.

- **Value-Based Analytics**: Value-Based Analytics tools (VBA) and similar systems are tools that aggregate information from multiple sources that can be used to measure health outcomes, quality, and cost. As envisioned in Oklahoma, a VBA tool will use claims and clinical data to develop analytics and metrics to measure outcomes and assist in value-based purchasing. Oklahoma's VBA will also incorporate supporting information from peripheral sources, including public health data and workforce information, to further enhance the state's desired analytics, health outcome improvement, and value-based purchasing initiatives.

These definitions and concepts are used throughout the remainder of this report.

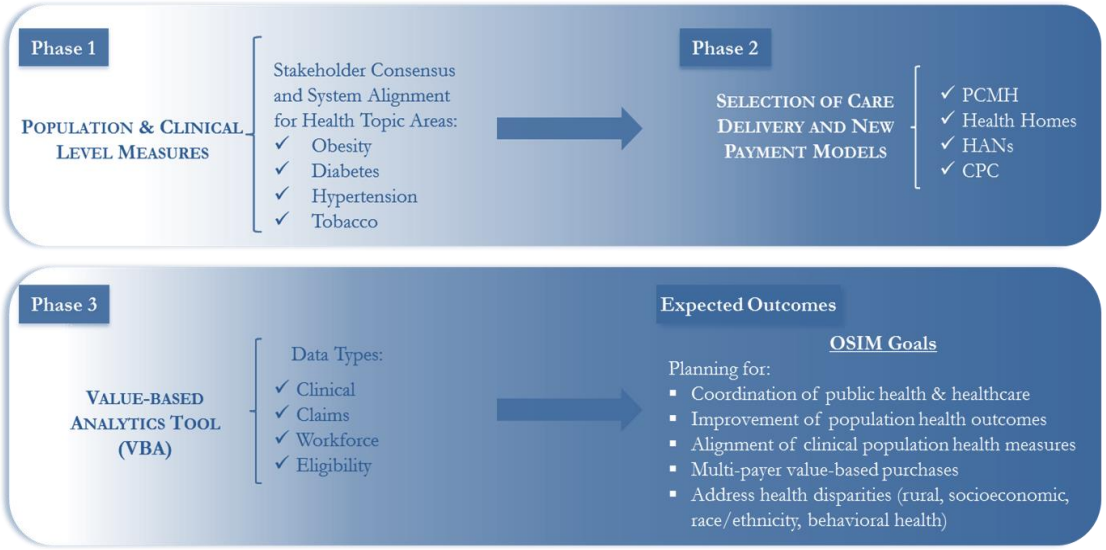
Oklahoma's Value-Based Analytics Goals

Oklahoma has taken a leadership role through OHIP and "Healthy Oklahoma 2020" in developing strategies to improve and measure the health of the population. The OHIP Coalition also submitted a proposal for a State Innovation Model (SIM) grant on behalf of the state of Oklahoma to provide a state-based solution to Oklahoma's healthcare challenges. Oklahoma was successful and received the grant in December 2014. The grant is administered by the OSDH, which in turn created the OKLAHOMA SIM leadership team (part of the OSDH's Center for Health Innovation and Effectiveness) to manage and direct the work detailed in the SIM grant. The OKLAHOMA SIM's goals align with those of the Institute for Healthcare Improvement (IHI) Triple Aim Initiative: to improve health, provide better care, and reduce health expenditures for Oklahomans.

Oklahoma's SIM grant application describes a phased and integrated design that will accomplish health system transformation in three phases, as shown in E*xhibit 2: Oklahoma State Innovation Model* below.

Phase 3, development of the VBA tool, is intended to incorporate numerous types of health information, including data which are typically stored in numerous independent sources (e.g., hospital and physician electronic health records (EHR), HIEs, APCDs, public health records, and health plan data), but which is siloed and not readily able to be used to develop a health system transformation plan that targets value-based insurance design.

Figure 3: Oklahoma State Innovation Model



Source: Oklahoma State Innovation Model Application

When fully developed, the VBA will create the opportunity for Oklahoma to conduct data analysis to measure population health outcomes and social determinants of health (e.g., education, employment, income, and access to services), and to provide analytics supporting culturally and linguistically appropriate care. The VBA will be used for monitoring and reporting clinical, population health, and quality measures across providers, payers, employers, and patients. A sample of the clinical and claims information that is envisioned to be incorporated in the VBA is shown in *Exhibit 3: Sample VBA Data Elements.*

Table 5: Sample Value-Based Aanalytics Data Elements

Clinical Information	Claims Information
Patient Information	Health Plan Payments
Diagnoses	Member Payments
Test Results	Diagnosis
Medications	Procedures
Problem History	Drug Codes
Allergies	Prescribing Physician
Procedures	Type of Insurance Product

Examples of questions that may be able to be answered using the VBA include the following:

- While claims data can be used to determine what portion of the population receives appropriate clinical testing, (e.g., glucose level and hemoglobin A1c testing for diabetics), it cannot be used to determine what portion of the population's test results are within the "normal" or expected range for a well-controlled diabetic. The VBA will contain both the claims data and the clinical information on the population, thus it could help answer this question. The results could then be used to develop state-wide programs to improve the population's health outcomes. Health plans could also use the information to develop value-based purchasing strategies that hold providers accountable for results.

- By incorporating public health data, the VBA could help identify the impact a person's education or income may have on his or her likelihood to be compliant with treatment protocols. The results of that analysis could be used to help develop strategies to address the social determinants of change and to improve population health outcomes. As an example, for a disease like hypertension, where medication adherence is typically suboptimal and can be difficult to track, combining real-time clinical info (EHR) with potential point-of-sale pharmacy data (claims) could result in more real-time monitoring of these patients to ensure they adhere to the prescribed treatment plan.

- The VBA could facilitate improved capability to compare provider performance by enabling use of risk-adjustments for factors such as patient type, condition, severity, complications due to related conditions, and local population attributes.

- As new care delivery and payment models are implemented, a VBA can provide tools for better evaluation of which interventions and innovations are most efficacious at improving quality outcomes and reducing the overall cost of care.

As demonstrated through the examples above, the effort to combine clinical, claims, and other data sources has the potential to improve the analysis of clinical outcomes and effectiveness.

A. Active Oklahoma Data Sharing Initiatives

Like many states, Oklahoma has a number of active data sharing efforts underway. These efforts are in varying stages of development and were initially created for different intended uses. Oklahoma has already made substantial progress in healthcare data exchange. For example, data are exchanged though HIEs and EHRs. HIEs are primarily used to share clinical data from EHRs to ensure providers have a complete clinical record when caring for patients.

Competition has spurred innovation and technological development within the state, and two competing HIEs have emerged. Oklahoma's two HIEs began as regional initiatives: Coordinated Care Oklahoma (Coordinated Care) in Norman and Oklahoma City, and MyHealth Access Network (MyHealth) in Tulsa. Each organization is currently in the process of expanding its reach across the state. OSDH is also working on a shared-service state agency HIE. Short descriptions of these options are provided below.

Coordinated Care Oklahoma

Coordinated Care has been in operation in the Norman and Oklahoma City areas since 2014. The organization was founded by local hospitals and providers with a goal of providing physicians secure access to health information for their patients for treatment purposes.

When a patient sees a new provider, improvements in care can be achieved if a complete clinical record is available to the provider as he or she delivers care. Coordinated Care focuses on providing support for a patient's transitions between care settings by delivering a complete clinical record, including advance

directives (if available) at the point of care. Coordinated Care has also developed a data model that can accept claims data.

MyHealth Access Network

MyHealth was started in 2009 with the goal of improving health, improving healthcare, and reducing costs by creating a complete view of all of the care Oklahoma patients receive. Based in Tulsa, the MyHealth HIE collects patient information to assist in treatment decisions during the patient visit and to enable population management programs through analytics and reporting tools.

Blue Cross and Blue Shield of Oklahoma has signed a participation agreement with MyHealth to send regular extracts of claims data to the HIE to measure pay-for-performance outcomes in its provider network. MyHealth has also received claims data from Oklahoma's state Medicaid agency, SoonerCare.

Oklahoma State Department of Health

Oklahoma's state agencies handling health information have historically experienced challenges in sharing data across departments. To address this challenge, the Oklahoma Health and Human Services (OHHS) cabinet created the Deliverable Interoperable Components Utilizing Shared Services (DISCUSS) committee designed to collaboratively share resources among the OHHS agencies for the development and implementation of shared information technology products, services, and technology frameworks. Membership of DISCUSS includes the Department of Health, Department of Human Services, Department of Mental Health and Substance Abuse Services, Department of Rehabilitation Services, and the Health Care Authority.

In 2015, DISCUSS members agreed to create a shared-services state agency HIE that would facilitate the sharing of the state's data across agencies and would link the disparate systems. State health data has a number of factors that influence how and when it can be shared. For example, birth and death information and sensitive patient registries cannot be shared with a public information exchange. Other data, however, would most certainly benefit from clinical integration. One example of such data is clinical data services provided by county health departments and labs.

A system for sharing data among agencies is anticipated to create benefits for private sector entities in Oklahoma, as well. For example, hospitals are required by law to report patient discharges to several agencies. Integration could mean that only one data feed would need to be sent to the state.

Summary

Careful consideration as to whether the identified vision and use cases for the VBA could be met by either of the existing HIEs, or possibly another state database, would be required before selecting one as a satisfactory solution for the state. Milliman did not identify any existing examples of privately led multi-payer claims databases competing within a state.

Interested readers can gain a deeper understanding of Oklahoma's current data sharing landscape by referencing Milliman's July 2015 report to OKLAHOMA SIM, "Health Information Exchange: Statewide Environmental Scan Findings."

Value-Based Analytics Framework

This report is intended to serve as a reference guide for the State of Oklahoma as stakeholders develop a VBA. The VBA will support the vision to improve health, provide better care, and reduce health expenditures for Oklahomans, as outlined in the "Healthy Oklahoma 2020" plan.

As described previously, VBAs and similar systems are tools that aggregate claims and claims-related information for a variety of purposes. Many states refer to their systems as APCDs because they include exclusively, or nearly exclusively, claims and administrative data. While Oklahoma may wish to consider including information sources beyond claims data in its system, for ease of readability, we will collectively refer to these efforts as multi-payer claims databases throughout the remainder of this report.

By incorporating multiple public and private payers' claims and administrative data into a single repository, a state can develop a database from which to measure health outcomes, quality, and cost for large portions of its population. With sufficient participation, Oklahoma could similarly develop an information source to support payment reform initiatives and to provide transparency on the cost, utilization, and value of health services across the state. Examples of how other states have utilized multi-payer claims database initiatives include:

- Conducting cost analysis and transparency efforts to support payment reform
- Identifying and analyzing geographic disparities in care
- Supporting performance improvement initiatives to address operational or clinical quality measures
- Analyzing health outcomes to evaluate the effectiveness of primary care demonstration projects, such as Patient Centered Medical Home initiatives

While claims data analysis is not a new discipline and is generally well understood by health plans and similar organizations, efforts to develop comprehensive repositories containing information contributed by multiple entities have only meaningfully begun within the past decade. While there is measurable progress occurring in many states, some efforts have faced considerable challenges in defining system usage, demonstrating value, ensuring high data quality, and addressing data privacy concerns.

A single proven blueprint for multi-payer claims databases has not yet emerged. The range of goals, health information technology maturity, and differences in political environments across states have led to the creation of many systems with similar components, but with distinctly different models. Many have taken significantly longer to implement than originally thought, and delivered less reporting capability than planned. Careful planning, transparency, and active, frequent stakeholder involvement are strategies that can help shape a more positive outcome and attainment of the database's goals.

The process of implementing a multi-payer claims database can be difficult because it requires many interrelated decisions to be made by a large number of stakeholders, and because it relies upon the synchronized timing of many dependent work efforts. In our research, we found that there are typically three distinct phases of implementation:

- **Phase I:** Establish a governance model
- **Phase II:** Implement the technology platform
- **Phase III:** Foster system adoption and improvement

Each phase is comprised of distinct concepts, which can be broken into a series of interrelated decisions. This framework is illustrated in *Exhibit 4: Multi-Payer Claims Database Implementation Model.*

Figure 4: Multi-Payer Claims Database Implementation Model

Phase I Governance	**Phase II** Techonology	**Phase III** Adoption
• Vision	• Technology Selection	• System Training
• Supporting Legislation	• Data Loading	• Adoption
• Funding	• Report Design	• Continous Improvement
• Oversight Entity		• Expansion
• Data Management		

During the first phase, stakeholders define why the system is being created, consider whether any legislation is required to support or enable the system, and describe the funding structure and the data management model, including what data are required to be incorporated in the system. In the second phase, technology is selected and implemented, and data are tested for quality and loaded into the system. In addition, stakeholders are engaged to design the reports and outputs that users will receive, as well as the rules about how users can obtain reports and/or data. The final phase of implementation is comprised of training, expanding the system's user group, and establishing the process for improving both the content and capabilities of the multi-payer claims database on an ongoing basis.

The phase-based framework described above is a useful construct for grouping and prioritizing the important topics to address when creating a multi-payer claims database. For this reason, Milliman created a phase-based decision tree to guide Oklahoma's VBA development process. This decision tree is included in *Section VII: Oklahoma Value-Based Analytics Roadmap* and is accompanied by a discussion of how Oklahoma could approach each step.

The remainder of this report is organized into two sections. The first section discusses similar efforts across the nation to orient the reader. The second section is a roadmap that illustrates the important decisions and considerations that must be accounted for when implementing a VBA in Oklahoma. By this report's conclusion, the reader should understand the key concepts in scope and governance of existing systems in use across the nation, and should have a frame of reference that can guide the process of establishing a VBA in Oklahoma.

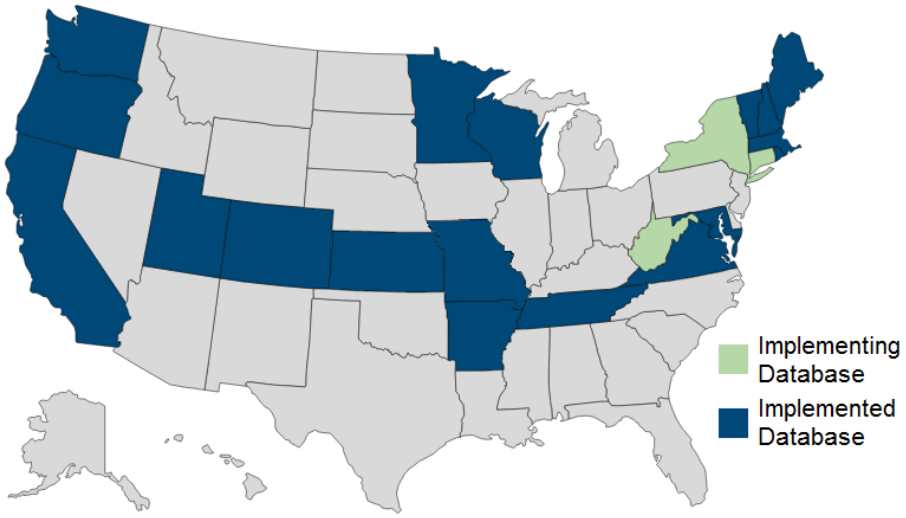
National Efforts

This section of the report includes discussion of national trends in multi-payer claims database models specifically related to their structure, use, and contents. It is organized to follow the concepts in Phase I of the Implementation Model shown in Figure 4 above.

As of the date of this report, 18 states have implemented a multi-payer claims database system, and three more are in the process of implementation. Three states (Maine, Oregon, and Washington) have both a public and separate, coalition-led system. According to information posted by the APCD Council, all but nine states have expressed "strong interest" in, have implemented, or are in the process of implementing a

multi-payer claims database. States that either have an existing multi-payer claims database or are in the process of implementation are shown in *Exhibit 5: National Multi-Payer Claims Database Efforts.*

Figure 5: National Multi-Payer Claims Database Efforts



Source: Milliman: Compiled from interviews and public sources, 2015

While each of the above states' multi-payer claims database is, or will be, a database containing claim-related information from multiple sources, there is a significant range across the initiatives in both the use of the systems, as well as the approach to system development. National efforts have resulted in a range of governance, funding, design, and user base structures. In the remainder of this section, we highlight some of the key similarities and differences among existing multi-payer claims databases.

B. Governance

As described in *Section V: Value-Based Analytics Framework*, the topic of governance includes identifying the vision for the system's use, legislation to support its creation and operation, and the ownership of the technical infrastructure and data assets, as well as the planned participation model. This section discusses the approach states with existing systems have taken to address each of these topics.

1. Vision for System Use

States have invested significant time and effort in defining the intended uses for multi-payer claims database systems. It is important to understand how existing systems are being used. *Exhibit 6: Multi-Payer Claims Database Use Summary* shows which of the states with implemented systems are using the database for a given activity, including those states (Maine, Oregon, and Washington) with both public and coalition-led systems. The number of systems being used for a particular function is identified in Figure 6 For example, 12 systems are used for payment reform efforts. It should be noted that the audience for each use outlined in the figure varies by state; some states choose to publish performance analysis publically, while others allow a more limited set of users to view the information.

This figure also describes the general relationship between system maturity and how the data are used, progressing from left to right. It should not be interpreted as a linear ranking of difficulty or as a required

progression among the identified uses (i.e., it is not necessary to use a system for payment reform prior to using it for policy analysis).

Figure 6: Multi-Payer Claims Database Use Summary

Quality Measurement	Performance Analysis	Payment Reform	Policy Analysis	Population Management	Academic Research
20 Systems	16 Systems	12 Systems	12 Systems	4 Systems	5 Systems

Degree of required system scope, maturity, and trust

To facilitate consistent understanding, the following bullets provide high-level descriptions of each type of system used:

- **Quality Measurement:** Quality measurement programs use system data to assess process-based measures of the quality of care provided to patients, such as clinical adherence to evidence-based standards for patient treatment. NCQA's Healthcare Effectiveness Data and Information Set (HEDIS) measures are commonly used for this kind of measurement.

- **Performance Analysis:** Performance analysis uses data contained in the system to compare providers or health systems using pre-defined metrics related to cost, utilization, or quality. Programs to assess statewide or regional trends across measure sets and comment on the condition of healthcare in a geographic area also are included in this category.

- **Payment Reform:** Payment reform refers to using the system to assess healthcare costs and payment trends for the purpose of analyzing and assessing cost containment initiatives or care delivery model changes to better utilize dollars spent on healthcare.

- **Policy Analysis:** In policy analysis, data from the system is used to explicitly inform and support public policy legislation and regulations.

- **Population Management:** Population management programs use the system to take action in patient care, potentially through case management capabilities, to improve the health outcomes of a group of individuals. Encounter tracking and management programs are also included in this category.

- **Academic Research:** Academic research refers to the explicit use of the system by an academic institution for formal analysis, typically through a partnership between the APCD and the research organization. Many states make system data available to researchers, but fewer have explicit, ongoing partnerships for this purpose.

Process-based quality measurement, performance measurement, and payment reform are the most easily attainable uses for a multi-payer claims database. By collecting information about procedures, diagnoses, and cost, users can evaluate whether treatment complies with evidence-based guidelines for care, and can analyze the cost of care across the state's healthcare landscape. Also prevalent is the use of a VBA-like system to evaluate and rank the performance of healthcare delivery systems within the state.

Twelve states explicitly make use of their multi-payer claims databases to provide policy analysis. For example, New Hampshire used commercial claims data to analyze the impact of its House Bill 790, which expanded the definition of dependent young adults to age 26, to understand the costs and coverage impacts

of the bill's passage. Significant system maturity and trust is typically required before using a system for this purpose. Five states make their data available for longitudinal health outcomes research, including formal partnerships with academic institutions in two states.

The number of states utilizing a system for population management may appear low to some readers. The seemingly low number may be due to the fact that many healthcare organizations have separately invested in healthcare information technology, such as data warehouses, or have connections to health information exchanges (HIEs) that provide population health management reporting capabilities based on clinical information.

Table 6 provides a state-specific view of the information summarized in Figure 6.

Table 6: Multi-Payer Claims Database Use

State	Quality Measures	Performance Analysis	Payment Reform	Policy Analysis	Population Management	Academic Research
Arkansas	Yes	No	Yes	No	No	Yes
California	Yes	Yes	No	No	No	No
Colorado	Yes	Yes	Yes	Yes	No	Yes
Kansas	Yes	Yes	No	No	No	No
Maine	Yes	Yes	No	No	No	Yes
Maine *	Yes	Yes	Yes	No	No	No
Maryland	Yes	Yes	Yes	Yes	No	No
Massachusetts	Yes	Yes	Yes	Yes	No	Yes
Minnesota	Yes	Yes	Yes	Yes	No	Yes
Missouri	Yes	Yes	No	No	No	No
New Hampshire	Yes	Yes	Yes	Yes	No	No
Oregon	Yes	No	Yes	Yes	No	No
Oregon *	Yes	Yes	Yes	Yes	Yes	No
Rhode Island	Yes	No	No	Yes	No	No
Tennessee	Yes	Yes	Yes	Yes	No	No
Utah	Yes	Yes	No	Yes	Yes	No
Vermont	Yes	Yes	Yes	Yes	Yes	No
Virginia	Yes	Yes	Yes	Yes	Yes	No
Washington *	Yes	Yes	No	No	No	No
Wisconsin	Yes	Yes	No	No	No	No

** Denotes voluntary initiative in states with both mandated and voluntary models.*

Multi-payer claims databases have been implemented for a wide variety of reasons. Identifying the intended use(s) at the outset of any development effort is a critically important first step as it guides all other aspects of the system's design.

2. Supporting Legislation

There are two primary methods for establishing a multi-payer claims database: initiatives are either started through a private coalition, or by state action. Each approach influences the system in different ways.

Legislative support for multi-payer claims databases varies by state. In some states, legislation simply specifies that a database must be created. Other states pass more proscriptive laws that describe the system's oversight, participation model, and funding structure, and identify which data are to be included in the database. Legislation that compels participation typically results in better participation in the initiative. Alternatively, legislation may also place limits on data sharing. The state may directly fund part or all of the cost of the system through general funds and federal grants available to states, or may direct the costs of ownership of the system to certain stakeholders through use-taxes or fees.

Coalition-led multi-payer claims database models may provide a higher degree of discretion on the part of participants to determine what data are contributed, how it is measured, under which circumstances data may be accessed, and with whom the data is shared. The cost burden is typically spread across coalition members. Some models also opt to supplement funding through data sales or by securing grant funds. Because of their voluntary nature, coalition-led databases may include limited data sets and fewer data sources than the state-led initiatives.

Table 7 is a summary table that lists each state with an active multi-payer claims database, the governance model, the participation model, and the types of data that can be contributed.

Table 7: National Governance and Participation

State	Governance			Data Source					
	Legislated	Oversight Model	Participation Model	Commercial Payers	TPA/ Self-Funded	Medicaid	Medicare	PBM	Uninsured
Arkansas	Yes	Public-Private	Voluntary	Yes	Yes	Yes	Yes	No	No
California	No	Public Non-Profit	Voluntary	Yes	Yes	Planned	Yes	No	No
Colorado	Yes	Public-Private	Mandatory	Yes	No	Yes	Yes	No	Planned
Kansas	Yes	State Led	Mandatory	Yes	No	Yes	No	No	No
Maine	Yes	State Led	Mandatory	Yes	Yes	Yes	Yes	Yes	Yes
Maine *	No	Private Non-Profit	Voluntary	Yes	Yes	Yes	Yes	Yes	No
Maryland	Yes	State Led	Mandatory	Yes	Yes	Yes	Yes	No	No
Massachusetts	Yes	State Led	Mandatory	Yes	Yes	Yes	Yes	Yes	No
Minnesota	Yes	State Led	Mandatory	Yes	Yes	Yes	Yes	Yes	No
Missouri	No	Private Non-Profit	Voluntary	Yes	Yes	No	Yes	Yes	No
New Hampshire	Yes	State Led	Mandatory	Yes	Yes	Yes	Yes	No	Planned
Oregon	Yes	State Led	Mandatory	Yes	Yes	Yes	Yes	Yes	No
Oregon *	No	Private Non-Profit	Voluntary	Yes	Yes	Yes	Yes	Yes	No
Rhode Island	Yes	State Led	Mandatory	Yes	No	Yes	Yes	Yes	No
Tennessee	Yes	State Led	Mandatory	Yes	Yes	Yes	Planned	Yes	No
Utah	Yes	State Led	Mandatory	Yes	Yes	Yes	No	No	No
Vermont	Yes	State Led	Mandatory	Yes	Yes	Yes	Yes	Yes	No
Virginia	Yes	Public-Private	Voluntary	Yes	Yes	Yes	Yes	No	No

Washington	Yes	State Led	Mandatory	Yes	Yes	Yes	No	No	No
Washington *	No	Private Non-Profit	Voluntary	Yes	Yes	Yes	No	No	No
Wisconsin	No	Private Non-Profit	Voluntary	Yes	Yes	Yes	Yes	No	No

** Denotes voluntary initiative in states with both mandated and voluntary models.*

While most existing systems were created via state legislation, six states (California, Maine, Missouri, Oregon, Washington, and Wisconsin) each have, or had, coalition-led initiatives. In these states, privately-led coalitions established data-sharing agreements and governance structures, and funded the development of technology to aggregate and analyze claims information from the participating organizations.

Maine and Washington passed legislation to expand the existing coalition efforts, leading to a mix of state and private governance. State involvement resulted in expanded payer participation, mandatory submission requirements, and diversified funding for the database. We note that a governance model that is structurally modified after the creation of the database may introduce complexity and operational challenges while each entity adjusts to the new governance model.

In order to ensure that the system includes sufficient claims data to be considered representative of the state, 13 initiatives are mandatory participation models, including four which are in geographic proximity: Colorado, Kansas, Tennessee, and Utah. States that wish to compel participants to submit data typically legislate this requirement.

Commercial health plans and TPAs are the most common participants in multi-payer claims databases, and are typically the first data sources integrated into the system. This occurs for two reasons. The first is that the majority of a state's insured citizens are typically covered through commercial insurance products, so they are a necessary data source for developing a comprehensive repository of the state's claims information. The second is that health plans are generally accustomed to reporting information externally, and thus have the sophistication necessary to develop and transmit the files for the multi-payer claims database.

After successfully integrating commercial health plan and TPA data, most states expand the database to include Medicaid data. The integration of Medicaid data is generally of equivalent, or greater (due to specific state requirements that deviate from commercial health standards), complexity when compared to the commercial health plan data sources.

Subsequent integration initiatives may include other data sources, such as Medicare fee-for-service (FFS), information from PBMs (if it is not contained in the health plan or TPA data set), and proxy data for uninsured claims. Information on uninsured patients can be particularly challenging to incorporate into a multi-payer claims database unless a consolidated source for information on the medical encounters of this population has been established (usually by a TPA or health plan on behalf of a health system). The ability to conduct analysis on the claims data for the uninsured is a goal of some states. Managing utilization, cost, and quality of care provided to this population could be of significant value, as uninsured care is not directly reimbursed. This is especially the case in states with high rates of uninsured. Maine has managed to develop a proxy-source of data for some uninsured claims, and has incorporated this information into its APCD.

These additional, non-commercial data sets are generally integrated after a system has been in use for some time because they may represent smaller portions of the state's population and/or be challenging to integrate. For example, the process to become certified as eligible to receive Medicare fee-for-service data from CMS can be difficult. Adding to the challenge, Medicare's data structure has caused integration challenges. Some states have concluded that the challenges presented by integrating these data sets make them better suited for later phases of implementation.

Funding

This section describes reported implementation costs and funding strategies for existing multi-payer claims database initiatives. One key observation from our research is that identifying funding sources early in the process of system implementation can expedite the development process; budget uncertainty can

complicate already difficult decisions regarding data integration and reporting functions. States have used varied approaches to funding the databases' startup and operational costs.

The costs cited in this report assume that the database's technical infrastructure is sourced from vendors with existing technology platforms. Few states elect to build their systems and, as such, it is difficult to accurately forecast costs for such an endeavor.

Determining the cost of a multi-payer claims database system is also dependent upon the number of participating payer organizations. Each source must be mapped into the system and tested in order to complete integration. Cost is further influenced by the extent and variety of data being integrated into the system. For example, adding vision, dental, or pharmacy data to the standard set of medical claims and eligibility information increases complexity, and thus, cost. Additional considerations that can affect cost include the following:

- Number of covered lives
- Variety of data formats
- Scope of reporting
- Frequency of data updates
- Number of planned users
- Whether there is a web portal for users
- Data request management process
- Staff time and effort to educate submitters and address data quality issues

According to the APCD Council, the annual budget states have allocated to multi-payer claims database operations can range from approximately $350,000 for small efforts to over $2,000,000 for more complex initiatives. This range represents systems that house data for between 1.3 million and 5.5 million lives. Annual budgets reported to the APCD Council include:

- Kansas: Approximately $1.3 million
- Maryland: Approximately $1 million
- Tennessee: Approximately $0.5 million

Funding for multi-payer claims databases typically comes from a variety of sources. A diversified revenue strategy minimizes the cost to a single stakeholder group. Diversified funding can also support ongoing operations should some sources become unavailable. Examples of funding structures include the following:

- Colorado funded startup costs through foundation grants, and plans to fund ongoing operations through the sale of data and reports
- Maine uses a combination of annual assessments on healthcare providers and payers based on market share, supplemented by data sales

- Several states have received rate review grants from CMS to fund costs, including Arkansas, Kansas, Maryland, Rhode Island, and Washington
- Utah and New Hampshire used a combination of general appropriation funds and matching funds from Medicaid to pay for implementation costs and to fund ongoing operations
- Vermont covers the costs of operating its database by assessing fees on payers and healthcare facilities
- Virginia splits funding across stakeholders by charging 40 percent to participating payers, and 40 percent to the healthcare and hospital association, with the state funding 20 percent through data sales
- Washington and Wisconsin's voluntary databases are primarily funded by coalition members

In order to reduce the cost burden, many states have structured the ownership of multi-payer claims database initiatives in a way that allows the utilization of funding from multiple state agencies, as well as state Medicaid programs. New Hampshire's APCD is run as a collaboration between the state's Department of Health and Human Services and its Insurance Department.

Some states are engaged in the sale of data from the database, where it is allowed by law. Maine and Virginia are examples of states that currently sell or have plans to sell data. Maine charges variable fees of up to $15,000 per year for access to certain data sets from its APCD, but most options cost between $1,500 and $6,000. While Virginia Health Information does not currently sell data from the Virginia APCD, the organization reports a data sales function generating over $1,000,000 of revenue annually from the sale of data-related products, including licensed data models and hospital discharge information. Subject experts we interviewed cautioned that relying on data sales as a primary funding mechanism could potentially compromise an initiative in the future if sales targets were missed.

The funding mechanisms used in each state are dependent on the state's political climate and their perspective on the purpose of the multi-player claims database. States that describe the system as a public utility are more likely to use general funds to operate it, whereas states with more limited distribution typically levy use taxes or fees on specific stakeholder groups.

Oversight Entity

Regardless of whether an initiative is state or coalition-led, multi-payer claims database initiatives generally have a two-tiered oversight model. Subject matter experts recommend that a board be convened to function as the initiative's strategic steering entity to address system usage, privacy, data collection policies, and expansion activities. Boards are most successful when comprised of representatives from as many distinct stakeholder groups as possible. Stakeholders generally include payers, employers, providers, the public, government agencies, and representatives from major state coalitions, such as hospital and physician associations and payer associations.

The oversight entity's second tier, the operations group, has a primary role of ensuring that processes and infrastructure are in place to collect, maintain, and report on the database's contents. The size and structure of this group will vary depending on the whether the entity has relationships with vendors to manage data processing activities, and depending on the type of reporting published by the oversight entity. Examples of existing oversight entities include:

- Independent Organization (Virginia Health Information)

- Purpose-Built State Agency (Maine Health Data Organization)
- State Department of Health (Minnesota)

Two representative examples of operations group staffing are found in Wisconsin and Maine. The Wisconsin Health Information Organization currently employs a staff of seven, including a chief executive officer (CEO), director of business development, program director, executive assistant, data analyst, business services coordinator, and a project manager. The Maine Health Data Organization employs a staff of six, with an executive director, administrative assistant, two health planners, and two programmer analysts.

The staffing needs of each state's operations group will vary based on the structure of the technology platform, reporting scope, and operations model.

Data Management Model

In this section, we discuss national approaches to data management. Typically, when the vision for the system is created, it will be accompanied by "use cases," which define system capabilities and how users will interact with the database. For example, a use case describing the public visiting a website to compare the average cost of a hip replacement in the state would inform later phases of the implementation when the system must be able to make information available to the public, manage a website, collect cost information related to specific procedures, and conduct the analysis to determine the average cost of the procedure. The combination of system vision and use cases serves as a guide for the overseeing entity to develop the rules governing the data collection process. These rules will typically define:

- Which entities must submit data (if not defined by the state)
- Submission thresholds for participating entities (e.g., by market share or covered lives)
- Content of submitted files (e.g., eligibility, medical claims, pharmacy claims)
- Structure and layout of submitted files
- Frequency of submission

To determine submission thresholds, states first identify how much data is needed to populate the system in order to generate credible analytics and reporting. States then identify how many payers need to submit data to hit the target based on the unique payer mix in the state. This process is different for voluntary models. In a voluntary system, payers elect to participate, and so significant time is spent developing payer interest. States with voluntary contribution models generally have fewer data sources, and thus information on fewer covered lives than those with mandatory contribution models. If a voluntary contribution model is in place, system users must be mindful of any limitations on the conclusions that may be drawn from reports with limited sample size or non-representative geographic distribution.

In general, the data elements included in each system vary based on the state's goals, availability of information, and the current environment. *Exhibit 9: Nationwide Data Element Inclusion* summarizes the data elements reported into existing systems.

Table 8: Nationwide Data Element Inclusion

State	Eligibility Data	Medical Claims	Dental Claims	Pharmacy Claims	Vision Claims	Provider Data	Clinical Data

Arkansas	Yes	Yes	No	Yes	No	Yes	No
California	Yes	Yes	Yes	Yes	No	Yes	No
Colorado	Yes	Yes	Yes	Yes	No	Yes	No
Kansas	Yes	Yes	Yes	Yes	No	No	No
Maine	Yes	Yes	Yes	Yes	No	No	Planned
Maine *	Yes	Yes	No	Yes	No	No	No
Maryland	Yes	Yes	Yes	Yes	No	Yes	No
Massachusetts	Yes	Yes	Yes	Yes	No	Yes	No
Minnesota	Yes	Yes	Yes	Yes	No	Planned	No
Missouri	Yes	Yes	No	Yes	No	No	No
New Hampshire	Yes	Yes	Planned	Yes	No	Yes	No
Oregon	Yes	Yes	No	Yes	No	No	No
Oregon *	Yes	Yes	No	Yes	No	No	No
Rhode Island	Yes	Yes	No	Yes	No	Yes	No
Tennessee	Yes	Yes	Yes	Yes	No	No	No
Utah	Yes	Yes	No	Yes	No	Yes	No
Vermont	Yes	Yes	Yes	Yes	No	Planned	No
Virginia	Yes	Yes	Planned	Yes	No	Yes	No
Washington	Yes	Yes	No	Yes	No	No	No
Washington *	Yes	Yes	Yes	Yes	Yes	No	No
Wisconsin	Yes	Yes	No	Yes	No	Yes	Planned

** Denotes voluntary initiative in states with both mandated and voluntary models.*

All of the states shown in Table 8 collect eligibility data, medical claims, and pharmacy claims, which represents the vast majority of information needed for common analytics. States have also included dental and vision claims, as well as information about rendering providers. Maine has received federal grant funds to combine clinical data, such as laboratory information and vital statistics, from the Maine HIE with claims data from Maine's APCD, but the state is an outlier in this regard, as few states have attempted to include clinical information in their multi-payer claims databases.

At this time, there is no existing common national standard that can be used for defining claims data formatting. Efforts to develop a national standard for claims data files have historically been met with resistance by payer groups, which in large part is due to the perceived impact on existing systems infrastructure. However, the APCD Council, in partnership with the Accredited Standards Committee X12, has published a Uniform Medical Claims Payer Reporting Standard that could be used for this purpose. Additionally, many states have published data collection rules. Adopting an existing data model used by all payers in a state as a common standard could ultimately reduce the submission burden for participating payers.

The best practice to develop data submission rules or standards is through discussion and working group meetings with all key stakeholders, including payers. By involving payers, the overseeing entity will be

able to balance obtaining the required data with formats that can be most readily supplied by the state's payers. Payers typically are accustomed to working with various data submission formats and can provide subject matter experts to advise on best practices.

Specific data types that are commonly provided to existing state databases include member identification information, demographic information, claim tracking information, insurance product identifiers, patient demographics, diagnosis and procedure codes, service dates, service and prescribing providers, national drug codes, and payments (both plan and member). Additional data elements, such as group name, Health Insurance Oversight System (HIOS) Plan ID, and payment arrangement type, may be included if they are needed for the intended use of the system.

Once the submitting organizations, data elements, and file formats have been determined, the overseeing entity defines how frequently data will be submitted to the database. Typically, data are submitted on a monthly, quarterly, or annual basis. Considerations used to determine submission frequency include data processing capacity and participating organization size. Very large health plans are generally required to submit data more frequently than those with lower volumes because the effort associated with processing such large amounts of data, including the ability to identify and correct data submission errors, is proportionately lower. A system with relatively small numbers of claims generated each month is more likely to request frequent, smaller data submissions.

Clear definition of the data management process is an important tactic for multi-payer claims database initiatives. This accomplishes two goals: engaging stakeholders, and limiting data submission delays by eliminating unexpected changes to file content and formatting.

B. Models of Interest

In the research process, Milliman identified two models that may be of particular interest in Oklahoma. In this section we discuss operations of the Wisconsin Health Information Organization (WHIO) and efforts by the Maine Health Data Organization to integrate claims and clinical data. Both organizations were early adopters of multi-payer claims databases and now conduct robust operations with mature processes and widespread adoption.

3. Wisconsin Health Information Organization

To improve healthcare in Wisconsin, the state and a group of payers, providers, and employers voluntarily created WHIO in 2006. WHIO is unique in that it is one of the few, fully voluntary state efforts that is overseen by a private entity and that also includes data on a large portion of the state's population. The organization's stated goals include reducing unwarranted variations in care; improving the quality of care through information exchange between providers, purchasers, and consumers; and supporting value-based initiatives across the state. Operations are overseen by a board comprised of payer organizations, the Wisconsin Medical Society, Wisconsin Department of Health Services, the Wisconsin Collaborative for Healthcare Quality, and an area business foundation on health. The WHIO Datamart includes data on 72 percent of the state's population, thereby creating the opportunity for analysis of a majority of the state's claims data.

WHIO uses its database to report on quality measures and analyze performance across the state by giving participants access to both pre-built reports and organization-specific data marts. Example uses for this information include quality and efficiency benchmarks, provider variation analysis, and network leakage analysis. In addition to data access for WHIO members, WHIO launched a consumer-oriented website in 2015 that publically ranks primary care clinics against both industry benchmarks and peers within the state. Clinics that offer pediatric care, family medicine, and internal medicine departments are ranked as above

average, average, or below average in providing recommended care for healthcare issues at the right time, and for making "good use" of healthcare dollars to help consumers select medical care.

WHIO receives medical and pharmacy claims information from commercial, Medicaid, and Medicare Advantage plans to support its reporting efforts. WHIO was certified as a qualified entity by CMS, and in 2015 will collect fee-for-service Medicare data. WHIO provides training to data mart subscribers in the form of webinars, classroom training, user workshops, and virtual office hours. In 2014, WHIO received funding support from the state to foster continued growth in operations and capabilities, and funded the remaining 48 percent of its budget through state contracts, subscription fees from members, and other sources.

4. Maine Health Data Organization

The Maine Health Data Organization (MHDO) was established in 1996 by the Maine legislature as an independent executive agency to collect, and responsibly make public, clinical and financial health information. MHDO policy is established by its 21-member board comprised of healthcare providers, payers, and consumers. Participation in the state-run initiative is mandatory, and the system is used for quality measurement, performance analysis, and academic research. MHDO first collected data for its APCD in 2003. The APCD currently includes information from commercial payers, TPAs, PBMs, dental benefits administrators, Maine Medicaid, Medicare fee-for-service, and a proxy for uninsured claims.

MHDO provides access to its data warehouse via an online portal for credentialed users. MHDO recently released payment and quality measures through a public website called CompareMaine. This website includes average payment information for approximately 300 procedures, and select quality measures for roughly 150 Maine healthcare facilities. MHDO grades healthcare facilities as low, good, better, or best for each of the published measures. Published measures include categories such as overall patient experience, whether the facility uses treatments proven to be effective, and whether methods that make care safer are used. Qualified entities may also purchase data from MHDO, which includes commercial, Medicare, and Medicaid claims from the APCD; inpatient and outpatient hospital service data; Maine hospital quality data for care transitions, infections, and nursing sensitive information; and financial information for hospitals. The sale of certain types of sensitive data is governed by Maine privacy laws, and requires the intended purchaser to sign a confidentiality agreement to protect participant and patient privacy.

MHDO is currently planning to combine claims and clinical data sets within its APCD. In 2013, a successful proof-of-concept to match de-identified commercial claims with clinical information from Maine's HIE led to a federal Cycle IV Rate Review grant, which requires MDHO to better define the clinical information they collect and to explore integration strategies. CMS Rate Review grants are federal grants available to states to review proposed rate increases using transparent cost data. MHDO receives claims feeds from commercial payers, as well as Medicaid and fee-for-service Medicare claims data. Prior to sending claims feeds to MHDO, payers encrypt patient identifying information, such as names and Social Security numbers, for privacy reasons, as required by Maine's APCD model. As a result of preliminary discussions to merge Maine's claims and clinical data, MHDO has altered its data submission requirements to allow identifiable data to be submitted.

As one of the first APCD efforts in the country, Maine is among the leaders of integrating clinical data into an existing multi-payer claims database. Maine's proof-of-concept efforts to pair claims and clinical data have been underway for two years, demonstrating that combining the data sets, while valuable, is a complex process. It further demonstrates that merging information from databases initially developed for different purposes is also challenging.

Alternative Systems

A state that does not wish to develop the infrastructure required by a multi-payer claims database could potentially utilize a manual analysis process. An example of this approach can be found in Massachusetts. Massachusetts used varying manual processes for analyzing and reporting on information submitted by payers from approximately 2006 through 2009. This process was time-consuming, with limited scope and reach. The state understood the value of the analysis that it was conducting and began looking for ways to scale the operation. In 2009, the Massachusetts APCD Charter stipulated the creation of a database that met all state agency needs to reduce the submission burden on payers and the administrative burden for the state.

Due to the complexity and volume of data involved in analyzing state-wide health information, states embarking on multi-payer initiatives typically bypass the manual early phases that Massachusetts conducted and opt to build analytics-driven reporting databases. No evidence of scalable, long-term alternatives to a reporting database have been established in other states.

The breadth of national experience in establishing multi-payer claims databases provides multiple resources and examples for the state of Oklahoma to reference in its pursuit of similar capabilities.

Oklahoma Value-Based Analytics Roadmap

Oklahoma has expressed interest in developing a VBA to support healthcare and payment reform initiatives within the state. The summarized national efforts described in *Section VI: National Efforts* provide useful context for understanding the forms such an initiative could take. The past experiences of states with an existing multi-payer claims database also serve as guidance that can be used to develop strategies to implement a VBA in Oklahoma.

Multi-payer claims databases frequently serve as a data source for other state or privately-run initiatives, making the initiatives important stakeholder constituencies for the multi-payer claims database program. Our research suggests that multi-payer claims database efforts are most successful when the intended users of the system are involved in the planning process. While value-based purchasing programs are generally operated independently of multi-payer claims databases, if Oklahoma intends to support value-based purchasing programs through the database, the needs of the program should be treated as requirements for any Oklahoma-based VBA.

In our interviews, subject matter experts observed that, by adopting or building-upon established processes and systems, the effort required to develop and deploy a VBA may be reduced if the existing components directly supported the intended use of the system. Oklahoma should carefully consider what existing health information technology infrastructure within the state may be leveraged to develop a VBA. Two examples of existing infrastructure include hospital discharge data submission rules and data specifications and the infrastructure created by Oklahoma's HIEs to support pairing claims and clinical data. *Subsection VII.A.2.a: System Creation* discusses these considerations in more detail.

As demonstrated in other state efforts, the decisions made while establishing a VBA can have far-reaching consequences for its ultimate usefulness and success. Decisions related to system governance, legislation, content, and user base can be both difficult and expensive to alter once the process of establishing the system has been begun. However, by approaching the process in a structured manner, Oklahoma will be able to ensure that the fundamental decisions were made with diligence.

Establishing a multi-payer claims database is best viewed as a program comprised of many related projects due to the complexity and interdependencies throughout all steps of the process. As such, experienced

program and project management oversight of the process is desirable. Recall the multi-payer claims database implementation model, which focuses on governance, technology, and adoption. It is replicated below in *Exhibit 10: Multi-Payer Claims Database Implementation Model.*

Figure 7: Multi-Payer Claims Database Implementation Model

Phase I Governance	Phase II Techonology	Phase III Adoption
• Vision	• Technology Selection	• System Training
• Supporting Legislation	• Report Design	• Adoption
• Funding	• Data Loading	• Continous Improvement
• Oversight Entity		• Expansion
• Data Management		

Milliman used this construct to create a decision tree-based roadmap for Oklahoma. We segmented each phase of the roadmap into critical decisions Oklahoma should consider in its implementation process. The decision tree is presented first in its entirety as *Exhibit 11: Value-Based Analytics Roadmap Decision Tree*, providing a detailed guide to the key decisions and processes that relate to implementing a VBA in Oklahoma. It is designed to be a quick-reference guide to the entire process of VBA implementation. Each of the three phases of the implementation model—governance, technology, and adoption—is represented by a separate section. Relevant subsections are revisited throughout the discussion of the implementation process. The remainder of this report discusses the considerations related to each component of the decision tree.

Figure 8: Value-Based Analytics Roadmap Decision Tree

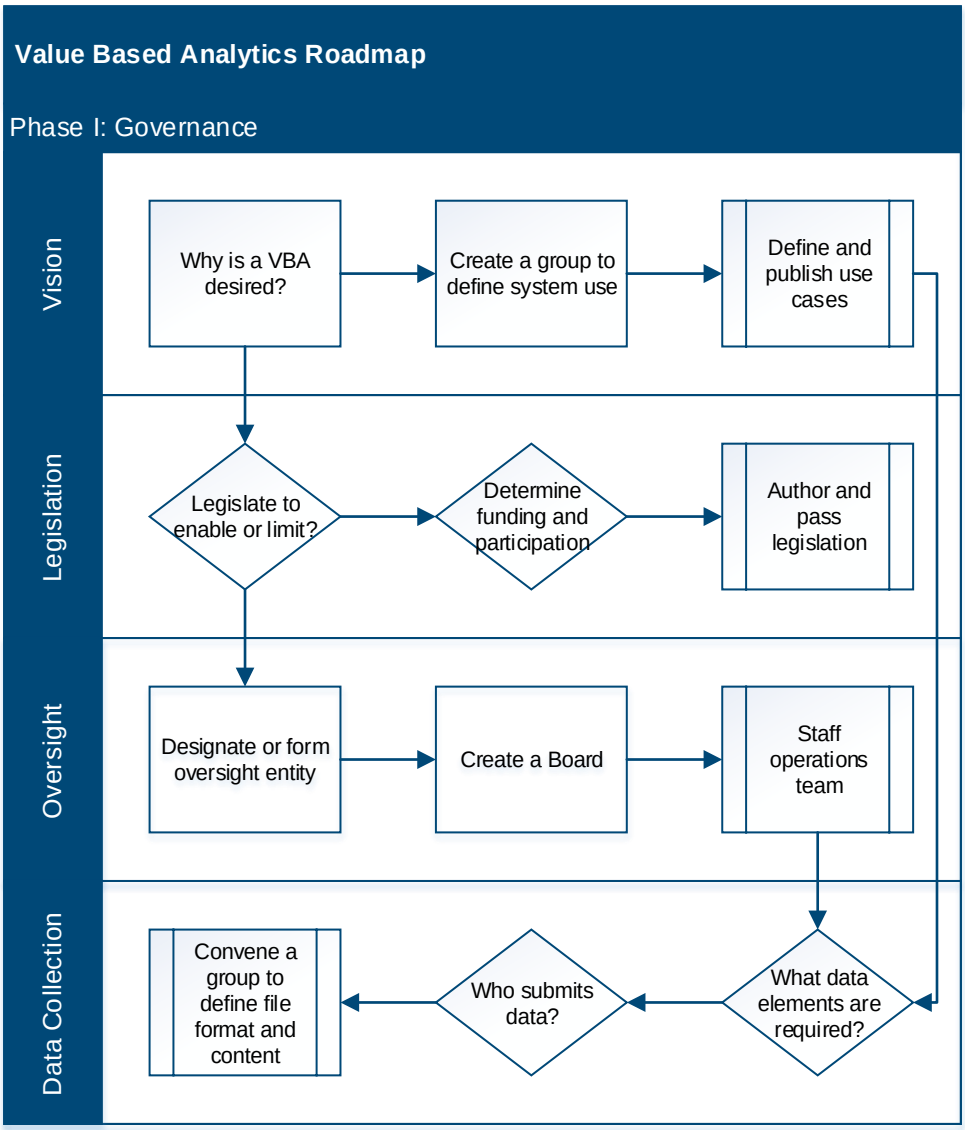
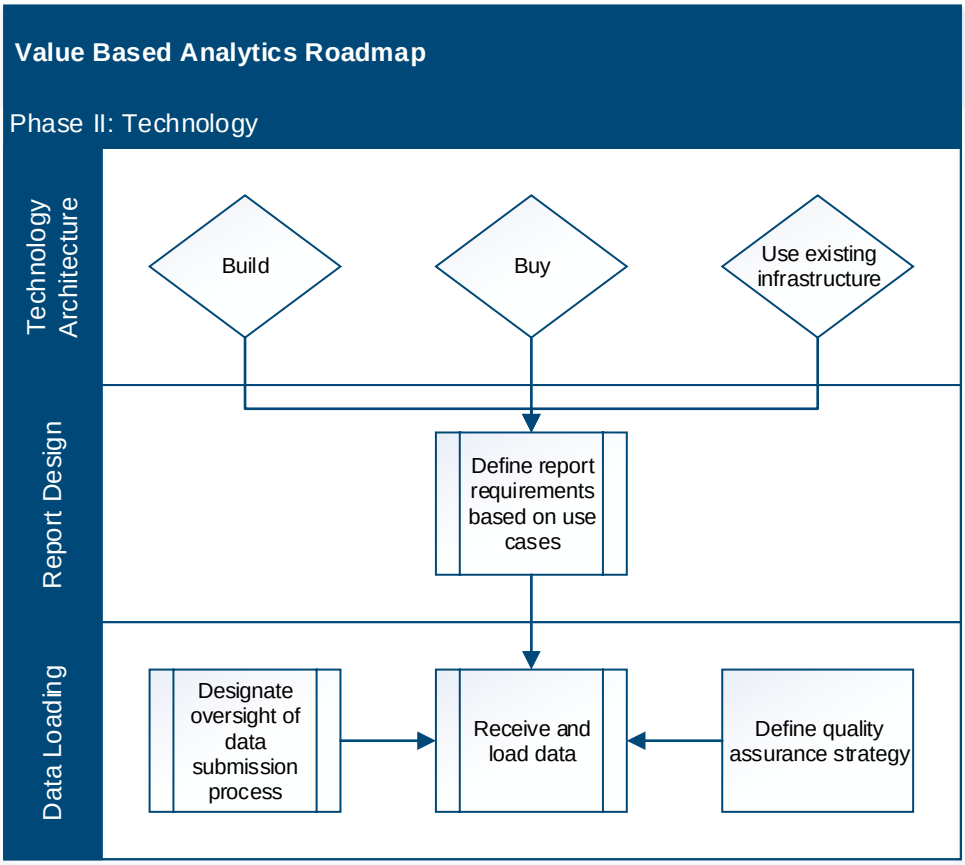
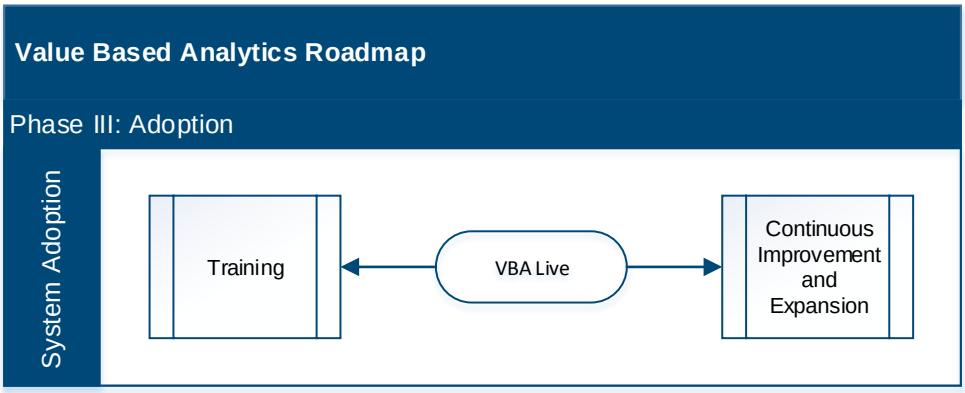


Figure 9: Value-Based Analytics Roadmap Decision Tree



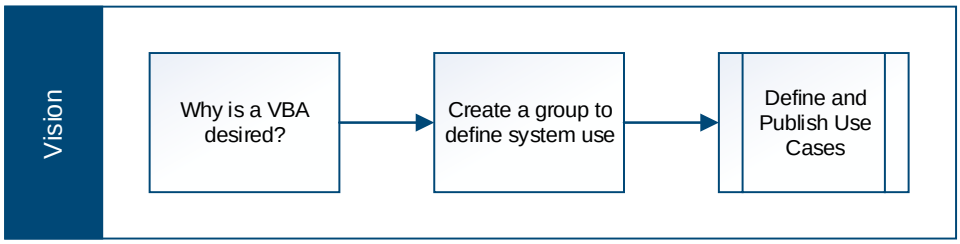


The following narrative expands upon the decision tree to further delineate considerations for Oklahoma as the state pursues a VBA capability. In each subsection, we refer to a component of the decision tree and have replicated part of the decision tree as a reference for the reader.

D. Phase I: Governance

This section discusses the process of establishing a governance framework for Oklahoma's VBA. Governance includes considerations related to vision, legislation, participation model, establishing an oversight entity, and identifying system participants.

5. Vision



The first action in implementing a VBA is to articulate a vision for why and how the system will be used, which is a two-step process. First, a unifying vision for the system must be defined. Second, the vision must be used to codify and publish use cases, or formal descriptions of how users will interact with and use the system. Regardless of whether the VBA is a state-owned system, these initial steps can benefit from the state serving as a catalyst for convening the group that will define them.

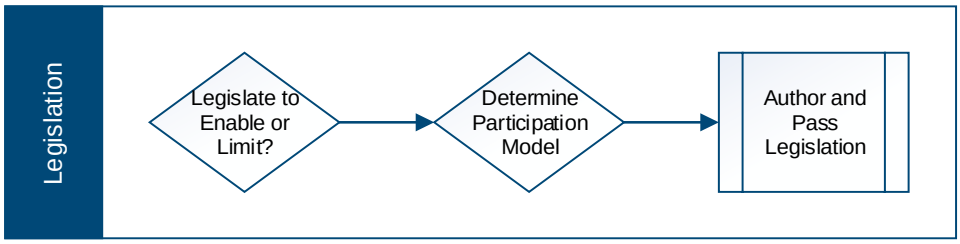
Experience from efforts in other states suggests that one of the best ways to develop the vision for a VBA is through a multidisciplinary stakeholder group. To ensure broad output, most states have sought the perspectives of stakeholders who will provide the system's data, those who will use the data, those who will produce the data, and those whom the data is about.

In Oklahoma, stakeholders may include commercial health plans, physical and behavioral healthcare providers, state agencies (such as OSDH), representatives of the public, and other special constituencies of interest, such as rural and small provider groups, or Native American nations and tribes. By including groups that may not be incorporated into the VBA immediately, but could be part of future efforts (such as telehealth practitioners), Oklahoma can ensure that a wide base of input is provided during the system's design.

Defining use cases is a critically important next step. Use cases describe the manner in which users interact with a system and, as a result, define some of the system's required capabilities. States frequently use the same group that defined the vision to develop use cases in order to ensure broad input. This effort may be most valuable if an expert in multi-payer claims database system development is included in the process of defining the use cases, both to ensure that they are fully documented and to provide expertise on the implications of system capabilities that the group expresses interest in.

The vision and use cases should identify who will access and interact with the system. Specific user access criteria will be defined during the technology implementation process or through legislation, but it is critical that the early stages of the process identify a preliminary user group to facilitate decision making through the VBA development process. Both the vision statement and the use cases will inform and guide all remaining steps in the process, from informing legislation, to reporting requirements, to selecting a system architecture.

Supporting Legislation



After the VBA vision and use cases have been defined, the implementation process reaches a critical juncture—the state must decide upon its level of direct involvement in the VBA process.

The state of Oklahoma may opt to "remain silent" on any or all aspects of the decision tree, effectively deferring the decision to the free market. The experience in other states suggests that the likely outcome of such passive decision making is extended timelines to define the governance and participation model of the VBA, low data quality, limited reach of reporting, and difficulty in securing the participation of even well-intentioned participants. States with multi-payer claims databases generally have reached and expressed concrete decisions for each of the aspects included in the decision tree. Lack of clarity around the state's position may also hamper private sector efforts.

Oklahoma may benefit from considering five key components that could be included in potential legislation: 1) system creation, 2) system oversight, 3) system funding, 4) participation model, and 5) personal identifiers. The implications of each of these components are described below in more detail.

<u>System Creation</u>

The majority of states with existing multi-payer claims databases have opted to create them through the legislative process, effectively choosing to view them as "public utilities." Passing legislation in Oklahoma could require the creation of a VBA on a defined timeline, and may allow funding through state-specific grants. Deciding to legislate that a VBA be created, however, would likely require additional state involvement in the process. States that have legislated the creation of multi-payer claims databases also generally determine funding, system oversight, and administration, and often will manage the technology procurement process. Should Oklahoma elect to not require the creation of a VBA through legislation, implementation of VBA capability would rely on the free market development of a voluntary database.

Because the Healthy Oklahoma 2020 plan stipulates the integration of health information technology that supports payment reform, careful consideration should be given to whether the state choosing to take a position of "remaining silent" would support that goal.

<u>System Oversight</u>

System oversight is an important concept in a VBA. The role of the overseeing entity is generally to establish policies and procedures necessary for the administration and management of the VBA, including procedures for the collection, processing, storage, analysis, use, and release of data. Three potential scenarios exist for system ownership and oversight:

1. State-Led System
2. Public-Private Partnership
3. Fully Private System

State-Led System: This is the most common model of system ownership among states with existing multi-payer claims databases. These databases are wholly managed by a state department or treated as a shared service by several departments, such as New Hampshire's collaboration between the state's Department of Health and Human Services and its Insurance Department. An example of an existing shared services arrangement in Oklahoma that could potentially be used for this purpose is the Oklahoma Health and Human Services cabinet group, DISCUSS. Designed to collaboratively share resources among the Oklahoma Health and Human Services agencies, DISCUSS focuses on the development and implementation of shared information technology products, services, and technology frameworks.

Public-Private Partnership: For states that plan to make data available to qualified public users, the alternative to a state-led model is a public-private partnership. Under a partnership model, the state delegates system ownership and process oversight to a private entity, either by creating it or through a competitive bid process, but may retain system oversight through funding and periodic audits. This model may be preferred in instances where the state perceives that an external entity has valuable prior experience and expertise, or if the state does not want to be seen as owning the system for political reasons. Arkansas, Colorado, and Virginia all operate APCDs under a public-private partnership model.

Fully Private System: Private initiatives exist in a minority of states with multi-payer claims systems. By choosing not to involve itself with the governance of the VBA, Oklahoma would effectively be opting for a solution driven by the free-market. Fully private governance structures are typically accompanied by voluntary participation models. The Wisconsin Health Information Organization is an example of this model.

National experience indicates that any of these three models could support a VBA. Based on Milliman's research, the most critical aspect of an oversight model is that the selected entity have expertise and experience in public reporting, data management, and relevant technology to support its role in system oversight and governance.

System Funding

Oklahoma must decide how to fund the VBA if the state chooses to be involved. Most states utilize a variety of funding sources to cover the initial development costs and the ongoing operating costs of a VBA. Oklahoma may consider several potential funding sources that have also been used by other states. They include, but are not limited to:

- SIM grant money
- General allocation funding
- Medicaid match
- Excise tax on system users, such as delivery systems and health plans
- Operational budgets of state agencies
- Subscription fees
- Data sales

A diverse funding structure may be preferable because it could mitigate the risk of funding loss from a single funding source, and could help to ensure the VBA's continued operation if such an event were to occur.

Privately led initiatives are generally funded by their members. Typically, founding members will contribute a share of the required initial investment on a prorated basis. Ongoing maintenance and enhancement costs are borne by expanding the membership of the initiative and charging subscription fees to access reporting and analytics tools. This model is fundamentally similar to the subscription model currently employed by both HIEs in Oklahoma.

Public-private partnerships are funded through both state and private organizations. Virginia's APCD provides an example of a participant-based funding structure. In Virginia's model, participating health plans contribute 40 percent, the Virginia Hospital and Healthcare Association contributes 40 percent, and 20 percent of the funding is provided from data sales by Virginia Health Information, under the authority of the Virginia Department of Health.

State-led efforts are primarily funded via state-appropriated funds. Taxes, agency operational budgets, and grant awards may be used for this purpose. The specifics of state arrangements are varied, yet most structure the cost burden such that system users and data contributors fund material portions of operating costs.

Some existing, larger multi-payer claims database initiatives have opted to sell subscriptions or reports as a funding method. Given the relatively small population of Oklahoma, the sale of data may not be a viable primary funding option for the Oklahoma VBA. Additionally, the expected return from data sales should be weighed against the consideration that selling data may serve as a catalyst to embolden privacy advocates and any VBA opponents. States that sell data have overcome this challenge through transparent communication about what information is sold, to whom, and under what circumstances.

Through our research, we noted that politically and fiscally viable funding structures often utilize many funding sources to reduce the burden on any one group or organization. Further, multi-payer claims databases are often funded through whatever channels are considered to be viable in a given state.

Participation Model

Oklahoma must determine whether to mandate participation from data-contributing organizations, and must determine the size threshold for that requirement. There are two primary considerations related to this decision: which types of data need to be collected to satisfy use cases, and what number of participants need to submit data from each group to meet both privacy needs and sufficient sample sizes for reporting.

In order to establish a state-wide VBA capability, Oklahoma should begin by identifying the minimum threshold for a representative portion of the state in the database. While Oklahoma's relatively consolidated payer market means that incorporating large insurers in the state will result in most of the covered lives being included, Oklahoma should take care to ensure that those covering rural Oklahomans or Native American tribes are included where possible.

Most states target between 70 percent and 75 percent of their state's population to serve as a representative sample of claims data. They also evaluate the data to ensure the system contains a diverse and reasonable representation of the state's population across lines of business and geography. Due to the nature of Oklahoma's health insurance marketplace, a voluntary participation model could potentially be successful in achieving this target, as fewer organizations would need to supply data to hit participation targets. If Oklahoma pursues this model, care should be taken to secure an agreement from targeted participants early in the process.

According to the *Oklahoma Insurance Market Analysis* report published by Milliman in August of 2015, 49 percent of Oklahoma's population is covered by commercial insurance through an employer or other private insurer. Another 21 percent is covered by Medicaid, 14 percent by Medicare, and two percent through other public sources. Approximately 14 percent of the state is uninsured. In order to achieve the threshold identified by other states as an acceptable participation floor, Oklahoma may wish to include major commercial payers, Medicaid, and Medicare. It is important to note that not all commercial payers in Oklahoma are of sufficient size to participate.

Oklahoma should also consider the impact of a mandatory versus voluntary model. Under a voluntary model, the onus for data transformation, cleansing, and quality rests with the VBA, which will have limited recourse to persuade contributing organizations to materially change the content of their submissions. Organizations may be hesitant to contribute, which is due to lack of clarity in both the effort associated with developing extracts, and also the possible uses for the data in a public forum. Each organization must decide if it is comfortable with those possibilities. A clearly defined system vision and use case set can help address this concern.

Data submission requires effort on the part of contributing organizations to develop the required extracts. If participation is mandatory, it is important to set minimum membership size thresholds at which payer organizations must submit data because the burden for small organizations may be greater than the value of the data they can contribute. Mandating participation and specifying penalties or fees for failures in compliance to both timely submission and data quality standards puts the obligation for submission on the contributing organizations. For example, New Hampshire has a mandatory participation model, but has exempted certain organizations if they cover fewer than 10,000 New Hampshire lives and are not participating in New Hampshire's healthcare exchange.

The participation model may also influence the implementation timeline for the VBA. Appropriate legislation required to initiate a mandatory VBA can take considerable time to pass, but may provide the penalties needed to ensure timeliness of submission and files that contain higher quality data. We note that, in some cases, the penalties are viewed as insufficient to cause changes in submitter behavior. In contrast, voluntary efforts have the advantage of not requiring the investment of time that legislation takes, but may result in lower data quality because penalties for non-compliance can be difficult to develop or enforce.

Personal Identifiers

Deciding whether to allow personal identification of patient data in the VBA requires balancing privacy concerns against the intended use of the database. The state must determine whether to support the system vision tacitly, support it explicitly, or decide to potentially reduce the scope of the system by limiting its contents to only de-identified patient data. The stakeholder-expressed vision and defined use cases will stipulate whether identifiable patient data is required to fulfill the goals for system usage.

Personally identifiable patient information (PII) (e.g., an individual's name, street address, email address, telephone number, or Social Security number) is a prerequisite for pairing claims and clinical data or for associating claims data with state public health data (such as registries) because it is the mechanism used to match a patient's records. However, including PII may result in patient privacy and data security concerns.

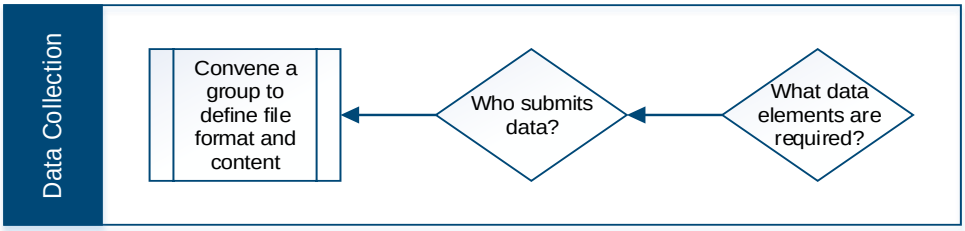
Some states, such as Rhode Island, have adopted a process whereby PII is submitted to a trusted technology vendor, or "lockbox" vendor, that manages the patient matching process and then sends a separate, consolidated, and de-identified data feed to the APCD. This process ensures that the data available to system users includes comprehensive aggregated claims records, but that it cannot be associated to a specific person. An alternative method that some states use is for payers to install software packages on their own servers, which encrypt the PII before sending data to the APCD. This approach ensures that the APCD is

in control of encryption, and if every source is encrypted the same way, the same member can still be matched across sources, but no PII is stored in the APCD itself.

In addition to evaluating whether to involve itself in the decision to include or limit PII, the state may opt to place limits on its usage by stipulating that PII may be collected, but that it may not be used until that usage is approved by an oversight board, either from the state or by the group that oversees the VBA.

Clear communication and transparency to the public about the planned approach to patient identifiers is critical. Failure to do so can result in implementation delays if data privacy and use become a public concern. Minnesota's APCD legislation includes precise language about what data will be collected and how it will be used as a result of privacy concerns that emerged during the APCD development period.

Data Collection



Collecting data from contributing organizations is a challenge faced by most multi-payer claims database initiatives. Experience indicates that even well-intentioned organizations that desire to participate in the process can have difficulty providing the required files. This occurs because payer organizations retain and store claims, eligibility, and other necessary data elements in varying levels of detail, formats, and locations.

It is important to plan not only the required content of the files to be sent to the VBA, but also the format, frequency, and allowable error rates. While no single national standard for claims and eligibility data exists, there have been efforts to develop and spread uniform standards. Utilizing an existing standard may decrease the time it takes to assemble the required files and ease the reporting burden for contributing organizations that submit data in multiple states. Based on our research, we expect that data collection efforts may be more successful if entities that will be submitting data, such as commercial payers, Medicaid, and healthcare delivery organizations, are invited to participate in the submission development process.

Four-steps are typically employed for the purpose of defining the required elements of the data collection process:

1. Identify any data gaps or system enhancements that need to be made to payer systems to meet the needs of the use cases
2. Determine the data feed format
3. Define quality standards and acceptable error rates
4. Determine how long it will take participants to begin submitting data

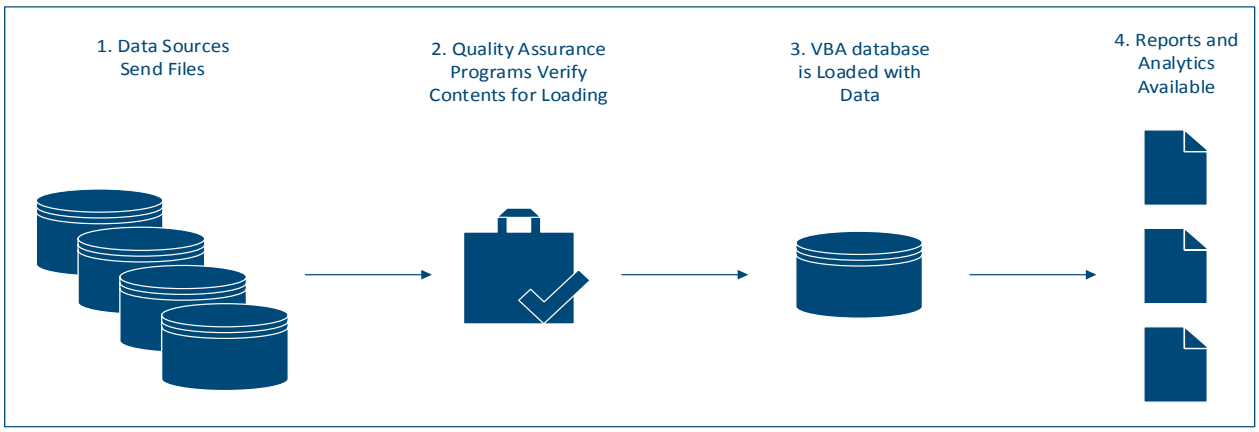
In summary, establishing the VBA governance model is a time-intensive, cyclical process that may require reevaluating decisions in the event that the original system vision conflicts with the political or technological realities of the state's health information technology infrastructure. By carefully crafting the

legal and operational environment in which the VBA will operate, and by involving stakeholders throughout the process, Oklahoma can build a foundation to simplify challenges that frequently accompany technology implementation.

E. Phase II: Technology Implementation

In order to discuss the processes and considerations related to the implementation of the technology infrastructure that underlies the VBA, we first outline processes associated with moving information from the participating payer organizations or other data contribution sources into the VBA, and from the VBA into reports. This process is summarized in four primary steps in *Exhibit 12: VBA Data Processes.*

Figure 10: Value-Based Analytics Data Processes

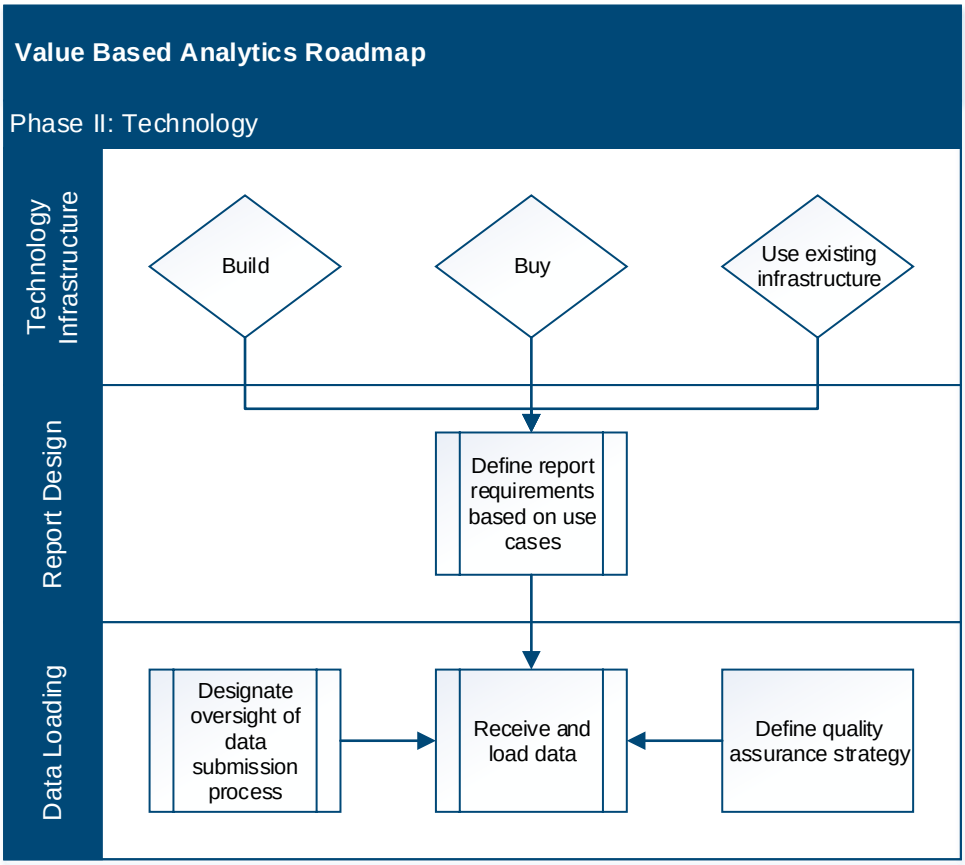


Organizations submitting data assemble information from their databases into the defined file format, which is then sent to the VBA. Before information is loaded into the VBA's database, a series of quality checks ensure that the data received conforms to the defined standard and that the files are complete. Data that passes the quality checks is then loaded into the VBA, where it is accessible for reporting and analytics. Data quality checks should be consistent with the use cases to ensure that data are of the highest quality for intended reporting purposes.

Steps Two through Four above rely on the VBA's technology infrastructure, which, in Oklahoma's case, must be built, purchased, or expanded from existing technology assets in the state.

It is important to note that the process of implementing the technology infrastructure can take up to or over a year. VBA leadership must proactively maintain stakeholder engagement throughout this process by communicating progress and involving participating organizations in activities that support these efforts, such as data validation. The Phase II decision tree is pictured in Figure 11: Technology Implementation.

Figure 11: Technology Implementation



6. Technology Infrastructure

Existing multi-payer claims databases generally compartmentalize the technology platform into three subcomponents: the database itself, quality assurance and data processing, and analytics and reporting. Each of these components may be provided by the same technology vendor, or by separate organizations. Whether Oklahoma should build, buy, or leverage existing health information technology for this purpose is dependent on evaluation of the required capabilities, cost, and time to implement each one.

Past experience in other states suggests that the entity responsible for the technology platform should have three traits: 1) prior experience, 2) expertise, and 3) functionality that supports the desired system usage. For this reason, few states build their databases because it is typically a complex and time-consuming process.

The majority of VBA implementations to-date have either identified a technology vendor through a bidding process, or have leveraged existing, similar health information technology in the state. By comparing the expected costs and functionality of each option with the defined vision, use cases, and available funding, the state will be able to identify the best option for these combination of factors.

Report Design

There are two typical models for accessing data: end users may directly query the database, or predefined reports may be made available to users. In order to design the system's output and reports, three processes

(each of which may require compromise) must have occurred: 1) a governance framework that specifies what data will be collected and how it may be used will have been identified, 2) a technology platform will have been selected, and 3) the selected platform will have an expected deployment timeframe. Any one or all of these may place practical limitations on the analytics and reporting the system can produce.

The process of designing reports creates an opportunity for continued stakeholder involvement. It is also a key step in ensuring that stakeholders trust the reports produced by the system. Individuals with pertinent technical expertise should guide the report design process. Oklahoma may wish to utilize either the oversight entity's board, or a voluntary stakeholder group to provide input into the report contents. The goal of the design process should be to develop an initial set of reports that support the system's vision, and to create reports that can be aggregated to a state or regional level. This is a best practice designed to engender participant trust in the system.

Technology vendors may not provide support for customized reports, so it is important that the system capabilities are assessed during any procurement process. During implementation, the report design phase consists of prioritizing the available reports, and potentially designing custom reporting capabilities.

By involving stakeholders in the report design process, Oklahoma can ensure stakeholder buy-in to the selected measurement metrics. This stakeholder process should be repeated over the life of the system as part of a continuous improvement process, including VBA capability expansion and enhancement.

Data Loading

Trust is likely to be one of the most important determinants of VBA adoption within Oklahoma. A defined and closely-managed data loading process is a primary mechanism for ensuring that the VBA contains complete, high quality data. If the system does not have a data set that is both complete and high quality, the reports and analytics are less likely to be utilized, limiting the usefulness of the VBA until these issues are remedied.

To ensure that high quality data are loaded into the VBA, the overseeing entity should create a mechanism to manage data loading. Data management may be provided through delegation to a vendor, or by convening a subgroup of stakeholders or an oversight entity team to manage the process. During implementation, the group responsible for data loading should supervise two critical steps: quality checks to ensure received data are complete, and validation that the output from the VBA's database is correct after files have been loaded.

Data submission rules, targets, and penalties are typically specified during Phase I of the implementation. The group responsible for loading data should be tasked with establishing the technical checks to ensure received files conform to requirements, and tasked with the communication of the processes supporting this activity, which should ensure that any challenges are rapidly addressed. By establishing designated points of contact within both the governing entity and the data submitters' organizations, questions and issues can be quickly addressed.

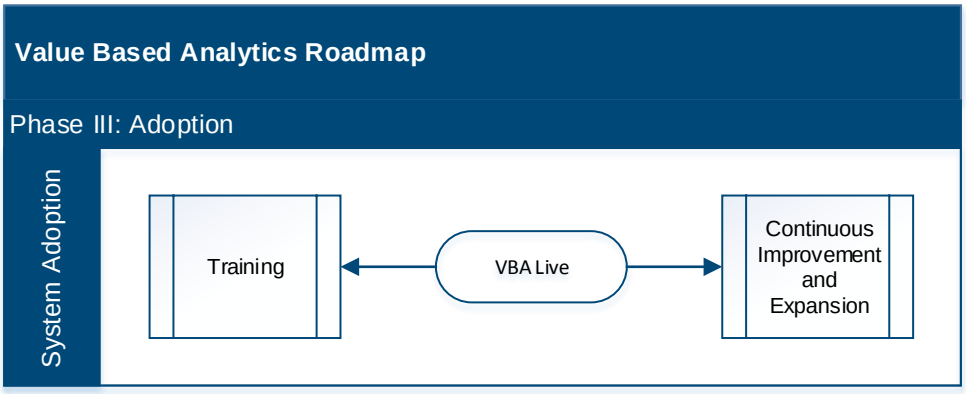
Validation serves two purposes. The first is to verify that the output from the VBA matches the input files submitted by participants. Typically, matching is internally verified by the organization responsible for data loading before the organization requests that data submitters do the same. Some states have automatic "checks" at the time of submission, where the carriers "sign off" on summary statistics of the files they submit. The two-step process ensures not only a higher level of quality, but also serves a critically important second purpose: trust in the system's accuracy.

Loading large volumes of data requires significant time. Oklahoma may elect to employ a process whereby participants submit files that contain up to a year's worth of data for validation purposes as part of an initial load. After participants are satisfied that quality assurance processes are functioning as intended and the data are of high quality, larger volumes of historical data may be loaded and a more frequent submission schedule, such as monthly or quarterly, may be prescribed.

A defined quality assurance and data-loading process is an important step in the VBA-implementation process.

F. Phase III: System Rollout Strategies

Figure 12: Value-Based Analytics Rollout and Adoption



Once the governance structure has been defined, technology infrastructure implemented, and data from participating organizations loaded into the system, Oklahoma will have achieved a major milestone, but will not have completed its work on the VBA. *Exhibit 14: VBA Rollout and Adoption* describes the processes used by national efforts to enhance adoption. In general, successful systems rely on training to familiarize users with the system, and continuous improvement cycles to increase the scope, quality, and reach of the tool.

Oklahoma should consider conducting two concurrent adoption initiatives. The first is to begin training the core user base on how to interact with and interpret the contents of the VBA. By focusing training efforts on an initially small group of users who have supported and been involved with the initiative, a group of champions can be fostered. By creating supporters across participating organizations, Oklahoma can ensure the distribution of advocates across the state, which has been proven to be a critical component in information technology deployment. As the VBA is deployed statewide, Oklahoma may wish to follow a training model such as Wisconsin's, in which participants have access to webinars, classroom training, user workshops, and virtual office hours.

The second adoption initiative is to begin continuous improvement and system capability expansion activities by soliciting feedback and through continued stakeholder engagement. Actively soliciting feedback on the VBA's ease of use and capabilities can enhance system functionality and can maintain participant engagement after the initial implementation work is completed.

Continuous improvement cycles should follow all steps in the decision tree (Phases I through III), related to establishing vision and use cases, expanding governance or legislation to secure the necessary involvement, and enhancing the technical capabilities of the VBA to expand its usefulness. Due to the comparative ease of data integration, many multi-payer claims databases have chosen to collect commercial claims and eligibility data as part of the initial system implementation. Continuous improvement cycles can

then focus on collecting Medicaid and Medicare data while simultaneously adding additional reporting and analytic capabilities.

Due to the scale and complexity of creating a VBA, a noted best practice is to structure the initial adoption periods as extended validation periods. This continued validation and correction of early issues will develop trust. One way the extended validation period can be structured is to publish initial reports exclusively to data contributors and to the governance organization for feedback. Simultaneously engaging stakeholders in ongoing improvement activities establishes an environment of partnership between the system administrators and system users that can result in increased system use and trust.

7. Considerations

As cited previously, approximately 31 percent of Oklahomans live in a rural area. Providers serving rural Oklahomans have two challenges in adopting health information technology: lack of funds, and lack of support staff to take action based on information gathered from technology systems. If the VBA is to be used by small provider groups or rural providers for population health management, addressing these issues will be an important step in the system adoption process.

Many providers and critical access hospitals in rural Oklahoma are choosing to affiliate with, or being acquired by, larger care delivery organizations. This process can help rural providers afford the technical infrastructure necessary to access systems. By waiving or reducing subscription fees, Oklahoma can further reduce the barriers faced by rural and small providers in adopting a VBA.

Population management programs rely on care coordination and case management capabilities that small and rural providers may not have. By utilizing resources such as regional extension centers set up to assist with electronic medical record systems, Oklahoma could use existing relationships to educate these providers on the discipline of population health management and attempt to establish cooperatives between groups of providers for patient outreach support.

Implementation Strategies

With 18 existing multi-payer claims databases across the nation, Oklahoma has many examples to draw upon as the state plans its VBA approach. Notable common themes cited across implementations include the following:

- Use existing data submission rules and formats where possible to derive potential cost savings through standardization
- Incrementally expand both the data set and reporting functionality over time
- Be transparent about what data will be collected, how it will be used, where it is stored, and how it will be protected
- Begin with statewide or aggregate measures and gradually report on more detailed levels as the system becomes more mature and more trusted
- Involve stakeholders throughout all phases of the process
- Communicate with stakeholders and the public throughout all phases of the program

Taking these considerations into account during the implementation of Oklahoma's VBA may help to limit complexity and mitigate risks inherent in the development and ongoing management process.

Summary

Multi-payer claims database initiatives are spreading rapidly across the country. Oklahoma's interest in developing such a tool to support its vision for improving the state's health outcomes and healthcare delivery model is commendable. By engaging stakeholders early in the process, being transparent about how information will be used and safeguarded, and learning from the successes and challenges of other states that have implemented multi-payer claims database tools, Oklahoma can leverage the learnings from other states to foster collaboration and trust in the stakeholders who will play a role in Oklahoma's VBA initiative.

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Appendix I: HIT Governance Models in Other States

Three states are similar to Oklahoma in terms of population characteristics, economics, and politics were evaluated to identify existing HIT structures and governance models: Arkansas, Kansas, and Texas. Additionally, the New York eHealth Collaborative policy and governance structure was evaluated due to its success and similarity to the proposed Oklahoma governance model.

These governance models are detailed below.

Arkansas

In 2011, Arkansas Act 891 established the Arkansas Office of Health Information Technology (OHIT) and authorized OHIT to form a nonprofit to be known as the State Health Alliance for Records Exchange (SHARE), the official state HIE. This was supported through a Federal Grant authorized by the American Recovery & Reinvestment Act (ARRA) of 2009. The purpose of SHARE and OHIT are to increase the use of HIT and improve the quality of health for Arkansas citizens by reducing the potential for medical errors, reducing the incidence of redundant tests and procedures, improving patient safety, and making the delivery of healthcare services more efficient and affordable. OHIT and SHARE adhere to privacy and security requirements under the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and Health Information Technology for Economic and Clinical Health of 2009 (HITECH) that cover access to and use of health information. The duties of OHIT and SHARE include:

- Coordinate Health IT initiatives of the state with relevant executive branch agencies, including state boards, commissions, nonprofit corporations, and institutions of health education
- Assure the effective coordination and collaboration of Health IT planning, development, implementation, and financing
- Review all Health IT-related grant applications before submission to funding entities
- Accept, receive, retain, disburse, and administer any state special or general revenue funds or federal funds specifically appropriated for health information technology
- Make contracts and execute all instruments necessary or convenient for carrying out its business
- Adopt rules necessary to carry out the policies and objectives of this chapter
- Establish reasonable fees or charges for the use of the SHARE to fund operational costs

Kansas

In 2013, Kansas established the Kansas Health Information Technology Act (KHITA). The law amended the 2011 Kansas Health Information Technology Exchange Act, renaming it the Kansas Health Information Technology Act. Both acts promote the electronic sharing of health information among providers and regulate health information organizations (HIOs) in Kansas; transferred oversight and management from a private corporation, Kansas Health Information Exchange, Inc. (KHIE), to the Kansas Department of Health and Environment (KDHE); and established the Advisory Council on Health Information Technology. The

Advisory Council on Health Information Technology serves in an advisory role to the Secretary of Health and Environment and resides within the Division of Health, Department of Health and Environment. KHITA adheres to nationally recognized standards for:

- Interoperability;
- Adoption and adherence to rules promulgated by the Department regarding access to and use and disclosure of protected health information maintained by or on an approved HIE; and
- Development of procedures for entering into and enforcing the terms of participation agreements with covered entities, which satisfy the requirements established by KDHE.

The act established the following requirements to be used by approved HIOs in participation agreements with covered entities:

- Specifications of procedures by which an individual's protected health information will be disclosed by covered entities, collected, and shared with other participating covered entities and with the Department as required by law for public health purposes;
- Specification of procedures by which an individual may elect that protected health information be restricted from disclosure by approved health information organizations to covered entities; and
- Specifications of purposes for, and procedures by which a covered entity can access an individual's protected health information from the approved health information organization, including access to restricted information by a covered entity in an emergency situation when necessary to properly treat the individual.

KHITA states that protected health information in the possession of an approved HIO cannot be subject to discovery, subpoena, or other means of legal compulsion for the release of such information to any person or entity. KHITA states that an approved HIO cannot be compelled by a request for production, subpoena, court order, or otherwise, to disclose protected health information relating to an individual.

Texas

The Texas Health Services Authority (THSA) was established through legislation in 2007 as a state-level non-profit corporation governed by a board of gubernatorial appointees. In 2010, THSA created the Texas State HIE Plan, which included three key strategies: general state-level operations, a local HIE grant program, and the white-space program. The White Space program provides Texas counties that are not served by a local community-based HIE assistance with electronic exchange of medical information. In 2013, Texas purchased a system for the development and implementation of the following shared services: Clinical Document Exchange (treatment), Federated Trust Framework (security/confidentiality/accuracy), patient consent management and eHealth Exchange. THSA's State-Level Shared Services or HIE Texas is a private secure network that spans the entire state and supports the exchange of information between Texas HIEs and other data sources.

The Texas HIE collaborative process involves a wide variety of stakeholders. It also includes local HIEs and WhiteSpace HISPs, the HHSC Office of e-Health Coordinator, THSA Board of Directors, collaboration council, and Task Forces. The THSA Board of Directors considers proposed policies and other recommendations developed through the collaborative process by the THSA Collaboration Council. The Collaboration Council serves as the THSA steering committee and helps provide oversight of statewide HIE implementation. The collaboration council also issues Statewide Policy Guidance to local HIEs and other contractors as necessary to support a common and consistent technical, privacy and security and legal framework for HIE in Texas.

The THSA has formed stakeholder taskforces to monitor ongoing developments in HIE in subject areas including data standards and technical architecture, privacy and security, and healthcare provider and consumer engagement. The role of the task force is to solicit advice from multi-disciplinary, multi-stakeholder experts on planning and implementation questions regarding statewide HIE. The THSA developed interoperability guidance, privacy and security guidance, a state-level trust agreement and a model business associate agreement (BAA). The Texas Model BAA is provided as an aid for use between Texas physicians and hospitals and the state's grant funded health information exchange or HIE. The Texas State-Level Trust agreement was developed by the THSA through a collaborative stakeholder process to serve as a contractual agreement between the THSA, the state's grant funded local HIEs, applicable state agencies and others who want to participate in the shares services.

New York

New York State developed a Statewide Health Information Network of New York (SHIN-NY) to connect the many different stakeholders around the state and facilitate the communication of vital health information. The New York eHealth Collaborative (NYeC) is charged with development and operation of SHIN-NY and coordinates efforts among and between key stakeholders, including but not limited to the New York State Department of Health, qualified health IT entities, providers, and the public.

The SHIN-NY governance model provides the structure necessary to ensure accountability and trust in the implementation of the SHIN-NY. The *Commitment to Fair Information Sharing Principles* outline practices that ensure a robust HIE and trust framework among patients, healthcare providers, and other healthcare organizations participating in the SHIN-NY. Qualified Health IT Entities have two options utilize a set of SHIN-NY core services established by NYeC, either through a "connect" or a "service" agreement relationship. Qualified Entities have input into SHIN-NY service development and implementation via a SHIN-NY Operations Committee that provides ongoing guidance on the SHIN-HY services roadmap and release plan.

Appendix J: Top 25 Health Occupations in Oklahoma

The critical health occupations list, seen below, was formulated based on forecasts for Oklahoma's top 100 occupations, developed by the Oklahoma Office of Workforce, 2015. Calculations used to create forecast integrated data from Economic Modeling Specialists, International, the Oklahoma Employment Security Commission, and the American Community Survey.

Table 9: Top 25 Health Occupations in Oklahoma

Description	2015 Jobs	2025 Jobs	2015 - 2025 Change	2015 - 2025 % Change
Magnetic Resonance Imaging Technologists	349	415	66	19%
Nurse Anesthetists	294	373	79	27%
Pediatricians, General	358	412	54	15%
Psychiatrists	348	410	62	18%
Anesthesiologists	446	523	77	17%
Internists, General	526	608	82	16%
Surgeons	826	950	124	15%
Respiratory Therapists	1,106	1,312	206	19%
Diagnostic Medical Sonographers	772	1,037	265	34%
Optometrists	708	867	159	22%
Phlebotomists	1,218	1,499	281	23%
Nurse Practitioners	1,109	1,463	354	32%
Radiologic Technologists	2,274	2,649	375	16%
Medical and Clinical Laboratory Technologists	1,939	2,150	211	11%
Mental Health Counselors	1,956	2,484	528	27%
Medical and Clinical Laboratory Technicians	2,097	2,533	436	21%
Dentists, General	1,986	2,625	639	32%
Physical Therapists	1,979	2,645	666	34%
Family and General Practitioners	4,027	4,340	313	8%
Medical Records and Health Information Technicians	3,708	4,126	418	11%
Pharmacists	3,962	4,426	464	12%
Physicians and Surgeons, All Other	4,387	4,895	508	12%

Medical and Health Services Managers	5,661	6,432	771	14%
Licensed Practical and Licensed Vocational Nurses	12,354	13,667	1,313	11%
Registered Nurses	27,335	31,552	4,217	15%