

# EVALUATION OF THE STATE OF MINNESOTA'S HEALTH CARE HOMES INITIATIVE EVALUATION REPORT FOR YEARS 2010-2014

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The views and analysis provided in this report are those of the authors. No endorsement by the Minnesota Department of Health is intended or should be inferred.

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## EXECUTIVE SUMMARY

This report to the Minnesota Legislature is an evaluation of the efficacy of the Health Care Homes Initiative. It describes differences between certified Health Care Homes clinics (HCH) and those clinics that, though eligible, choose not to be certified (non-HCH). Using Medicare and Medicaid claims data, this report addresses differences in cost, utilization, and disparities between Health Care Homes and non-Health Care Homes from 2010 through 2014. It also presents findings related to the quality of health care and patient experience using data from the Statewide Quality Reporting and Measurement System (SQRMS) and the 2013 Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey.

The report addresses two major questions: 1) Was the Health Care Homes Initiative as implemented successful in lowering the cost of care without reducing the quality of care or increasing the level of disparities in the receipt of care for persons of color and geographic location? And 2) To what extent were the effects of the initiative the result of the Health Care Homes model as opposed to the way the model was implemented? Below are the key findings. See Appendix J for a list of abbreviations used throughout the report.

### QUALITY

- Using Statewide Quality Reporting and Measurement System (SQRMS) data, HCH clinics had better quality of care for Diabetes, Vascular, Asthma (for children and adults), Depression, and Colorectal Cancer screening.
- Patient experience, as measured by the 2013 Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey, was positive across both HCH and non-HCH clinics, with little differences between the two. However, Communication with one's doctor showed a significant, but small, benefit for HCH clinics.
- Using Medicare and Medicaid data, both number of hospital admissions and the length of hospital stays showed modest benefits that were significant among Medicaid enrollees, but non-significant among Medicare and Dual Eligible enrollees.

### COST AND UTILIZATION

- Health Care Homes had significant and substantial savings on their Medicare, Medicaid, and Dual patients compared to non-Health Care Homes between 2010 and 2014.
- Even after correcting for differences in patient population, Health Care Homes clinics had lower costs.
- The majority of the savings were due to the Health Care Homes model and only about twenty five (25%) was due to patient selection.

- While Health Care Homes saw an increase in emergency department and skilled nursing home use relative to non-Health Care Homes, they also saw major decreases in the use of hospital services, which was the primary driver of cost savings.
- Health Care Homes saw a slight decrease in the use of prescription drugs.

## **PAYMENT FOR CARE COORDINATION SERVICES**

- HCH clinics' submission of claims to Medicaid for care coordination services has increased steadily since the beginning of the HCH Initiative implementation.
- Care coordination claims are more likely submitted for persons of color, Hispanics, more complex enrollees, and Dual Eligible enrollees. They are less likely to be in non-urban settings.
- Clinics serving low-income populations with complex medical and social needs are more likely to submit care coordination claims.
- Financial incentives do not appear to be a primary driver of clinic or organization participation in the HCH Initiative. Fewer than half of respondents report conducting a financial analysis before becoming certified as a HCH, and only one-fifth said a financial analysis influenced their decision to become certified.
- HCH organizations reported being better able to capture care coordination payment from Medicaid (both fee-for-service and managed care) than from Medicare, private managed care, or commercial insurers (with the exception of organizations participating in the Medicare Advanced Primary Care Program who are also able to capture payment from Medicare).
- Less than half (40%) of survey respondents report cost increases related to operating as a HCH. Increased costs appear to be primarily related to increased staff and billing expenses.
- The majority of responding HCHs have adopted and are actively using the state billing methods including the state-developed care coordination tier assignment tool to support care coordination billing.
- The majority of responding HCHs rate the state-developed care coordination tier assignment tool as adequate for current billing and clinical use.

## **DISPARITIES**

- Racial disparities were significantly smaller for Medicaid, Medicare, and Dual-eligible beneficiaries served by HCH versus non-HCH clinics for most measures.
- Differences by disability and rural status did not show consistent benefits of HCHs in reducing disparities.
- Disparities by serious mental illness were slightly larger in HCH clinics.
- While the overall effect of HCHs was to reduce most morbidity related disparities, the effect differed by subgroup. Compared to low morbidity groups, disparities were smaller for those with

moderate morbidity in HCHs. However, compared to low morbidity groups disparities were greater for those with severe morbidity in HCHs.

## **CONCLUSION**

In conclusion, the Minnesota Health Care Homes Initiative was successful in reducing cost and utilization while increasing quality of care and either maintaining or decreasing levels of health care disparities in Minnesota's primary care market.

# CHAPTER 1: HEALTH CARE HOMES EVALUATION INTRODUCTION

## INTRODUCTION

The Health Care Homes (HCH) evaluation documents for the Minnesota legislature the impact of the HCH Initiative on health care quality, cost, and outcomes.<sup>100</sup> Both the State of Minnesota and Minnesota's primary care clinics have important roles in the Health Care Homes Initiative. The State's involvement focuses on encouraging health systems and clinics to participate in the HCH certification process, which includes financial incentives, a learning collaborative, certification standards, and transformation assistance. At the clinic level, the focus is on implementing effective clinical care systems and care coordination to improve patient access and quality while reducing costs. Participation in the HCH Initiative is voluntary, but to become an HCH a clinic must pass a rigorous review and be certified as an HCH by the Minnesota Department of Health.

The primary care clinic role originates from the Minnesota HCH Rule that states HCH clinics must provide primary care, where "primary care means overall and ongoing medical responsibility for a patient's comprehensive care for preventive care and a full range of acute and chronic conditions, including end-of-life care when appropriate."<sup>95</sup> The focus on primary care is based on research demonstrating the effectiveness of primary care in improving care.<sup>146, 147</sup> Because of the focus on primary care, the evaluation of the HCH Initiative at the clinic level compares clinics certified as HCHs with primary care clinics eligible to be HCHs clinics that are not certified as HCHs. The relationship between specific HCH certification and access, quality, and cost is examined in this report.

## HCH EVALUATION APPROACH: QUESTIONS AND LEVELS OF ANALYSIS

HCHs provide patient centered primary care, which improves patient and caregiver outcomes.<sup>146, 147</sup> Corbin and Strauss<sup>24</sup> and Shippee and colleagues<sup>135</sup> argue that patient centered integrated care support patients and caregivers in the work they do to manage their health and lives. Corbin and Strauss<sup>24,p. 224</sup> found that chronic illness management involved everyday work, illness work, and biographical work. Everyday work consists of activities related to housework, homemaking, and caring for children and partners. Illness work consists of managing the events associated with illness. Because the work burden for a patient and a patient's resilience are a cumulative function of their caregiver support system and shocks to it, such as caregivers' health, providing patient centered care also requires taking into account the resources the patient has available to support her in her work<sup>135</sup>. Because illness work, everyday work, biographical work, and cumulative complexity are intertwined, patient centered care requires a holistic perspective on patients and their caregivers. This means that HCHs focus on patients and caregivers holistically, taking into account not only their medical condition but patient and caregiver lives,

preferences, needs, culture, circumstances, and community supports. In an HCH, providers, patients, and caregivers work collaboratively in a team through shared decision-making processes to provide effective care and engage patients and caregivers in managing their health.

Research suggests that while patient centered medical homes (PCMHs) care quality and promote responsible resource use, their effectiveness “depends on which approach is used, how well it is implemented, and on features of the environment in which a provider is operating, including the financing system.”<sup>110</sup> In other words, a comprehensive understanding of the HCH Initiative requires the examination of both the efficacy and the effectiveness of the HCH Initiative.

This evaluation assesses the effect of the HCH Initiative on access, cost, and quality. The primary focus of the evaluation addresses the questions: (a) did the initiative work and (b) did the effects of the HCH Initiative vary across sub-populations, such as racial, ethnic, or multi-morbid populations. The unit of analysis for these questions is *patients nested within clinics*. The secondary focus of the evaluation is on clinic transformation which addresses the question of HCH diffusion by examining the correlates of clinics becoming HCHs and differences in transformation levels. The unit of analysis for these questions is *clinics nested in Minnesota*. Table 1 shows the types of questions by analysis level (state, clinic) and the focus on the question.

Table 1: Evaluation Levels and Questions		
Analysis Level	“What effects does the intervention have?”	“What works for whom in what circumstances and why?”*
State	<ul style="list-style-type: none"> <li>• Is the HCH Initiative budget neutral?</li> <li>• What was the effect of payment policies on payment for care coordination?</li> </ul>	<ul style="list-style-type: none"> <li>• What affects health system and clinic participation in the HCH Initiative?</li> <li>• How does payment affect participation in the HCH Initiative?</li> <li>• What affects transformation to becoming certified as an HCH?</li> </ul>
Clinics	<ul style="list-style-type: none"> <li>• What is the impact of HCH certification of my clinic on access, quality, and costs?</li> <li>• Is HCH certification cost effective in my clinic?</li> <li>• Is there a clinic level business case for a HCH certification?</li> <li>• Is HCH effectively implemented? Is HCH related to access, quality, and cost?</li> </ul>	<ul style="list-style-type: none"> <li>• How do patient populations affect the functioning of HCH certification (e.g., is the effect different in Federally Qualified Health Centers or rural clinics)?</li> <li>• How does affiliation with a health system affect the functioning of HCH certified clinics?</li> <li>• How do the components of a HCH relate to effective implementation of HCH?</li> </ul>



The state level analysis examines clinic participation in the HCH Initiative such as the correlates of clinics becoming certified. The clinic level of analysis examines clinic transformation to an HCH such as HCH implementation of core functions (managing populations, assuring a primary care relationship, and coordinating care, electronic health records) and their relationship to the clinic's culture and context (Chapter 6).

In summary, a full evaluation of the HCH Initiative requires answers to the following questions:

- 1) Is there evidence the HCH Initiative produces what is intended?
  - a) Is it associated with better quality of care provided to enrollees?
- 2) Is it associated with lower costs of care? If it is associated with lower costs of care, is the difference in care costs less than the costs associated with compensating providers for care coordination (budget neutrality)?
- 3) Does it benefit medically complex or disadvantaged enrollees more than less disadvantaged enrollees?
- 4) If the program is efficacious, is there evidence that the HCH Initiative produces what is intended in the Minnesota context?
  - a) If the analysis of efficacy shows that HCHs improve quality and access while reducing costs, would these results generalize to clinics that have not yet become HCHs? Or are the results due to clinics with good care systems with strong management becoming HCH certified clinics?

In other words: 1) Does the HCH Initiative work as intended and implemented, and 2) Will the results of implementing the HCH model be likely to generalize to either the community of primary care clinics in Minnesota, some subset of primary care clinics in Minnesota, or specific patient populations in Minnesota?

## **UNDERSTANDING THE HCH INITIATIVE: COMPLEXITY AND FIDELITY AND A LOGIC MODEL**

HCHs are diverse clinics providing primary care with structures and processes that are designed to produce patient-centered, coordinated care for all patient populations, particularly those with complex needs. HCHs need to be prepared to respond to changing and emergent patient circumstances, either by providing services themselves or by supporting and coordinating services provided by other organizations and providers in their community, such as mental health, social services, or other physical health providers. To be successful, HCHs need to be learning organizations to stay current with evolution of evidence-based practice in medicine and the continuing development of technologies such as electronic

health records. Finally, HCHs are accountable for the care they deliver, for instance by reporting care quality in the Minnesota Statewide Quality Reporting & Measurement System (SQRMS).

Evaluating the effect of certified HCHs on access, quality, and cost is challenging. A key challenge is the ability to know whether a non-HCH clinic has truly implemented the HCH model.<sup>7, 47, 160</sup> Not being able to assess whether a HCH was really implemented is a limitation of current research and evaluations related to HCHs.

This problem is addressed in Minnesota's HCH Initiative by incorporating a site visit into the HCH certification process to verify whether a clinic has met specific HCH criteria.<sup>95</sup> The evaluation literature calls this process assessing the fidelity of the implementation to an accepted fidelity standard.<sup>102</sup> Fidelity standards are comprehensive, measurable standards that measure how well a clinic implemented a HCH. Assessing fidelity relative to fidelity standards measures how well an intervention was implemented. Fidelity standards, assessment, and certification are important for a number of reasons. First, in an evaluation it assures that the intervention, such as transforming to a HCH, was actually implemented in all participating clinics and the HCH evaluation does not compare dissimilar care delivery models. Second, the publishing of the standards, which MDH provides to non-HCH clinics,<sup>95</sup> supports non-HCH clinics in planning for their transformation because the clinic knows what it must accomplish. Third, the availability of standards supports the implementation of learning collaboratives and the provision of technical assistance and coaching to assist non-HCH clinics in learning how to transform into HCH certified clinics. In sum, fidelity standards, fidelity assessment, and certification are critical components of effectively implementing and evaluating the HCH Initiative.

The goal of HCH certification is encouraging clinic transformation. This includes a variety of components which are believed to be associated with improved patient care coordination, access, quality, and lower costs that are covered in HCH certification, such as:

- Availability of HCH to all enrollees, particularly those who have or are at risk for complex or chronic conditions
- Population health management focus
- Team based care with a primary care provider and care coordinator
- Electronic searchable registries and tools to support care coordination, monitor patient health, and screen enrollees
- Care plans
- Continuous access to staff through on-call providers or triage staff who have access to the enrollees' medical information

- Coordinating care processes from the HCH: inpatient admissions, referrals, laboratory and imaging, and the transition to home from hospital-to-home
- Measuring, monitoring, and providing HCHs feedback on population health, such as care quality and resource use, that can be used to guide learning and improvement
- Demonstrate continuous patient centered engagement and quality improvement
- Coordinating care throughout the community
- Quality improvement teams including care team members, patients, caregivers, and relevant community members

## UNDERSTANDING THE HCH INITIATIVE: A LOGIC MODEL

Figure 1 (shown below) presents the HCH Initiative logic model. The context for the HCH Initiative includes a variety of Minnesota and health system efforts that provide a strong foundation for HCHs. The text that follows describes specific components of the logic model in greater detail.

### HCH Context

At the state level, three mandates provided critical infrastructure for HCHs. First is e-prescribing which required “prescribers, pharmacies, and pharmacy benefit managers to implement e-prescribing by January 1, 2011”.<sup>91</sup> Second was the Minnesota Statewide Quality Reporting & Measurement System (SQRMS)<sup>94</sup> which provided a common, consistent measurement of clinical care quality for public reporting. This allows clinics to benchmark their performance relative to other clinics and can provide an incentive to improve their performance by improving clinical care systems.<sup>115</sup> Third is the Interoperable Electronic Health Record (EHR) Mandate<sup>92</sup> which requires hospitals and clinics to have interoperable electronic health systems implemented by 2015. The EHR is a critical component of HCHs, supporting population health management, registries, performance measurement, clinical alerts or reminders, and provider feedback.

Two programs associated with National Health Reform indirectly supported HCHs. The Centers for Medicare & Medicaid Services Multi-Payer Advanced Primary Care (MAPCP) initiative provided care coordination payments for eligible HCHs Medicare enrollees.

Figure 1: Health Care Homes Logic Model

Context	HCH Implementation	Clinic Transformation	Care Process Outcomes	HCH Initiative Outcomes
<p>MN Health Reform<sup>93</sup></p> <ul style="list-style-type: none"> <li>Health Care Homes Initiative<sup>96</sup></li> <li>Minnesota Statewide Quality Reporting &amp; Measurement System (SQRMS)<sup>94</sup></li> <li>Interoperable Electronic Health Record (EHR) Mandate<sup>92</sup></li> </ul> <p>National Health Reform</p> <ul style="list-style-type: none"> <li>Multi-Payer Advanced Primary Care (MAPCP) site</li> </ul> <p>Minnesota Provider Context</p> <ul style="list-style-type: none"> <li>Many large integrated health systems</li> <li>Few large health insurers dominate market</li> <li>ERISA Employers</li> <li>Institute for Clinical Systems Improvement (ICSI)</li> <li>High EHR development</li> <li>Pediatric medical homes</li> </ul> <p>MN Community Context</p> <ul style="list-style-type: none"> <li>Shifting demographics with growth of Asian, African, and Hispanic populations</li> </ul>	<ul style="list-style-type: none"> <li>Fidelity standards for HCHs that guide clinics in implementing HCH and allow the assessment of whether a clinic is a HCH</li> <li>Certification and annual re-certification</li> <li>HCH Learning Collaboratives</li> <li>MDH Coaching</li> <li>Care Coordination Payment Incentives<sup>97</sup></li> </ul>	<ul style="list-style-type: none"> <li>Offer HCH to all enrollees who have or are at risk for complex or chronic conditions</li> <li>Population health management focus</li> <li>Team based care with a primary care provider and care coordinator</li> <li>EHR registries and tools to support care coordination, monitor patient health, screen enrollees</li> <li>Care plans</li> <li>Patient centered care and shared decision-making</li> <li>24/7 access to staff through on-call providers or triage</li> <li>Coordinating care processes: Inpatient admissions, referrals, laboratory and imaging, hospital-to-home,</li> <li>Measure, monitor, and feedback population health</li> <li>Continuous improvement engagement and demonstrate improvement</li> <li>Integrating care with community resources</li> </ul>	<p>Patient centered integrated care</p> <p><u>Primary Care</u><sup>144, 147</sup></p> <ul style="list-style-type: none"> <li>Longitudinal care</li> <li>Continuity of care</li> <li>First contact care</li> <li>Comprehensive care</li> <li>Integrated and coordinated care</li> </ul> <p>Care Processes</p> <ul style="list-style-type: none"> <li>Situational awareness</li> <li>Implementation assistance for enrollees<sup>41</sup></li> </ul>	<p>Short term</p> <ul style="list-style-type: none"> <li>Increased patient satisfaction</li> <li>Improved health outcomes</li> <li>Appropriate use of high cost services</li> <li>Increased quality of care</li> <li>Increased provider satisfaction</li> </ul> <p>Medium term</p> <ul style="list-style-type: none"> <li>Lower overall cost of health care, especially for those with complex conditions</li> <li>Reduction in health care disparities</li> </ul> <p>Long term</p> <ul style="list-style-type: none"> <li>System change resulting in new ways to provide care with spillover effects to the broader population of enrollees and provider settings, decreased system health care costs and increased health care quality</li> </ul>

## HCH Implementation

Clinic HCH certification is supported by a number of components of the HCH Initiative. First, there are learning collaboratives where clinics can share best practice examples and discuss HCH implementation and transformation strategies. Second, Minnesota Department of Health (MDH) representatives offer coaching and technical assistance to assist clinics in assessing what they need to do to accomplish certification and recertification as a HCH. Third, care coordination payments have been implemented to help clinics cover the costs associated with becoming certified, such as recruiting care coordinators or strengthening EHRs.

## Clinic Transformation and Care Process Outcomes

Clinic transformation to a HCH is predicted to improve patient centered integrated care, and it is expected that these factors can improve access to care and quality of care while reducing cost of care. Research shows that well implemented primary care affects patient outcomes through factors such as situational awareness,<sup>34</sup> implementation assistance,<sup>40, 41</sup> and patient centered care.<sup>149</sup> Situational awareness is defined as knowing the patient's medical, behavioral, and social condition and context well enough to understand how care coordination may influence patient outcomes and to notice potential changes in a patient's condition or context to proactively coordinate care. Implementation assistance involves assisting enrollees in a) becoming aware of a problem and acknowledging that a behavior is important enough to address, (b) committing to a behavior change and implementing the change, (c) implementing desired changes, and (c) sustaining the desired behavior.<sup>129</sup> Patient centered care focuses on understanding how enrollees experience their illness, the patient as a whole person, sharing decision-making about care processes, prevention, and relationship building.<sup>149</sup> Research shows that this transformation process is difficult.<sup>62, 140</sup> Chapter 6 examines HCH transformation in Minnesota.

## HCH Initiative Outcomes

The expected primary care process outcomes of HCH certification are that a clinic will provide a patient first contact for care, comprehensive care, and integrated and coordinated care.<sup>144, 147</sup> This requires a strong, trusting primary care relationship over an extended period of time, which includes having information about all the care the patient receives, the care the patient needs, and the enrollees' personal and social environment.<sup>130</sup> The expected HCH Initiative short term outcomes are improved access and quality and lower costs. The HCH Initiative long term outcome is health care system transformation from fee for service models of payment to quality care payment model.

## **CONCLUSION**

This report evaluates the HCH Initiative from 2010 to 2014, from the time the first HCH was certified in July of 2010 to the end of 2014. The evaluation measures the effect of the HCH Initiative on access, cost, and quality for all patients and for specific sub-populations, such as disadvantaged enrollees or enrollees with behavioral health conditions. The evaluation also examines HCH transformation and the relationship of care coordination payments to HCH adoption. The report first discusses HCH provider and patient demographics (Chapter 2), HCH effects on quality (Chapter 3) and cost (Chapter 4), followed by an examination of HCH payment (Chapter 5) and transformation (Chapter 6), and concluding with an analysis of HCH effects on disparities (Chapter 7). The appendices describe the evaluation design, the context of HCH implementation, and methods.

## CHAPTER 2: DEMOGRAPHICS

### INTRODUCTION

A key aspect of evaluating the Health Care Homes Initiative is understanding the characteristics of Health Care Homes organizations and their enrollees. The enabling legislation for the HCH Initiative specifies that evaluation of the initiative should include “the number of state health care program enrollees in health care homes and the number and characteristics of enrollees with complex or chronic conditions, identified by income, race, ethnicity, and language,” as well as “the number and geographic distribution of health care home providers.”<sup>93</sup>

The Minnesota Department of Health has further requested that the evaluation include a description of certified Health Care Homes, including the number and geographic characteristics, organizational characteristics, number and type of certified providers, and demographic characteristics of clinics. This chapter provides an overview of the organizational and patient characteristics for HCH clinics and enrollees.

### DEMOGRAPHICS SUMMARY

Characteristics of organizations and providers participating in Health Care Homes during the evaluation period (July 2010-December 2014):

- 4 out of every 10 primary care physicians in Minnesota practice in a certified HCH.
- Nearly half of the certified Family Medicine and Pediatrics providers in the state provide care within HCHs.
- At the end of 2014, approximately 83% of HCHs were in medical groups with 10 or more clinics and approximately 16% are in medical groups with less than 10 clinics.
- At the end of 2014, approximately 60% of HCHs were in the metropolitan Twin Cities area. The State Community Health Services Advisory Central (Benton, Cass, Chisago, Crow Wing, Isanti, Kanabec, Mille Lacs, Morrison, Pine, Sherburne, Stearns, Todd, Wadena) and Metro (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington) regions had significantly more HCHs than are expected.

Analysis of clinic characteristics correlated with participating in the HCH Initiative indicate that:

- Clinics were more likely to become certified if:
  - They had 20 or more providers
  - They had a high proportion of moderately severe beneficiaries
  - They were part of a medical group with 10 or more clinics

- They were federally qualified health centers (FQHC)
- Clinics were less likely to become certified if:
  - They were located in a frontier rural area
  - Their observed costs per beneficiary per year were greater than their risk adjusted expected costs

The FQHC results suggest that Health Care Home clinics are serving populations such as those from historically disadvantaged populations served by FQHCs.

Compared to non-HCH enrollees, HCH enrollees are:

- Dual Eligible enrollees, followed by Medicaid enrollees, followed by Medicare enrollees.
- Children (0 to 18), followed by adults (18 to 65), followed by Seniors (> 65).
- Males rather than females.
- Persons of color and Hispanics.
- Among Medicaid/Dual Eligible enrollees, non-English speakers as their primary language and those who had completed high school.
- More likely to have moderate to severe co-morbidities, with enrollees in the 3rd resource utilization band (a measure of co-morbidity and severity, followed by enrollees in the 5<sup>th</sup>, 2<sup>nd</sup>, 4<sup>th</sup>, and 1<sup>st</sup> resource utilization bands.
- Less likely to have Metastatic Cancer and Acute Leukemia, Lung, Upper Digestive Tract, and Other Severe Cancers, Lymphatic, Head and Neck, Brain, and Other Major Cancers, or Breast, Prostate, Colorectal and Other Cancers and Tumors.
- More likely to have Drug/Alcohol Psychosis.
- Less likely to have Schizophrenia.
- More likely to have Major Depressive, Bipolar, and Paranoid Disorders.
- The probability of being in HCHs increased over time, reflecting an increasing participation of HCHs.

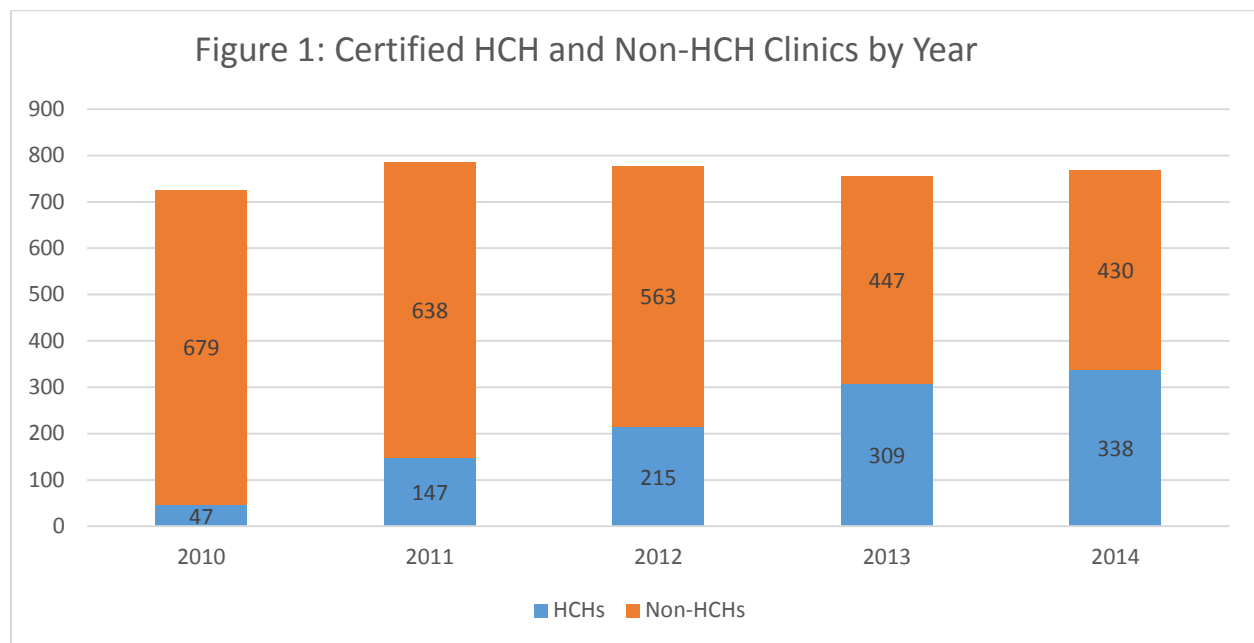
The results that persons of color, Hispanics, Dual Eligible enrollees, enrollees with moderate or higher levels of co-morbidities, and enrollees having behavioral health issues such as drug/alcohol psychosis or major depression being more likely to be served by HCHs are consistent with HCHs serving disadvantaged and more complex populations.



## CHARACTERISTICS OF HCH CLINICS

A total of 358 unique clinics were included in the HCH certification database at the end of 2014. Of these, 338 were located in Minnesota. Most Minnesota HCHs were located in the Minneapolis-St. Paul metropolitan area, but HCHs were also represented in all areas of Minnesota.

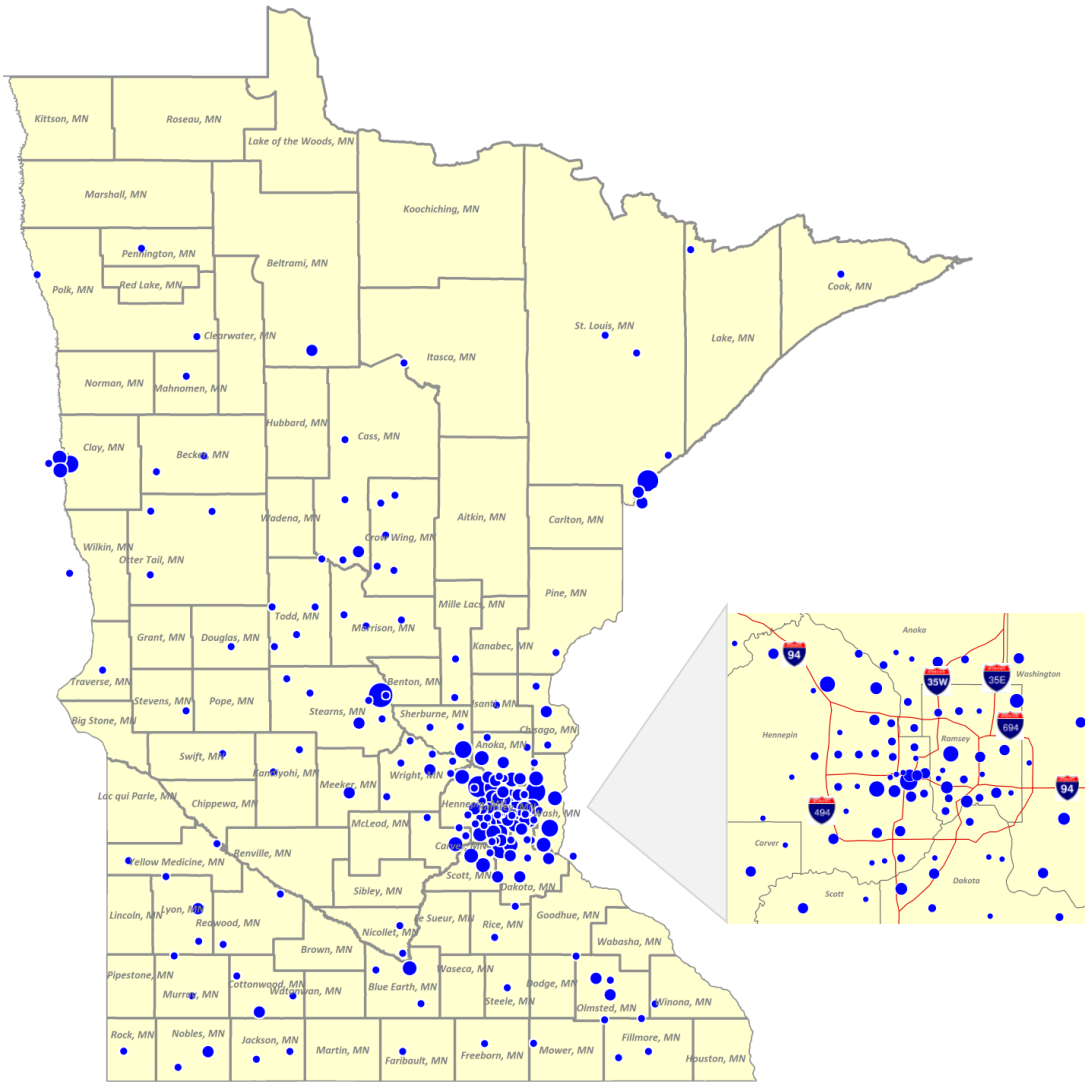
Figure 1 shows the number of clinics that were certified as HCHs and the number of clinics that were non-HCH by year (see Appendix D: Attribution Methods for a discussion of how non-HCH clinics were defined and measured for this evaluation using information supplied to the evaluation team). By 2014, 44% of the clinics that were eligible to be HCHs were certified HCHs.



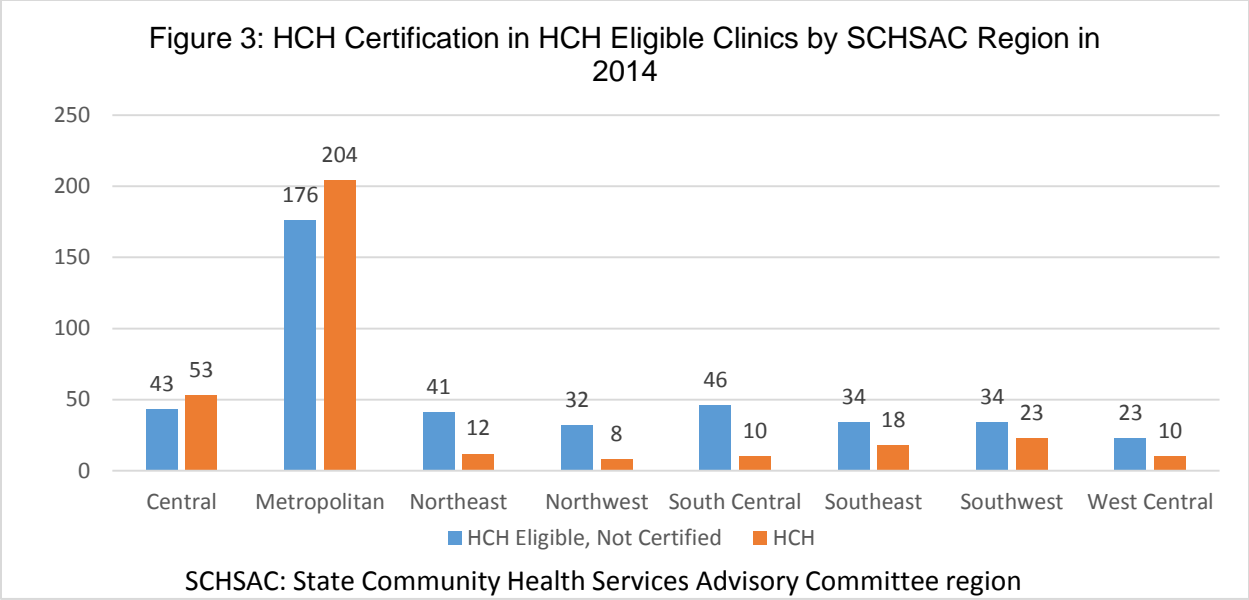
### Geographic Distribution of Health Care Homes

Certified Health Care Homes operate both within the Minneapolis-St. Paul metropolitan area and throughout the state. The distribution of certified HCHs in the state at the end of 2014 is shown in Figure 2. While Health Care Homes are concentrated in the metropolitan area, they are present in all areas of the state. However Figure 3 shows that, outside of the Central and Metropolitan regions, the number of clinics that choose not to be certified as a Health Care Homes clearly outnumber those that became certified.

Figure 2: Certified Health Care Homes in Minnesota, December 2014\*



\*Circles indicate presence of certified HCH. Larger circles indicate a higher concentration of HCHs in this location. Source: MDH HCH certification database.

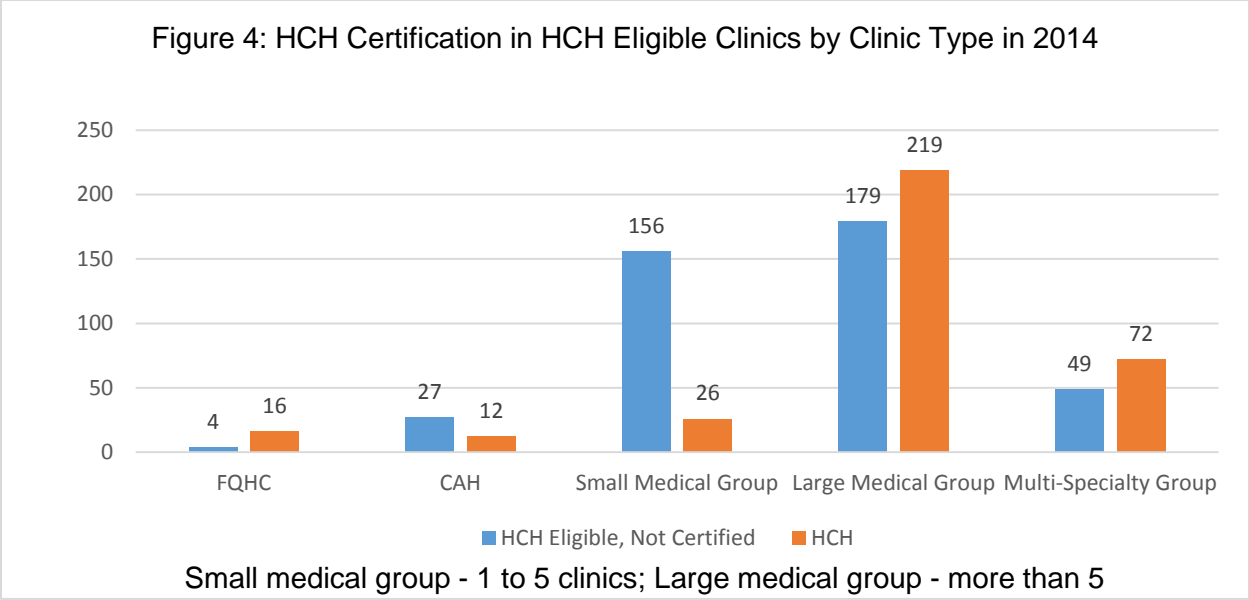


### Organizational Characteristics of Health Care Homes Clinics

Health Care Homes clinics in Minnesota represent a wide range of organizational contexts and characteristics. The simplest way to think of an individual HCH is as a free-standing primary care clinic. However, HCHs have a relatively diverse set of organizational characteristics.

Figure 4 compares non-HCH clinics to certified HCH clinics by type of clinic as of December 31, 2014. Statistical analysis shows that Federally Qualified Health Clinics (FQHCs) are more likely to be certified, critical access hospitals (CAHs) and clinics in small medical groups are less likely to be certified, and clinics in large medical groups or multi-specialty medical groups are more likely to be certified.

The measures for whether a clinic is a FQHC or a CAH comes from self-reported data, the measure for membership in a multi-specialty medical group comes from the National Plan and Provider Enumeration System (NPPES), and the number of clinics in a medical group is constructed using the SQRMS clinic registry and HCH certification database.



**Correlates of Becoming a HCH**

A multivariate analysis examined the correlates of clinics becoming HCHs. The analysis included only non-HCH clinics with the potential to change their status from not HCH certified to HCH certified (see Appendix A: HCH Evaluation Design and Appendix D: Attribution Methods for methodological details).

Clinics were more likely to become certified if:

- They had a high proportion of moderate severe beneficiaries
- They were part of a medical group with 10 or more clinics
- They were federally qualified health centers
- They had 20 or more providers

Clinics were less likely to become certified if:

- They were located in frontier rural areas
- Their observed costs per beneficiary per year were greater than their expected risk adjusted costs

**PROVIDER DEMOGRAPHICS IN NON-HCHS AND HCHS**

Figure 5 shows the distribution of primary care providers in non-HCH and HCH clinics in Minnesota in 2014. Both Family Medicine and Pediatrics providers were more likely to be in a certified HCH while Internal Medicine, Obstetrics & Gynecology, and Physician Assistants were less likely to be in certified HCHs. Sixty-seven percent of family medicine practitioners and forty-eight percent of pediatricians practiced in a certified HCH.

Figure 6 shows the distribution of primary care and specialty providers in certified HCHs by year. Family medicine, internal medicine and pediatrics providers were the predominant types of providers in certified HCHs. The number of Nurse Practitioners and Physician Assistants appears to be increasing over time.

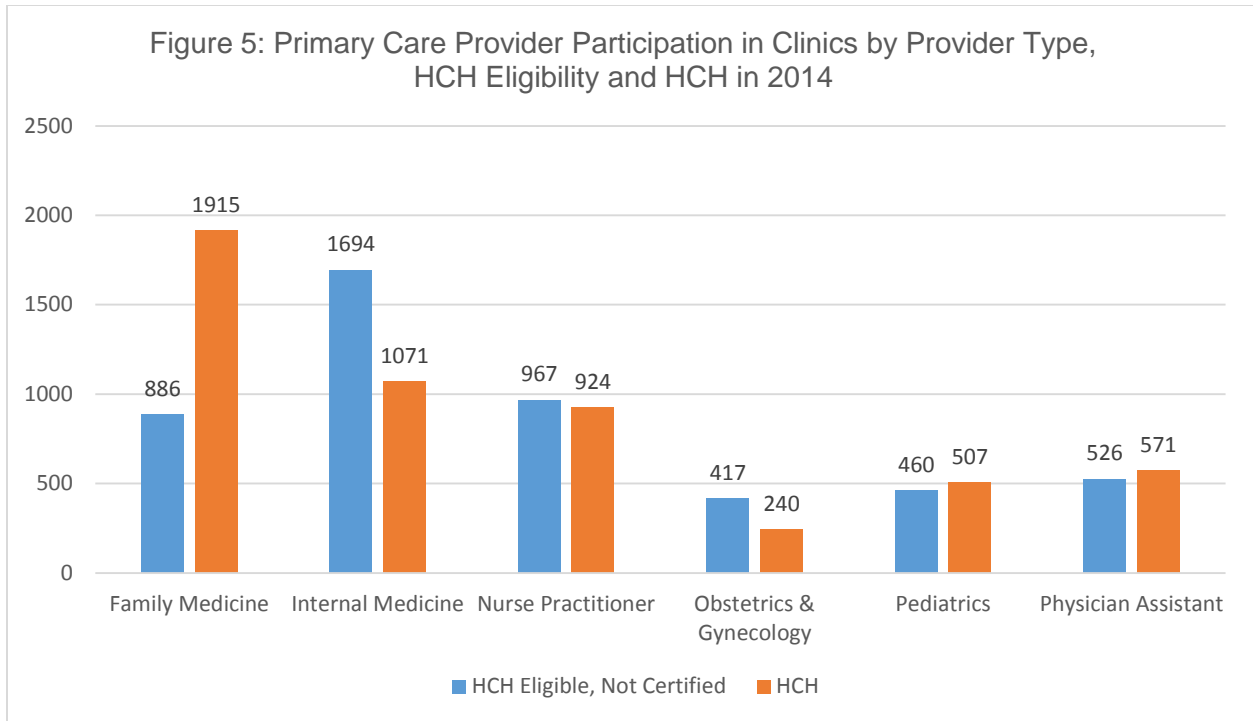
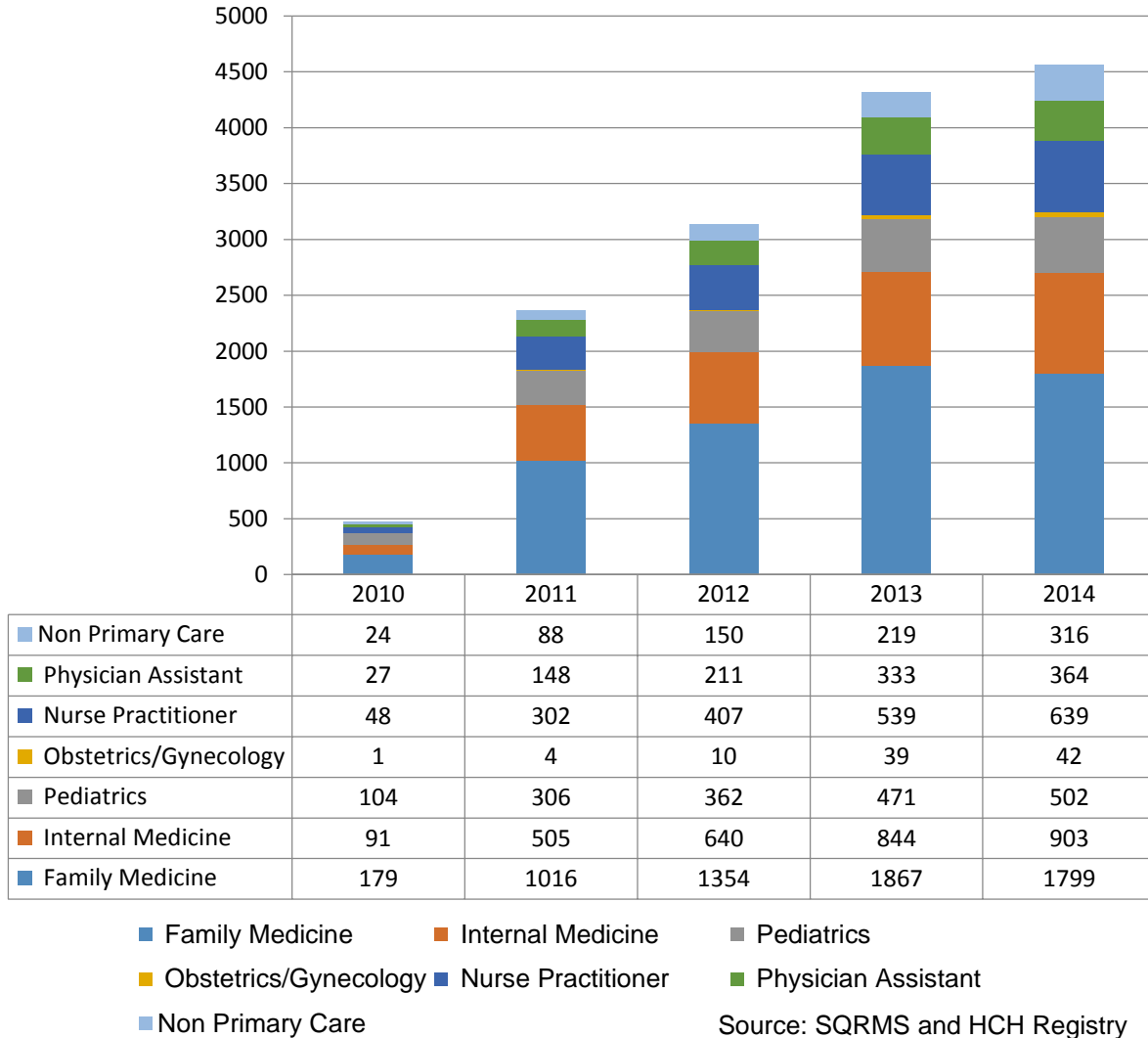


Figure 6: Provider-Health Care Homes Specialty Distribution By Year



## HCH ENROLLEE DEMOGRAPHICS

This section describes the demographics of HCH enrollees (Appendix D: Attribution Methodology describes attribution of enrollees to clinics). Demographics such as race, ethnicity, language, and education are described for each of the enrollee types of insurance the beneficiary – Medicaid, Medicare, and Dual Eligible. Data was available for Medicaid, Medicare, and Dual Eligible enrollees for 2010 to 2013 and for Medicaid enrollees in 2014. Because Medicare and Dual data was not available for 2014, Medicare and Dual results are not included for 2014.

Changes in the HCH versus non-HCH population distributions over time may have been caused by at least two processes:

- At any given time, HCH clinics might be providing health care for different patient populations than non-HCH clinics.
- New clinics entering the HCH population each year may differ in terms of clinic characteristics and patient population from the previous year's HCH and/or non-HCH clinics.

### Age and Gender

Figure 7 shows that in each year Health Care Homes clinics had fewer patients over 65 but more patients age 18 and younger. However, there were only slight differences in gender over the same time period (see Figure 8).

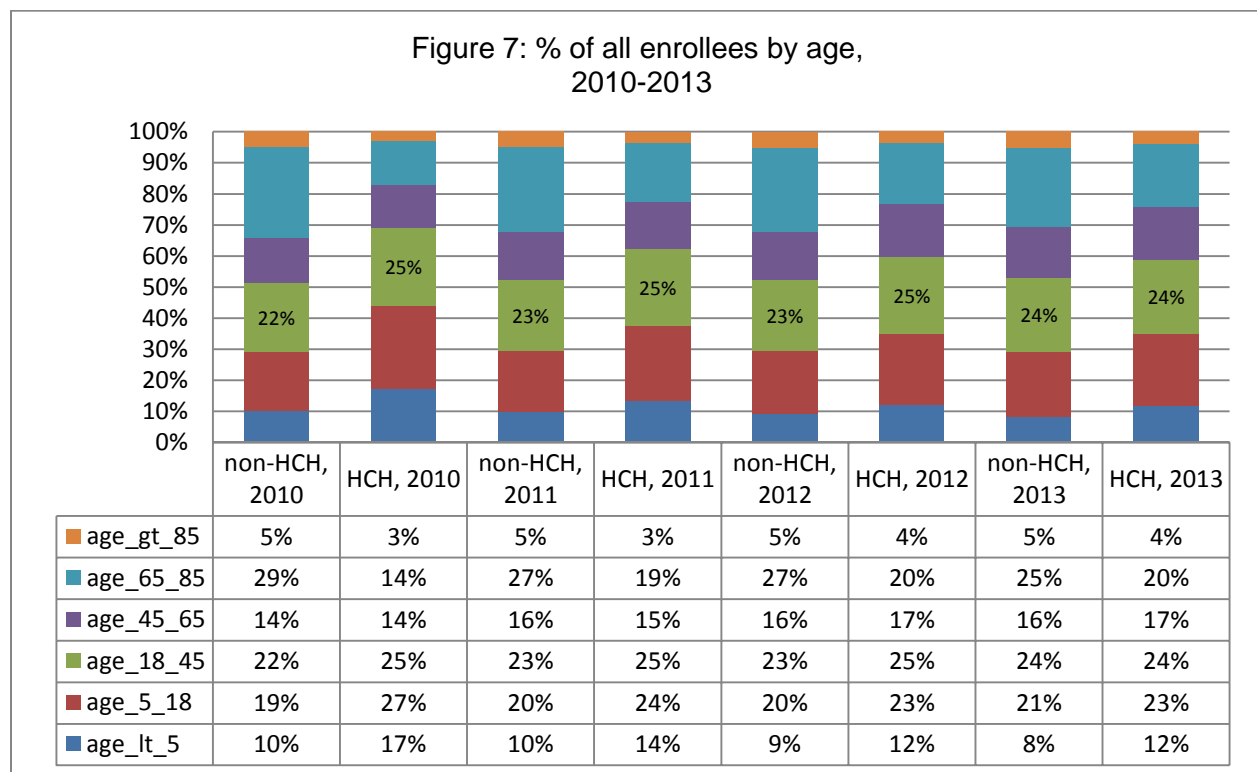
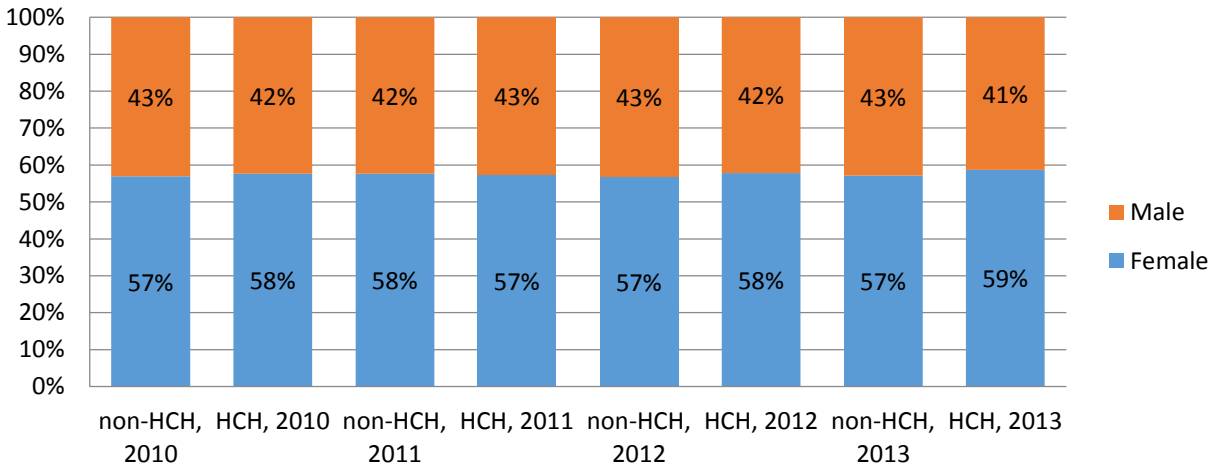


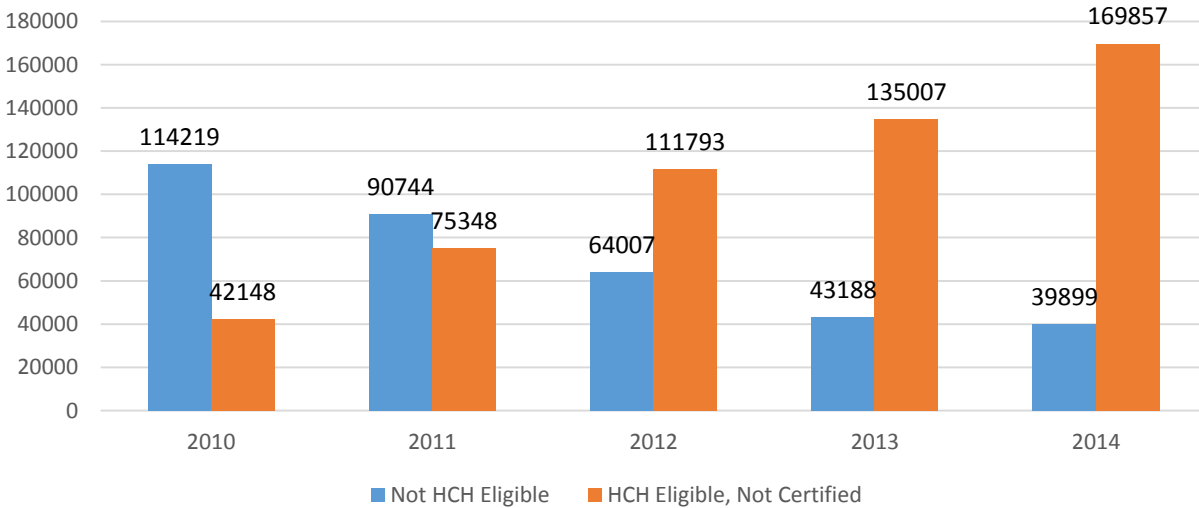
Figure 8: % of all beneficiaries by gender, 2010-2013



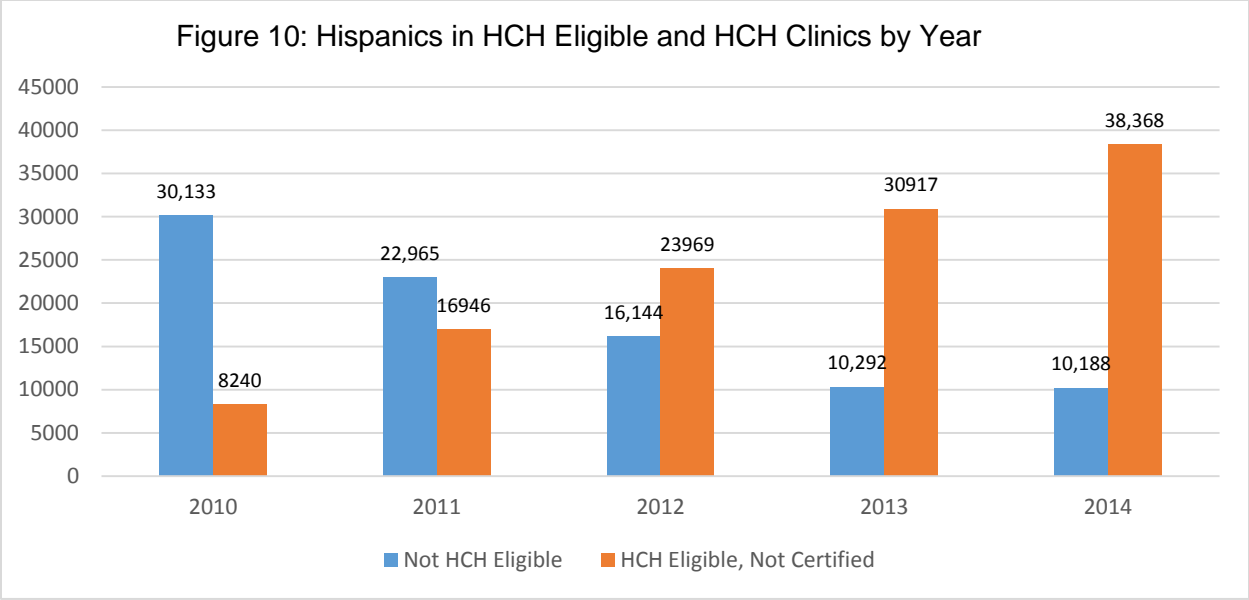
### Race and Ethnicity

Figures 9 and 10 compare racial (persons of color) and ethnicity (Hispanic) composition of non-HCH and HCH clinics. Persons of color include Asian, African American, Native American, and Pacific Islander. The difference between non-HCH and HCH clinic populations in race and ethnicity is statistically significant and shows that HCHs are serving persons of color and Hispanics.

Figure 9: Persons of Color in HCH Eligible and HCH Clinics by Year



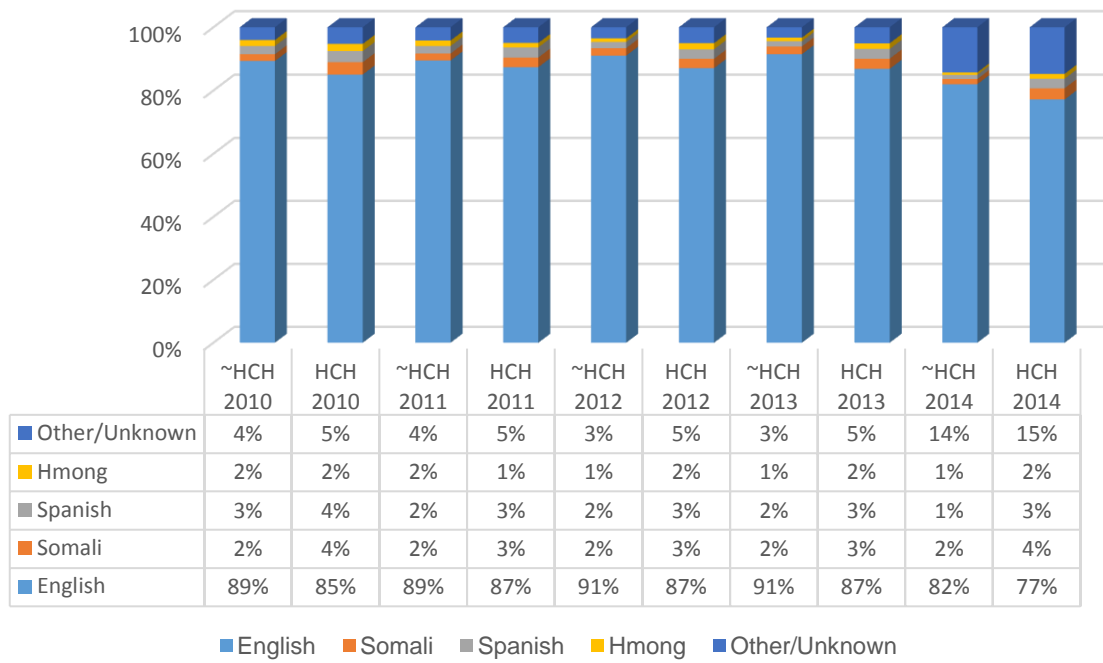




**Language**

While Minnesota Medicaid collects information on over twenty four (24) languages spoken by their enrollees, four (4) languages, English, Spanish, Somali, and Hmong account for the language spoken by over 95% of all Medicaid enrollees until 2014 when other languages accounted for 15% of all HCH Medicaid enrollees and 14% of non-HCH Medicaid enrollees (Figure 11). This may be associated with the implementation of the Affordable Care Act which resulted in changes in Medicaid enrollment policies. Differences in the distribution of these four languages between HCH and non-HCH enrollees are statistically significant in all years, but the differences between HCH and non-HCH certified clinics are small. Over time HCH certified clinics provide care for a higher proportion of non-English language speaking enrollees.

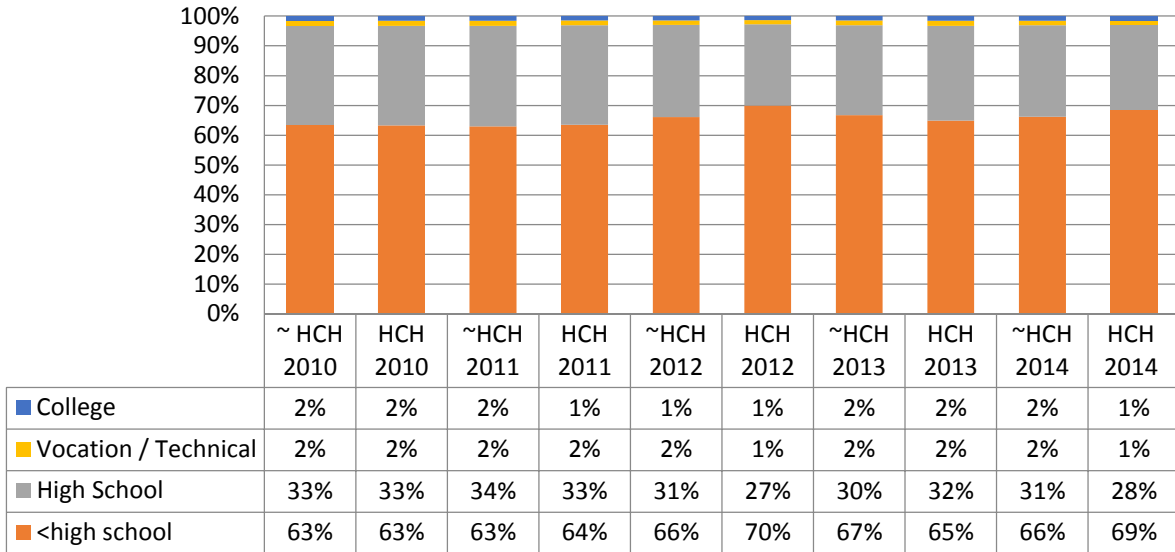
Figure 11: Primary language of HCH and non-HCH attributed patients, 2010-2014 (Medicaid / Dual Eligible)



### Educational Attainment

While there are statistically significant differences in educational attainment between the HCH clinics and the non-HCH clinics, they are small and with one exception, erratic (see Figure 12). Across time HCH clinics have an increasing percent of the population with less than a high school degree and a decrease in high school graduates.

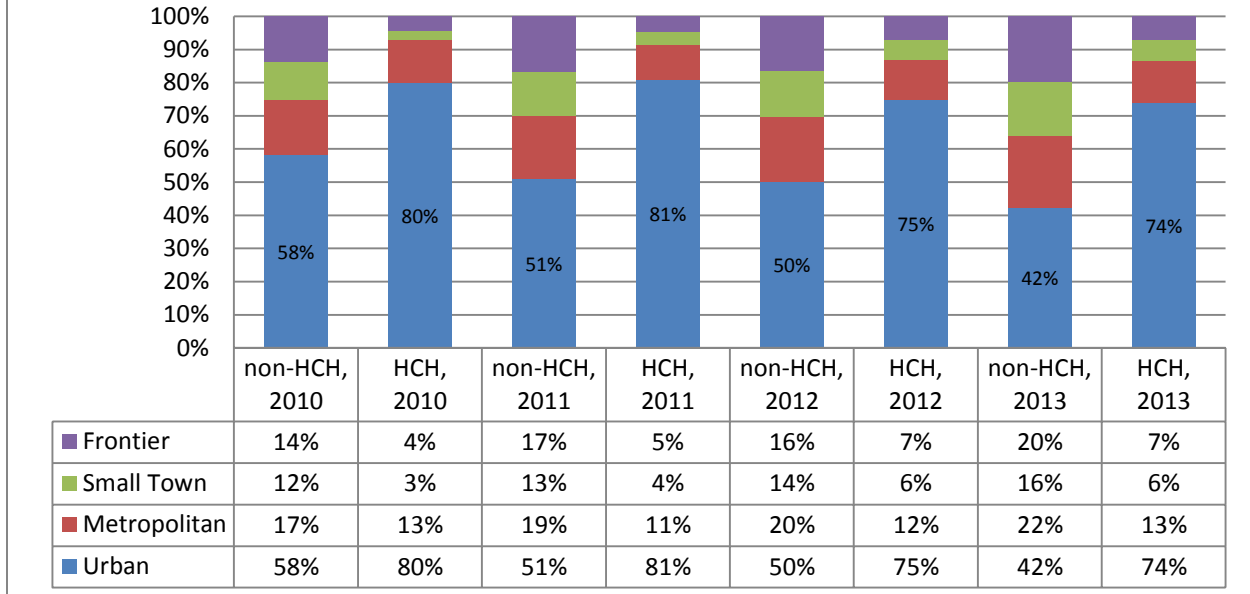
Figure 12: Educational Attainment by HCH and non-HCH attributed patients, 2010-2014 (Medicaid / Dual Eligible)



### Urban / Rural

Earlier the distribution of Health Care Homes clinics was examined and determined to be primarily located in urban and metropolitan regions, so it is no surprise that patients show the same distribution (Figure 13), overrepresented in urban and metropolitan regions and underrepresented in small towns and frontier regions.

Figure 13: All enrollees residence, 2010 to 2013



### Illness Burden and Co-Morbidities

The number of comorbidities a person has affects their pattern of health care use. Comorbidities have been shown to predict short term (1-year) mortality and to a lesser extent hospitalization. Understanding the differences in number of comorbidities between HCH and non-HCH clinics is critical in evaluating the disease burden and thus, the long term cost and efficacy of HCHs.

Co-morbidities were examined using the Johns Hopkins Ambulatory Care Groups (ACG)<sup>51, 52, 148, 166</sup> resource utilization bands (RUBs) which categorize enrollees into five levels: 1- Healthy, 2 – Low Use, 3 – Moderate Use, 4 – High Use, and 5 – Very High Use. RUBs indicate enrollees with a similar expected pattern of resource use due to their co-morbidity patterns.

Figures 14 through 16 shows the RUB analysis for each type of insurance coverage (Dual Eligible, Medicaid and Medicare enrollees) as there are important differences across the three populations. In each of these figures, a higher average score indicates that patients had, on average, a higher number of co-morbidities. For Dual Eligible beneficiaries, HCHs have a slightly higher percent of patients in the highest RUB category in HCHs. For Medicaid beneficiaries, HCHs have a slightly higher percent of patients in the middle RUB category.

Figure 14: % of Dual Eligible enrollees in each ACG Resource Utilization Band

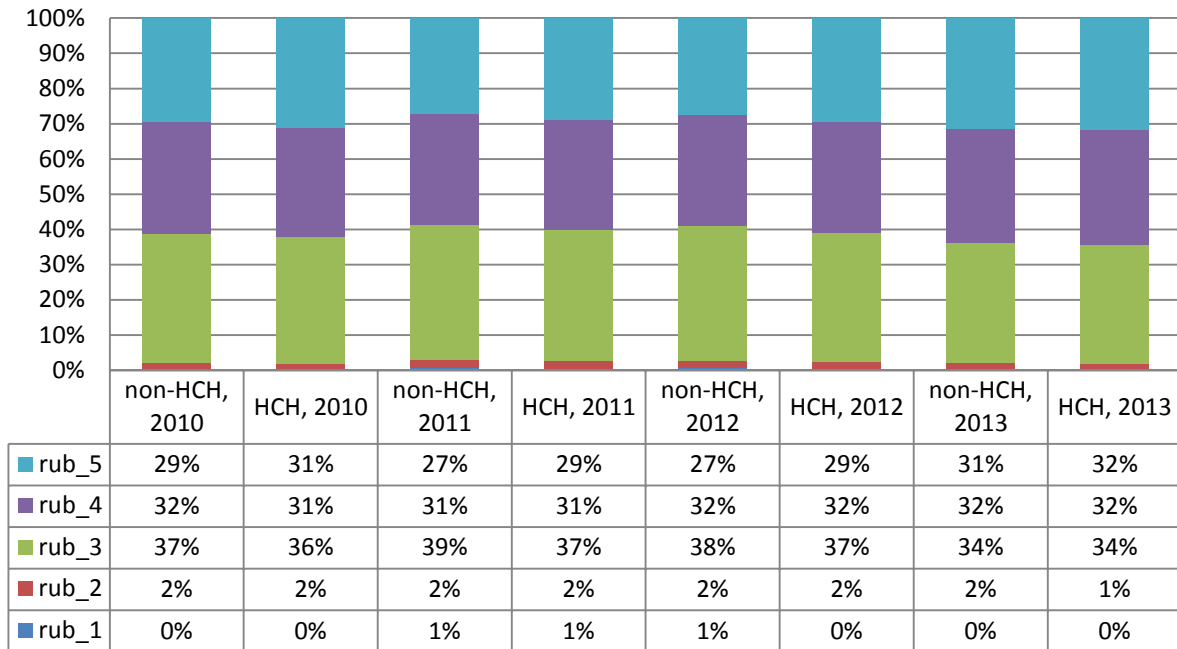


Figure 15: % of Medicaid enrollees in each ACG Resource Utilization Band

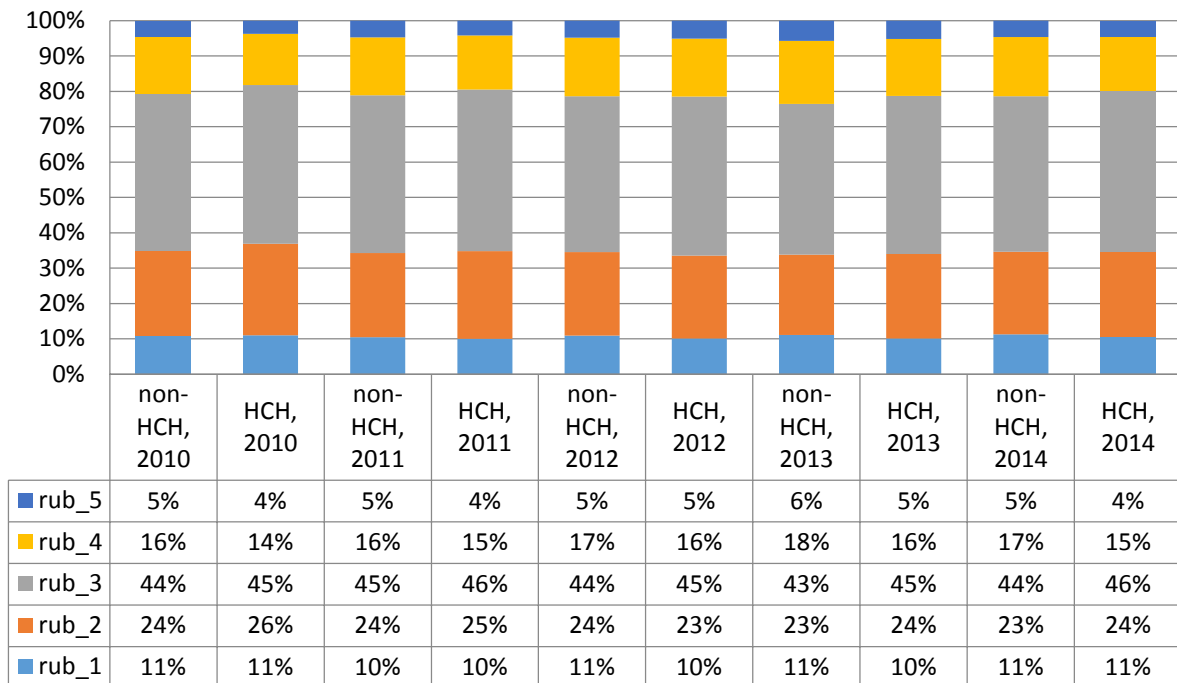
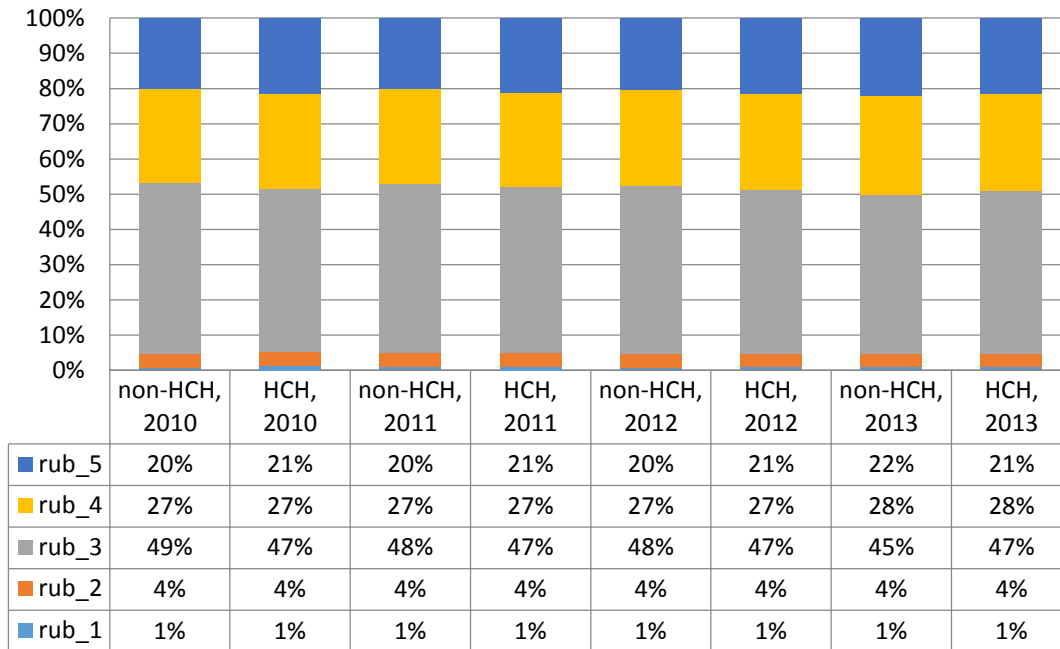


Figure 16: % of Medicare beneficiaries in each ACG Resource Utilization Band



### Which Enrollees Are Served by HCHs?

A multivariate analysis examined the correlates of enrollees being served by a HCH to determine significant correlates of being in HCHs. Only enrollees who were attributed to a non-HCH clinic were included in the analysis. Whether an enrollee was served by a HCH was regressed on the enrollee's age, gender, insurance type (Dual Eligible, Medicaid, Medicare, race (person of color), ethnicity (Hispanic), whether their primary language was not English, whether they had a high school education, their rurality, their resource utilization band, whether they had cancer, and whether they had behavioral health conditions (substance abuse, schizophrenia, major depression).

The analysis showed that:

- Dual Eligible enrollees were most likely to be in HCHs, followed by Medicaid enrollees, followed by Medicare enrollees.
- Children (0 to 18) were most likely to be in HCHs, followed by adults (18 to 65), followed by Seniors (> 65).
- Females were less likely to be in a HCHs.
- Persons of color and Hispanics were more likely to be in HCHs.
- Among Medicaid/Dual Eligible enrollees, those for whom non-English was their primary language and those who had completed high school were more likely to be in HCHs.

- Enrollees in the 3rd resource utilization band were most likely to be in HCHs, followed by enrollees in the 5<sup>th</sup>, 2<sup>nd</sup>, 4<sup>th</sup>, and 1<sup>st</sup> resource utilization bands.
- Enrollees with Metastatic Cancer and Acute Leukemia, Lung, Upper Digestive Tract, and Other Severe Cancers, Lymphatic, Head and Neck, Brain, and Other Major Cancers, or Breast, Prostate, Colorectal and Other Cancers and Tumors were less likely to be in HCHs.
- Enrollees with Drug/Alcohol Psychosis were more likely to be in HCHs.
- Enrollees with Schizophrenia were less likely to be in HCHs.
- Enrollees with Major Depressive, Bipolar, and Paranoid Disorders conditions were more likely to be in HCHs.
- The probability of being in HCHs increased over time, reflecting an increasing participation of HCHs.

The findings suggest that HCHs address disparities associated with ethnicity and race. The findings with respect to morbidity are a bit more complex. While the most severe or cancer are less likely to be in a non-HCH clinic or HCH, individuals with high expected resource use and behavioral health conditions are more likely to be in HCHs. These findings suggest that HCHs are addressing disparities and patients with multi-morbidity.

### Summary of HCH Patient Characteristics

In summary, the number and percent of enrollees attributed to Health Care Homes is increasing over time. HCHs tend to have more persons of color enrollees and a slightly higher percent who speak languages other than English.

## CHAPTER 3: HCH EFFECTS ON QUALITY

### INTRODUCTION

This chapter addresses quality of care in Health Care Homes (HCH) and non-Health Care Homes primary care clinics in Minnesota. Differences are reported between three groups: non-HCH certified clinics, HCH full-year certified and HCH partial-year certified (termed “Transforming”) clinics in Minnesota using 2009-2013 data on quality of care for quality of Asthma Care, Diabetes Care, Vascular Care, Depression, and Colorectal Cancer Screening. Findings are also presented on the patient experience (using clinic level data from 2013), on overall and unplanned hospitalizations, unplanned readmissions to the hospital, and gaps in medications for Medicare, Medicaid, and the Dual Eligible (Medicare and Medicaid) enrollees 2010-2014.

### SUMMARY OF KEY FINDINGS

- HCH Transforming and HCH full-year Certified clinics were associated with better adjusted quality of care for Diabetes, Vascular, Asthma (for children and adults), Depression, and Colorectal Cancer screening
- Patient experience was positive across both HCH and non-HCH clinics, with little differences associated with certification: only communication with one’s doctor showed a significant, but small, benefit for HCH clinics.
- Using Medicare and Medicaid data, adjusted counts and rates of hospitalization showed modest benefits that were significant among Medicaid enrollees, but non-significant among Medicare and Dual Eligible enrollees.

### POPULATION, DATA, AND METHODS

The study population was comprised of patients seen at clinics certified as HCHs for a full year, clinics transforming to be a certified HCH during the year, and non-HCH primary care clinics for the years 2009-2014. There were two primary sources of data for this analysis: clinical quality measures from the Statewide Quality Reporting and Measurement System (SQRMS) and Consumer Assessment of Health Care Providers and Systems (CAHPS) Patient Experience data.

#### SQRMS Quality of Care

Data on quality of care consisted of patient-level Statewide Quality Reporting and Measurement System (SQRMS) data for all clinic-reported patients for the years 2009-2013 (see Appendix E, Data Sources, for a description). SQRMS quality measures were used for five conditions, for the following years:



- 1) Diabetes Care: 2009 to 2013
- 2) Vascular Care: 2009 to 2013
- 3) Asthma Care: 2011 to 2013
- 4) Depression- Six-month follow-up rate and Six-month Remission: 2011 to 2013
- 5) Colorectal Cancer Screening: 2010 to 2013

Two types of measures for Asthma, Diabetes, and Vascular conditions were analyzed. The first was the SQRMS optimal care measure: patients were considered to have reached optimal care when all goals for the care of that condition were achieved. The second type was a composite average, based on the average (mean) number of care goals met for a condition.

#### *Optimal Diabetes Care*

Clinics report data to SQRMS on patients aged 18 to 75 at the start of the annual measurement period, who were recently seen by an eligible provider and diagnosed with diabetes mellitus. Optimal Diabetes Care is achieved when patients meet all of the following criteria: (1) HbA1c <8.0, (2) LDL cholesterol <100, (3) systolic blood pressure <140 and diastolic blood pressure <90, (4) documentation of being a non-tobacco user, and (5) documentation that patients comorbid with Ischemic Vascular Disease are on daily aspirin or have an accepted contraindication. Optimal care indicates the percentage of adults with Diabetes which have met all these goals, whereas Average Diabetes Care represents the average (mean) number of goals met.

#### *Optimal Vascular Care*

The SQRMS Optimal Vascular Care measure is achieved when patients meet all of the following care goals: (1) LDL cholesterol <100, (2) systolic blood pressure <140 and diastolic blood pressure <90, (3) documentation of non-tobacco use, and (4) documentation that the patient is on daily aspirin or has an accepted contraindication. From 2010 through 2013, clinics report data on patients aged 18 to 75 diagnosed with Ischemic Vascular Disease at the start of the annual measurement period who have been seen recently by an eligible provider. Within this population, Optimal Vascular Care indicates the percentage of adults with Ischemic Vascular Disease who have met all these goals, whereas Average Vascular Care represents the average (mean) number of care goals met.

#### *Asthma Care*

From 2010 through 2013, clinics reported Asthma Care measures data to SQRMS at the start of the measurement period on patients aged 5 to 50, recently seen by an eligible provider and diagnosed with Asthma. In this population, Optimal Asthma Care is achieved when all of the following targets are met: (1) well-controlled asthma (based on applicable asthma control tests or questionnaires), (2) not at

elevated risk of exacerbation (based on number of patient-reported hospital and emergency department visits), and (3) educated about asthma self-management and has a written asthma management plan present in the medical record. Optimal Asthma Care indicates the percentage of patients with Asthma who have met all care goals, whereas average Asthma care is the average (mean) number of these goals met.

### *Colorectal Cancer Screening*

SQRMS Colorectal Cancer Screening measure outcomes indicate the percent of patients up to date with regular colorectal cancer screenings. Clinics report data on patients age 51 to 75, seen in person by eligible providers at least twice during the two years prior to the measurement period, and seen in person by eligible providers at least once during the annual measurement period. Within this clinic population, patients are considered up to date with appropriate colorectal cancer screening exams if they have received either a colonoscopy within the measurement period or previous 9 years, a sigmoidoscopy within the measurement period or previous 4 years, or a stool blood test within the measurement period.

### *Depression Quality*

The Depression Quality measure consists of two measures. The first, Depression Remission at Six Months, indicates the percentage of patients identified as having depression (defined by a Patient Health Questionnaire, 9-item [PHQ-9] with a depression score of 10 or greater) who subsequently reach remission (a PHQ-9 score of less than 5) six months after depression is identified. The second measure, Depression Follow-up at Six Months, indicates the percent of patients assessed as having depression at an index visit with a follow-up PHQ-9 administered within six months (plus or minus 30 days) from the index identification of depression.

## CAHPS Patient Experience

Patient experience data came from the 2013 Consumer Assessment of Healthcare Providers and Systems (CAHPS)<sup>4</sup> survey at the clinic level for all eligible certified, transforming, and non-HCH clinics.. Measures for the standard CAHPS survey include scores by the following domains:

- Getting needed care and getting care quickly (“Access to care”)
- Communication with doctors (“Communication with Dr.”)
- Overall rating of doctors (“Overall Dr. Rating”)
- Willingness to recommend the doctor to others (“Would recommend Dr.”)

Because the levels for these variables were clustered at the high end, each were measured as the percent of individuals with the highest ratings (e.g., the percent giving an overall rating of 9 or 10 for their doctor).

## Medicare and Medicaid Data Analysis using Ambulatory Care Group (ACG) Measures

The population for this analysis consisted of Minnesota's Medicare, Medicaid, and Dual Eligible (Medicare-Medicaid) population attributed to primary care clinics from 2010-2014. Medicare data was available through 2013 and Medicaid data was available through 2014. These data sets included patient-level Medicare and Medicaid enrollment and administrative claims information on use of health care services; clinic characteristics including zip code and rurality; and patient characteristics including reasons for enrollment (e.g., age, gender, disability), diagnoses. For the analysis, the Johns Hopkins Ambulatory Care Group (ACG) <sup>51, 52, 148, 166</sup> case-mix and coding system was used to adjust for morbidity, utilization patterns and to identify key outcomes: unplanned hospitalizations, unplanned readmissions, and total medication gaps for those with Medicaid data. Pharmacy data was not available for Medicare. Outcomes were analyzed as both counts of events (number of hospitalizations) and as binary measures indicating having one or more of each type of visit (was hospitalized: yes or no).

### Analysis

Unadjusted statistics by clinic enrollment were calculated for non-HCH certified, HCH certified, and transforming clinics. Multivariate models for SQRMS data were adjusted for clinic self-selection into HCHs and clustering of patients within clinics, with models examining transforming and certified clinics compared to non-HCH primary care clinics. Models controlled for patient age and sex, clinic rurality, and for interactions between HCH certification and number of years certified.

Grouped logit regression models for clinic-level CAHPS data controlled for clinic self-selection into HCHs and other clinic-level factors: clinic size, percent Medicaid, percent in each quintile of clinical complexity as measured by hierarchical condition categories, percent African American, clinic rurality, and federally qualified health center (FQHC) status. Person-level analyses using Medicare and Medicaid data controlled for patient age, sex, race/ethnicity, and rurality; interactions of HCH by year; and clinic self-selection into HCH.

Tests for statistical significance for most analyses were set at a p-value less than 0.0001. Unless otherwise indicated, all differences between HCH and non-HCH quality scores presented in this chapter are statistically significant at this value. Further description and specifications for each of these quality measures is provided in the Appendix.

## RESULTS

The results for each set of condition-specific SQRMS measures and for CAHPS patient experience measures are defined below.

### SQRMS Quality of Care

Below are adjusted rates of Optimal Care Quality and adjusted Average Care Quality by HCH status for each condition.

#### *Optimal Quality of Care*

Findings indicate that HCH Transforming and HCH certified primary care clinics are associated with slightly and significantly better adjusted rates of optimal quality of care across medical conditions. The largest HCH-related differences in quality of care were in the Asthma care measures: that is, the adjusted optimal quality rates for Transforming and HCH-Certified clinics were approximately 13 and 18 percentage points higher, respectively, than the non-HCH quality rate among adults, with similar differences among children.

However, despite consistent improvements in non-HCH, HCH Transforming, and Certified clinics in most years, the adjusted rates for conditions with the best optimal care (Vascular and Diabetes Care and Colorectal screening), were less than 70%. Across all optimal quality indicator measures, adjusted rates of optimal care quality were between 24% and 63% meeting each target (colorectal cancer screening was highest at 63%; excluding it, the next highest rate was 53% meeting the optimal target for vascular care) for HCH-Transforming and HCH-Certified clinics, and between 17 and 59% (47% if excluding colorectal screenings) for HCH non-certified clinics, suggesting room for improvement.

Table 1. Optimal Care Quality: Adjusted rates of Optimal care (all goals met), by condition and HCH clinic status

	Non-HCH clinics	HCH-Transforming (partial year) clinics		HCH-Certified (full year) clinics	
	% meeting goals	% meeting goals	Difference from non-HCH clinic	% meeting goals	Difference from non-HCH clinic
Vascular care	46.6%	53.2%	6.6%	53.3%	6.7%
Diabetes care	36.6%	40.1%	3.5%	40.6%	4.0%
Asthma care (adults)	16.7%	29.8%	13.1%	34.5%	17.8%
Asthma care (children)	19.2%	30.2%	11.0%	39.2%	20.0%
Depression follow-up	19.5%	23.6%	4.1%	26.7%	7.2%
Depression remission	22.6%	24.3%	1.7%	25.0%	2.4%
Colorectal Cancer screening	58.8%	60.7%	1.9%	63.3%	4.5%

Notes: Percentages are regression-adjusted for clinic self-selection into HCH, patient demographics, interactions between HCH status and year, and clinic size, medical group affiliation, and rurality. All results shown were statistically significant at  $p < .001$ .

#### *Average Quality Of Care*

Results for Average Quality of Care were similar to Optimal Quality of Care (see table below). HCH-Transforming and full-year HCH-Certified clinics had slightly higher average number of goals met for each condition. The best Average Care Quality was for Vascular Care, particularly among HCH full-year certified clinics, in which an average of 3.4 goals were met (nearly 85% of the 4 goals for vascular care). Asthma Care among adults had the lowest quality for all clinic groups (and lowest for HCH Non-Certified clinics at 31% of goals met). However, Asthma Care for adults was also where the largest differences were evident by HCH status: patients in full-year HCH-Certified clinics had an average of 1.58 goals, or 58% of goals for Asthma Care, met—a difference of 0.64 goals greater and a 21 percentage point difference in the percent of goals met compared to Non-HCH clinics.

Table 2. Average Care Quality: Adjusted counts and percentages of care goals met, by condition and HCH clinic status

	Non-HCH clinics		HCH-Transforming (partial year) clinics			HCH-Certified (full year) clinics		
	# goals met	% of goals met	# goals met	% of goals met	Difference from non-HCH clinic	# goals met	% of goals met	Difference from non-HCH clinic
Vascular care	3.25	81.3%	3.38	84.4%	3.0%	3.38	84.6%	3.0%
Diabetes care	4.02	80.4%	4.09	81.8%	1.4%	4.10	82.0%	1.6%
Asthma care (adults)	0.94	31.4%	1.40	46.7%	15.3%	1.58	52.7%	21.3%
Asthma care (children)	1.09	36.3%	1.42	47.3%	11.0%	1.69	56.3%	20.0%

Notes: Numbers are regression-adjusted for clinic self-selection into HCH, patient demographics, interactions between HCH status and year, and clinic size, medical group affiliation, and rurality.

### CAHPS Experience of Care

There were no significant differences in patient experience between HCH Transforming or full-year certified HCHs versus non-HCH clinics. In most cases, ratings were relatively high regardless of HCH status. The exception was Communication: HCH transforming clinics were significantly more likely to have high ratings on this domain than non-HCH clinics, though full-year certified clinics showed no such significant differences.

Table 3. Patient experience: Adjusted percent with high ratings, by experience domain and HCH status

		<b>Non-HCH clinics</b>	<b>HCH-Transforming (partial year) clinics</b>		<b>HCH-Certified (full year) clinics</b>		
		% with highest rating	% with highest rating	Difference from non-HCH clinic	% with highest rating	Difference from non-HCH clinic	p value of contrast
	Communication with Dr.	90.5%	92.0%	1.4%	91.1%	0.6%	0.0008
<b>Not significant</b>	Would recommend Dr.	88.8%	89.7%	1.0%	89.1%	0.4%	0.2414
	Overall Dr. rating	79.2%	80.3%	1.1%	79.4%	0.2%	0.2754
	Access to care	61.0%	59.5%	-1.5%	59.0%	-2.0%	0.3554
Notes: Numbers are regression-adjusted for clinic self-selection into HCH, patient demographics, clinic size, medical group affiliation, and rurality.							

### Quality of Care using Medicare and Medicaid Data

In addition to assessing HCH and non-HCH performance on SQRMS measures, this evaluation also included analysis of select utilization metrics using Medicare and Medicaid data for analysis at the patient-level. The measures included unplanned hospitalizations and unplanned readmissions to a hospital within 30 days after an inpatient stay. These outcomes are shown as both counts and as binary models for having one or more of a type of visit; and total medication gaps (the number of gaps in medication supply for a condition – see Appendix A: HCH Evaluation Design for a full description) for those with Medicaid data (the evaluators did not have Medicare pharmacy data). The results are presented by payer (separately for Medicare, Medicaid, and Dual Eligible).

Table 4. Quality measures among Medicare and Medicaid enrollees in non-HCH, HCH-Transforming, and full-year HCH-Certified clinics in Minnesota, 2010-2014

	Adjusted # / %	Adjusted # / %	Adjusted # / %	Joint test, p value
<b>Medicare</b>				
	Non-HCH	Transforming	HCH-Certified	Joint test, p value
Unplanned inpatient stays (#)	0.1763	0.1759	0.1748	0.1071
Unplanned readmissions (#)	0.0239	0.0238	0.0226	0.3206
Any inpatient stay (%)	17.69%	17.36%	17.31%	0.7332
Any unplanned inpatient stay (%)	12.64%	12.54%	12.54%	0.3958
Any unplanned readmission (%)	1.79%	1.79%	1.71%	0.4212
<b>Medicaid</b>				
<i>Adults</i>	Non-HCH	Transforming	HCH-Certified	Joint test, p value
Unplanned inpatient stays (#)	0.149	0.140	0.133	<0.0001
Unplanned readmissions (#)	0.248	0.229	0.217	0.0004
Total medication gaps (#)	1.327	1.411	1.377	<0.0001
Any inpatient stay (%)	14.91%	14.41%	14.02%	<0.0001
Any unplanned inpatient stay (%)	9.58%	9.37%	9.07%	<0.0001
Any unplanned readmission (%)	1.40%	1.36%	1.32%	0.0442
<i>Children</i>	Non-HCH	Transforming	HCH-Certified	Joint test, p value
Any inpatient stay (%)	5.05%	4.68%	4.77%	0.0029
Any unplanned inpatient stay (%)	4.25%	3.96%	4.07%	0.0353
Any unplanned readmission (%)	0.30%	0.23%	0.24%	0.0889
<b>Dual Eligible</b>				
	Non-HCH	Transforming	HCH-Certified	Joint test, p value
Unplanned inpatient stays (#)	0.3372	0.3388	0.3302	0.5238
Unplanned readmissions (#)	0.068	0.067	0.063	0.1535
Total medication gaps (#)	0.6446	0.6831	0.6893	0.1359
Any inpatient stay (%)	22.48%	22.59%	22.25%	0.0808
Any unplanned inpatient stay (%)	19.26%	19.48%	19.18%	0.3914
Any unplanned readmission (%)	3.90%	3.88%	3.73%	0.2632

Note: models control for patient demographics and conditions, clinic self-selection into HCH, and interactions of HCH effects and year.



Based on joint tests of significance for transforming and certified HCH versus non-HCH, no significant differences were found in the Medicare or Dual Eligible groups. In most cases, adjusted counts and probabilities in Medicare were better for patients attributed to transforming and certified clinics, but not significantly so. Results were slightly more mixed in the Dual Eligible group, showing in most cases some small benefit, at least to full-year HCH certified clinics, that was non-significant in joint tests.

For the Medicaid population, the analysis indicated that adults in HCH transitioning or HCH certified clinics had significantly lower mean adjusted counts of unplanned hospitalizations and readmissions, and lower adjusted chances of planned and unplanned hospitalizations than those in non-HCHs. Total medication gaps were slightly higher, and statistically significant, for those in HCH Transforming and Certified clinics than those attributed to non-HCHs.

For children enrolled in Medicaid, the differences on each of these measures between HCH certified clinics, transforming clinics, and non-HCH clinics were not significant.

## CONCLUSION

This analysis compared performance on key Statewide Quality Reporting and Measurement System (SQRMS) quality of care measures for HCH Transforming and HCH certified versus non-HCH certified clinics in Minnesota. Of clinics reporting data on these measures to SQRMS, adjusted rates of optimal care, and adjusted average quality goals met, were significantly higher in HCH transforming and HCH-certified clinics. This is consistent with literature indicating slightly better preventive care and process of care in HCHs<sup>49</sup>. However, even in fully-certified HCHs, the rates of optimal quality were less than 70% for all conditions (and less than 59% in Non-Certified clinics). While there was some evidence that these rates improved over time, the results indicate that there is room for improvement across all clinics, particularly with regard to issues such as asthma care for adults and depression remission: while HCH-Transforming and HCH-Certified clinics' rates of meeting targets in these areas were better than non-HCHs, the overall adjusted rates for all clinics were still relatively low compared to other quality targets.

CAHPS measures focusing on patient experience outcomes, with the exception of communication with one's doctor, showed no difference between HCH-Transforming and HCH-Certified and non-HCH certified clinics. This is consistent with prior studies showing no, or small, effects of health care home on patient experience compared to usual care, even if process of care may show improvements<sup>49, 70</sup>. Greater communication in HCHs may reflect many aspects of patient-provider relationships in HCHs, including greater continuity or coordination of care, but these require further study. However,

communication ratings tended to show small differences by clinic status, and tended to be relatively highly rated across all clinics regardless of HCH certification, as were all CAHPS measures. In addition, the CAHPS measures were only available for a single year, and so the context during that year, larger trends over time, and other data were not observable for the analysis.

Results from patient-level Medicare and Medicaid analyses of unplanned admissions, readmissions, and adherence suggest very modest benefits for patients attributed to HCH versus non-HCH clinics in most measures, which were in most cases not significant other than among adult Medicaid beneficiaries. It may be that these beneficiaries received the most benefit, or the finding could be due to other factors such as these beneficiaries having the most to gain (though that does not negate the fact that HCHs may help to increase such gains) or due to differences in sample size and statistical power. The lack of an effect for children may be a consequence of pediatric medical homes being implemented in some clinics prior to the HCH initiative which resulted less of a difference between HCHs and non-HCHs.

## CHAPTER 4: COSTS AND UTILIZATION

### INTRODUCTION

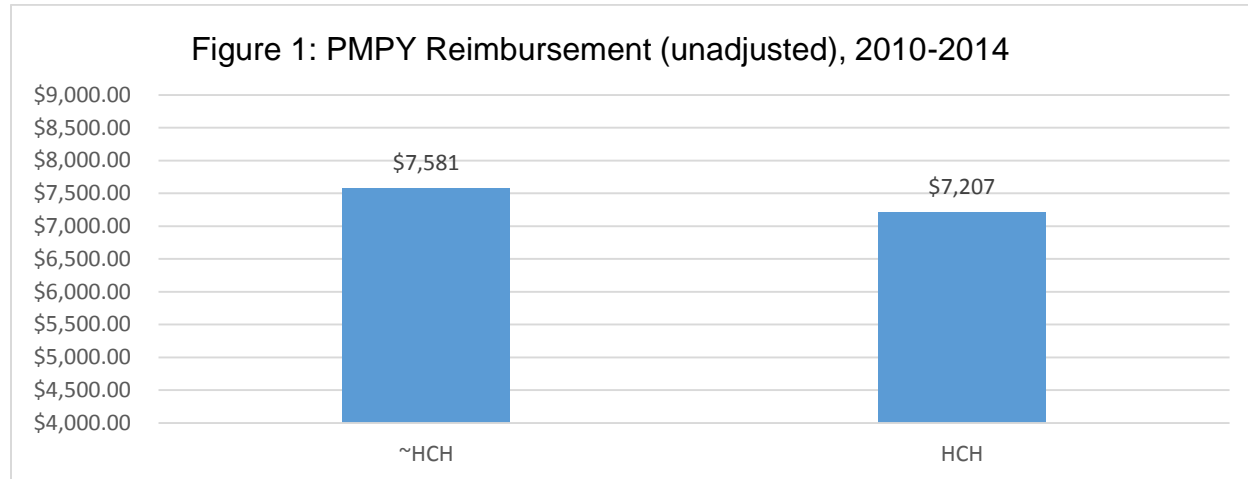
This chapter examines two principal questions of the evaluation: “Was care provided in Health Care Homes (HCHs) more expensive or less expensive than care provided in traditional clinics?” and “How did Health Care Homes affect utilization?”

### OVERALL FINDINGS ACROSS MEDICAID AND MEDICARE

Medicaid and Medicare claims data were reviewed for the years 2010 through 2014 comparing the use and cost of services between certified HCHs clinics compared to non-HCHs. Throughout the report these comparison clinics are referred to as non-HCHs and are abbreviated as “~HCH.”

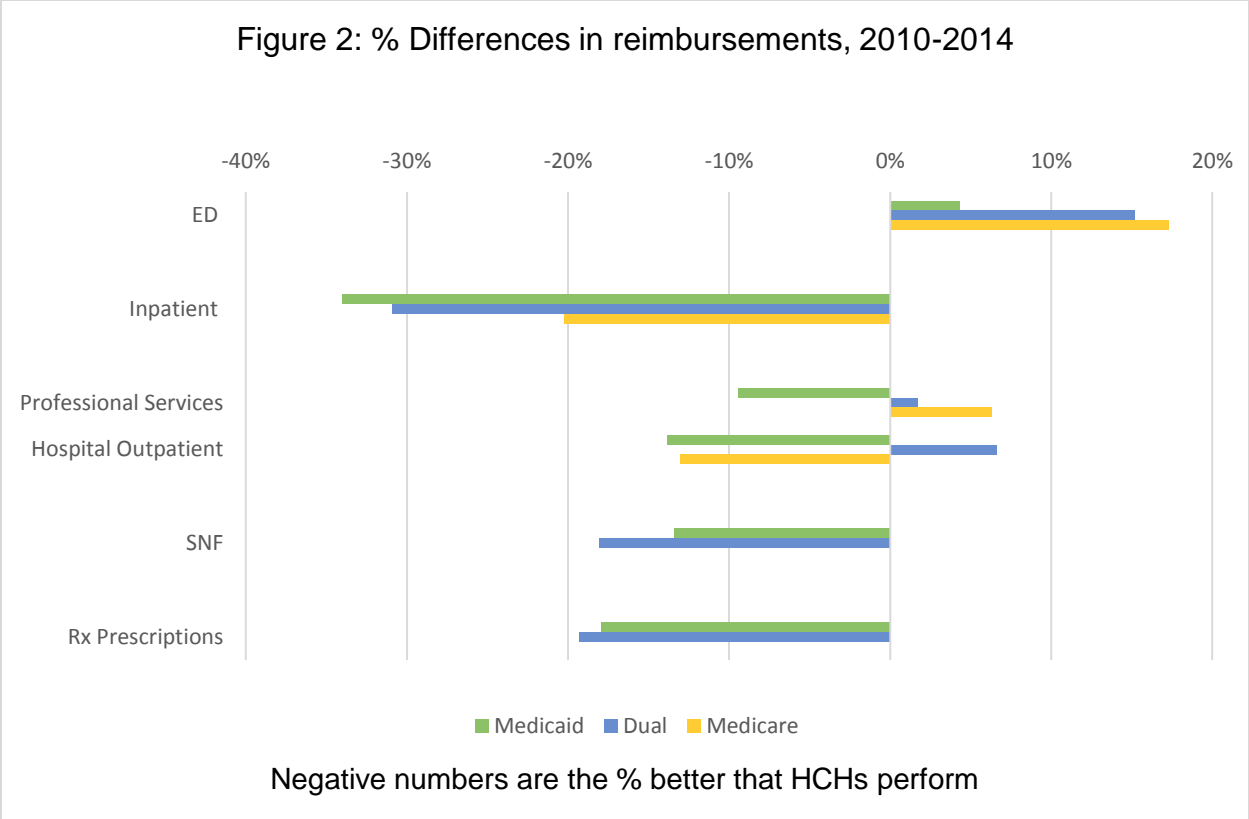
#### Overall Reimbursement

Overall, the comparison of HCHs to non-HCHs using observed dollars and not adjusting for severity, demographics, or self-selection of clinics shows that HCHs were nine percent (9%) less expensive than non-HCHs in Per Member Per Year (PMPY) reimbursement (Figure 1). PMPY is defined as the sum of all seven health care spending categories.



Also examined were expenses for emergency department, inpatient hospital admission, ambulatory surgery, physician visits, prescription drugs, and skilled nursing home admissions.

Figure 2 shows that not only were HCHs less expensive overall, they were also less expensive in three of seven categories of health care spending measured annually (per member per year).



HCHs were more expensive in use of emergency departments and ambulatory surgery. However, and more impressive, HCHs were less expensive by wide margins in four categories of spending: inpatient hospital admissions, hospital outpatient visits, skilled nursing facilities, and pharmacy. There was no percentage difference for the cost of physician visits.

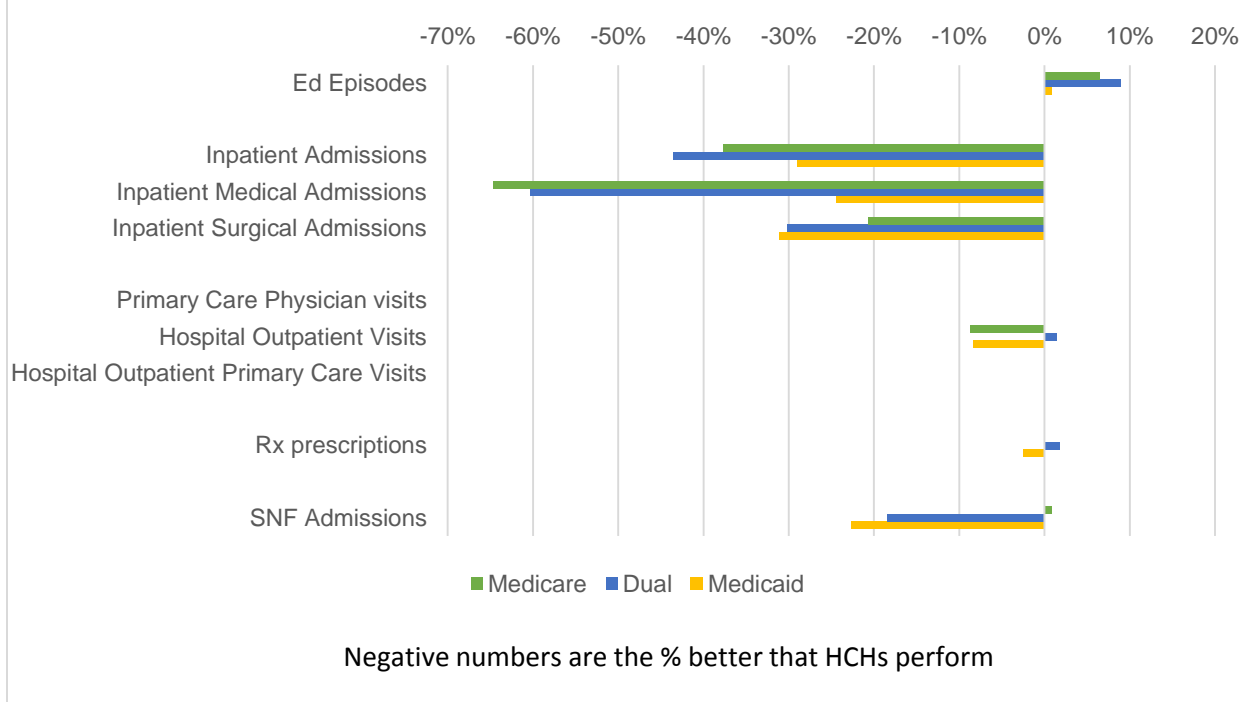
**Overall Utilization**

An examination of costs is not complete without an understanding of the volume of service that was reimbursed.

Figure 3 shows inpatient admissions, visits or prescriptions (as appropriate) for several categories of health care spending. As with Figure 2, negative numbers in Figure 3 indicate better HCH performance (i.e. using fewer services) compared to non-HCHs.

HCHs use fewer services than non-HCHs in every category except for emergency department visits and skilled nursing home admissions. Possible reasons for these results will be examined later in the chapter especially since it was hypothesized that HCHs would reduce use of the emergency department.

Figure 3: % Differences in encounters, 2010-2014



### Summary

For convenience, Table 1 contains the percentage difference in use and cost side-by-side.

This side-by-side comparison is important as it demonstrates a key finding that needs to be further explored. For example HCHs use ten percent (10%) more ED visits but these visits only result in a three percent (3%) increase in cost. Conversely, HCHs use only two percent (2%) more ambulatory surgery services but pay more than 6% more for these services. There are any number of explanations for this finding - less acute visits, less expensive provider, better contractual relationship – all of which may be in alignment with the HCHs approach but while interesting, are beyond the scope of the current evaluation.

Table 1: Comparison of % Differences in Use and Cost		
	Use	Cost
ED visits	10%	3%
Inpatient Admissions	-29%	-35%
Ambulatory Surgeries	-2%	6%
Physician visits	0%	0%
Hospital Outpatient Visits	-38%	-47%
Pharmacy	-1%	-13%
SNF	7%	8%

While HCHs saw higher emergency department and skilled nursing home use relative to non-HCHs, they also saw substantially lower use of hospital services, which was the primary driver of cost savings, and slight lower use of prescription drugs.

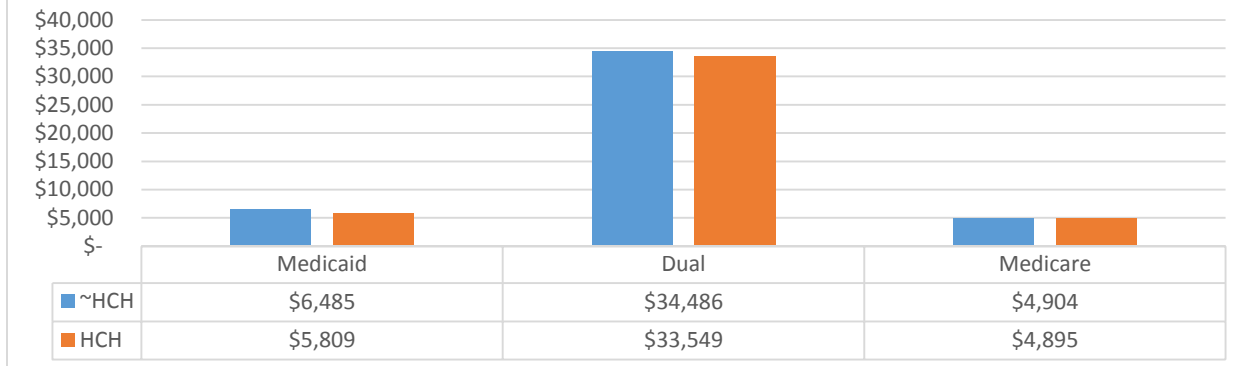
## FINDINGS BY TYPE OF INSURANCE

This section examines differences in use and cost of services between HCHs and non-HCHs by insurance status. Use and cost are compared for patients covered by Medicare, Dual Eligibles and Medicaid. The comparisons use actual costs by plan to measure the observed impact of HCHs. Following sections examine whether HCH effects are due to other factors such as for clinic self-selection into being a HCH, patient characteristics and risk, and clinic characteristics. Multivariate analyses designed to test for the effect of being an HCH on costs by controlling for these factors showed that compared to non-HCHs, HCHs significantly lowered costs for Medicaid and Medicare enrollees.

### Total Per Member Per Year Costs

Figure 4 shows the percentage difference in reimbursement (PMPY) by insurance type for HCHs and non-HCHs. HCHs cost less for Medicaid (12% better) and Dual (3% better) enrollees but are neutral for Medicare enrollees.

Figure 4: Average total reimbursement, 2010-2014 by insurance type



### Emergency Department Use and Cost

Use of emergency department, followed by use of the hospital, and finally physician services, both in traditional stand-alone clinics and in hospital outpatient clinics.

Figure 5 reveals that HCHs had more emergency department visits than non-HCH (1%, 7% and 9% respectively) and had higher expenditures (5%, 18% and 21% respectively) (see Figure 6).

Figure 5: Average Emergency Department visits per enrollee, 2010-2014 by insurance type

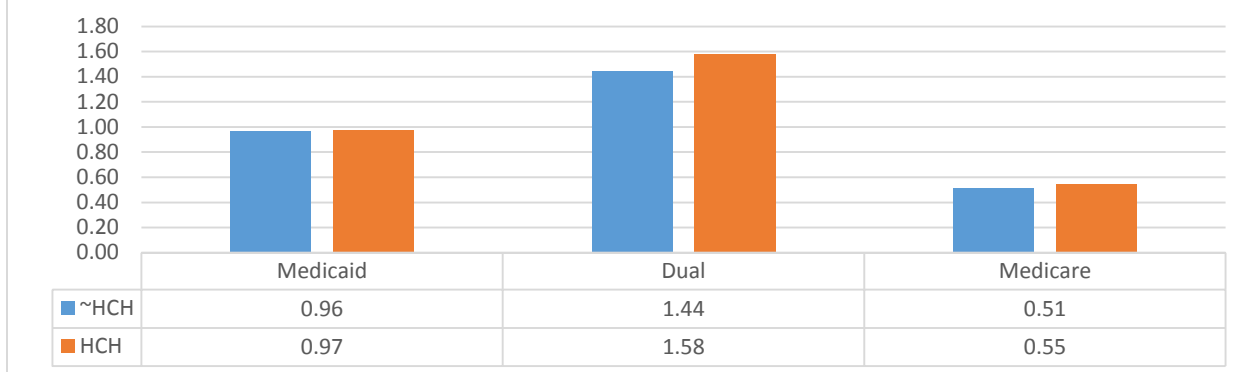
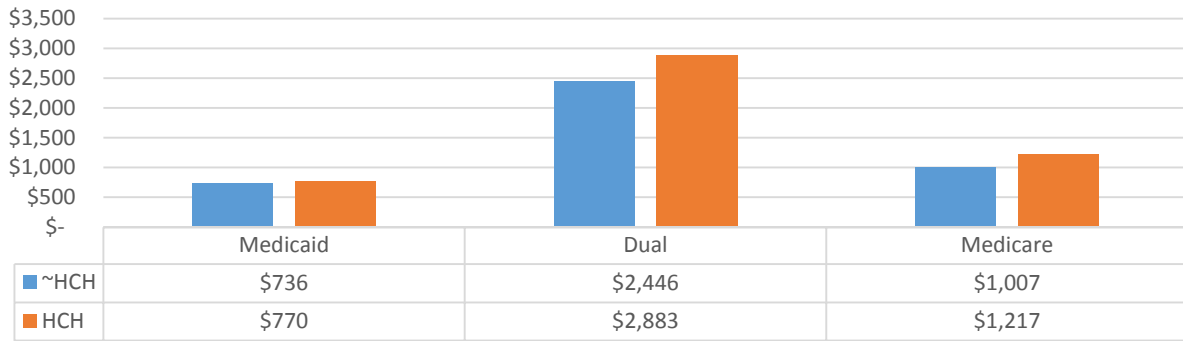


Figure 6: Average Emergency Department reimbursement, 2010-2014 by insurance type



### Inpatient Hospital Use

Beneficiaries in certified HCHs have dramatically fewer hospitalizations than non-HCHs with 29%, 44% and 38% fewer admissions for the Medicaid, Dual Eligible, and Medicare populations respectively (Figure 7). This trend holds up for both medical (Figure 8) and surgical (Figure 9) admissions. In addition, when patients are hospitalized they, across the board, have shorter lengths of stay with, respectively, 41%, 36%, and 32% shorter stays (Figure 10).

Last, hospital costs for HCHs are lower than non-HCHs regardless of insurance type. HCH inpatient hospital costs are 34% lower for Medicaid enrollees, 31% lower for Dual Eligible, and 20% lower for Medicare enrollees (Figure 11).

Figure 7: Average inpatient admissions (per 1000), 2010-2014 by insurance type

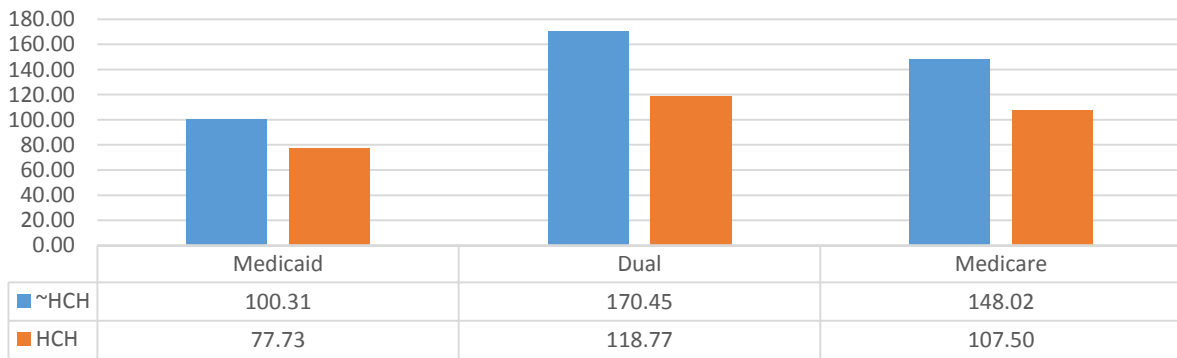




Figure 8: Average medical admissions, 2010-2014 by insurance type

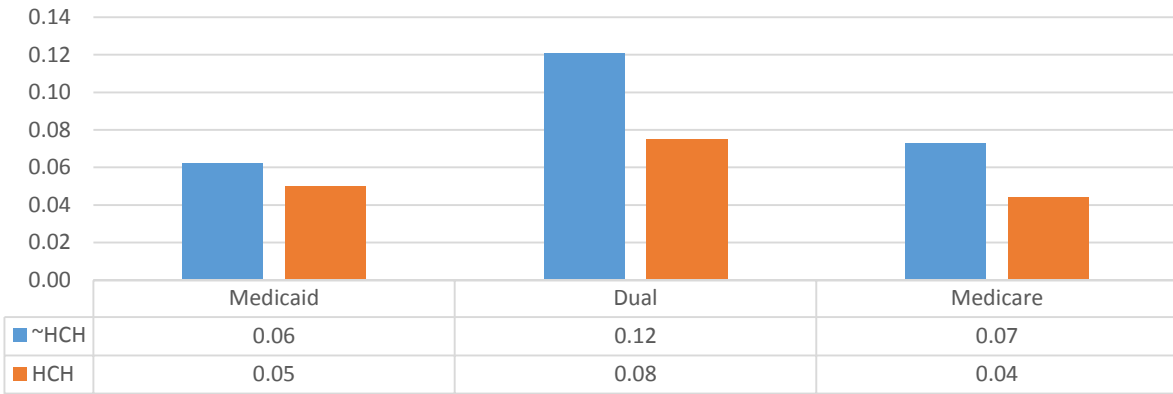


Figure 9: Average surgical admissions (per 1000), 2010-2014 by insurance type

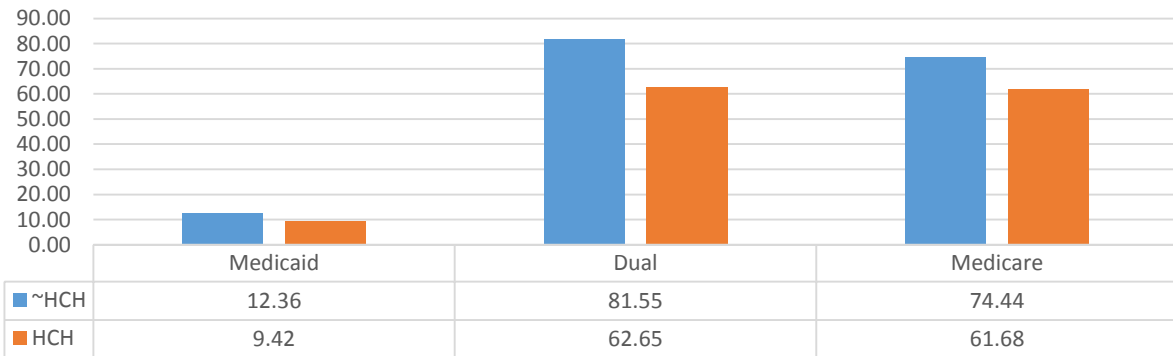


Figure 10: Average inpatient length of stay, 2010-2014 by insurance type

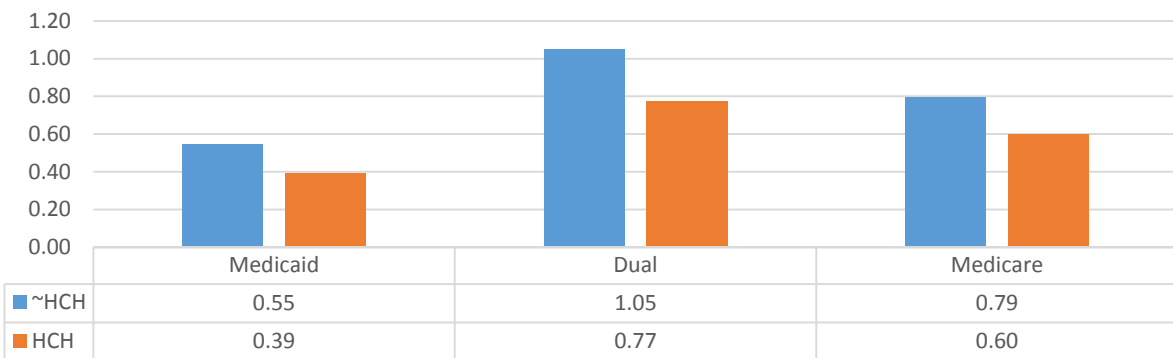
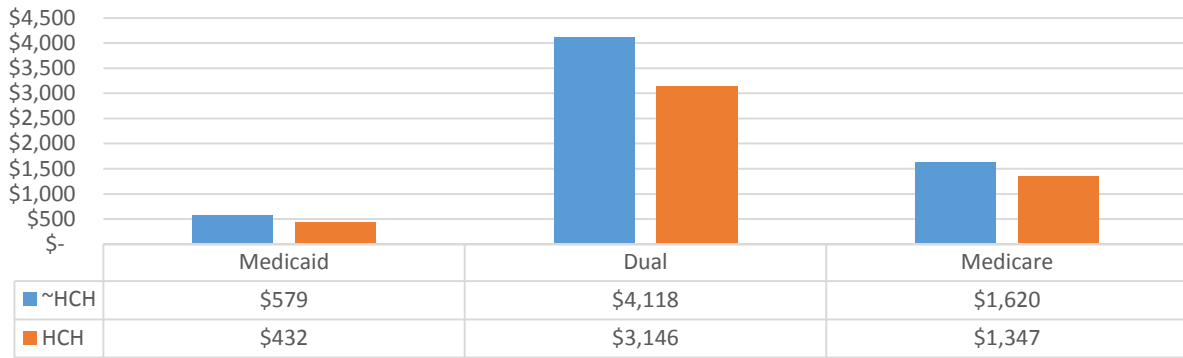


Figure 11: Average inpatient reimbursement, 2010-2014 by insurance type



### Use of Outpatient Physician Services

Patients can receive outpatient care from physicians in two settings: 1) Office based or 2) Hospital based. Hospital based visits are, in general, reimbursed at a higher rate than office based visits. HCH Medicaid and Medicare enrollees use about eight percent (8%) fewer hospital based physician services than non-HCHs and have thirteen percent (13%) lower costs. However, dual eligible enrollees in HCHs use 2% more hospital based physician services and have 7% higher costs (Figure 12 and 13).

Figure 12: Average hospital outpatient encounters (per 1000), 2010-2014 by insurance type

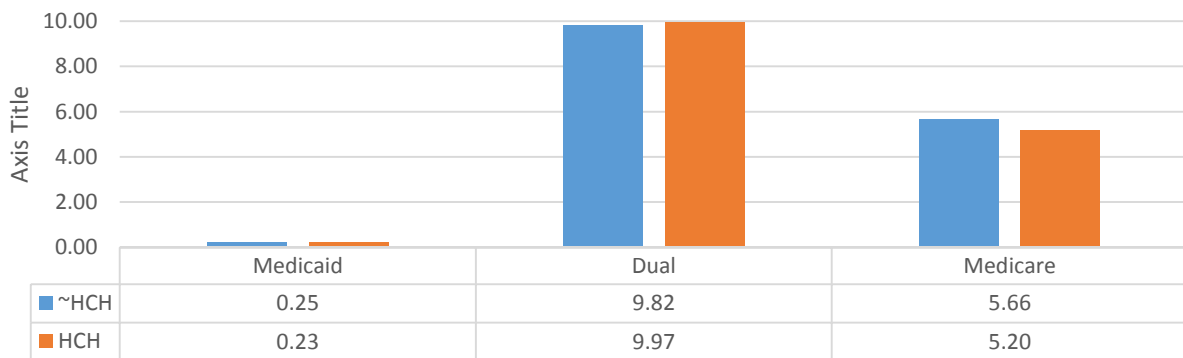
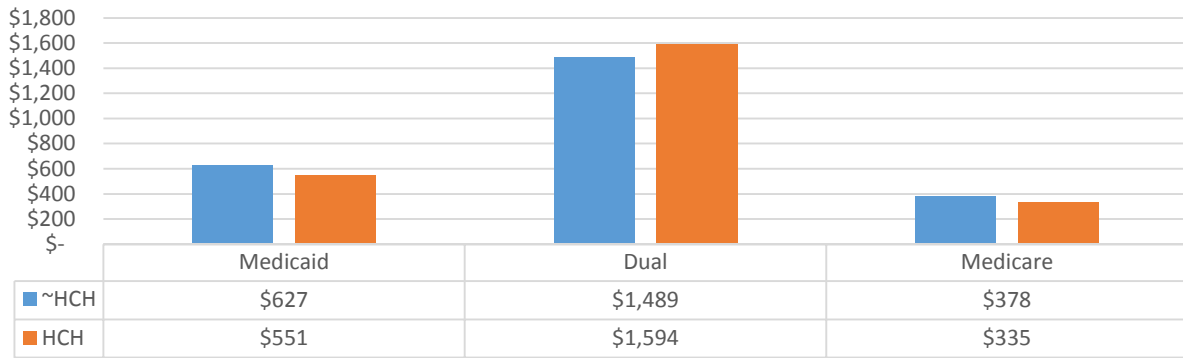


Figure 13: Average hospital outpatient reimbursement, 2010-2014 by insurance type



Professional encounters in a clinical setting are higher in HCHs across all three insurance types. Medicaid enrollees professional encounters were only one percent (1%) higher with nine percent (9%) lower cost. Dual Eligible enrollees were eleven percent (11%) higher professional encounters with two percent (2%) higher cost. Medicare enrollees had 3% higher professional encounters and 5% higher costs (Figures 14 and 15).

Figure 14: Average professional encounters, 2010-2014 by insurance type

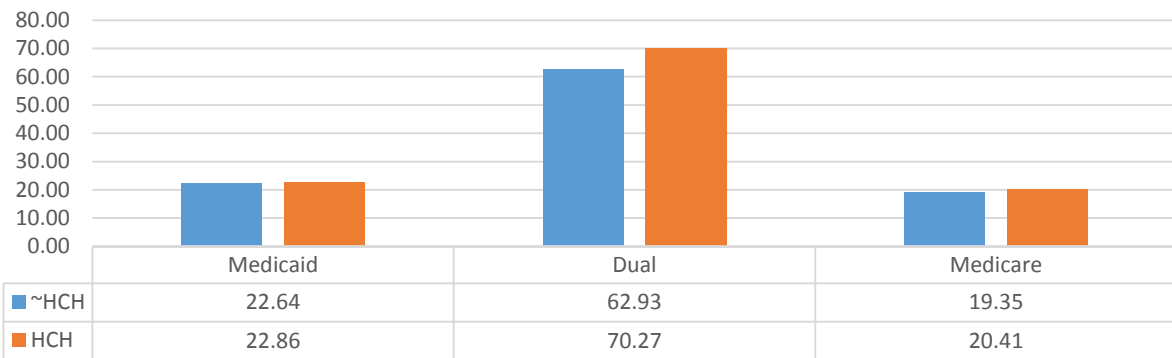
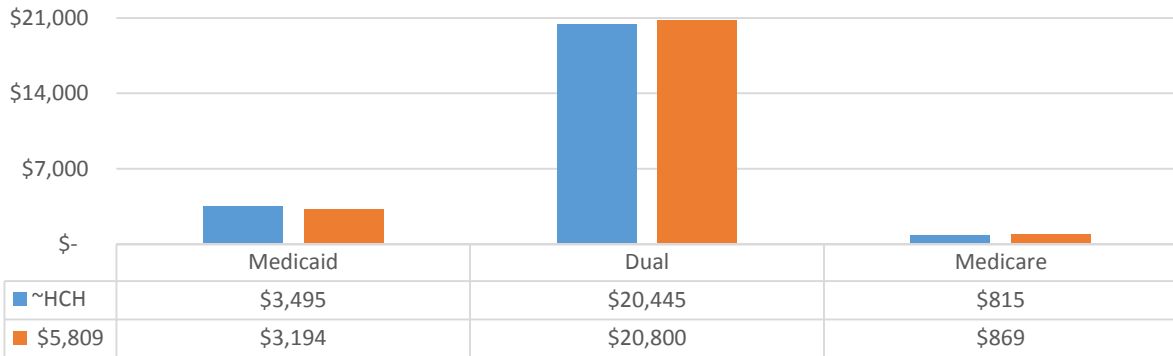


Figure 15: Average professional reimbursement, 2010-2014 by insurance type



### Prescription Drug Use

Medicare drug data were not available for this evaluation and thus are absent in the following two figures. For the Medicaid population, enrollees in HCHs had three percent (3%) fewer prescriptions than enrollees in non-HCHs, but costs were eighteen percent (18%) lower. The Dual Eligible population's prescriptions were two percent (2%) higher in HCHs with twenty percent (20%) lower cost (see Figures 16 and 17).

Figure 16: Average number of prescriptions, 2010-2014 by insurance type

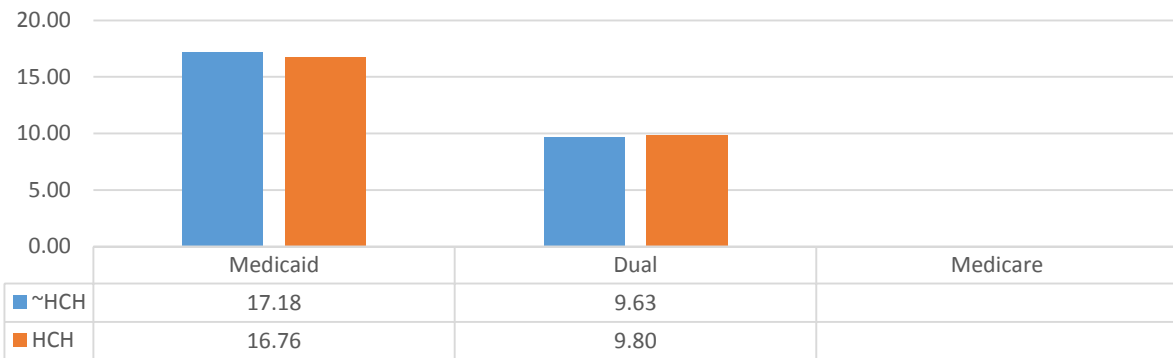
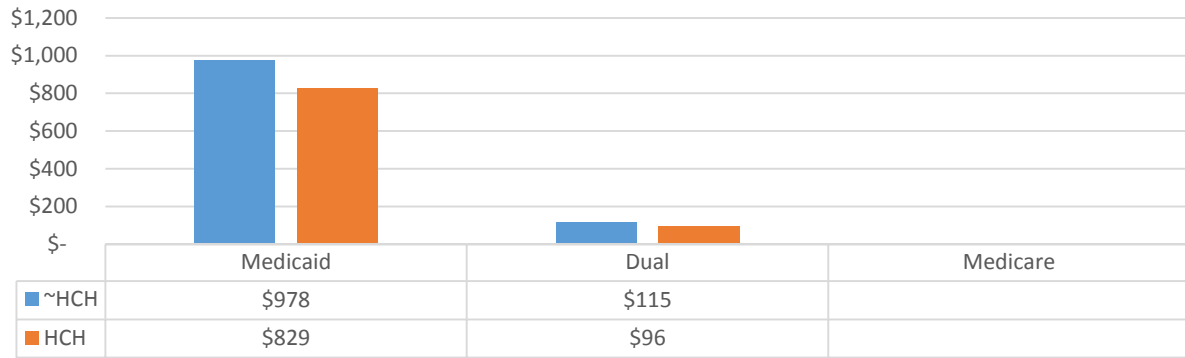


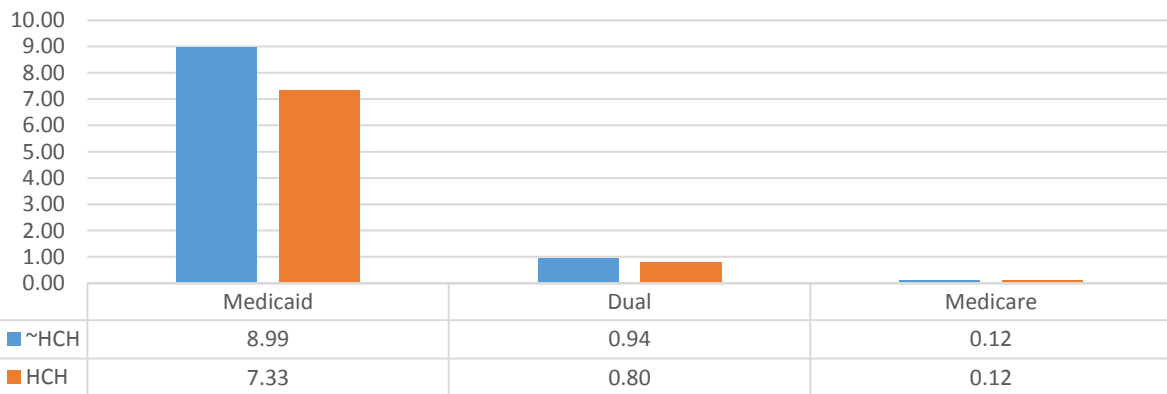
Figure 17: Average reimbursement for prescriptions, 2010-2014 by insurance type

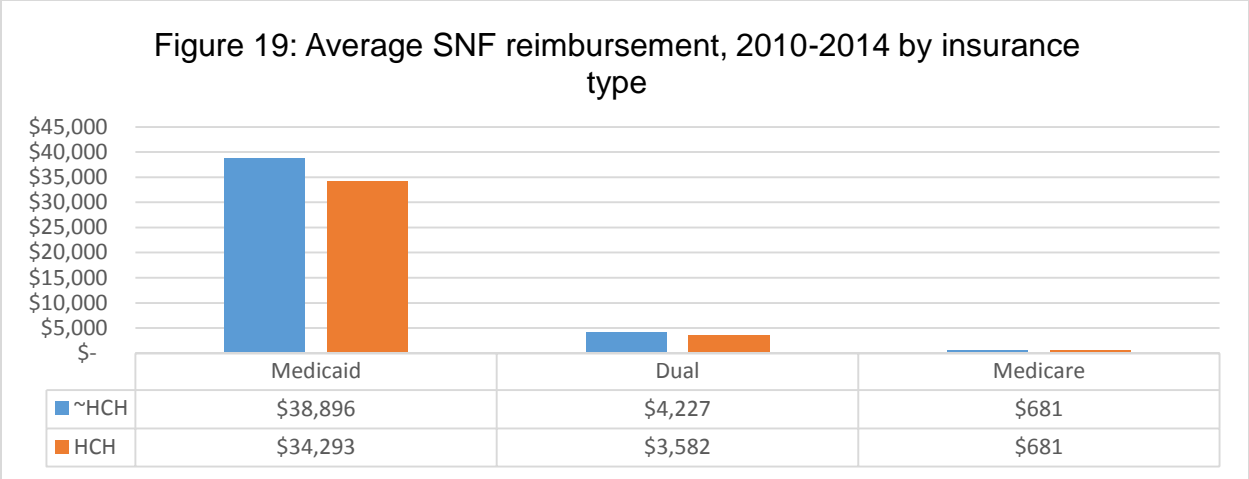


### Skilled Nursing Admissions

HCHs out-perform non-HCHs in the Medicaid and Dual Eligible populations with twenty three percent fewer Skilled Nursing Facility (SNF) admissions and thirteen percent (13%) lower costs for Medicaid and eighteen percent (18%) fewer admissions and eighteen percent (18%) lower costs for the dual eligible population. Admissions and cost for Medicare enrollees were the same between HCHs and non-Health Care Homes.

Figure 18: Average SNF admission, 2010-2014 by insurance type





**ARE HCH SAVINGS DUE TO BETTER PERFORMANCE OR DIFFERENT PATIENTS?**

This section examines one possible reason HCHs provide care at lower cost than non-HCHs. There are a number of reasons this may be the case – other than that the HCH model performs better than the traditional clinic model. While most of these alternative explanations cannot be tested with the data at hand, one particular alternative can be tested.

Perhaps HCHs performed better because they attracted less ill patients or patients that typically use fewer and/or less expensive services. This hypothesis was tested two ways. The first approach, shown in Table 2, is more intuitive; the second, shown in Table 3 and Figure 20, is more complicated but also more precise.

**Test 1**

Table 2 shows the differences between HCH and non-HCH patients. All these characteristics are known to increase the cost of health care.

Overall, HCHs had younger patients, fewer female patients, and patients with lower disease burden, all of which should lower costs. But HCHs also saw more patients of color, which typically increases costs.

But looking at the marginal distribution of these characteristics can be very misleading, as they are typically correlated with one another. A better way to examine this question is to examine the joint distribution of the characteristics of the patients in both HCH and non-HCHs. To do this, these characteristics were regressed on membership in a HCH. The results are also shown in Table 2 in the column labeled ‘Odds Ratio.’ An Odds ratio is the relative likelihood that a patient would be in a HCH. Values larger than one (1.0) indicate a higher probability of being in a HCH compared to a non-Health

Care Homes. Conversely a number less than 1.0 signifies lower probability of being in a HCH. As the table shows, patients in HCHs have few differences from non-HCHs. The apparent, but misleading difference in ACG Risk has all but disappeared as has the apparent difference in age. The only remaining difference is that HCHs have more patients of color than non-HCHs. These findings would suggest that HCHs' ability to reduce cost is not dependent upon them attracting traditionally less expensive patients; their costs are lower even though they have a higher percentage of patients that traditionally experience higher costs.

Table 2: Characteristics of HCH Attributed Enrollees			
	Mean		Odds
	~HCH	HCH	Ratio
Age	41.94	33.6	0.99
ACG Risk Score	1.3	1.16	1.01
Non-White	0.79	0.66	0.55
Female	0.58	0.57	1.01

## Test 2

To further test the hypothesis that HCHs benefited from patient selection, patient gender, age, age interacted with gender, if the patient was a person of color, if they were Hispanic, illness burden, year, and clinic characteristics (was the clinic an FQHC, was the clinic a critical access hospital, was the clinic part of a medical group of 10 or more clinics) were regressed on per member per year reimbursement separately for patients in non-HCH clinics and those in HCH clinics using random-effects GLS regression with clustered standard errors. These regressions were estimated separately for those insured under Medicare, Medicaid, and Dual Eligible. The calculated reimbursements from these regressions are shown in Table 3.

	Non Certified Clinics		Certified Clinics		PMPY		Program wide
	Number of enrollees	Average Reimbursement	Number of enrollees	Average Reimbursement	% savings	\$ savings	\$ savings (in millions)
Medicare	543,637	\$4,989	275088	\$4,896	1.9%	\$ 93.20	\$26
Medicaid	1,096,930	\$6,578	1197949	\$5,821	11.5%	\$ 756.86	\$907
Dual	117,424	\$34,434	87597	\$33,581	2.5%	\$ 853.45	\$75
Total	1,757,991	\$7,946	1,560,634	\$7,216	9.2%	\$ 729.64	\$1,139

As is clear from Table 3, even after adjusting for differences in patients and clinics, the HCH clinics performed better than the non-HCH clinics saving the state of Minnesota over \$1.14 billion over the period 2010 through 2014. 86% of the savings came for Medicaid and Dual Eligible patients.

Next, the counterfactual was estimated: What would the estimated reimbursement for patients in non-HCH clinics have been if the patients were in an HCH clinic and vice-versa (patients in an HCH clinic as if they were in a non-HCH clinic). These results are shown in Table 4.



	Expected difference in PMPY reimbursement if patients in non-HCH clinics were in HCH clinics	Expected difference in PMPY reimbursement if patients in HCH clinics were in non-HCH clinics	Saved cost of moving all patients to HCH clinics	Increased cost of moving all patients to non-HCH clinics
Medicare	\$ (113)	\$ 248	\$ (55,220,653)	\$ 59,207,851
Medicaid	\$ (464)	\$ 873	\$ (378,482,655)	\$ 836,233,456
Dual	\$ (525)	\$ 2,203	\$ (53,012,965)	\$ 164,217,036
Total			\$ (486,716,273)	\$ 1,059,658,343

Table 4 shows that t \$1.06 billion (\$1,059,658,343) more would have been spent during the life of the program if the patients cared for in HCH clinics had not been in HCH clinics (these results differ slightly from the results Table 3 because of differences in statistical estimation). Conversely, an estimated additional \$500 million (\$486,716,273) could have been saved if all patients who were not in a HCH were in an HCH during this period.

## CONCLUSION

In summary, this evaluation found that HCHs did better in terms of reduced cost than non-HCHs. Even after correcting for differences in patient population HCHs performed better. Evidence of savings in the order of over \$1 billion in the HCH clinics was found. Overall HCH clinics had lower utilization of hospital inpatient and outpatient services including less lengthy hospitalizations. Also found, contrary to expectations, was that HCH patients used more ED services than non-HCH patients and more SNF admissions, suggesting that there could be more savings in the program if potentially avoidable ED visits or SNF admissions were prevented.

## CHAPTER 5: PAYMENT

### INTRODUCTION

This chapter examines how HCH clinics implemented the payment method including processes for patient tier assignment, billing for care coordination and operational changes and costs related to implementation.

To learn how HCH organizations and clinics have implemented the state payment methodology and their experiences with payment of care coordination fees and the clinic costs related to implementation, the evaluation team analyzed Medicaid care coordination claims for 2010 to 2014, and developed and administered a survey to understand implementation efforts and perceptions of all HCH clinics certified as of December 2012.

### PAYMENT SUMMARY

Claims analysis indicates that:

- HCH clinics submission of claims to Medicaid for HCH care coordination services has increased steadily over time since the beginning of the HCH Initiative implementation.
- Care coordination claims are more likely for persons of color, Hispanics, more complex enrollees, Dual Eligible enrollees, and are less likely in non-urban settings.
- Clinics serving low-income enrollees with more complex medical and social needs were more likely to submit care coordination claims.
- The analysis is consistent with care coordination payments supporting clinics serving low-income enrollees with more complex medical and social needs

Surveys of HCHs certified within the evaluation period (July 2010 through December 2012) in the first phase of the HCH initiative evaluation<sup>171</sup> indicate that:

- Financing HCH services is important to HCH organizations, with a large proportion of organizations reporting that it is important to collect payment for care coordination services.
- Financial incentives do not appear to be a primary driver of clinic or organization participation in the HCH Initiative. Fewer than half of respondents report conducting a financial analysis before becoming certified as a HCH, and only one-fifth said a financial analysis influenced their decision to become certified.

- HCH organizations reported being better able to capture payment due to them for HCH care coordination services from Medicaid than from Medicare, managed care, and commercial insurers (with the exception of organizations participating in the Medicare Advanced Primary Care Program who are also able to capture payment from Medicare).
- While less than half (40%) of survey respondents report experiencing cost increases related to operating as a HCH to date, these cost increases appear to be largely related to increased staff and billing expenses to implement the HCH model.
- The majority of responding HCHs has adopted and is actively using the state billing methods, including the state-developed care coordination tier assignment tool to support care coordination billing.
- The majority of responding HCHs rate the state-developed care coordination tier assignment tool as adequate for current billing and clinical use, and their comments note that they consider the tool an acceptable start at providing tiering of patient complexity and cost which can be modified to better encompass patient care complexity, psychosocial factors, and time and cost required to coordinate patient care.

## CARE COORDINATION CLAIMS 2010-2014

Care coordination was examined using claims data for 2010 to 2014 paid through Medicaid and Medicare (the care coordination claims are S0280 for the initial care coordination month and s0281 for subsequent months). The claims are billed at four tiers corresponding to health complexity level<sup>2, 98</sup>. The analysis was done by examining all care coordination claims from July of 2010, when the first HCH was certified, through December of 2014. Clinic statistics were calculated using the clinic that an enrollee was attributed to (see Appendix D: Attribution Methodology for a description of attribution).

Figure 1 shows the number of care coordination claims submitted by HCHs from 2010 through 2013 for Medicaid, Medicare, and Dual Eligible enrollees and for Medicaid enrollees in 2014 (Medicare claims data was unavailable for 2014). Figure 2 shows the total care coordination expenses for the same period. Both the number of claims and expenses increased steadily over the observation period. The total number of care coordination transactions was 247,230 and the total amount of care coordination expenses was \$3,956,472.36 for an average cost per claim of \$16.00. The percent of the total care coordination costs by year were 3.11% in 2010, 10.30% in 2011, 15.58% in 2012, 27.86% in 2013, and 43.15% in 2014. This percentage increase reflects both the growth in the number of HCHs and changes in billing for care coordination claims. The higher level of care coordination transactions for children may be due to pediatric health care homes preceding the implementation of HCHs beginning in 2010 and clinics serving pediatric populations being better prepared to submit care coordination claims.

This analysis is consistent with the goal of HCH Initiative of supporting clinics caring for low-income enrollees with complex medical and social conditions.

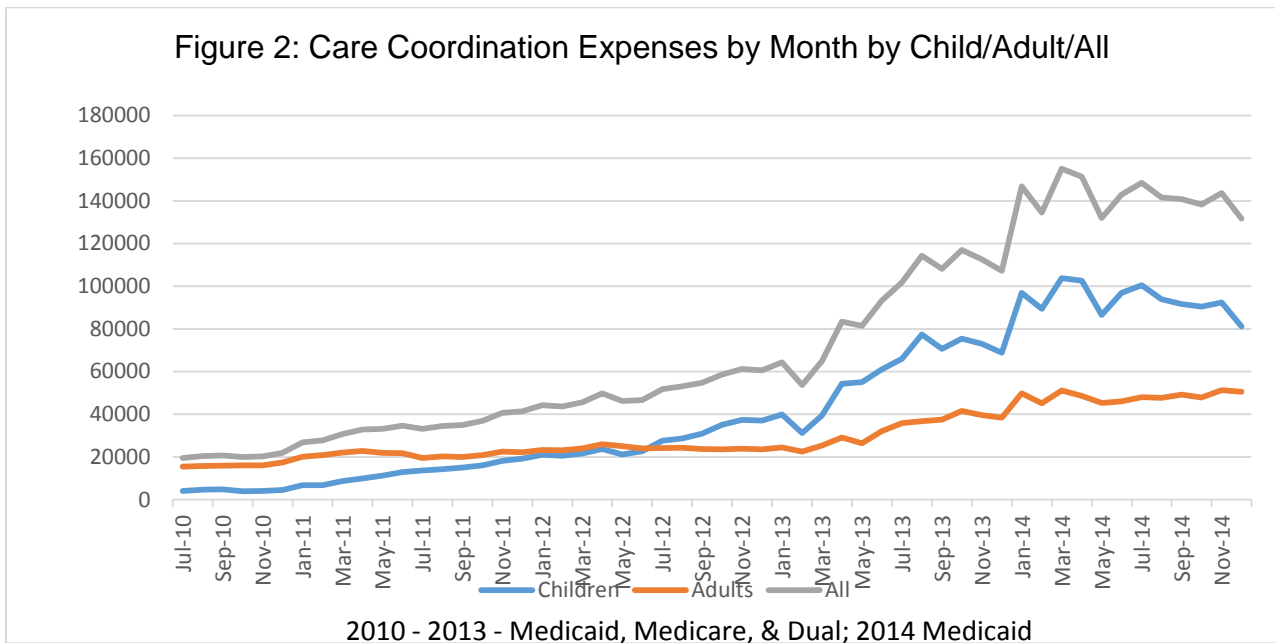
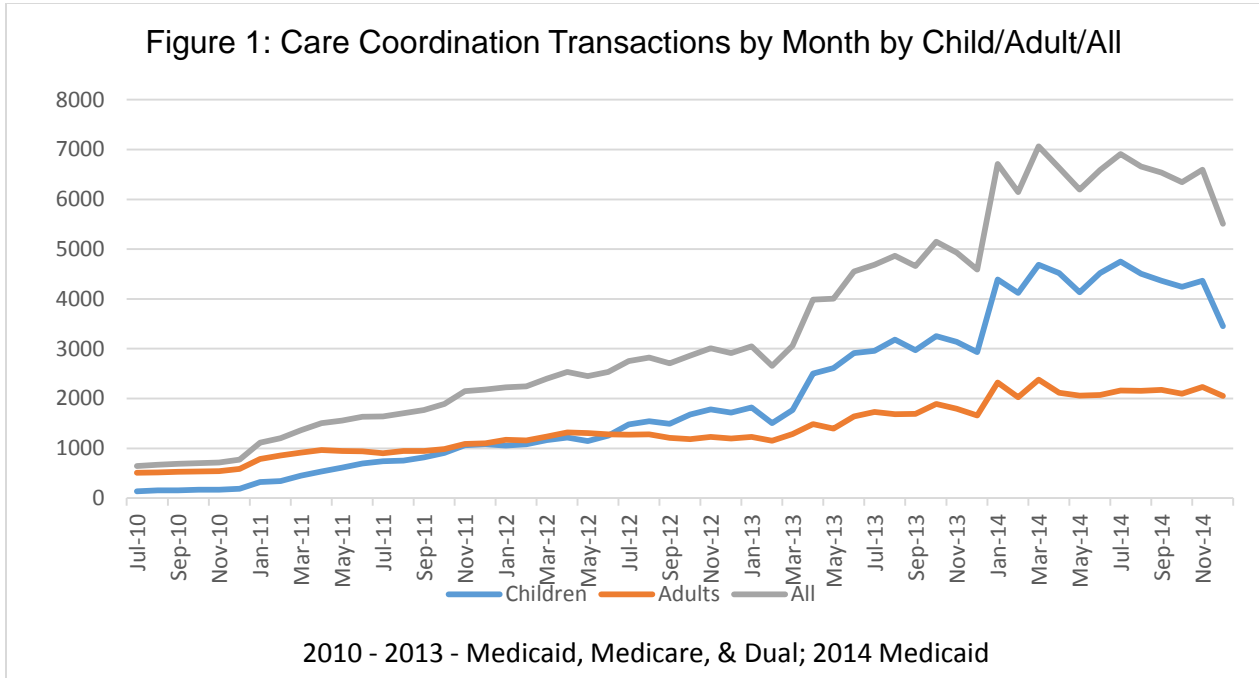


Figure 3 shows the number of HCHs, the number of HCHs submitting claims, and the percent of HCHs submitting claims by year. Figure 4 shows that the number of HCHs submitting monthly claims for care coordination for the same period and plans. The number of care coordination claims, expenses, and clinics increased steadily over time from 2010 to 2014. By December 2014, approximately 41% of all certified HCHs were submitting claims. The average reimbursement per clinic per month was \$685.70. Figure 4 also shows that more care coordination claims were submitted for children than adults. The closeness of the total number of HCHs submitting care coordination claims for children to the total line suggests that the HCHs that billed for adult care coordination were similar to the HCHs that were billing for children care coordination.

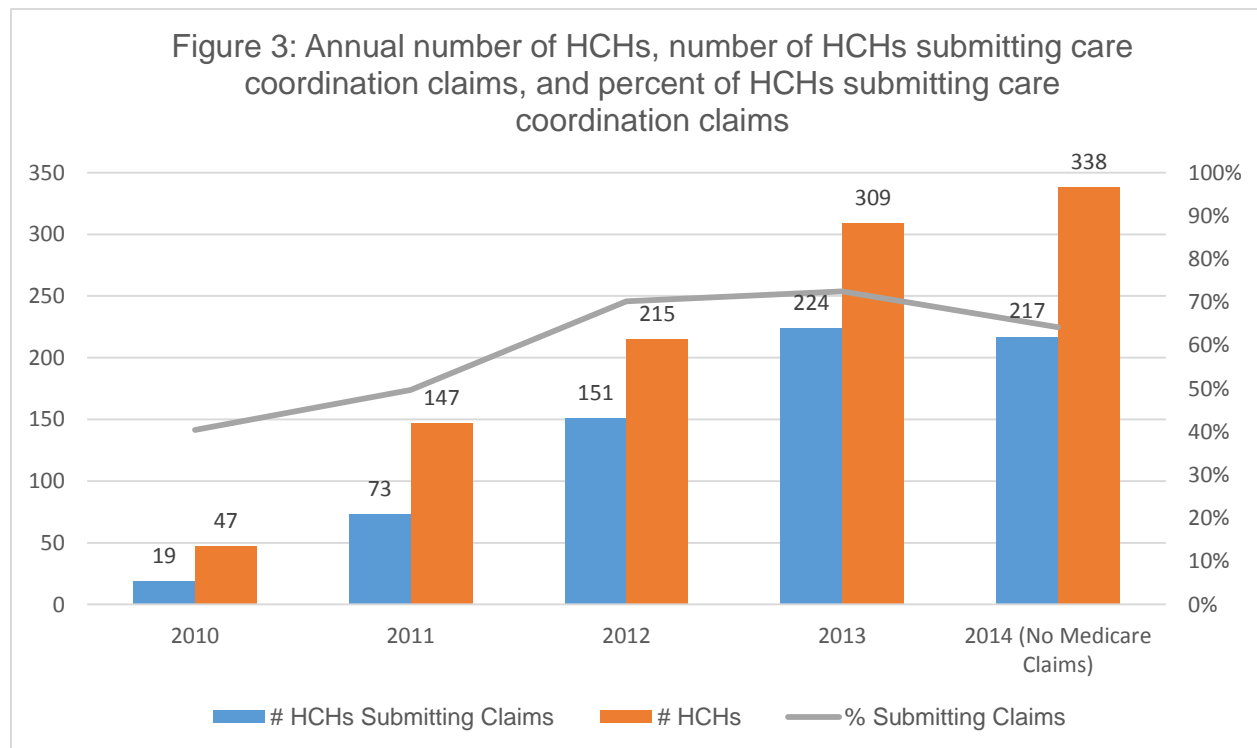


Figure 4: Number of Clinics Submitting Care Coordination Transactions by Month and Child/Adult/All

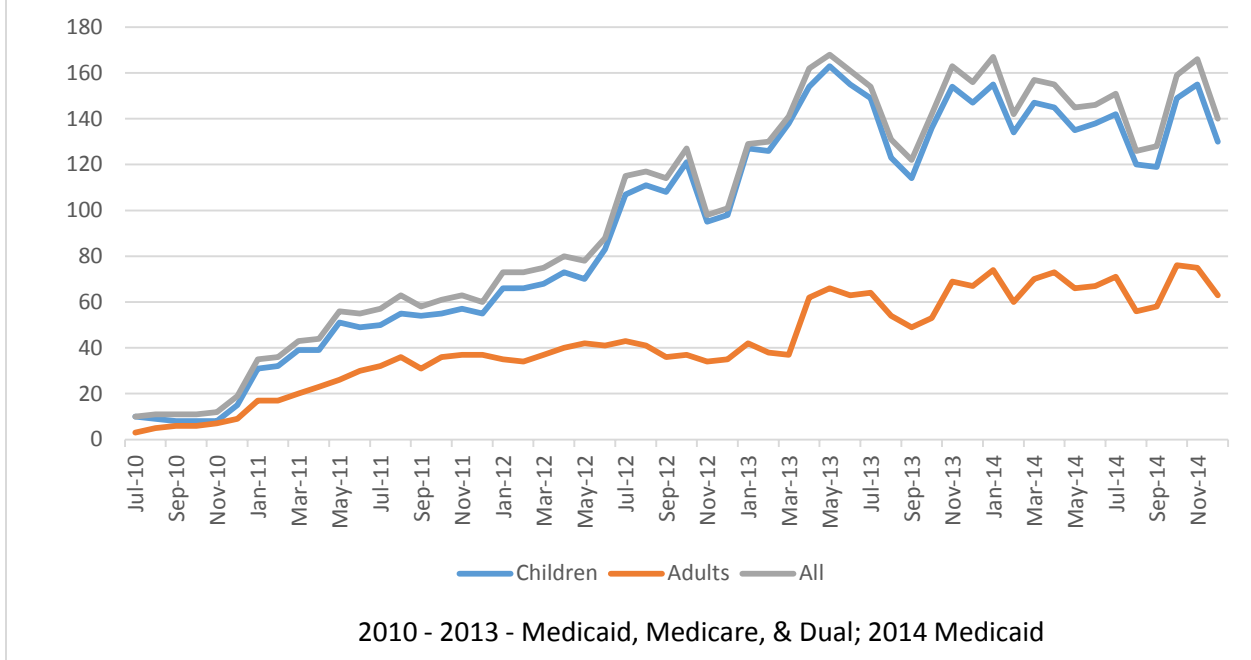
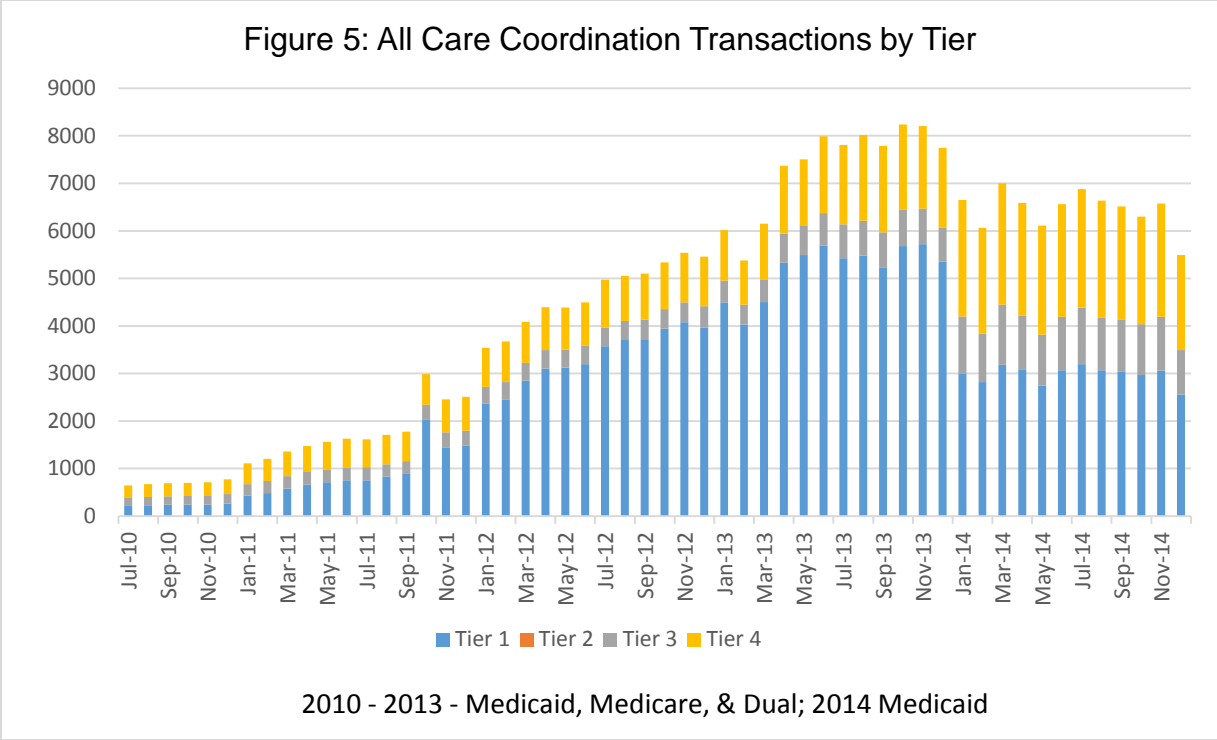


Figure 5 shows the distribution of care coordination claims by tier. The majority of claims are for Tier 1 or Tier 2 patients, with one-third to one-quarter of monthly claims for Tier 3 and 4 patients.



Multivariate analyses of care coordination transactions showed that (a) Dual Eligible enrollees were more likely to have care coordination claims than Medicaid enrollees; (b) that having care coordination claims has increased every year; (c) that adults, persons of color, and Hispanics are more likely to have care coordination claims; (d) women are less likely to have care coordination claims; (e) that enrollees with greater severity are more likely to have care coordination claims; (f) that enrollees cared for in FQHCs are less likely to have care coordination claims; (g) that enrollees cared for in Critical Access Hospitals are more likely to have care coordination claims; (h) and that enrollees in non-urban settings are less likely to have care coordination claims. The negative effect of FQHCs may be a function of FQHCs being more likely to care for persons of color, who had a higher likelihood of care coordination claims. Controlling for severity, care coordination expenses are lower for Dual Eligible enrollees, persons of color, and Hispanics. The fact that these groups have more care coordination claims and less care coordination expenses, controlling for severity, suggests that care coordination claims could be associated with helping these enrollees manage forms of complexity other than medical complexity, such as social complexity.

Analyses of care coordination claims at the clinic and medical group level showed that for clinics submitting care coordination claims the average number of care coordination encounters per clinic per month was 34 (maximum = 558, median = 8) and the average care coordination expense per clinic was \$728.18 (maximum = \$14,943.20, median = \$126.27). The mean being larger than the median means

that the distribution was skewed with most clinics submitting few care coordination claims and a few clinics being much more active in submitting care coordination claims. The clinics and medical groups that were most active in submitting care coordination claims were clinics serving low-income enrollees with complex medical and social needs and clinics serving children. The latter effect may be associated with the implementation of pediatric medical homes prior to the HCH initiative.

This analysis indicates that the use of claims to Medicaid for HCH care coordination services has increased steadily over time since the beginning of the HCH Initiative implementation. The decline in 2014 may be due to the lack of Medicare claims data for 2014. This may not represent the full use of care coordination claims, as additional claims have been submitted to non-Medicaid payers that are not represented in this data set .

## HCH EVALUATION PAYMENT SURVEY

While many of the questions the evaluation team was asked to address could be answered using existing claims data, understanding *how* the state of Minnesota's HCH payment methodology was implemented in the HCH certified clinics required collecting primary data. This was accomplished in the first phase of the HCH initiative evaluation with a survey administered to all HCH clinics certified as of December 31<sup>st</sup> 2012 (n=217 clinics, 35 organizations) during the first phase of the analysis.<sup>171</sup> Three different aspects of payment implementation were examined: **billing practices** (decisions and preparations made for clinic billing for monthly care coordination services, about how the process works, about if they had to make changes to their billing system as part of HCH certification, and about additional feedback on billing); **financial practices** ( financial analyses conducted prior to becoming certified as a HCH and if and how these analyses affected their decision to become an HCH; about financial monitoring processes; about any impact on their cost structure for operating as a HCH; about which types of payers they collect care coordination payments from; about the importance of care coordination payments; and about additional comments on HCH certification and financial processes); and **patient tiering practices** (the tools and processes used to complete the tiering process; about if or how patient tiering connects with the billing process; about how effective they feel their current tiering process is; and about any additional feedback they have on patient tiering). A full description of the payment surveys, full text of the surveys, and discussion of survey analysis methods is provided in Appendix F.

The survey results reported in the first phase HCH Initiative evaluation were:<sup>171</sup>

- Financial incentives do not appear to be a primary driver of clinic or organization participation in the HCH Initiative. Fewer than half of respondents report conducting a financial analysis before becoming certified as a HCH, and only one-fifth said a financial analysis influenced their decision to become certified.



- HCH organizations reported being better able to capture care coordination payment from Medicaid (both fee-for-service and managed care) than from Medicare, private managed care, or commercial insurers (with the exception of organizations participating in the Medicare Advanced Primary Care Program who are also able to capture payment from Medicare).
- Less than half (40%) of survey respondents report cost increases related to operating as a HCH. Increased costs appear to be primarily related to increased staff and billing expenses.
- The majority of responding HCHs have adopted and are actively using the state billing methods including the state-developed care coordination tier assignment tool to support care coordination billing.
- The majority of responding HCHs rate the state-developed care coordination tier assignment tool as adequate for current billing and clinical use.

## CONCLUSION

Analysis of claims data and survey data collected from HCHs allows for several conclusions to be drawn about the implementation of the state payment method, billing, and general costs associated with HCH implementation.

While it is clear that HCH organizations feel it is important to obtain adequate financing to support initial transformation and maintain care coordination and billing, clinics are still working out the details of how to efficiently bill for and access payments for HCH services. The majority of HCH organizations responding to these surveys report submitting HCH care coordination claims, most often to governmental payers including Medicaid and Medicare programs. However, analysis of claims submitted to Medicaid shows sixty to seventy percent of HCHs submitting care coordination claims. Possible reasons for this discrepancy may be that clinics submit claims to payers other than Medicaid and Medicare so that the full number of claims being submitted is not reflected in the analysis. Additionally, given that survey results indicate establishing systems and procedures for billing may be a time consuming process, some clinics may intend to submit claims but do not yet have the systems in place to do so. Another reason is that some clinics may feel that care coordination is part of their usual care and should not be separately claimed. The finding that the proportion of certified clinics submitting care coordination claims is increasing over time may also support the idea that ability to bill for care coordination is a lagged process that clinics are better able to implement over time.

HCHs are able to capture payment due to them from governmental payers, in particular Medicaid and Medicare payers, but have more challenges attempting to access payment from non-governmental payers. These challenges include implementing multiple billing processes to match differing billing requirements based on payer and unwillingness to charge payers for care coordination if it means

patients may have to pay a co-pay for these billings. While the survey in the first phase of the HCH Initiative evaluation did not specifically ask about varying billing and payment methods by payer, comments from HCHs indicate that having multiple different payment arrangements for HCHs may cause confusion and increase administrative costs.

Not all HCH organizations monitor costs and financial performance associated with operating as a HCH. Among those that do, the majority have experienced cost increases. However, HCHs note that these expenses may largely be driven by investments to change billing systems and add care coordination staff; and the impact of these start-up costs may be lessened over time as the HCH model becomes institutionalized within clinics.

The majority of HCHs have adopted the Minnesota State Care Coordination Tier Assignment tool for billing and/or clinical management purposes, and few HCHs use other patient tiering tools for clinical or billing purposes. While HCHs did note specific modifications that might be made to the patient tiering tool, such as greater ability to account for psychosocial factors, most HCHs appear to view the tool as a good starting place for assessing patient tier and cost.

# CHAPTER 6: UNDERSTANDING PATIENT CENTERED MEDICAL HOME TRANSFORMATION: INSTITUTIONAL LOGICS, CORE FUNCTIONS AND MATURITY

## INTRODUCTION

HCHs are a type of Patient Centered Medical Homes (PCMHs), which is an inter-professional team approach to providing comprehensive, accessible, and coordinated patient centered primary care.<sup>5</sup> HCHs provide patient-centered care that has the goal of improving patient outcomes and the patient experience, lowering health care costs, and ultimately transforming primary care.<sup>32</sup> The transformation of clinics to becoming a PCMH has attracted strong interest from researchers, practitioners, and policy makers.<sup>25, 72, 141, 150, 164, 173</sup> The PCMH literature on transformation provides useful recommendations about leadership, implementing team-based care, and readiness for transformation. Even with these recommendations, transformation studies have noted that there is significant variation among transformed clinics, that there is overlap between transformed and untransformed clinics, and that there is variation in change and outcomes over time. One source of this variation could be that, while the literature defining PCMHs shares themes, the specific PCMH dimensions identified in the studies, such as access, care coordination, and information system support differ in their details.<sup>7, 47, 117, 123, 143, 160</sup> This could result in making transformation difficult because of confusion in understanding exactly what it means. A second reason for the variation is that the recommendations about transforming effectively are so generally stated (e.g., context matters, a well-developed infrastructure matters, leadership matters, transformation is difficult) they are difficult to use for guidance in specific implementation situations. A third reason for the variation is that rather than organizational components having independent effects on transformation, organizational components fit together in a configuration for transformation to fully occur.<sup>23, 27, 29, 35, 77, 136</sup>

This evaluation builds on earlier work on PCMH transformation by examining whether effective transformation can be characterized as a configurational fit of three elements: (1) transforming a clinic's institutional logics to be consistent with a HCH's structures and processes; (2) implementing core HCH functions; and (3) implementing measurement and management processes to become a mature learning organization. The evaluation uses a literature review to guide the development of an interview instrument (see Appendix H: Conceptualizing Health Care Homes: Institutional Logics, Core Functions and Maturity for this review), administers the interview instrument in clinics eligible to be HCHs, analyses and reports the results of the interviews. The goal of the evaluation is to improve the understanding of HCH transformation and suggest hypotheses for future studies of HCH transformation, as well as to provide ideas that may guide the continued development of HCHs.

The core hypothesis guiding this evaluations is that an HCH's processes and functions cause better patient and provider outcomes, while also reducing costs. The argument is that the core HCH care management functions are (1) managing populations, which consists of enrolling patients, knowing patients, targeting care, and systematically reviewing population outcomes; (2) assuring a primary care relationship; and (3) coordinating care. Two maturity functions that are necessary to achieve a learning HCH and improve the care management processes are (1) performance measurement and feedback and (2) quality improvement. Finally it is hypothesized that the performance of these functions are influenced by HCH context: (1) HCH design which is aligned with institutional logics; and (2) a supportive context and leaderships that promotes provider and staff engagement and empowerment. These categories are used to develop and test a structured interview instrument in order to assess HCH transformation.

## TRANSFORMATION SUMMARY

Two aspects of cultural transformation appear to be related to effective transformation. The first cultural transformation is integrating medical control, where providers are dominant, with organizational control, where care systems are dominant so that both are important. The second is from a logic of separating planning from execution<sup>134,p. 41-43</sup> to a logic of *integrating* planning and execution so that a HCH becomes learning organizing that includes the expertise of all staff and providers..

The results show that HCHs are more likely than non-HCHs to have implemented population management tools (registries), assuring access tools (patient portals), care coordination tools (clinical decision support systems), and maturity tools (measurement, feedback, and quality reporting). But, there is significant variation in other transformation aspects, such as inclusion in planning and implementing care process improvements, using population information to guide care design and care processes (e.g. targeting). The difference between the areas of similarity and differences may be related to clinics being more able transform on processes that are closest to a medical institutional logic. It appears to be more difficult to transform those tasks that are described as an organizational control.

## HCH TRANSFORMATION: CULTURE, CORE FUNCTIONS AND LEARNING

In order to assess transformation a model of transformation is proposed. This model consists of the key elements of (a) cultural change; (b) implementing functions for assuring the performance of core HCH functions, a primary care relationship, population management, and care coordination; (c) implementing functions for learning organization such as measurement and quality improvement.

### Cultural Change

The first significant transformation issue is changing clinic culture - how clinic providers and staff understand and structure their activities. These “ways of ordering reality, and thereby rendering experience of time and space meaningful” are called *institutional logics* by sociologists.<sup>37,p. 243, 78, 133</sup> They are a component of a clinic’s culture – the unspoken, taken for granted, and common understandings about how things are done in the clinic. It is hypothesized that HCH transformation will be more complete if there is also a change in institutional logics from medical to organizational control<sup>3, 36, 132</sup> and from separation to integration of planning from execution. The first cultural transformation from medical to organizational control focuses on a change from a medical model in which physicians are dominant and the understanding of work is delivery of care services to an organizational control model including population management, monitoring populations for needed care, standardized routines, and standardized roles are used to improve situational awareness<sup>34, 137</sup> and patient centered care. In contrast to the medical model, in an organizational logic, control also resides in the team and HCH as well as the physician. The second cultural transformation is from a logic of separating planning from execution<sup>134,p. 41-43</sup> to a logic of *integrating* planning and execution. In clinics separating planning from execution can be seen as a form of top-down management in which health systems mandate routines and processes that are executed by staff who have little input in the design of the task. The separation of planning from execution also discourages the implementation of a learning organization and engaging all staff and providers in the quality improvement process, both of which require the integration of planning and execution.

### Implementing HCH Functions for Population Management and Care Coordination

The second major transformation issue is implementing new routines and process such as population management, care coordination and care transitions, and assuring a primary care relationship. This evaluation proposes a core functions approach based on existing standards for PCMHs<sup>18, 103, 105, 111, 118, 123, 126, 159</sup> to understand HCH transformation. A core functions approach allows each clinic to implement a HCH using structures and processes that fits their unique population, providers, and community at a given point in time. In contrast to approaches which focus on specific structures and processes, a core functions approach focuses on whether a HCH effectively implements the core functions of (1) population management, (2) access and communication, (3) care coordination, (4) measurement and feedback, (5) quality improvement, and (6) transforming. The hypothesis is that performing the core functions well with a well-designed HCH in a supportive context will result in better patient outcomes. The core functions are:

#### *Dimension 1: Care Management Design.*

Care management designs the organization of the HCH in terms of types of providers and the scope of services. It is expected that effective HCHs will have a methodology for measuring the needs of their population and using that measurement to guide selecting providers, either in the HCH, health system, or

community. In contrast, it is expected that less effective HCHs, or HCHs based on a medical institutional logic, will focus on implementing HCHs by adding a care coordinator role. A second assumption is that HCHs will tend to be organized either as stand-alone teams responsible for a specific population or HCHs will be organized as a care coordination team that supports all the providers in a clinic. The latter is referred to as a common resource pool because all providers share the care coordination team services. Examples of stand-alone teams include the Coordinated Care Center at Hennepin County Medical Center<sup>46</sup> and prepared practice teams<sup>48, 139</sup>. In stand-alone teams a provider team is accountable for caring for a specific population. The third assumption is that the choice of provider types and HCH organization affects the implementation of coordination. When providers are co-located in stand-alone teams, coordination mechanisms such as huddles, team meetings, or informal conversations can be used as a coordination mechanism. In HCHs with organization based as a common pool of resources, coordination mechanisms such as standardized care coordinator roles, standardized community and pathway protocols, schedules and targets will be more important. The fourth assumption is that the better the fit of the HCH design with the patient population needs, the more effective is the HCH. While HCHs serving a less complex population can rely on more formal approaches such as rules, targets, guidelines, and schedules. As the average complexity of patients in the population increases, effective HCHs will increasingly rely on face-to-face interaction among diverse types of providers for understanding and diagnosing patients, sensemaking, and prioritizing treatment. The fourth assumption is that HCHs which have inclusive regular meetings to manage HCH organization and processes will be more effective in transforming because they integrate planning and execution.

*Dimension 2: Population Management.* Population management refers to the functions used to manage patient population. Consistent with organizational control, standardizing and integrating tools used for population health management should result in greater safety and efficiency in use by care coordinators and providers. Population management also implies the HCH should know who their patients are and that the patients should acknowledge their relationship with the HCH. These functions are important because the relationship between an HCH and a patient can be ambiguous as patients may have multiple provider relationships. An effective HCH should have functions to reduce this ambiguity.

An effective HCH will have mechanisms for assessing, monitoring, and updating information, social support, social complexity, and medical complexity. A HCH should be able to use sub-population registries as well as social and medical complexity information to target care. For example, a HCH should be aware of a change in a patient's social support network capacity, such as a spouse's ability to provide support being degraded by changes in the spouse's health, should be addressed by adding capacity to the patient's social support network<sup>135</sup>. An effective HCH should have consistent, regular, and reliable processes for updating population management information, as well as processes for retrieving

information. One risk of assessment tools is that while assessment is initially completed, procedures for updating and retrieving the information is less developed. Effective patient and population information management requires competency in creating, storing, retrieving, and updating the information<sup>9</sup>.

*Dimension 3: Care Coordination - Assuring Access and a Primary Care Relationship.* An effective HCH should establish reliable and accessible care coordination with patients/caregivers that supports communication from patients/caregivers to providers and from provider to patients/caregivers. Access and community should support a primary care relationship, which is based on a longitudinal, first-contact approach for a broad variety of conditions<sup>145, 144, 147</sup>. The patient should be able to access the HCH through a variety of modalities, such as the ability to arrange a same day visit, contact care coordinators, contact clinic staff, or use EHR based patient portals to provide and obtain information. Having a variety of modalities is important because each modality supports different types of interactions and patients vary in the modalities they are comfortable with. The bi-directional component captures the importance of care coordinators and/or the HCH being able to follow-up with patients and caregivers about their understanding of provider and medication instructions, as well as check on unmet needs after transitions from care settings to home.

*Dimension 4: Care Coordination - Coordinating Care.* Care coordination refers to coordination among providers to meet patient/caregiver needs. Care coordinators protocols, routines, and processes should be standardized across all providers. Role standardization increases reliability, safety, and efficiency in task execution. This dimension most clearly reflects the difference between an institutional logic of medical control and one of organizational control. Role standardization across all providers is considered organizational control. Care coordinators having to adjust their behaviors to fit individual provider preference is medical control, which may increase the risk of errors being made and reduces efficiency. Communication pathways and protocols should also be clearly defined although the content of the role, communication, and pathway standardization will vary as a function of the specific needs of HCH's population, which will be a function of race, ethnicity, morbidity, income and other factors.<sup>6</sup>

Since HCHs are based on inter-professional teams, an effective HCH should have processes that integrate diverse perspectives and implement inter-professional work. This is likely to vary by HCH population. In HCHs serving a population that primarily has low to moderate medical complexity and low social complexity (on average), the HCH may be able to rely on primary care physicians for most care<sup>3</sup>. In a setting with more medically and socially complex patients, such as a safety-net hospital or federally qualified health center, caring will require organizational mechanisms for integrating diverse professional perspectives<sup>53, 68, 158</sup>. Dominance by a particular provider, such as a physician, in this situation reflects medical control and may result in ineffective information sharing and care<sup>31</sup>.

Effective HCHs will also have boundary-spanning coordination with other clinics in a health system, hospitals, or with other community providers. The HCH should know which providers outside the HCH are likely to be needed by their population and have established formal coordination mechanisms with those providers who they share a significant number of patients with.<sup>19, 58, 59, 112, 120, 151</sup>

## Implementing a Mature, Learning Organization

Population health management, assuring a primary care relationship, and care coordination are the functions HCHs perform to organize care delivery. Maturity and learning refer to the functions for monitoring, assessing, and improving those core delivery functions.<sup>10, 63, 153</sup> There are two key dimensions in maturity and learning: (a) Measurement and Feedback; and (b) Quality Improvement. Measurement and Feedback is based on the principle the measurement is a necessary part of improvement.

*Dimension 5: Maturity - Measurement and Feedback.* A core hypothesis of HCHs is that the better the execution of care coordination the better are patient and provider outcomes. While Dimensions 2 (population management), 3 (assuring a primary care relationship) and 4 (care coordination) are the key maturity dimension of defining care organization, measurement and feedback, is the next step in HCH maturity. An effective HCH should have procedures for measuring care processes (e.g., missed/delayed laboratory reports, delays in responding to patients, non-standard communication), and measuring patient and provider outcomes. Providing these measures to providers and staff help them assess their own performance and provide ideas for quality improvement<sup>124</sup>. Using these measures to assess the effect on processes on outcomes is a key component of guiding HCH improvement using evidence.

The most effective measurement will have a strong foundation in the specific HCH's functions (population management, assuring primary care, care coordination) and the outcomes that the HCH's population values rather than primarily focusing on outcomes that the HCH is accountable for such as costly outcomes (admissions, ED visits, readmissions)<sup>54</sup> and quality measures such as those used by Minnesota Community Measurement (MNCM) and Minnesota Statewide Quality Reporting and Measurement System (SQRMS).

*Dimension 6: Maturity - Quality Improvement.* Quality improvement reflects a HCH being a learning organization that uses measurement (Dimension 5) as a foundation for continual learning. A key feature of quality improvement is the degree to which staff are included in the improvement process, reflecting the degree to which planning is integrated with execution. An effective HCH will include community members so that improvement efforts will be targeted to and informed by key stakeholders. While care coordinators may not lead quality improvement efforts, they should be included for two reasons. First,



their observations of how tools are working are the most accurate reflection of how HCH tools work in practice. Second, their inclusion in meetings provides them information on the broader context, organization and goals of care which will assist them in coordinating their actions with other clinic members.

A robust and effective quality improvement implementation requires the implementation of a number of discrete, separate steps. Quality improvement should be targeted in a cumulative, hill-climbing fashion to the HCH's core vision and goals. The problem definition should be stated as the gap/difference between a desired state (e.g., waiting times for patients, provider burnout) and the current state. Root cause analyses to identify the core causes of performance gaps (problems) should be used to determine the levers most likely to reduce the gap.<sup>64, 152</sup> Alternatives should flow directly from the root cause analysis and be based in both exploring alternatives others have developed, such as in evidence based practice standards, learning collaboratives, and visiting leading HCHs, and exploiting alternatives developed within the HCH to improve existing processes<sup>69, 106, 154</sup>. Alternatives should be systematically implemented and evaluated<sup>50</sup> and then diffused to the HCH and the community of practice, such as through learning collaboratives.

## Constructive Contexts and Implementation

The context transformation that occurs is likely to influence the extent of quickness transformation. A context that is associated with providers and staff are engaged in problem solving activities related to implementing the core functions for population health management and learning is likely to lead to more effective and complete transformation.<sup>172</sup> Organizational research suggests a number of contextual factors that are likely to be important correlates of a supportive context and climate.

*Dimension 7: Supportive Context and Climate.* While culture refers to core, often unspoken beliefs, context and climate are the focus of tasks. A central characteristic of effective HCHs is having a patient centered vision, rather than productivity or cost reduction, vision. A patient centered vision is important for two reasons. First, it results in a focus on improving patient centered outcomes and provides a decision-mechanism for coordinating action (what will improve patient centered outcomes). Second, it increases motivation and identity. A key dimension of job design is the meaningfulness of work<sup>42</sup> and a patient centered vision provides a strong focus on meaningful work. Research shows that a shared vision, such as a patient centered core vision, combined with perceived outcome and work interdependence will result in identity with an organization such as a HCH.<sup>60</sup> In turn, identity results in stronger engagement, positive affect, and organizational citizenship behaviors (helping).<sup>61</sup> In sum, a patient centered core vision is much more likely to be associated with transformation than a vision focusing on productivity or costs.

A core feature of effective teams is assuring teams have the autonomy and are delegated the authority they need to do their work. This dimension also comes from the job design literature which shows autonomy is associated with motivation<sup>42</sup> and the teamwork literature which points to the importance of delegating authority to manage their own activities to a team.<sup>161</sup> While health systems should provide tools and infrastructure, the HCH should be charged with the responsibility of fitting to their specific population and context to meet performance goals.

Finally, contextual features such as incentives and fairness should support HCH providers and staff. In an effective organization, members should experience procedural fairness and have legitimate procedures to address grievances and problems. This procedural fairness and ability to bring up issues improves performance.<sup>109, 155</sup> By linking individual outcomes to group performance, hybrid incentives reduce the probability of functions being put into silos and tasks while individual incentives reduce the probability of individuals freeriding.<sup>116</sup>

## Summary

A core function approach has been proposed to examine variation in HCH transformation. The core functions for HCH performance are population management (Dimension 2), assuring primary care (Dimension 3), and care coordination (Dimension 4). The core functions for creating a learning organization that matures are measurement and feedback (Dimension 5) and quality improvement (Dimension 6). The implementation of these functions is affected by the context created by HCH design (Dimension 1) and HCH constructive context (Dimension 7).

## METHODS

Transformation was studied using a qualitative case comparative study<sup>55, 125</sup> of thirteen HCH eligible clinics supplemented with survey data on clinic EHR implementation. The unit of analysis was the clinic and study design was a retrospective survey design. The population was HCH eligible clinics. Clinics were sampled to maximize variation on key HCH dimensions - value (quality/cost), geography (urban/rural), population mix (severity level), insurance type (Minnesota Health Care Plans, Medicare), and certification status (not certified, newly certified, certified for three or more years). A structured interview was administered to the senior care coordination in each clinic. Appendix H describes the survey administration and sampling protocol and includes a copy of the structured interview.

The senior care coordinator in a clinic or the care coordinator in the clinic who the clinic identifies as most knowledgeable about HCH implementation was chosen as the respondent because this role should be most knowledgeable of HCH practices such as population management, primary care relationship, and care coordination in a clinic and should be aware of whether these tools are actually being used and

should also be participating in meetings and other activities related to planning the implementation of these activities in the clinic and health system (this is a characteristic of a mature, learning organization). The senior care coordinator was also chosen as the respondent because perceptions about care systems and institutional logics/culture can systematically vary between more senior staff and operational staff.<sup>176</sup> Care systems and institutional logics, cultures, and climate can be described at three levels – policies, procedures, and practice.<sup>175</sup> In contrast to physician or managerial respondents, who may be more likely to provide information on policies, procedures and systems of logic as intended, the senior care coordinator is more likely to illuminate care systems and institutional logics as implemented and practiced.

The care coordinator is most likely to illuminate institutional logics through the description of their work practices. For example, a senior care coordinator who said that her role was primarily managing transitions, such as hospital to home, or social complexity issues when patients were referred from physicians or other providers, reflects the institutional logic of medical logic. In contrast, a senior care coordinator monitoring or interacting with populations to anticipate care needs and communicating those needs to providers as well as managing transitions reflects an organizational institutional logic. The strength of interviewing senior care coordinators is that their responses provide information on how HCH work is actually implemented in the clinic by the role supposedly responsible for performing the activities. Other individuals in the clinic may have thoughts how HCH functions should be implemented but do not directly perform these functions.

The structured interviews were recorded for inductive content analysis purposes and each dimension was scored on a scale of 1 to 5 by the interviewer. This method has been used in studies of AMI care,<sup>71</sup> NHS hospitals,<sup>12</sup> and industrial organizations.<sup>13, 15</sup> The methodology minimizes respondent bias and increases measurement reliability because the interviewer codes a standard measurement based on the respondent's description of the respondent's practices, reduces demand responses from a respondent choosing along a scale, allows the use of structured open questions rather than closed questions with a limited set of choices to describe organization, allows for probing questions to be used to refine measurement, and can be calibrated by having multiple readers of transcribed interviews to code measures.<sup>14</sup> The interviewers also noted and coded the institutional logics from the respondent's description of care organization and participation in planning.

The structured interviews are supplemented with Minnesota Department of Health's 2015 MN Clinic HIT Survey Public Use file<sup>138</sup> integrated with information of HCH certification status for HCH eligible clinics. The Clinic HIT survey provides information on levels of EHR implementation for clinic decision support software (CDSS), registries, and patient portals. The survey included 372 HCH eligible clinics that were not certified and 282 HCH eligible clinics that were certified.

## RESULTS

This section summarizes evidence about the transformation of HCH systems related to EHRs when available and provides examples of HCHs at different transformation levels from the structured interviews.

### Dimension 1: Care Management Design

HCHs varied with regard to using population health needs as a guide to care management design and provider selection. Highest scoring responses were those which reflected using information about their HCH's population needs in care management design, provider selection, and care coordination.

#### *Using Population Health Needs to Inform Care Management Design*

A midrange response comes from a clinic which fostered an understanding of patient needs among care coordinators, and in which care coordinators were able to select or plan to select providers based upon patient needs (rather than institutionalized staffing patterns):

We have some registries that, that is a challenge though. It would be great if we had a dashboard of some sort. You know, red light, green light, yellow light, these are the patients. I think that is something that we are moving towards. [...] You know, at times, just review it for, 'oh gosh, I haven't touched base with this patient for awhile, I should do an outreach call' or 'this person, I know they moved out of the state, so let's take myself off of the care team,' things like that. So, you have those kinds of registries. (Clinic 5)

A high response is a clinic whose care coordinators could describe specific follow-ups for patients, such as using interpersonal contact to find out about effectiveness of medication use, were associated with a high level of ease of contact and selection between the care coordinator and other providers. Care coordinators in these type of clinics provided compelling arguments about how the skills, knowledge, and abilities represented within their HCH were based upon assessment of their clinic's population's needs:

I think it's the communication and your relationship with that patient [that helps us know whether things are working]. You kind of get to know that patient and you know when they're struggling. I get to know my patients. [...] I might ask a question about their medication, a particular one, and if I get some type of fuzzy answer or, I can tell if it is not sinking in, and that is when I will say, 'You know, I would like to suggest something. How about if you come in or would you like the community paramedic to come out and just kind of go over that medication with you, just a little bit?' [...] Also, [the paramedics] go out to the homes of our patients, who need their help, who can't come into the clinic, who might not have transportation to come in, who might have a disability and need some blood work. I also have my homeless patients. (Clinic 10)

Another high response comes from care coordinators in a multi-specialty clinic who described variation in patient preferences before describing care coordination in terms of selecting specialty providers, who are appropriate to patient preferences, from lists and locations, both within and outside of their clinic, and systems. A patient services department is then responsible for assuring that appointments and preparations are made for patients receiving referrals:

[...] we have urology and we have ophthalmology and we have ENT and audiology out here. But then our [Name] clinic has many. I mean it is a list! We are a multi-specialty clinic so a lot of our referral base can stay within the clinic. Now sometimes they opt to go to [geographic area] or to go to [geographic area]. You know if we have the specialties here and they are willing to stay here we do that. In this town we have two big healthcare systems and we are healthy competitors and one is [System] who has their own specialty clinic, they are primary care [too] and the hospital and then [another] who is just an independent provider owned clinic. [...] Most referrals going out go through our patient services department and the doctor orders or referral it goes to patient services and then they make that appointment. They do everything with that patient. They make the appointment. They talk to the patient. They explained to them where to go. They tell them what they need to take [with them]. (Clinic 2)

Another high response comes from a care coordinator in a multi-specialty clinic who described being involved in decisions about staffing patterns based open anticipated needs of the patient population:

We know that we had to add a few other people to our team [such as] the psychologists. [Our clinic] is hiring social workers, supposedly. They are going to try and get some social workers on board to get them involved. So, then we have MTM Pharmacy. So, they will have helped with, you know, the patient's medications. If they are like too expensive, or you know they can coordinate somehow where they can delete one or, you know. So, the pharmacist, they are involved. Yeah, we have them. I can call one any time I like. Psychologist, like I said, for the mental patients who are struggling. I think it's a group that we use and we all use these groups, you know, depending on the patient's needs. We anticipate something that, you know, a need, and we talk to each other. (Clinic 10)

A low response comes from a clinic which did not foster a high level of understanding between patient population needs and staffing and referral patterns among providers. "Well, I'm not, I don't have, I have a list of patients that I follow. I don't have the clinic-wide load. [...] That's not on my level. That's a higher than what I'm at. (Clinic 1)"

Clinics varied in implementing information management processes for reducing ambiguity and mechanisms for assessing, monitoring, and updating information, social support, social complexity, and medical complexity.

A midrange response reflects partial implementation of information management processes:

Usually what will happen is they will get in the discharge summary they will see what discharged medications they put them on and they will compare their clinic list with what they put them on and try to re[concile] the clinic list. But they really have been involved [with] the pharmacy, too, to make sure [the patient] actually filled the new medication. Then [I] will call the patient when they have a little bit of a story. To know what am I going to ask the patient. (Clinic 5)

A low response reflects significant difficulties in information management:

[We are supposed to gather information from patients] prior to the physician going into the room. It doesn't happen. I'm going to be honest - the reality of that is we can try to work with these people and often times you're, you know, you're with them either in person for extended periods of times and in this particular clinic, we also are responsible for telephone triage, walk-in emergencies, diabetic meter teaching, I mean, the list goes on and on. (Clinic 4)

#### *Co-locating Providers*

Clinics also varied significantly in co-locating providers to facilitate coordination. An example of a midrange response comes from a clinic where providers are in the same clinic but not co-located providers in a manner that facilitates communication and coordination:

Everybody's really already in the clinic it's just that nobody's sitting close together. You know we're all kind of spread out. You know even our wound care and diabetic ed and dietician and all of that, they're kind of in a whole different hallways behind a whole other door. They're not really within in the walls of the clinic so much. And our... we have call center that's set up now so when people call in to make an appointment or schedule, the call center is on the whole opposite end of our facility within the hospital area. They're very separate from us. (Clinic 6)

A high response reflects co-locating providers in a manner that facilitates communication and coordination:

[Our clinic] is very small. We have 8 exam rooms, we have 9 plus the procedure room. The ninth one we turned into the ancillary room. So, one day a week it is anticoagulation, one day a week it is care coordination R.N. So every day it's a different person reside in there, including coding is there a day and diabetic yet. Yet, if they need to intermingle with the rest of the staff, our three clinics are set up so that we have what we call care teams. Everybody sits together. So for

instance, when that PA comes on Tuesdays, her and her CMA are right out in the midst with everybody else as well. (Clinic 7)

A low response demonstrates a clinic where providers are not co-located in a manner that facilitates communication and coordination:

You know, I think actually the biggest challenges come for the RN health coaches, because then they're divided. [...] They will sometimes go to each, you know, I've got this patient, this is what I'm dealing with, you know, what do you suggest or what's your perspective, or what can we do? Or, like for instance, we also have a community health worker here. [...] She is located here at the main clinic and not that she can't travel, but then if they have a patient over there that they want her to connect with, then she's got to get over there or the patient's got to get over here and so, it's not even just the primary care department, it's kind of the resources all in general being spread out provides just another inconvenience for our patients that they are connecting with one person that is here versus across the street and that kind of thing and then they think sometimes too, for the providers, it just is difficult for that same reason. You know, a lot of our resources, like now our social worker too, she is here in the main clinic, so you know, they have to reach out to her here and then, you know, she either has to go there to the patient or they have to come here because she needs to meet with them. I think often we're going to the patient, but it still provides an inconvenience either way, so. (Clinic 12)

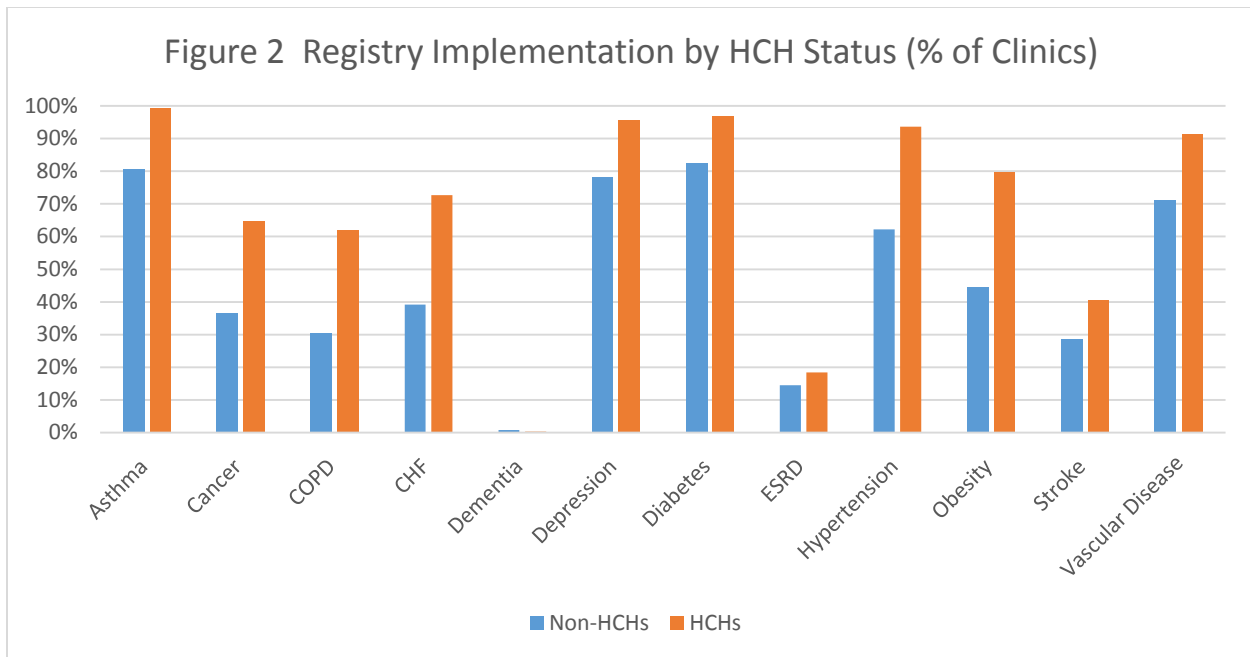
### *Summary*

Clinics varied in care management design, such as using information about population health needs for care management design and staffing the clinic in a manner that reflects population health needs, in implementing information management processes to minimize information presence and ambiguity, and in co-locating providers to facilitate communication and conflict. The highest responses used population health information for care management design, implemented information management processes to minimize ambiguity, and co-located providers to facilitate communication and coordination.

## Dimension 2: Care Management – Population Management

Dimension 2 evaluates the implementation of population management tools such as registries and procedures for targeting care delivery and step-up/step-down of care.

An analysis of EHR implementation shows that HCHs are more likely to implement registries for sub-populations that can be used for population management than are non-HCHs. Figure 2 shows the implementation of registries by HCH status. The difference between clinics certified as HCHs and HCH eligible clinics that were not certified controlling the specific registries was significant ( $T = 2.93$ ,  $p < .01$ ).



Responses to the transformation interview for using Population Management Tools reflects the EHR findings. Using population management did not vary substantially across clinics. All but one care coordinator/interviewee report that they are able to access their patient’s current health status and background information within the clinic.

*Using Population Management Tools for Care Management*

However, the specific tools and protocols that were used for and the extent to which the tools and processes are used to monitor and manage subpopulations, as well as proactively targeting patients varied among clinics. The responses below illustrate the range of tools and processes applied across HCH-certified clinics.

A midrange response comes from clinics that use discharge summaries, contacts (phone calls), system alerts, and in-house created patient assessment tools to create, monitor, and update information:

[Care coordinators can look into a patient’s] discharge summary they will see what discharged medications they put them on and they will compare their clinic list with what they put them on and try to rec[oncile] the clinic list. But they really have been involved [with] the pharmacy, too, to make sure [the patient] actually filled the new medication. Then [I] will call the patient when they have a little bit of a story. To know what am I going to ask the patient [before updating the patient’s medication list]. (Clinic 5)



Once my name is on [the patient's] care team, if they go to a specialist, I get the specialty report in my in basket so I can see it. So I get alerted if they go to the hospital. I get alerted if they went to [hospital] and saw the transplant doctor. I then get that report in my in basket. I kind of scan through those just to see if there has been any changes. If it somebody that I'm still working with or if some patients that need me to call them and remind them that they have a specialty appointment coming up. (Clinic 11)

[it took months to create the assessment for patients] Months. And still sometimes we have to change things around. You try to get it all with every patient, every time, but sometimes a patient has their own agenda. You're not able to get through everything because they want to check about one specific thing, but there are lots of notes from. Like if somebody was just in the hospital, you can look at their PT assessment, their OT assessment, the social work notes. You can get a lot, I usually do a lot of that background before I call the patient and know kind of what's going on. (Clinic 11)

A low response reflects difficulty in updating and retrieving information. Even though processes were in place at the following clinics these were less developed than processes reflected in midrange responses:

A team coordinator [...] gets a list every day of patients who discharge from a [hospital] and so they send those patients out to the triage nurses and to me and they kind of split them up half and half where they take, kind of, our in-house discharges and we take all of the TCU discharges and then we split up our ED followups. So we try to follow up with most of our patients. I think the triage nurses are following up with every ED patient that comes out regardless of how many times they've been in. (Clinic 4)

#### *Updating Population Management Information*

A key aspect of population management information is that it is updated and current. One clinic provides an example of a low response in maintaining current information:

[We are supposed to gather information from patients] Prior to the physician going into the room. It doesn't happen. I'm going to be honest - the reality of that is we can try to work with these people and often times you're, you know, you're with them either in person for extended periods of times and in this particular clinic, we also are responsible for telephone triage, walk-in emergencies, diabetic meter teaching, I mean, the list goes on and on. (Clinic 4)

A clinic that continuously develops their population management tools to assure that population information is updated and timely provides an example of a high response:

We're working on a report for patients - the care coordinators are - for patient who are in other systems and they're seeing us, but they have been in the hospital at the [location] or at [geographic region]. There are reports now that we're getting and IT helped to form that. We can track our patients. [...] that's a great report because a lot of times, you know, the patient goes from one hospital to the next, you know, for whatever. A lot of times you don't know what is going on with that patient. This way, the care coordinators, we can identify patients that are ours, or you know, that is in our clinic, not only just in care coordination, but in our clinic and that recently, [...], we started to work on that and get medical records and things like that and bring them back into the clinic for follow up. If there is something that I see that the doctor has, you know, noted or changed, then that is when I would talk with the paramedic and let them know what we need. We might need an extra blood draw or, you know, but we discuss that patient. They go out to see the patient and they create a note in Epic so the doctor has it and I have it. It happens right here in Epic. Anyone can put it in. The providers put it in, [care coordinators] will put a referral in [...].  
(Clinic 10)

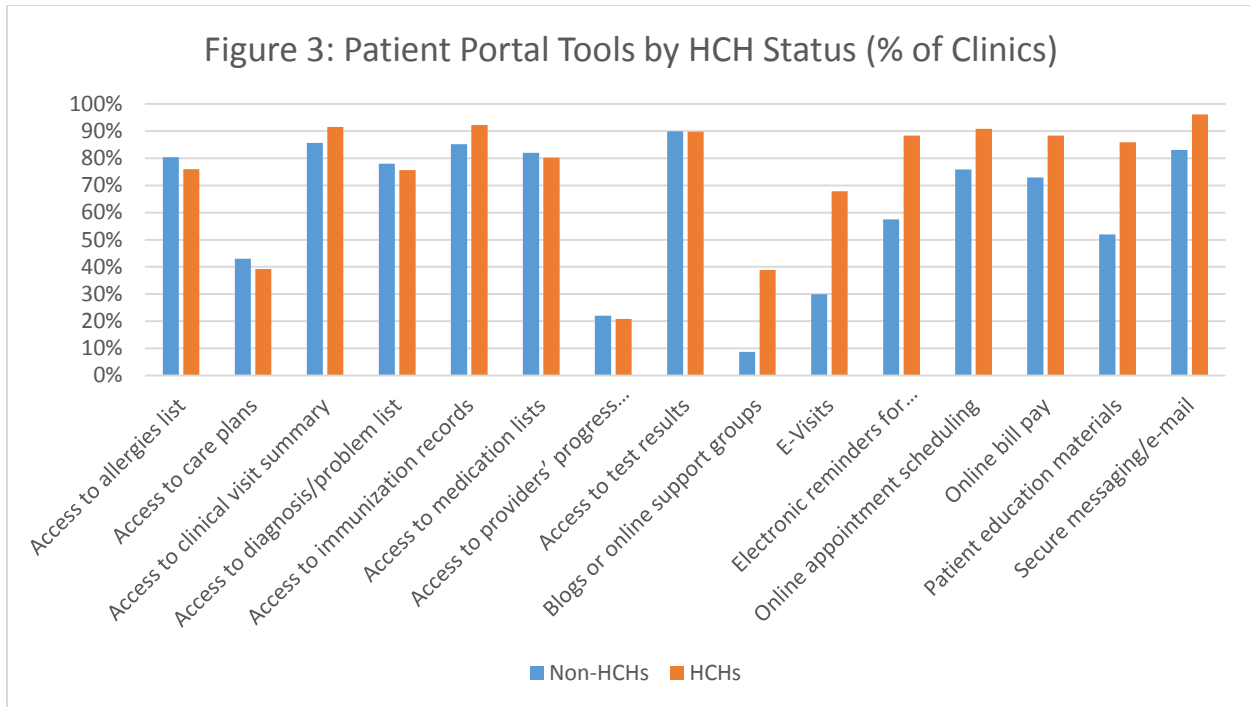
### *Summary*

HCHs were more likely to have implemented registries than non-HCHs and all clinics had implemented EHR population management tools that supported accessing a patient's current health status and background information. However, clinics varied in the extent to which the tools and processes are used to monitor and manage subpopulations, proactively targeting patients varied among clinics, and assuring that information was regularly updated and timely.

### *Dimension 3: Care Coordination - Assuring Communication and a Primary Care Relationship*

A central HCH aspect is assuring a primary care relationship with patients that supports bi-directional communication from patients to providers and providers to patients.

An analysis of EHR implementation shows that HCHs are more likely to implement patient portal tools that can be used for assuring access than are non-HCHs. Figure 3 shows the ways that patients can access the clinic through a patient portal. The difference between clinics certified as HCHs and HCH eligible clinics that were not certified controlling the specific registries was significant ( $T = 2.34, p < .05$ ).



The interviews showed that while all clinics had tools that were likely to assure patient interactions, the specific way clinics implemented procedures for communicating and verifying understanding of test results, schedules, medication information, health education, and care reminders varied substantially across clinics. Midrange responses indicated a high level of development in this dimension of HCH transformation because every clinic offered a variety of modalities to assure communication within the primary care relationship. Highest-scoring responses included telemedicine, printed care plans provided to patients, electronic access to information for patients, and care coordinators having direct, real-time access to their patients' hospital records.

A midrange response is:

What we've found there is that scheduler can sometimes can just put the person on hold and just go quick ask a provider or nurse something and take care of a situation much more efficiently, whereas when it's [...] so far away, you know they can do some messaging over the computer or whatever, but it's not quite the same as just poking your head out and saying, hey what about this, could we fit this person in? [...] better patient access. Getting them in sooner or [...] you know because sometimes it might be just asking a provider, 'hey you normally take these kind of appointments in 30-minute increments, could you do this particular appointment. Could we squeeze it in there?' (Clinic 6)

A high response is:

[Telemedicine] patients always know what their bill is going to be. And [telemedicine provider is] also great in that, you know, [they say to patients,] 'If you could just come to this one visit, even if it is not fully covered, we will be more than happy to work with you over the phone after that, it's just that first visit is really vital.' And then doing the phone after that, not a telemedicine one, but a phone one visit for follow up, they don't charge for. They know when a patient really needs something and the barrier is there and if you can take the barrier down, in the long run, it is going to be cheaper for our system to keep them out of a hospital, to give away a telephone call, than to have a patient be admitted to the hospital. (Clinic 7)

Care coordinators in clinics 11 and 12 provided a number of strong coordination examples, such as contacts related to hospitalization, care plans, long-term continuity, and ability to directly contact care coordinators:

I worked with [my favorite patient] for a little over two years and I would call anytime he would go in the hospital. Then he started calling me when he was going to the hospital instead me calling him. He was calling me to tell me, I'm going to the hospital. So he would call me right when he got home. (Clinic 11)

We've got two different kinds of care plans. We've got an emergency care plan that basically just has my information, the providers that they see, the primary's information and it has the 24-hr nurse line, the 24-hr scheduling line, the hospital, their pharmacy, and an urgent care that is close to them. So that is just like the basic emergency care plan. Then with the conflict care plan if they have a lot of different specialists like orthopaedic doctors or care coordinators that are involved down at the [hospital]. All of those things get added to the care team. So once the names get added to the care team, that will also print out on that care plan. So when they get the care plan, it will have their demographics at the top. It has that 24-hr access plan. It has if they speak English, if they would like to have a phone call, if they need an interpreter. It has the \_\_\_\_ line information on it. (Clinic 11)

For instance yesterday I had a phone call out of the blue from a patient's son that I hadn't talked to since 2013. I sent a care plan and my card, and it wasn't somebody that I was going to be following. He calls me yesterday out of the blue. They saved my card. They save it and they call. He now is wanting to try get his mom into a long-term care facility. So we'll help with that. People just have to save the number. I don't know if they share their care plan with other providers. I hope that they do. It's really got all of their information and it's really helpful if they do that. But I can't say for sure if they do. I would hope they do. (Clinic 11)

Our RN Health Coaches give their patients their direct lines to call at the clinic, which has been a huge satisfier for our patients and they don't have to call our front desk and wait on phones, and get transferred because maybe they ended up in the wrong spot. They get their direct line and the RN Health Coaches have a voicemail. So, of course, if they have an urgent need, they put that in their message to make sure that they're following appropriate procedure, but it has been a nice satisfier for patients that they have a direct contact to call and ask questions too. (Clinic 12)

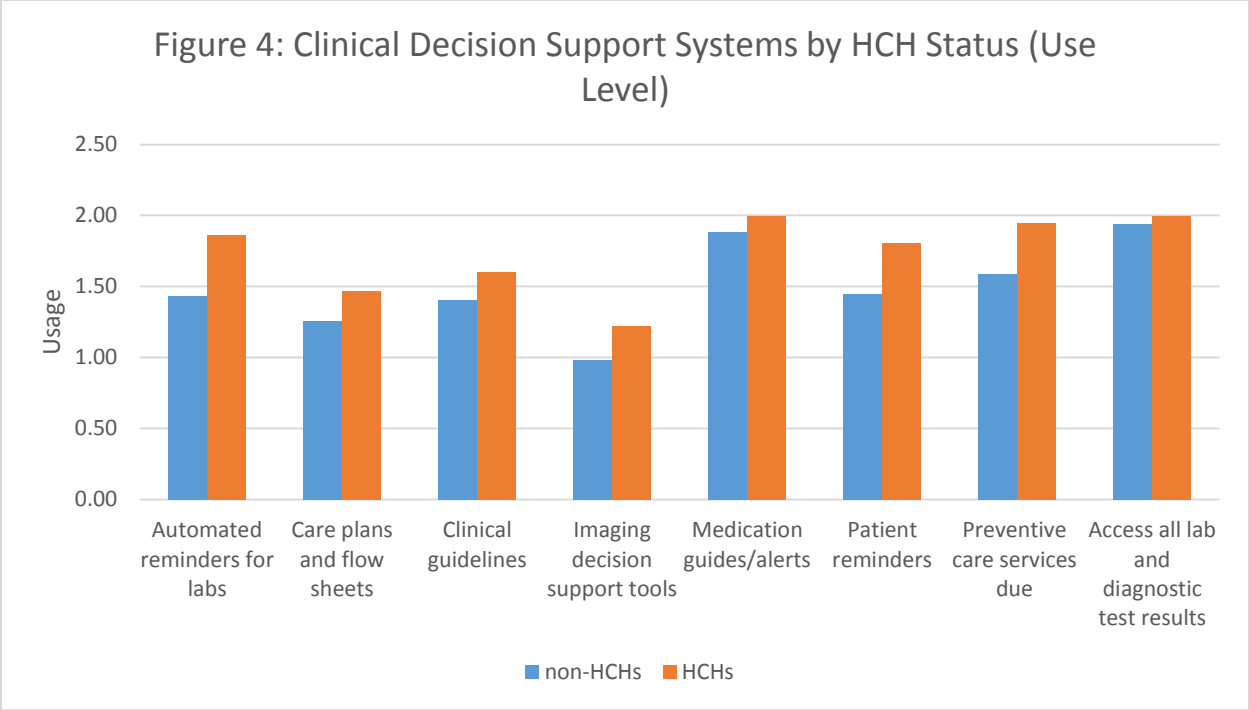
### *Summary*

Clinics implemented a variety of procedures for assuring a primary care relationship that supported communication from patient to provider and provider to patient. All clinics had midrange to high responses. In the high response clinics care coordinators described a variety of processes for fostering access to care and care coordination, including electronic access to information and providers, as well as interpersonal availability.

### **Dimension 4: Care Management - Coordinating Care**

The primary care relationship with patients and caregivers (Dimension 3) supports coordination with patients and caregivers. Dimension 4 measures care coordination activities among providers, such as clinical decision support systems, integrating diverse perspectives in care management, sharing care plans and information among care coordinators and providers.

An analysis of EHR implementation shows that HCHs are more likely to implement clinical decision support systems to support care coordination than are non-HCHs. Figure 4 shows the implementation of Clinical Decision Support (CDSS) tools by HCH status (0 = not used, 1 – used occasionally, 2 = used routinely). The difference between HCHs and HCH eligible clinics adjusting for the CDSS tools was significant ( $T = 2.93, p < .01$ ).). In all cases HCHs were more likely to be using CDSS tools.



*Integrating Diverse Perspectives using Role Clarity and Integration*

The interview data showed that care coordination processes among care coordinators and providers varied substantially across clinics, especially in terms of involvement in decision-making as well as joint problem-solving to achieve desired patient outcomes. In lower scoring clinics, care coordinators were delegated tasks in an ad hoc or idiosyncratic fashion. In higher scoring clinics coordinators were more actively involved for decision-making, planning and implementation and also had more standardized roles.

The responses below indicated midrange/average development in the area of care coordinator role clarity and integration:

I would say they kind of see it first of all care coordination is still a little bit confusing for the physicians even though we have been doing it for 2 years or more 3. I think they would look at that person as kind of an extension of what they can do and to really do more targeted focus with the patients. You know something, I am just trying to best describe it. I think they would look at themselves as a team and what pieces can I do versus what pieces can do versus what pieces can the primary \_\_\_ CMA or really you know what this isn't something the clinic can do I think we need to get social services involved or human services or public health or you know what is there just some other communities as far as we can look at. I think they are really looking at that person to kind of be the connector of all of those types of resources. (Clinic 5)

I think now most of our primary care physicians are on board. Some of them are still having, I think, a little bit hard time determining, you know, what can they do that I don't need to do because they've just gotten so used to the way that they've always practiced. [...] Some of them have very specific things that they want their RN Health Coaches to do and other things that they just want them to not do. So, then, they just leave that out for their RN Health Coaches, so it does vary a little bit per practice, but we overall, I think we're getting more and more buy in and support from the physicians and they're realizing how much help that the RN Health Coaches are providing for their patients and for them too, because then that kind of takes some of the weight off of the [...]. (Clinic 12)

Since this role has developed over the last 3 years, [providers] are now kind of asking a little bit more questions of their patients instead of just kind of dealing with what is in front of them for the appointment. They are kind of digging in a little bit more of maybe a social background or kind of how are things in school, or you know, finding out if there is any more deeper problems going on with the child that they are seeing; and then that's where they kind of pull me in, you know come and talk to me [...] coming to me for those things that the [patient's family] aren't able to manage just because they're overwhelmed or just haven't gotten to it. So, that is when they are kind of using me more, where they just weren't asking those things back in the day. (Clinic 8)

The following response is an example of a low response about the extent to which HCHs clarified, standardized and integrated care coordinators:

Honestly, if there's anything that the physicians don't know what to do with, it comes our way. We're kind of a dumping ground. If there's a problem, they bring to us if they could. [...] Some of them don't use us a lot. Some of them use us heavily. I think it's what their comfort level is with their practice and with understanding our role. You know, we've done several presentations for our clinics but, you know, everybody has their own idea of what they want to use us for. [...] The way our model has been, we have been very separate from the clinic staff. (Clinic 1)

HCHs which clearly defined and integrated diverse perspectives (including the care coordinator) and implemented inter-professional work scored highest. Clinic 10, for example, integrates perspectives among several diverse provider types – including front desk staff. In this clinic, inter-professional deliberation about patient needs and follow up has also resulted in addition of provider types to the clinic's HCH:

We have two physicians' assistants here [...] our Medical Director, is also here. Family practice [...] and the physician assistants. We have diabetes education that comes into our clinic. [...] We also have the community paramedics. [...] But the front desk is the first person that sees the

patient. If they see a patient who has cancelled a lot of appointments, the patient might tell the front desk that, 'You know what, I just can't get here, I don't have transportation,' you know, they can identify patients also. They are trained to do that and they refer them to me. So, it comes from the front desk. It comes from the lab. I've had the lab person come in and just kind of give me, you know, because the patient sometimes will get to know someone and sit down and talk, and you know, and sometimes lab will come in and say, 'You know, you might want to give blah blah blah a call because, I think she's struggling with her INR. She is not really taking her medication right and her numbers are not good. So, can you just talk to her and see if she needs some help?' That is great, because then I can give the patient a call. We have discussions with each other too, because sometimes we're stumped, you know. It varies from patient to patient. (Clinic 10)

#### *Boundary-Spanning across organizations*

Organizational mechanisms for integrating diverse professional perspectives also involves boundary-spanning coordination. The HCH should know which providers outside the HCH are likely to be needed by their population and have established formal coordination mechanisms with those providers. The examples below illustrate typical responses to items about boundary-spanning coordination, almost all of which were scored midrange to high:

[...] we have done Metro Mobility forms, and if they can't walk a block to the public transportation. There is MINAP if they're Medicaid primary health partners. If there is a certain branch of insurance, we have Rideshare. [...] You know, sometimes it works and sometimes it doesn't, but we always, always, try. Some of our social workers, when we refer, we have heard that there are a few that actually take their practice out into the community. For instance, meet people at the local Burger King if their homeless. (Clinic 4)

I have one gentleman who I had to make an adult protection report on and he's not taking his insulin as he should [...] so I've turned him over to the county that he lives in to say 'hey, we need to check into this.' [...] I'm afraid he's going to die. He's afraid he's going to die but then he doesn't remember that four days later. He doesn't remember it ten minutes later. [...] he has an endocrinologist who is outside of our organization but within our partnerships and so I've called that endocrinologist to talk to him about his concerns with this patient. I [also] have talked [...] his family, [...] the management team at the assisted-living that he is at to try to come up with some options for him. (Clinic 1)



[...] there is a community meeting here at [community name] Community Meeting or something like that. That happens once per month and we've tried to be present at those meetings as much as possible just because it's kind of everyone, several different community resources come together in one location and share \_\_\_\_, maybe what has changed, to get everybody kind of an update and then what we've tried to do is send one of our RN Health Coaches or two, depending on capacity, and then they bring that information back to our Medical Home meeting. We've had to do that a little bit less with the introduction of our community health worker because she keeps us more up to date on that stuff, more regularly even than once per month because she has built so many of those relationships with people. (Clinic 12)

I have conversations all the time with teachers and staff [...] just to see what is going on. [...] I go to the school. [...] I go as the care coordinator for the patient. (Clinic 8)

### *Summary*

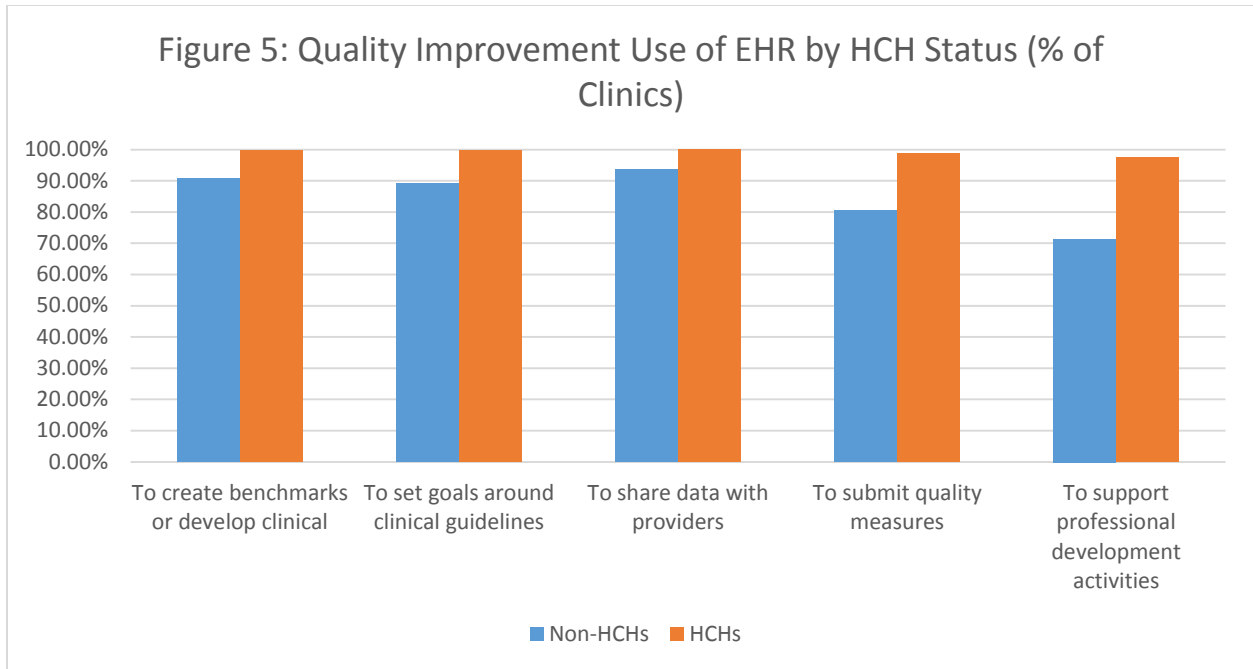
Clinics had implemented a variety of procedures for coordinating care and integrating diverse perspectives and spanning organizational boundaries. Overall, all clinics had midrange to high-scoring responses, and care coordinators described a variety of processes for coordinating care using community meetings and face-to-face visits with patients and providers of other organizations outside of the clinic. However, in some clinics care coordinators were assigned tasks in an ad hoc manner and providers varied in their working with care coordinators. This lack of role clarity and integration is likely to be problematic for effective coordination.

### **Dimension 5: Maturity – Measurement and Feedback**

Measurement and Feedback measures the use of measurement to monitor HCH functioning and provide feedback to providers and care coordinators about their performance. HCHs are required to participate in outcomes measurement by Minnesota Community Measurement (MNCM) and Minnesota Statewide Quality Reporting and Measurement System (SQRMS). While these outcome measures are useful for assessing clinics, they are often effected by the many processes, such as population health management, timely patient/caregiver contact, assuring clear communication. The highest scoring HCHs will have measurement and feedback processes in place for these processes that produce the outcomes measured by MNCM/SQRMS. This measurement and feedback can be used by providers and staff to improve the processes they are accountable for and to assess the relationship between process functioning and patient outcomes.

An analysis of EHR implementation shows that HCHs are more likely to implement EHR tools that are used for measurement, provider feedback, and quality reporting than are non-HCHs. Figure 5 shows the

implementation of EHR based quality improvement and learning tool implementations by HCH status. The difference between HCHs and HCH eligible clinics adjusting for the CDSS tools was significant ( $T = 3.62$ ,  $p < .01$ ).). In all cases HCHs were more likely to be using EHR based quality improvement and learning tools.



In all clinics that were interviewed, care coordinators had access to lists or searchable records which could inform them about outcomes for the patients they worked with directly. However, HCHs varied in the extent to which their clinics fostered care coordinator awareness of and involvement in measurement of outcomes such as hospital and ED visits, and quality outcomes. In most clinics, care coordinators primarily used these lists for managing referrals and coordination – for performing service related tasks. In their responses, care coordinators drew attention to not using data to help measure and improve their performance. There were very few HCHs that had implemented and were implementing care coordination process measures associated with patient outcomes that could be used in motivating, planning, and improving care processes and performance.

The following example illustrates a midrange-to-high response to items asking about care coordinator involvement in measurement and feedback activities in their HCH:

[...] we talk about in our operations meetings that we have twice per month, where we will talk about, 'Okay Dr. ----, your diabetes numbers are phenomenal. What are you doing there that is different there that is different than what we are doing in our other sites, because you seem to

have found a breakthrough?' [...] Then it is having conversation of, 'Oh well, we found that if we call the patient instead of sending a letter.' Or, we have found that if we could focus on one piece at a time, and whittle away, first we are going to whittle away at this piece and then we are going to whittle away at this piece, and then it comes down to, you know, whatever the scenario is. Sometimes it's just a 'I'm not quite sure what we did differently.' It truly is - I think a lot of it has to do with the connectivity that you have with the patients as well and the trust and the respect that you have with the patient and involving them in the shared decision making so that they are understanding why they are doing what they are doing. (Clinic 7)

Well we have we measured a lot of things based on the Minnesota Community Measurement from a quality perspective. We in our place we share that information pretty transparently so T---- would know, for example, how we are doing for our ER follow ups, how we are doing for inpatient follow ups, how we are doing for diabetes. All of those kinds of things. [...] I have asked for [outcomes measures] from the beginning and no we don't get - in my opinion, we do not get feedback on the measurements. Specifically, you know, what percentage of people are we keeping out of the Emergency Departments by doing this work. (Clinic 4)

Some clinics incorporate care coordination into measurement and feedback activities, and these received the highest transformation scores. The following two examples illustrate a how a high-scoring clinic measures and informs care coordinators about coordination processes:

Well we have dashboards and readily access to the dashboard. Everybody can go into the dashboards and that is why we are able to drill it down to the private level of how we are doing with quality measures and down to the patient level down to the provider level. So the teams work these dashboards and that is really what threads the population health piece. (Clinic 2)

Everybody has access to their own vantage points or quality measures on a provider level so that piece [...] is racked up in them being able to make quality measures with patients. So there is some incentive that way to. So on a provider level with their entire panel they are involved [in measurement] that way. (Clinic 2)

Coordinators at high-scoring clinics echoed demand for explicit links between care coordination efforts and outcomes (similar to care coordinators at average/midrange-scoring clinics):

As far as quality outcomes go, as far as financial outcomes, I would like to have a more consistent way of measuring the impact of care management on how did we make a difference because we get big reports on total classic care but what piece of that is care management. We don't know that yet and I don't have a way because we don't have utilization data within our EHR.

I don't have accurate utilization data because of EHR I don't really have a way of pulling this patient was care managed and he had this much readmissions before and know he has this much. We are working toward that. I need some metrics for just how we impacted from care managed patients and that is what we are trying to work for. (Clinic 2)

### *Summary*

Clinics commonly kept measures for outcomes such as hospital admissions and ED visits in some form, as well as for quality measures such as those used by Minnesota Community Measurement (MNCM) and Minnesota Statewide Quality Reporting and Measurement System (SQRMS). Where care coordinators had access to such measures, EHR was often cited as the information source. The interviews with care coordinators identified the lack of care coordination process measures related to patient outcomes as a significant weakness because they did not have data to motivate, plan, and implement process improvement.

### **Dimension 6: Maturity – Quality Improvement**

Quality improvement involves identifying care outcome gaps (problems), conducting root cause analyses, identifying alternatives based on the root cause analysis, learning collaboratives, and evidence based practices, implementing and testing the alternative, and diffusing effective interventions. This process is facilitated by the degree to which care coordinators, providers, staff, and community stakeholders are included in quality improvement because their diverse expertise can be integrated. The highest scoring clinics were those in which care coordinators articulated gaps or differences between a desired state and a current state as well as described opportunities to help the clinic address such gaps.

The following responses are examples of midrange responses to items concerning the extent to which HCHs informed and involved the care coordinator role in quality improvement:

You find, oh, well [this local clinic] is doing this and it appears to be really working. We want to do that. So, there is always that ability to, even though you are 24 miles apart, 12 miles apart, that you are a part of each other. We also have what we have our Operations Team. This is a combination of a variety of staff in different disciplines from all three sites that meet an hour every other week. (Clinic 7)

If there's something specific that I have to discuss with them, if they invite me or if I say 'hey, I want to talk about this. When's your next ops meeting?' Then I'll go to those but, again, that is changing a little bit with [new leadership]. I know [new leadership is] hoping to have us in those meetings a little bit more and be more present with some of those things, even though a lot of it

doesn't pertain to our job. I think just having our presence there is kind of where [new leadership] is looking to go with it. (Clinic 1)

A high response illustrates extensive involvement of care coordinators (integration of planning and execution):

[Care coordinators] are part of our OPS team, they are part of our huddles, they are a part of - they get some of their own metric pieces as well, and I couldn't tell you what all they get, but I know that they get some of their own pieces and they meet together as a group themselves, as well. They are all part of; they would get different pieces that are pertinent, more pertinent to them in their work that they would need to follow through with. (Clinic 7)

A low response illustrates the lack of involvement of care coordinators (separation of planning from execution):

Typically [quality improvement efforts] are done, again, at a higher level than where we are. I think our senior director team for our group looks at those outcomes and I don't know how they filter those reports out but they do look at those outcomes to see were those patients readmitted, how are they doing. [...] I think [QI priorities] probably set forth by the national accrediting agencies, I think. (Clinic 1)

### *Summary*

Care coordinators occupy a central role in a HCH. In some clinics the care coordinator role is implemented primarily as service delivery activities and is not involved in quality improvement activities, which are seen as being done at higher hierarchical levels. In other clinics, the care coordinator role includes involvement in quality improvement related to the care coordinator role. In these clinics, care coordinators appear engaged to seeking to improve the care coordinator role, care processes, and patient outcomes.

### **Dimension 7: Supportive Context and Climate**

A supportive context measures the degree to which a clinic has a context that is conducive to provider and staff engagement. This includes cultural change and other elements. Do provider and staff have the autonomy and authority they need to transform or are they micro-managed? Does the clinic have adequate resources to transform or are they being asked to transform on top of busy schedule? Does the context vision focus on patient centered outcomes (maximizing patient centered outcomes subject to a budget constraint) or on productivity (maximizing revenue subject to a patient centered outcomes constraint)? Are providers and staff rewarded jointly for performance that has its source in how a care system works or are providers and staff rewarded individually based on their own job?

HCHs varied with regard to how they assured that teams have the autonomy and authority they need to do their work. A high response described the context and climate in which care coordinators perform tasks, “the vision and the purpose doesn't change, but the strategies change” (Clinic 2). Another high response described working to see that care coordinators could have direct access to their patients’ hospital records:

[Getting care coordinators to have access to the hospital records] wasn't easy [...] But it is absolutely continuity of care and [an IT professional] needed to embed it through Enterprise to be able to have it happen and they did but it was a long process. (Clinic 2)

Regarding changes such as brokering care coordinator access to hospital records:

I think that the transparency and the flexibility of the leadership - I think the leadership is huge and our CMO is extremely visionary. And the other thing is that we can change fast. ... You know, everybody on from the top down to the staff levels is used to change and we've gotten really good at understanding what's the best way to have change happen. (Clinic 2)

A low response illustrates micro-management and individual rewards:

I am not involved in [monitoring and problem solving], they just pretty much tell us what our expectations are and, you know, it's pretty much if you're not doing your job you can expect to be moved on down the road, which is not a good way to think of things. (Clinic 1)

Some clinics that were interviewed appeared to be moving from medical control to organizational control or from separation of planning from execution to integration of planning and execution. One clinic described implementing practices within a new organizational logic:

The big cultural shift is just that team-based care. You know? And trying to just make everybody feel like everyone's an equal part of the team, like everyone has as an important role. And you know the whole goal is we're really trying to free time from the provider so that they can spend more time with the patient and less time trying to do this pre-visit stuff. So we've been shifting some of the workload so maybe something the provider has traditionally done for 20 years now we're going to say, hey it's within the scope of the nurse to do this. Or if we have a really good protocol in place, the nurse can follow that protocol and do this and free time up for providers. So it might just be changing, just changing something a person has done forever, like it's always been their job and looking at oh no, you know what, somebody else can do this. Or it might be kind of the other way around of having somebody be trying to do something they've never done before, you know? So there's all of that and... I think that's the biggest piece is just spreading out the workload and everybody working as a team to get the work done instead of it... the provider

shouldn't have to work 16 hours a day to take care of their patients. [...] We've been training to get people comfortable and pulling that information and ordering orders based off of a protocol. That's part of it. We're looking at creating a better protocol for medication refills and so looking at RNs have ever done that in the past, but with this new protocol, that could be something our LPNs could be doing, and so training them to do that. But one thing we haven't been doing is correcting those ABMs... something our facility has just written off. Well now we're asking our providers to do that as part of a new work flow, and some of them have never done that. So we're training to add that piece in. Those are just a couple examples. [...] the MD [will be doing things differently in terms of doing] advanced care planning, we've asked them to make sure they're doing that with each visit. A lot of [pre-visit planning has] come off their plate is where I've seen the biggest shift. [...] and then the after-visit summary, we've looked at that. It makes more sense for the provider to talk about this plan with their patients and then sign it off and give it to them versus having somebody else, maybe a checkout staff person do it. If the patient has some questions then you got to track the provider down to ask these questions that could've just been taken care of. So that's a different work flow change. (Clinic 7)

A serendipitous finding from the interviews illustrates the issue of cultural transformation from separating planning and execution to integrating planning and execution. The respondent that was targeted for interviewing was the senior care coordinator in a clinic. In some of the interviews this individual was accompanied by an individual responsible for managing HCH implementation in multiple clinics. An occurrence in these interviews was that the more senior individual would respond about HCH as a system even though the questions were developed to understand how the senior care coordinator actually implemented the care coordination role. When the senior individual responded at the system level, the care coordinators were limited, focused on their actions rather than how their actions fit into the care coordination role and how the role fit in their clinic. In other words, it appeared that while the care coordinator could describe how the role was performed, their answers did not reflect involvement in the planning of their role or understanding of the resources which the more senior/administrative person assumed were available for care coordinators.

### *Summary*

Clinics varied in transformation context. In some, the clinic culture focused on a medical model and separation of planning and execution. In some activities are micro-managed and individuals rewarded while in others the team is rewarded together and the team is given autonomy to improve the care system. Both the cultural transformation and the supportive context appear to play a role in transforming effectively.

## CONCLUSION

This study argues that HCH transformation requires three components. First is the transformation of institutional logics – from medical to organizational and from separating planning from execution to integrating planning and execution. This component of transformation requires a culture medical and hierarchal model control to a culture that focuses on organizing systems and involvement in learning and improvement. This cultural transformation has been noted on other research related to care teams and HCHs. Hrosikoski and her colleagues described the lack of transition from a medical to an organizational institutional logic in a study of HCHs - “the most striking was that physician roles were generally unchanged. Although certain physicians were actively involved with the changes either as named or as de facto leaders, by and large, change happened around the physicians and did not depend on their participation or engage them in a meaningful way”.<sup>48,p. 321</sup> Later they noted that physicians “neither actively supported nor actively resisted the change, so other clinic staff strategically built change around them. The issue of physician autonomy and general lack of engagement in the change process was not addressed systematically.”<sup>48,p. 323</sup> Recommendations of implementing care teams for individuals with severe mental illness note that psychiatrists “must act as an ‘apprentice’ to staff who probably have less formal education and training. This can be difficult to accept for the psychiatrist who is accustomed to being an ‘expert,’ but is essential to his or her establishing credibility and taking a leadership role in the team.”<sup>8,p. 42</sup>

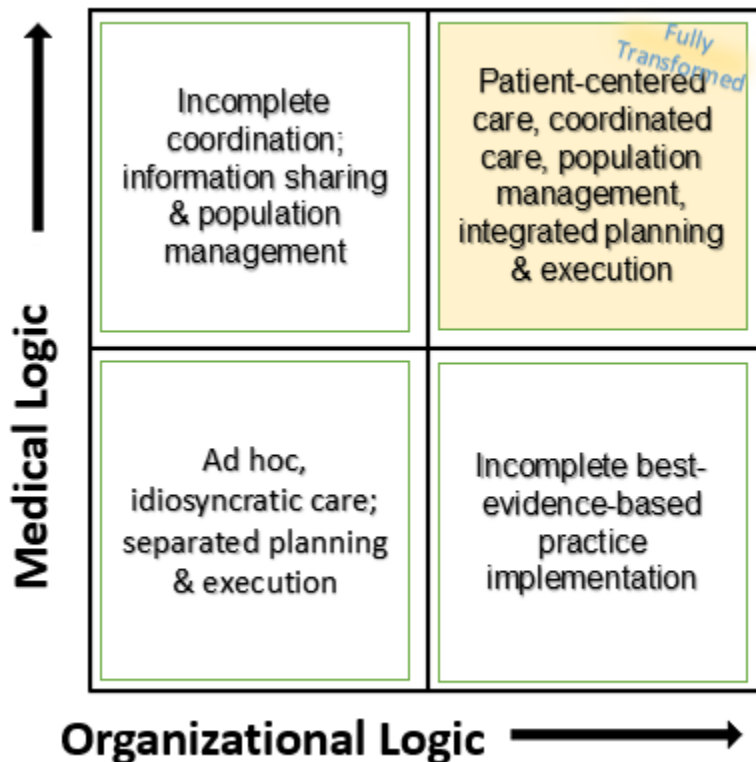
The second is implementing the core HCH functions - population management, assuring primary care, and care coordination, in a systematic, standardized manner. This is foundational for operating as a system and is necessary for becoming a complete HCH. The third is implementing HCH maturity and learning functions - measurement and feedback and quality improvement. This begins to optimize HCH functioning using evidence about the relationship between the processes in core HCH functions and patient/provider outcomes. Finally, a constructive climate focused on patient centered outcomes facilitates the implementation of all three steps by causing staff and provider engagement.

The results also show that HCHs are more likely than non-HCHs to have implemented population management tools (registries), assuring access tools (patient portals), care coordination tools (clinical decision support systems), and maturity tools (measurement, feedback, and quality reporting). The interview are consistent with this finding. But, there is significant variation in other transformation aspects, such as inclusion in planning and implementing care process improvements, using population information to guide care design and care processes (e.g. targeting). The difference between the areas of similarity and differences may be related to clinics being more able transform on processes that are closest to a medical institutional logic. It appears to be more difficult to transform those tasks that are described as an organizational institutional logic in an integrated, inter-professional care systems. Figure 6 shows a



possible transformation model. It hypothesizes that HCHs are fully transformed when they have implemented an integrated model based on both a medical and organizational institutional logic. The interview results suggest that it is easier for clinics to transform along the medical institutional logic dimension. This may occur because transforming along the organizational institutional logic dimension requires more changes on authority relationships and requires integrating planning and execution.

Figure 6: Proposed Transformation Model



A second finding is that there is significant variation in implementation of HCH practices. However, this is not necessarily problematic. Practices can vary because of variation in the needs of the population served by an HCH, the types of providers in HCH, and the types of health system supports that are available to the HCH. The key issue is whether the implementation of HCH functions and practices is fit for purpose - does it fit the needs of the HCH's population, providers, staff, and community?. Allowing and leveraging this variation in implementing core functions may represent a strength of the HCH Initiative.

# CHAPTER 7: HCH EFFECTS ON DISPARITIES

## INTRODUCTION

In this chapter, Medicare and Medicaid data is used to assess whether disparities in access, use, and quality of health care are smaller in Health Care Homes (HCH)-certified primary care clinics than in non-HCH certified primary care clinics. The research team assessed whether disparities may be reduced in HCH compared to non-HCH clinics for: management visits, emergency department visits and overall and unplanned hospitalizations for Medicare, Medicaid, and Dual-eligible (Medicare and Medicaid) enrollees from 2010-2014, as well as gaps in medications for Medicaid and dual-eligible enrollees for the same period. The disparities assessed are: (1) Race/ethnicity, (2) Disability, (3) Serious mental illness, (4) Multi-morbidity, and (5) Rurality. Comparisons are shown for clinics full- or partial-year Certified (HCH) clinics versus those not certified at any time during a given year (Non-HCH).

## SUMMARY OF KEY FINDINGS

- Racial disparities were significantly smaller for Medicaid, Medicare, and Dual Eligible beneficiaries served by HCH versus non-HCH clinics for most measures.
- Differences by disability and rural status did not show consistent benefits of HCHs in reducing disparities.
- Disparities by serious mental illness were slightly larger in most cases in HCH.

While the overall effect of HCHs was to reduce most morbidity related disparities, the effect differed by subgroup. Compared to low morbidity groups, disparities were smaller for those with moderate morbidity in HCHs. However, compared to low morbidity groups disparities were greater for those with severe morbidity in HCHs.

## POPULATION, DATA, AND METHODS

The population consisted of Medicare, Medicaid, and dual-eligible (Medicare-Medicaid) enrollees in Minnesota attributed to primary care clinics from 2009-2013. Data included patient-level Medicare and Medicaid enrollment and administrative claims information on use of health care services; clinic characteristics including zip code and rurality; and patient characteristics including reasons for enrollment (e.g., age, gender and disability), diagnoses. For the analysis, the Johns Hopkins Ambulatory Care Group (ACG) <sup>51, 52, 148, 166</sup> case-mix and coding system was used to adjust for morbidity and utilization patterns and to identify key outcomes indicating quality through Medicare and Medicaid data, specifically management visits, emergency department visits, unplanned hospitalizations, unplanned readmissions, and total medication gaps for those with Medicaid data (there was not pharmacy data for Medicare).

Analysis of these outcomes involved counts of events and binary (yes-no) measures indicating having one or more of each type of visit.

## Measures

### *Outcomes: Utilization Measures*

Three areas of health care utilization were analyzed to assess disparities based on counts for these Medicare and Medicaid claims data variables (these measures are calculated by the Johns Hopkins University Adjusted Clinical Groups (ACG) Case-Mix System<sup>52</sup>, see Appendix A for a full description): emergency department visits, overall inpatient medical visits, and unplanned inpatient medical visits (unplanned inpatient medical visits are “inpatient hospitalization count with exclusions for planned admissions. A planned admission is defined as either: [a] A definitively planned procedure, identified by either ICD procedure code or diagnosis code; and [b] A potentially planned procedure, identified by ICD procedure code. Potentially planned procedures are more common surgical procedures, such as hip replacements, cardiovascular procedures and other inpatient surgical treatments without evidence of acute complications”<sup>52,p. 89</sup>). For the Medicaid and Dual beneficiaries, medication gaps in prescribed medications, as identified using pharmacy fill data which can be associated with adherence, were also measured. While there are many reasons that a medication gap could occur, care coordination and monitoring of medication gaps by HCHs could minimize the presence of gaps and adverse consequences associated with them.

### *Race/ethnicity*

Based on Medicare and Medicaid enrollment data the Race/ethnicity categories consisted of White, African American, Hispanic, Asian/Pacific Islander, American Indian/Alaska Native, and Other/Unknown..

### *Disability*

Disability was measured as a binary (yes-no) variable. Disability is based on the original reason for Medicare entitlement (disability versus other) for Medicare enrollees, and on disability waiver status for Medicaid enrollees; for Dual Eligible individuals, it could be either or both of these justifications.

### *Serious Mental Illness (SMI)*

Serious mental illness (SMI) is measured using a binary (yes-no) variable indicating whether a person had Major Depression, Bipolar disorder, or a Schizophrenic disorder. These conditions are chosen to indicate SMI based on prior literature. Presence of these conditions was taken from the Hierarchical Condition Categories (HCC) coding of conditions.<sup>121, 122</sup>

### *Multi-morbidity*

For differences in multi-morbidity, the ACG variable for resource utilization bands (RUB) was used which originally set six comorbidity and demographic related categories for health care use from non-user to very high morbidity user of health care. If there was very little utilization in the lower categories, these codes 0, 1, and 2 (or non-user, healthy user, and low morbidity) were combined together as level 1. The remaining levels (moderate morbidity, high morbidity, and very high morbidity) were coded as levels 2 (moderate morbidity), 3 (high morbidity), and 4 (very high morbidity).

### *Rurality/Rural status*

Rural status is based on the population of patient residential zip codes, coded originally as metropolitan statistical areas, micropolitan statistical areas, small town, and frontier town. Due to the interest in rurality, the data was coded as a binary (yes-no) indicator for rural status, with small and frontier towns being “yes” and all other categories being “no” (see Appendix A for a discussion of rurality measurement).

## Analyses

Multivariate regression models were used to properly adjust for factors that might create alternative explanations for group differences. (For instance, age might differ between White and African American populations and also be related to some outcome, and thus might explain or confuse racial differences on that outcome). Assessment of interactions are computed between disparity status measures (race/ethnicity, disability, etc.) by HCH certification to assess whether HCH had any effect in reducing those disparities. These multivariate models controlled for clinic self-selection into HCH, patient age, sex, rurality, medical conditions, and race/ethnicity. These models were run according to Medicare, Medicaid, and dual eligible insurance coverage status. . Results from these models are used to calculate adjusted rates and counts of outcomes.

## RESULTS

### Medicare

Among Medicare enrollees, racial-ethnic disparities in acute health care use were smaller in HCHs than in non-HCHs, with the exception of African American-White differences which tended to be slightly larger in HCHs. For instance, Hispanic enrollees had 37 more unplanned hospitalizations per 1,000 enrollees than did White individuals among those attributed to non-HCH clinics; among HCH-attributed enrollees, this difference was only 12 more unplanned hospitalizations for Hispanic versus White individuals per 1,000 enrollees.

Table 1. Disparities in adjusted annual number of visits per 1,000 Medicare enrollees attributed to non-Health Care Homes and Health Care Homes clinics

	Emergency department visits		Hospitalizations (overall)		Unplanned Hospitalizations	
	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH
White	272.8	269.3	244.6	248.6	173.1	176.8
African American	415.8	438.6	273.8	303.3	221.9	247.3
<i>Difference from White</i>	143.0	169.4	29.1	54.7	48.9	70.5
Hispanic	343.0	319.6	271.8	244.5	210.4	188.8
<i>Difference from White</i>	70.2	50.3	27.2	-4.1	37.4	12.0
Asian/Pacific Islander	183.0	215.8	285.5	221.3	221.5	182.4
<i>Difference from White</i>	-89.7	-53.4	40.9	-27.4	48.5	5.7
American Indian/ Alaska Native	451.4	422.6	299.9	274.1	245.5	217.8
<i>Difference from White</i>	178.6	153.3	55.3	25.4	72.4	41.1
No disability	333.0	339.5	280.0	291.9	220.7	231.9
Disability	252.6	252.9	243.5	246.5	169.8	172.9
<i>Difference</i>	-80.4	-86.5	-36.5	-45.4	-50.9	-59.0
No SMI	265.9	262.3	242.6	245.3	170.5	173.7
SMI	351.5	347.2	267.4	278.0	202.3	207.7
<i>Difference</i>	85.7	84.8	24.8	32.8	31.8	34.0
Non/Healthy user-Low morbidity	45.3	42.2	1.4	1.0	0.7	0.8
Moderate Morbidity	117.6	111.9	34.8	31.6	18.4	17.2
<i>Difference from low</i>	72.3	69.7	33.4	30.6	17.7	16.4
High Morbidity	317.8	315.6	199.6	191.0	129.5	124.2
<i>Difference from low</i>	272.4	273.4	198.2	189.9	128.8	123.4
Very High Morbidity	617.5	623.2	818.6	856.1	597.6	626.9
<i>Difference from low</i>	572.2	581.0	817.2	855.1	596.9	626.1
Non Rural	283.0	277.9	245.1	248.1	174.3	177.3
Rural	245.9	246.8	248.9	255.5	175.4	181.5
<i>Difference</i>	-37.1	-31.2	3.8	7.4	1.0	4.3

Notes: models adjusted for patient age, non-linear term for age, sex, race/ethnicity, rurality, and clinic self-selection into HCH, and clustering by clinic. Gray-shaded areas indicate differences not significant at  $p < .0001$ .

By disability, differences in averages of visits were slightly larger in HCH than non-HCH clinics, but the interpretation is different: disabled individuals used less emergency and hospital visits in both groups, which were different from racial/ethnic differences, in which minority groups tended to have more acute use. As such, larger differences in HCH meant even lower counts of visits for HCHs for disabled versus non-disabled individuals, but there was no evidence that disabled individuals were disproportionately high users of acute health care services to begin with.

Findings for other outcomes were mixed. Serious mental illness (SMI) was associated with greater visits overall. For emergency department visits, this difference was smaller in HCH- than non-HCH-attributed enrollees, whereas the reverse was true for hospitalizations. For morbidity in the resource utilization bands, differences between the moderate and high morbidity groups versus low were smaller in HCH- than non HCH-attributed enrollees; however, the difference between the very high morbidity and low/non-user bands was slightly higher among HCH-attributed enrollees. Rural enrollees had lower ED visits in general, and this difference (trending toward fewer visits) was larger among HCH-attributed patients, but there were no significant differences in hospitalizations by rurality.

## Medicaid

Findings for adults in Medicaid showed that minority-versus-White differences in adjusted counts of emergency department, overall inpatient, and unplanned inpatient visits were smaller in HCH than in non-HCH clinics in all but one case. For example, African American enrollees had 556 more emergency department visits than White enrollees per 1,000 persons among non-HCH attributed enrollees (more than double the visit rate for White enrollees—essentially 101% more visits), but 470 more among HCH-attributed enrollees (only about 80% more visits). The lone exception was the American Indian compared to White difference in unplanned hospitalizations: the difference was 50.6 visits per 1,000 among non-HCH enrollees and 52.2 per 1,000 among HCH-attributed enrollees. These smaller disparities also extended to medication gaps: minority groups typically had more gaps, but this difference was smaller in HCH than in non-HCH clinics. It should be noted, however, that the visit rates to ED and hospital were lower in HCH than non-HCH clinics for African American, Hispanic, and American Indian enrollees in all cases except for, again, American Indian enrollees and unplanned hospitalizations (near-equal at 180.2 versus 178.6 per 1,000 in HCH versus non-HCH, respectively).

Differences by disability, SMI, and rural status were more mixed, but actually slightly larger in HCH than in non-HCHs in most cases although there were no significant rural/non-rural differences for overall hospitalizations.

In terms of morbidity, differences in the disparities between moderate and low/non-user resource utilization bands were smaller for HCH-attributed enrollees, differences between high morbidity and the lowest band were larger for emergency and medication gaps and smaller for all-cause and unplanned hospitalizations for HCH versus non-HCH attributed enrollees. As in Medicare, differences between very high morbidity and low bands were larger for HCH than non-HCH enrollees.

**Table 2. Disparities in adjusted mean number of visits and events per 1,000 adult Medicaid enrollees attributed to non-Health Care Homes and Health Care Homes clinics**

	Emergency department visits		Hospitalizations (overall)		Unplanned Hospitalizations		Medication gaps	
	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH
White	550.4	580.4	196.7	188.2	128.0	128.1	1084.7	1215.2
African American	1106.6	1051.1	229.7	205.4	154.2	135.1	1683.5	1785.4
<i>Difference from White</i>	<i>556.2</i>	<i>470.7</i>	<i>33.0</i>	<i>17.2</i>	<i>26.2</i>	<i>7.0</i>	<i>598.9</i>	<i>570.2</i>
Hispanic	882.0	834.2	255.6	232.6	153.6	137.1	1656.1	1668.1
<i>Difference from White</i>	<i>331.6</i>	<i>253.8</i>	<i>58.9</i>	<i>44.3</i>	<i>25.6</i>	<i>9.1</i>	<i>571.5</i>	<i>452.9</i>
Asian/ Pacific Islander	731.4	675.9	194.3	186.5	128.1	124.6	1613.1	1720.0
<i>Difference from White</i>	<i>181.0</i>	<i>95.5</i>	<i>-2.4</i>	<i>-1.7</i>	<i>0.1</i>	<i>-3.4</i>	<i>528.5</i>	<i>504.9</i>
American Indian/ Alaska Native	1309.5	1307.0	248.4	238.2	178.6	180.2	1649.0	1656.0
<i>Difference from White</i>	<i>759.1</i>	<i>726.6</i>	<i>51.6</i>	<i>49.9</i>	<i>50.6</i>	<i>52.2</i>	<i>564.3</i>	<i>440.8</i>
No disability	820.9	806.7	210.9	201.3	142.2	136.6	1358.8	1386.4
Disability	667.8	700.9	222.5	214.3	161.0	158.7	999.4	1131.0
<i>Difference</i>	<i>-153.2</i>	<i>-105.8</i>	<i>11.5</i>	<i>13.0</i>	<i>18.8</i>	<i>22.1</i>	<i>-359.5</i>	<i>-255.5</i>
No SMI	744.0	713.3	203.2	185.9	117.2	104.4	1334.0	1332.6
SMI	980.2	1013.8	225.8	229.6	183.9	189.7	1346.0	1420.8
<i>Difference</i>	<i>236.2</i>	<i>300.5</i>	<i>22.5</i>	<i>43.7</i>	<i>66.7</i>	<i>85.3</i>	<i>12.0</i>	<i>88.2</i>
Non/Healthy user- Low morbidity	236.6	212.5	2.8	2.3	2.6	2.1	1040.8	1056.7
Moderate Morbidity	609.7	584.3	42.2	33.7	40.8	32.9	1208.6	1211.7
<i>Difference from low</i>	<i>373.2</i>	<i>371.8</i>	<i>39.3</i>	<i>31.4</i>	<i>38.2</i>	<i>30.8</i>	<i>167.8</i>	<i>155.0</i>
High Morbidity	1216.7	1213.2	438.2	422.1	209.0	193.2	1349.5	1398.2
<i>Difference from low</i>	<i>980.1</i>	<i>1000.7</i>	<i>435.3</i>	<i>419.8</i>	<i>206.5</i>	<i>191.1</i>	<i>308.7</i>	<i>341.5</i>
Very High Morbidity	2318.7	2396.2	1207.8	1227.2	902.0	934.6	1658.7	1749.3
<i>Difference from low</i>	<i>2082.1</i>	<i>2183.7</i>	<i>1205.0</i>	<i>1224.9</i>	<i>899.4</i>	<i>932.6</i>	<i>617.9</i>	<i>692.6</i>
Non Rural	814.8	793.8	212.8	203.7	145.6	140.7	1341.1	1385.4
Rural	803.4	818.5	209.4	198.2	135.0	130.2	1324.1	1304.2
<i>Difference</i>	<i>-11.4</i>	<i>24.7</i>	<i>-3.4</i>	<i>-5.5</i>	<i>-10.6</i>	<i>-10.5</i>	<i>-17.0</i>	<i>-81.2</i>



**Table 3. Disparities in adjusted mean number of visits and events per 1,000 child Medicaid enrollees attributed to non-Health Care Homes and Health Care Homes clinics**

	Emergency department visits (# visits per 1,000)		Any hospitalization (# with one or more visit per 1,000)		Any unplanned hospitalization (# with one or more visit per 1,000)		Any medication gap (# with one or more visit per 1,000)	
	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH
White	428.9	490.9	51.0	52.7	41.7	44.0	530.4	587.5
African American	686.7	669.6	50.5	48.4	42.5	41.7	664.9	663.6
<i>Difference from White</i>	257.9	178.7	-0.5	-4.4	0.9	-2.3	134.5	76.1
Hispanic	580.8	590.6	49.2	46.0	40.1	38.4	619.9	619.0
<i>Difference from White</i>	151.9	99.7	-1.9	-6.8	-1.6	-5.6	89.6	31.5
Asian/Pacific Islander	464.2	429.0	48.8	42.5	41.3	33.6	541.1	637.2
<i>Difference from White</i>	35.3	-61.8	-2.2	-10.2	-0.3	-10.4	10.8	49.8
American Indian/Alaska Native	745.4	761.4	65.3	62.7	56.3	54.9	570.6	576.6
<i>Difference from White</i>	316.5	270.6	14.3	10.0	14.7	10.9	40.3	-10.9
Non/Healthy user-Low morbidity	319.3	305.3	5.8	4.4	5.3	4.1	603.7	616.7
Moderate Morbidity	786.3	809.7	63.1	59.0	52.2	50.3	588.6	599.9
<i>Difference from low</i>	467.0	504.4	57.3	54.6	46.9	46.2	-15.1	-16.7
High Morbidity	1027.1	1022.6	171.3	175.4	131.2	137.7	551.7	559.3
<i>Difference from low</i>	707.8	717.3	165.5	171.0	125.9	133.6	-52.0	-57.3
Very High Morbidity	1425.3	1314.2	221.9	229.7	106.1	106.9	644.3	638.1
<i>Difference from low</i>	1106.0	1009.0	216.1	225.3	100.9	102.8	40.6	21.4
Non Rural	549.7	541.7	42.9	47.8	41.1	40.6	584.8	597.9
Rural	581.8	588.0	49.9	47.9	41.6	40.7	591.5	583.1
<i>Difference</i>	32.1	46.3	7.0	0.1	0.5	0.1	6.6	-14.8

Notes: Models adjusted for patient age, sex, race/ethnicity, rurality, and clinic self-selection into HCH, and clustering by clinic. Gray-shaded areas indicate differences not significant at  $p < .0001$ .

For children in Medicaid, all racial/ethnic differences versus White were smaller in HCH than non-HCH enrollees, but these differences were only significant for emergency department visits. A number of results were not significant, partially because the adjusted point estimate rates were actually very similar between groups (e.g., African American-White differences in hospitalizations in both HCH and non-HCH clinics were on the order of, respectively, 4.4 and 0.5 fewer children with a visit per 1,000), though of course sample size is always a factor in significance/p-value levels.

Among Medicaid-enrolled children, comparisons were omitted for disability and serious mental illness because each of the groups (a) comprised very small proportions of Medicaid-enrolled children; and (b) given patterns of enrollment in Medicaid/SCHIP for children, the indicators available to us, and the diagnostic uncertainty that might be associated with SMI diagnoses (e.g., bipolar disorders) in children, due to uncertainty of their validity.

Morbidity findings for resource utilization bands (RUBs) among children in Medicaid were significant but mixed. The effect of HCH differed by RUB and by outcome. HCH was associated with lower rates of acute use at the lowest RUB; higher ED but lower hospitalization rate at the moderate RUB; and lower ED but higher hospitalization rate at the very high RUB level. HCH was associated with lower rate of medication gap at all RUBs except the top, where the opposite was true. Similarly, the difference between each higher RUB versus the lowest RUB, and the HCH interaction with these differences, all varied across outcomes and across levels of RUB. For instance, while the difference between those in the “very high” morbidity versus the lowest band was smaller in HCHs for ED use and medication gaps, it was larger in HCHs for hospitalizations compared to non-HCH clinics. Meanwhile, the reverse was mainly true for moderate and high morbidity groups versus low (that is, larger differences in HCHs for ED but smaller differences in HCH for hospitalizations). **Rural status** trended toward smaller differences in HCH for hospitalizations and medication gaps but was not significant for those measures; whereas the rural/non-rural difference was larger, and significant, for HCH in emergency department visits.

## Dual Eligible

Among dual eligible adults, HCH was largely associated with smaller racial/ethnic differences in acute health care use as compared to non-HCH. That is, racial/ethnic differences in acute health care use, with the White, non-Hispanic population as the reference group, were smaller in almost all cases for HCH-attributed versus non-HCH enrollees. The one exception was the Asian/Pacific Islander versus White difference in emergency department visits, which was larger for HCH. There were no significant differences in medication gaps at all in this population.

Similar to Medicaid findings, acute utilization rates were smaller for HCH compared to non-HCH for African American, Hispanic, and American Indian enrollees.

Differences in disparities by disability were mixed with differences smaller in HCH versus non-HCH overall but larger for hospitalizations. SMI-related differences were consistently larger in HCH versus non-HCH attributed enrollees. There were no significant differences by rurality in this population.

In terms of morbidity, results for Dual Eligible were mixed. In most cases, differences in the disparities for HCH versus non-HCH attributed enrollees were very small; they were slightly larger in HCH than non-HCH enrollees for emergency department visits, and the very high morbidity band versus the lowest band difference was larger across all visit measures for HCH, but results for moderate and high morbidity versus low, showed mostly smaller differences in HCH.

**Table 4. Disparities in adjusted mean numbers of visits and events per year among Dual-Eligible enrollees attributed to non-Health Care Homes and Health Care Homes clinics**

	Management visits		Emergency department visits		Hospitalizations (overall)		Unplanned Hospitalizations		Medication gaps	
	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH
White	7.506	7.685	0.815	0.827	0.384	0.376	0.326	0.321	0.634	0.612
African American	7.239	7.502	1.265	1.231	0.446	0.426	0.376	0.364	0.818	0.988
Difference from White	-0.267	-0.184	0.450	0.404	0.062	0.050	0.050	0.043	0.184	0.375
Hispanic	7.799	8.312	1.107	1.021	0.447	0.384	0.368	0.314	0.648	0.482
Difference from White	0.294	0.627	0.293	0.194	0.063	0.008	0.042	-0.008	0.014	-0.131
Asian/Pacific Islander	8.220	8.173	0.635	0.891	0.512	0.281	0.448	0.267	0.000	0.567
Difference from White	0.714	0.487	-0.180	0.065	0.128	-0.095	0.122	-0.054	-0.634	-0.046
American Indian/ AK Native	8.234	7.892	1.312	1.286	0.480	0.440	0.422	0.383	0.759	0.884
Difference from White	0.728	0.207	0.497	0.459	0.096	0.064	0.096	0.062	0.125	0.272
No disability	7.313	7.486	0.896	0.890	0.392	0.376	0.331	0.320	0.700	0.687
Disability	8.238	8.364	0.840	0.876	0.417	0.417	0.362	0.368	0.516	0.585
Difference	0.925	0.878	-0.056	-0.014	0.025	0.040	0.031	0.048	-0.184	-0.102
No SMI	6.690	6.861	0.801	0.791	0.373	0.354	0.310	0.297	0.686	0.699
SMI	8.340	8.511	0.970	0.982	0.420	0.414	0.364	0.363	0.635	0.641

**Table 4. Disparities in adjusted mean numbers of visits and events per year among Dual-Eligible enrollees attributed to non-Health Care Homes and Health Care Homes clinics**

	Management visits		Emergency department visits		Hospitalizations (overall)		Unplanned Hospitalizations		Medication gaps	
	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH	Non-HCH	HCH
Difference	1.650	1.650	0.168	0.191	0.047	0.060	0.054	0.066	-0.050	-0.058
Non Rural	7.731	7.881	0.881	0.878	0.398	0.388	0.341	0.334	0.647	0.660
Rural	6.426	6.859	0.894	0.901	0.395	0.383	0.326	0.328	0.714	0.736
Difference	-1.305	-1.021	0.013	0.023	-0.003	-0.005	-0.015	-0.006	0.067	0.077

Notes: models adjusted for patient age, non-linear term for age, sex, race/ethnicity, rurality, and clinic self-selection into HCH. Gray-shaded areas indicate differences not significant at  $p < .0001$ .

## DISCUSSION

In this assessment of disparities by race/ethnicity, disability, mental illness, rurality, and multi-morbidity, findings indicate that HCHs are associated with smaller racial/ethnic disparities in most cases, across insurance programs. This is promising, in light of the fact that racial/ethnic disparities are among the most pernicious and intractable problems facing health care, especially in Minnesota. However, in most cases, while disparities were smaller, they still existed. This suggests that, while HCH may be a partial remedy for such disparities, more work can be done to improve access, address pent-up demand (high health care needs for those who have not had access to health insurance and/or health care), or address other sources and causes of greater acute utilization by racial/ethnic minority groups.

In most other demographic and status groupings, findings were mixed. Disability status was often associated with lower, meaning that a larger difference among HCHs does not mean more use—it may mean less. As with children, disability-based comparisons were omitted and caution is urged in the interpretation of disability as a source of disparities given that this research was forced to use enrollment information, which may be imperfect for the current task or may signal other differences in enrollees' use that are not picked up in these claims data.

In most cases, serious mental illness was associated with greater acute use, and this was not lessened, in fact, it was often slightly greater by HCH status. Taken at face value, these results could suggest that

HCHs at large require more attention to the management of individuals with mood (bipolar and major depressive) and schizophrenic disorders.

In terms of morbidity, the smaller differences for HCH in moderate and high versus the lowest resource utilization band, compared with the typically larger differences for the very high morbidity (versus lowest) band, indicate that while HCHs may in some way manage moderately clinically complex or moderately high using individuals better, the same is not true for the highest users. Considering that the “very high” resource utilization band typically had slightly larger differences in acute use from the low RUB for HCH as compared to non-HCH enrollees, the manner in which clinics in general, including HCH clinics, address the difficulties of patients in this heavy-morbidity group deserves attention.

With differences by rurality often non-significant, it is noted if this pattern holds up, it may reflect two things: (a) rural/non-rural differences, in many cases, are very small, which may result in non-significance even with a relatively large sample; and (b) HCH may not be an effective mechanism for addressing rurality-based disparities where they do exist, given other problems such as distance to clinic, travel time, etc. faced by rural users compared to other problems faced by enrollees in metropolitan areas.

In sum, HCH-attributed enrollees based on race/ethnicity are found here to have smaller, but not non-existent, differences compared to non-HCH enrollees. The effect or association with other disparities is more mixed, but suggested areas of attention include the very highest resource utilizers and those with SMI.

## APPENDIX A: HCH EVALUATION DESIGN

The HCH evaluation is a retrospective observational study using both quantitative and qualitative data. This chapter introduces the goals and framework of the HCH evaluation analysis, describes the population and sample examined in the analysis, the evaluation design, risks to inference, and methods common to all analyses. Further description of methods specific to an analysis is presented in the analysis chapter. Further details on the context of HCHs, population and sample, attribution, data sources, payment survey, and certification standards are found in other appendices.

### INTRODUCTION

The first goal of the HCH evaluation was to evaluate differences in access, cost, and quality between clinics certified as HCHs and eligible clinics not certified as HCHs – are there differences between clinics certified as HCHs and clinics that are non-HCH in access, cost, and quality? The second goal of the HCH evaluation is evaluating whether any differences, if they exist, is associated with Minnesota’s HCH Initiative and clinic transformation to being a HCH – did the HCH Initiative cause differences between clinics certified as HCHs and clinics that are non-HCH? The first question answers the question of whether HCHs are a better way of organizing care. The second question answers the question of whether the HCH Initiative had an impact on organizing care.

The evaluation uses two different units of analyses:

- Enrollees nested within HCH eligible clinics are used to examine the effect of HCH certification on the triple aim of access, cost, and quality/enrollee experience outcomes among enrollees.
- Clinics are used to examine the relationship between clinic characteristics, the decision to become certified as a HCH, and differences in implementing HCH practices, such as care coordination, registries, and other required HCH components among clinics.

The evaluation methods are designed to address methodological problems that have been identified in evaluations of medical homes:<sup>7, 119</sup>

- Not assessing triple aim outcomes. This evaluation examines access, cost, care quality and enrollee experience.
- Not having appropriate comparison clinics which results in the lack of a control group or using a limited number of clinics participating in select programs, which reduces statistical power and limits generalizability. This evaluation examines all HCH eligible clinics in Minnesota.

- Not adjusting for clinic-selection into becoming a HCH, such as high performing clinics becoming HCHs which is an alternative explanation for the effect of the HCH Initiative on causing clinics to become HCHs. The evaluation addresses self-selection effects.
- Not examining the effect of HCHs targeting higher risk enrollees for services. The evaluation addresses this by using concurrent risk adjustment.
- Not accounting for the clustering of enrollees within clinics which causes statistical significance of HCH certification effects to be overstated. The evaluation adjusts for clustering of enrollees within clinics.

The sample of clinics for appropriate comparisons includes both HCH certified and eligible but non-certified clinics. HCH eligible clinics are clinics that provide primary care, where “primary care means overall and ongoing medical responsibility for a enrollee’s comprehensive care for preventive care and a full range of acute and chronic conditions, including end-of-life care when appropriate.”<sup>95</sup> HCH eligible clinics started being certified in July of 2010. HCH eligible clinics that have not become certified serve as comparison clinics for HCH certified clinics. Since the analysis categorizes a HCH eligible clinic as certified for an observation if it becomes certified at any point during a year, the first year a clinic appears as an HCH certified clinic it measures both the part of the year the clinic was transforming and the part that it was certified. Clinics that are transforming but not certified are categorized as not certified. Future analyses will investigate the effect of the transformation period more extensively. Since many Minnesota clinics have been HCH eligible and have had the opportunity to participate in the HCH program, with over 200 being certified by the end of 2012, statistical power is strong for 2012, the most recent year of available data.

## POPULATION AND SAMPLE

The population of interest consists of enrollees attributed to Minnesota clinics that are eligible to be certified as HCHs. A clinic is an operational entity through which personal clinicians or local trade area clinicians deliver health care services under a common set of operating policies and procedures using shared staff for administration and support.<sup>95</sup> The operational entity may be a department or unit of a larger organization as long as it is a recognizable subgroup. The enabling statutes use the term “clinic.” Minnesota Statutes, section 256B.0751, subdivision 3, spells out the requirements for clinicians certified as health care homes: (a) A personal clinician or a primary care clinic may be certified as a health care home. If a primary care clinic is certified, all of the primary care clinic’s clinicians must meet the criteria of a health care home.<sup>67</sup> Minnesota Community Measurement (MNCM), which collects clinic care quality measures under a contract to the Minnesota Statewide Quality Reporting and Measurement System (SQRMS)<sup>94</sup>, similarly defines a clinic as “A clinic site location is a building, separate space, or an entity with a street address. It should be a functional unit that is easily understood by enrollees/consumers. The



goal of reporting by clinic site is to provide enrollees/consumers with information about the entity with which they are most familiar and to provide information to clinics that is actionable for quality improvement purposes.”<sup>88</sup>

The sample frame consists of all HCH eligible clinics, certified and not certified, identified using the SQRMS clinic provider registry and the HCH certification database (see Appendix D for details on identifying these clinics). The sample frame is based on a common clinic level identifier available in the SQRMS provider registry and the HCH certification database that is not available in other sources, such as the National Plan and Provider Enumeration System (NPPES) system. The clinic level identifier and the registry of providers associated with the clinic are necessary for attributing providers to clinics and attributing enrollees to clinics (see Appendix D for a full description of the attribution method).

The measurement period for this analysis was calendar years 2010 through 2014. HCH certified clinics included in the population of interest are those certified between July of 2010 and December 31<sup>st</sup> of 2014. 2009 quality and claims data were used to obtain measures of quality and cost preceding the certification of HCHs.

## DATA SOURCES

The following section provides an overview of the quantitative and qualitative data sources used in the HCH evaluation, including the Minnesota Department of Health’s HCH Certification Database, the State Quality Reporting and Measurement System (SQRMS) database of Minnesota clinics, Medical claims data, SQRMS quality data, and qualitative documentary and survey data. These data are described more completely in Appendix F – Data Sources.

### Quantitative Data

- HCH Certification Database: Information on certified providers and clinics including the dates clinics became certified, and the certified providers associated with those clinics.
- The Minnesota Statewide Quality Reporting and Measurement System (SQRMS) Provider and Clinic Registry<sup>88</sup> which lists clinics in Minnesota participating in SQRMS and the providers associated with them.
- Minnesota Medicaid claims for 2009 to 2014 and Medicare claims for 2009 to 2013. Both were provided by the Minnesota Department of Human Services. These files were used to construct measures for Medicaid, Medicare, and Dual Eligible enrollees. Dual Eligible data was constructed by using the Medicare’s health insurance claim (HIC) number for Dual Eligible in the Medicaid data to integrate to Medicaid and Medicare claims data. Because Medicare data was available

only through 2013, the analysis included only Medicaid enrollees in 2014. The beneficiary files contained race and ethnicity measures which were used in the disparities analysis.

- The SQRMS Measurement data which includes vascular care for 2009 to 2012,<sup>82, 87, 90</sup> diabetes care for 2009 to 2014,<sup>81, 86, 89</sup> colorectal cancer screening for 2011 to 2014,<sup>83</sup> depression care for 2011 to 2014,<sup>84</sup> and asthma care for 2011 to 2014.<sup>80, 85</sup> The data were collected through direct data submission of enrollee level data.
- Clinician & Group Survey Consumer Assessment of Healthcare Providers and Systems (CG-CAHPS) which assesses patient experience with a clinic.
- National Plan and Provider Enumeration System (NPPES) registries which have information on National Provider Identifiers (NPIs) and provider specialties.
- Minnesota Department of Human Services crosswalk of provider identifiers used for payment to NPIs.
- Crosswalk files to identify the rurality of a patient or clinic (urban, micropolitan, small town, frontier) using a zip code based on rural urban commuting areas (RUCAs)<sup>157, 174</sup>. Crosswalk files to identify State Community Health Services Advisory Committee (SCHSAC) regions from geographic information. SAS geocode data to identify latitude and longitude from a street address.

## Qualitative Data

- HCH program documentation, such as descriptions and process documentation for certification;
- selected committee reports;
- Meetings with key informants who have been active in HCH implementation during evaluation team meetings (e.g., MDH and DHS staff participating in evaluation team meetings) ;
- Web-based resources documenting HCH processes and meetings;
- Participation in learning collaborative meetings;
- Textual fields in the HCH certification database, such as those describing certification variances and questions the certification site visit team feel should be explored; and
- Responses from a survey of HCH clinics about care coordination payment processes and tiering in the first phase of the HCH Initiative evaluation.
- Interviews with key informants in clinics about care coordination management and transformation.

The key use of qualitative data was (a) documenting the certification process, (b) documenting clinic and health system response to the payment methodology, and (c) documenting transformation.

## POPULATION, SAMPLE, AND ATTRIBUTION

For enrollee analyses (cost, quality, access, disparities) the population is all individuals cared for by HCH eligible clinics in Minnesota.

SQRMS care quality data was used for evaluating quality effects. The sample is all patient level data reported to SQRMS on care quality. These data include commercial, Minnesota Health Care Plans, Medicare, uninsured, and self-pay patients. A strength of the evaluation of care quality using SQRMS data is that clinics report data on patients they care for which means that patients do not need to be attributed to clinics by another algorithm.

Medical claims data was used for analyses of cost, utilization, and pharmacy adherence. The sample consists of all enrollees who were continuously enrolled for 12 months, did not die, did not have hospice usage, and were not in Medicare Advantage at any time (for Medicare / Dual enrollees) (see Appendix C for sampling details). The inclusion rules were designed to assure that measures such as per member per year (PMPY) costs were comparable and that enrollees who had expenses due to the last year of life were not included in the analysis. Medicare Advantage enrollees were excluded because of incomplete utilization and cost data. Enrollees were attributed to the clinics where they received care coordination, evaluation and management encounters, and encounters (see Appendix D for attribution details).

## MEASURES

### Resource Use

Reimbursement for services was calculated from paid claims for the years 2009 to 2014 for Medicaid and from 2009 to 2013 for Medicare and Dual Eligible. Prior to 2012 Medicaid managed care (MCO) reimbursement amounts were not included in the claims data but were imputed. In 2012, MCO reimbursement began to be reported and has continued to be reported. In order to make comparisons over time consistent and because prior to 2012 MCO reimbursement was not reported, MCO reimbursement was imputed for all years. Imputation was accomplished by calculating the ratio of total reimbursements to total charges for each service category for each pay-to-provider in fee-for-service (FFS) claims. This assumes that the ratio of reimbursement to charged amount for a particular provider is similar between FFS and MCO claims. This ratio was multiplied times the MCO charged amount to obtain the imputed MCO reimbursement amount.

Emergency department (ED) visits were calculated using an algorithm provided by the Minnesota Department of Human Services. Both Method A and B were used to obtain the most sensitive measure of

ED visits. ED visits that ended with an inpatient admission were not excluded (these type were calculated using ACG software and sensitivity analyses were conducted).

There are two methods used at DHS to identify ER claims in the Data warehouse. The analyst can use both methods together to cast a slightly wider net for ER claims.

Method B will produce more ER visits than Method A. There may be a number of reasons for this. The main reason appears to be that some of the practitioner claims selected on the basis of physician-assigned procedure codes in Method B have no corresponding facility claim. Method A excludes ER visits where the recipient was admitted as an inpatient on the day of the ER visit. Even if a Type O claim is submitted for the ER, if an admission occurred the O claim is denied. Both methods can be used to construct the sensitive measure of ER visits. Neither method described below includes urgent care.

Method A: Using facility claims) exclusively. Each bullet is required limiting criteria (i.e., read each solid bullet as an "and").

- ClaimType = O or W
- ProviderType = 01
- All revenue codes beginning with 045
- Paid FFS claims and claim lines or any managed care encounter claim

Method B: Using mix of professional and facility claim types. Each bullet is required limiting criteria (i.e., read each solid bullet as an "and").

- Claim Type = A, F, O, R, V, or W
- Paid FFS claims and claim lines or any managed care encounter claim
- The combination of the following criteria reading each clear bullet as an "or":
  - All revenue codes beginning with 045 or revenue code = 0981 and TypeOfBill beginning with 13 or 85 (TypeofBill requirement applies to both revenue code criteria)
  - Procedure codes between 10040 and 69979 and PlaceOfService =23
  - Procedure codes 99281, 99282, 99283, 99284, 99285

Inpatient stays were measured by combining all inpatient claims for a beneficiary over time. An inpatient admission was identified as a continuous spell in an inpatient setting (there can be multiple claims associated with a single spell, particularly when integrating Medicare and Medicaid claims for Dual Eligible).

A number of measures were constructed using the Johns Hopkins ACG® System<sup>52, 148, 166</sup>. These measures are used as needed in the analyses, are discussed in the appropriate chapters, and are available for analyses of specific populations. ***The description of these measures directly quotes documentation from The Johns Hopkins ACG System Version 11.0 Technical Reference Guide Chapters 2, 4, 5 and 6.***

## Care Quality Measures – Pharmacy Adherence

Since the Medicaid claims include pharmacy data, pharmacy adherence can be calculated for Medicaid and Dual beneficiaries. Pharmacy adherence is a likely outcome of care coordination. The following descriptions are quoted from The Johns Hopkins ACG System Version 11.0 Technical Reference Guide<sup>52</sup>.

There is a considerable literature on pharmacy adherence and a substantial body of evidence that high levels of medication adherence yield improved therapeutic outcomes and more cost effective treatment. Medication adherence represents an important dimension of effective disease management. The ACG System measures adherence for 17 conditions where the chronic administration of medication is, in most instances, appropriate. Pharmacy adherence calculations are ONLY performed for members with a TRT condition marker. The five markers used to measure pharmacy adherence are”

- Number of Gaps: Count of occurrences where the time interval between the end of supply of one prescription and the onset of the next prescription for the same medication (active ingredient) is more than the grace period.
- Medication Possession Ratio (MPR): Total number of days for which medication is dispensed (excluding final prescription) divided by the final prescription) divided by the first and last prescription. If a patient is on multiple medications for a single condition, the days supply and prescribing days are totaled across all and averaged.
- Continuous Single-Interval Measure of Medication Availability (CSA): Ratio of days supply to days until the next prescription averaged across all prescriptions.
- Proportion of Days Covered (PDC): Ratio of days supply divided by days between first prescription fill and end of observation period.
- Untreated: The untreated marker indicates instances where although chronic drug administration may be warranted for a condition, there is no evidence of such through the pharmacy claims. Non-treatment represents another potential care management issue. It should be noted, however, that there are situations where prescribing can occur, but not be captured in the pharmacy claims.

## Risk Adjustment Measures

- Adjusted Clinical Groups (ACGs): Adjusted Clinical Group actuarial cells, or ACGs, are the building blocks of The Johns Hopkins ACG© System methodology. ACGs are a series of mutually exclusive, health status categories defined by morbidity, age, and sex. They are based on the premise that the level of resources necessary for delivering appropriate healthcare to a population is correlated with the illness burden of that population. ACGs are used to determine the morbidity profile of patient populations to more fairly assess provider performance, to reimburse providers based on the health needs of their patients, and to allow for more equitable comparisons of utilization or outcomes across two or more patient or enrollee aggregations.
- Resource Utilization Bands (RUBs): ACGs are collapsed according to concurrent relative resource use in the creation of Resource Utilization Bands (RUBs). The software automatically assigns six RUB classes:
  - 0 - No or Only Invalid Dx
  - 1 - Healthy Users
  - 2 – Low
  - 3 – Moderate
  - 4 – High
  - 5 - Very High

## Utilization Measures

- All Cause Inpatient Hospitalization Count: The intent is to count acute care inpatient hospitalization stays, regardless of cause.
- Inpatient Hospitalization Count: The intent is to count unanticipated acute care inpatient hospitalization stays.
- Inpatient Hospitalization Days: Inpatient hospitalization days count the days between the minimum service begin date and the maximum service end date associated with each inpatient confinement in the inpatient hospitalization count.
- Unplanned Inpatient Hospitalization Count: The unplanned inpatient hospitalization count is a subset of the inpatient hospitalization count with exclusions for planned admissions. A planned admission is defined as either:
  - A definitively planned procedure, identified by either ICD procedure code or diagnosis code. Definitively planned procedures include items such as rehabilitation services, chemotherapy and transplants.
  - A potentially planned procedure, identified by ICD procedure code. Potentially planned procedures are more common surgical procedures, such as hip replacements, cardiovascular procedures and other inpatient surgical treatments without evidence of acute complications such as infections, burns or injuries.

- Readmission 30 Day Count: The readmission 30 day count is a subset of the all cause inpatient hospitalization count. The presence of this count indicates, regardless of cause, the identified admission occurred within 30 days of a previous inpatient hospitalization.
- Unplanned Readmission 30 Day Count: The unplanned readmission 30 day count is a subset of the inpatient hospitalization count. The presence indicates the identified admission meets the unplanned inpatient hospitalization criteria and occurred within 30 days of a previous inpatient hospitalization.
- Emergency Visit Count: The intent is to count emergency room visits that are not precursors to subsequent inpatient hospital stays in the same time period. Those emergency room visits that are immediately followed by an inpatient hospital stay are 'absorbed' by a hospitalization.
- Outpatient Visit Count: The intent is to count instances where patients receive ambulatory care in outpatient settings.

## Care Coordination Measures

Using only administrative claims information, ACG Coordination Markers are able to assess whether an individual is at risk for receiving poorly coordinated care. Five patient markers make up ACG Coordination Markers (the documentation lists the procedure codes and specialties considered in measuring care coordination):

- Management Visit Count: The number of face-to-face physician visits with an eligible specialty.
- Majority Source of Care (MSOC): An assessment of the level of participation of those providers that provided care to each patient. The Majority Source of Care marker will determine the percent of the outpatient face-to-face visits provided by eligible physicians that saw the member most over the measurement period.
- Unique Provider Count: A count of the number of unique providers that provided care to the patient.
- Specialty Count: A count of the number of specialty types (not the same as number of specialists seen) that provided care to the patient.
- Generalist Seen: A marker indicating a generalist's participation in an individual's care.
- A summary measure of coordination risk is developed based on the five coordination markers:
- Coordination Risk: A coordination risk measure combines these markers to determine whether a person has a "likely," "possible," or "unlikely" coordination issue. The ACG Coordination Markers can be used together to provide a comprehensive picture of coordination of care. The ACG System assigns patients into three levels indicating the risk for coordination issues based on a grid provided in the ACG© documentation. A high unique provider count is the major risk factor for being a potential coordination issue with one exception. An analysis presented in the documentation states that persons who presented a coordination risk carried higher costs into the

following year and that Patients at the highest level of risk for coordination issues experience twice the percentage of ED visits during the measurement period.

- Care density measures the degree to which the physicians seeing a patient share patients.
- Care Density: A care density ratio quantifies patient sharing based on outpatient face-to-face visits with eligible physicians. Myriad formal and informal referral relationships among clinicians lead to varying levels of patient sharing. Higher levels of patient sharing are often credited with higher intensity of care, better care coordination, and greater potential cost opportunities. A finding from research is that greater patient sharing and higher care density are associated with lower resource utilization. As a consequence one may form expectations about cost savings relative to the top quartile of care density that is achieved by members. The expected savings associated with high care density are greater for members in the bottom quartile of care density compared to patients in the middle half.

## Markers

- Expanded Diagnosis Clusters (EDCs) and Major Expanded Diagnosis Clusters (MEDCs): EDCs are a tool for easily identifying people with specific diseases or symptoms. . The EDC methodology assigns diagnosis codes found in claims or encounter data to one of 282 EDCs, which are further organized into 27 categories called Major Expanded Diagnosis Clusters (MEDCs). MEDCs are used to identify patients by condition. The MEDC types are:
  - Administrative
  - Medical: Allergy, Cardiovascular, Endocrine, Gastrointestinal/Hepatic, General Signs and Symptoms, Genetic, Hematologic, Infections, Malignancies, Neonatal, Neurologic, Nutrition, Renal, Respiratory, Rheumatologic, Skin, Toxic Effects
  - Surgical: Dental, ENT, Eye, General Surgery, Genito-urinary, Musculoskeletal, Reconstructive
  - Obstetric/Gynecologic: Female reproductive
  - Psychosocial: Psychosocial
- Chronic Condition Count: The ACG System includes a chronic condition count as an aggregate marker of case complexity. A chronic condition is an alteration in the structures or functions of the body that is likely to last longer than twelve months and is likely to have a negative impact on health or functional status.
- Frailty Conditions: The Frailty Flag is a dichotomous (on/off) variable that indicates whether an enrollee over the age of 18 has a diagnosis falling within any one of 10 clusters that represent medical problems associated with frailty.



- **Cancer Treatment Marker:** The goal of the dichotomous marker for cancer treatment is to differentiate the active treatment phase from the diagnostic and remission phases since the use of resources is different.
- **Psychotherapy Service Marker:** The psychotherapy marker identifies the presence of ambulatory therapeutic interactions or treatments to address problems that are psychological in nature. The focus is on ambulatory treatment as a proxy for ongoing management and not crisis-related interventions.

## Comorbidity Measures

Some analyses required measuring enrollee comorbidity for purposes of risk adjusting resource use models or stratification. Comorbidity was measured using the Centers for Medicare & Medicaid Services (CMS) Hierarchical Condition Categories (HCC) risk adjustment tool<sup>121, 122</sup> and The Johns Hopkins Adjusted Clinical Groups (ACG) Case-Mix System<sup>51, 52, 148, 166</sup>. Both risk adjustment tools are based on diagnoses to identify medical conditions related to resource utilization. The analyses used a concurrent risk adjustment methodology<sup>30</sup> because it provides the most conservative approach to evaluating HCH effects.

## Geographic Measures

For geographic analyses of Minnesota regions, counties are assigned to regional development commissions as determined by the State Community Health Services Advisory Committee (SCHSAC)<sup>87</sup> which reflect area partnerships to integrate regional development in Minnesota.<sup>99</sup> This categorization was chosen to support consistency with other MDH regional analyses. For geographic analyses of urban-rural differences, 2013 urban influence codes were used.<sup>156</sup> Urban influence codes distinguish “metropolitan counties by population size of their metro area, and nonmetropolitan counties by size of the largest city or town and proximity to metro and micropolitan areas. The standard Office of Management and Budget (OMB) metro and non-metro categories have been subdivided into two metro and 10 non-metro categories, resulting in a 12-part county classification.”<sup>156</sup>

## METHODS

The methods used in the analysis are constructed to be appropriate for the analytical purpose and for the nature of the dependent variable. Specific measures and analytic methods used for examining the effects of HCH certification will be described in the chapter for each analysis. For example, Poisson/negative binomial regression is used for count data (number of ED encounters), logistic regression is used for binary outcomes (e.g., any hospital admission), regression for continuous measures. Where the distribution is skewed, such as annual health care costs, different functional forms for transforming the

dependent variable (e.g., square root, log) and error distributions (e.g., normal, gamma) and two part models are examined to assess the robustness of the estimates<sup>17, 28, 79</sup>.

This section describes further issues that all analyses must consider and some overarching issues associated with this analysis.

### Comparison Groups: HCH Eligible Clinics

An essential component of any evaluation is the presence of a suitable comparison group, in this case eligible clinics that have not chosen to become HCH Certified compared to clinics that have become HCH certified. This approach is strong for two reasons: First, because the HCH program is a statewide program, there are many clinics in both the certified and non-certified groups. Second, because clinics choose to become certified at different times, clinics that have not yet become certified and are becoming certified serve as comparisons for certified clinics. The presence of a comparison group for HCH certified clinics significantly strengthens the evaluation.<sup>119</sup> Appendix D provides greater detail on how HCH eligible clinics were identified.

### Measuring HCH Certification Status

HCH program implementation poses some evaluation challenges. The first is measuring HCH status. Clinics start the process of becoming a certified HCH by entering a transformation process, which includes clinic system evaluation and redesign where necessary. This transformation process is supported by the availability of regular learning collaborative meetings and coaching by MDH staff, such as through communication. During the transformation process when a clinic's assesses that they are ready for certification, the clinic submits documents for review to determine if the clinic is ready for a site visit. This is followed by a certification site review and in most cases recommendation for certification, perhaps with variances for under-performing areas. During the transformation process the clinic is not fully comparable to a clinic that has not chosen to become a certified HCH nor is it fully comparable to a certified HCH. Following certification, HCHs become recertified by meeting additional standards at year one recertification. This means that HCH status can be viewed as: (a) Not pursuing HCH certification; (b) Transforming (the year the clinic becomes certified); (c) Certified – full year, (d) Re-certified in continuing years of improvement and recertification.

Evaluating each stage of the process is difficult for two reasons. First, there may be a limited number of clinics at a particular stage that statistical power is reduced or they may differ in ways that reduce generalizability. The second difficulty occurs because measurement of access, cost and quality occur on an annual basis – Per Member Per Year (PMPY) costs for enrollees and care quality for a condition during the prior year. HCH status in a given year will always be out of synchronization with outcome

measurement because HCHs become certified at some point during a year, so in the year that an HCH is certified, it is both transforming and certified. In the following year it is certified for the first year and recertified for the second year. Because the HCH certification status does not perfectly map to the outcome measurement period, it is difficult to clearly assess the effect of HCH status. Taking into consideration this issue, for the initial set of analyses HCH status was measured in two ways. First, to measure the overall effect of the HCH certification, an indicator of whether the HCH is certified in any form during the year (certified, recertified, first year, second year) was used. Second, for some analyses we also examined whether there were differences between the initial year a clinic was certified (transforming) and years during which the clinic was certified the full year.

### Self-Selection

A difficulty with assessing the HCH program effect is the issue of self-selection. This issue does not affect the answer to the question of whether HCHs differ in access, cost, and quality from non-HCH clinics. Self-selection affects the questions of (a) whether the HCH Initiative affected differences in access, cost, and quality and (b) whether the evaluation can generalize from HCH certified to non-HCH clinics. Self-selection affects the question of would the effects that are reported in this report be observed in future cases of non-HCH certified clinic becoming certified? In order to answer this question, clinic self-selection into HCH certification must be controlled for when analyzing HCH effects.<sup>119</sup>

An example illustrates the issue. Assume that only clinics that have better outcomes because of some unobservable clinic level factors, such as patient mix or clinic systems, choose to pursue HCH certification. Then the positive effect of HCH certification on clinic outcomes could be attributed to these unobservable factors rather than being attributed to HCH certification.

There are a number of ways to address this issue econometrically. One way to address the self-selection issue is to use propensity score modeling to find non-HCH certified clinics that are similar to HCH certified clinics for HCH comparison purposes (e.g., they both had good outcomes and similar patient mixes prior to implementation of the HCH program). The clinic propensity score model can be developed to reflect the factors that have been documented in the literature and those with good face validity that are likely to influence a clinic to pursue certification. Examples of these measures are the distribution of enrollees by co-morbidity and insurance status, quality of care as documented by Minnesota Statewide Quality Reporting & Measurement System (*SQRMS*), and controls such as clinic type (family practice, internal medicine), clinic size, rurality, presence of competing clinics offering a HCH, and health system support.

The evaluation adjusted for self-selection by estimating a model predicting whether a clinic is a HCH or becomes a HCH and use these methods to examine the degree to which self-selection is associated with

observed HCH effects. A multivariate analysis was used to examine the correlates of clinics becoming HCHs and the correlates of a clinic being a HCH. The analysis included only HCH eligible clinics with the potential to change their status from not HCH certified to HCH certified.

The analysis of becoming a HCH, the transition from not being a HCH to being a HCH, was examined by regressing whether the clinic became a HCH on its characteristics in the prior year. For example, whether a clinic was certified in 2011 was regressed on 2010 clinic characteristics, such as number of providers, number of enrollees, percent of attributed enrollees insured by Medicaid and percent of enrollees that were Dual Eligible (the omitted group was Medicare), percent of enrollees by ACG resource utilization bands, and risk adjusted Per Member Per Year (PMPY) beneficiary costs. A secondary analysis included SQRMS measures of clinic care quality for diabetes and vascular care (this analysis was secondary because quality measures were available only for clinics participating in SRMS). Medicaid claims data was used to measure number of enrollees, percent of Medicaid/Medicare enrollees in Medicaid or Dual Eligible programs and the percent of enrollees in each ACG resource utilization band, the proportion of African American enrollees and Asian enrollees. The clinic's zip code was used to describe the clinic's rurality (urban, micropolitan, small town, isolated town).

The analysis of being a HCH regressed whether the clinic was a HCH in a year on its prior year characteristics. Similar correlates to the analysis of becoming a HCH were used. The results of this model were used to construct the inverse mills ratio that was included in models for HCH effects on access, quality, and costs to correct for the potential sample selection bias.<sup>45</sup>

## **OBSERVATION NESTING AND CLUSTERING**

While clinics are the focus of analysis for the HCH evaluation, the nesting of enrollees within clinics and the nesting of clinics within health systems poses statistical difficulties. In some analyses, clinic effects will be estimated using patient level data. This allows the inclusion of patient characteristics in the models as controls. For example, in analyses of SQRMS quality measurement, patient level characteristics such as age, gender, and insurance type can be used as controls. This controls for different patient mixes across HCHs and allows the examination of HCH effects without being confounded by different patient mixes. The statistical issue with the nesting of enrollees within clinics and clinics with health systems is that tests for significance, such as testing for a HCH effect, assumes the errors for each observation are independent and identically distributed (the IID assumption). Violating this assumption results in errors for testing statistical significance, with the error being that significant effects are more likely to be observed when clustering and nesting of observations are not accounted for. Whenever enrollees or clinics are nested it is very likely that the IID assumption is violated either because a clinic has common systems for all enrollees in its clinic that leads to their outcomes being correlated or a health system has a common

infrastructure or system that leads to correlated outcomes for all the clinics in the health system. The clustering or nesting of observations will be addressed with statistical procedures that adjust for the clustering, such as the inclusion of random effects for either clinics or health systems and by allowing the errors between the observations within a clinic to be correlated.

## LEVELS AND DIFFERENCES

There are two approaches to examining the effect of HCH certifications, analyzing the effect of HCHs on the performance level and analyzing the effect of HCHs on changes in performance using a Difference in Differences approach (DiD)<sup>21</sup>. In DiD performance prior to becoming certified is compared to performance after becoming certified. For example, a DiD approach to examining the differences in inpatient, outpatient, and ED associated with being certified could be done by calculating the difference between the clinic's resource use before and after certification. The strength of a DiD approach is that it uses a clinic as its own control and examines changes in resource use, which is a key target for the HCH program. A weakness of the DiD approach is that it does not use information about differences in levels between clinics. The DiD approach also focuses on the change in rather than level of a measure. For example, the difference of a high ER visit patient who continues to visit the ER at the same rate is the same as the difference of a patient who does not visit the ER at all. Another weakness of a DiD approach is that it can reduce statistical power because it removes observations from the analysis where pre and post observations are not available. Low power would make drawing inferences about no HCH effect, measuring a true negative – that HCHs have no effect, difficult. Because of using information on differences in levels between clinics and greater power this evaluation focuses on performance levels.

## TIERING AND SUBGROUPS

The initial analyses focus on the average effect of HCHs across all patient tiers. For some data sources, such as SQRMS data, this is done because the patient level data does not include a reliable patient tier level for all enrollees. For the Medicaid claims data, the modifier code for a care coordination encounter can be used to determine the patient complexity tier. The difficulty here is that clinics may not code the tier in a consistent manner across all clinics, care coordination encounter transactions are only available for a subset of enrollees, and some HCH certified clinics have chosen not to bill for care coordination encounters. These factors make care coordination claims an unreliable source of patient tier information for analytic purposes.

This evaluation uses the Johns Hopkins ACG® System<sup>52, 148, 166</sup> measures of resource utilization bands to test for differences in HCH effects by severity level. A strength of these measures is that they are closely related to the methodology for developing HCH tiers. The evaluation also uses indicators from the

Centers for Medicare & Medicaid Services (CMS) Hierarchical Condition Categories (HCC) risk adjustment tool<sup>121, 122</sup> to examine differences in HCH effects by whether an enrollee has behavioral health diagnoses.

## APPENDIX B: HCH CONTEXT

The outcomes documented in this evaluation of Minnesota's Health Care Homes (HCH) Initiative are associated with a variety of different factors. To fully appreciate the performance of the initiative, as well as how and why it differs from other Medical/Health Care Homes Initiatives undertaken nationally, it is important to understand the context for the development of HCH's in Minnesota. This includes factors that influenced how it became legislation and how this legislation was translated into the rules and regulations that governed the program. The Health Care Homes Initiative is a component of a large, relatively complex piece of health care reform legislation enacted in 2008. This ambitious legislative effort was explicitly intended to encourage and support the health care system in Minnesota in its pursuit of the "triple aim" (better population health, an improved patient experience, and increased affordability of care). In addition to the HCH Initiative, the legislation consisted of components addressing quality of care, payment reform, e-health and consumer engagement. In this section of the evaluation, the context for the HCH Initiative is discussed, addressing both its development as part of the broader health reform legislation, focusing on the period prior to the passage of the legislation and the subsequent "rule-making" period and HCH clinic certification implementation that occurred immediately following passage of the legislation. The discussion is divided into these chronological segments because factors and groups that influenced the design and passage of the legislation were, in many cases, different from those that influenced the rule-making part of the implementation process.

### DATA

The analysis of HCH context relies on two sources of data: interviews with key respondents and documents related to the early implementation period (e.g. records of committee meetings, public testimony, etc.) as developed and maintained by the State. The key informant interviews were guided by two different interview protocols, one for respondents involved in, or knowledgeable concerning, the political process and considerations that influenced the design and passage of the legislation. The second protocol was used in interviews with respondents involved in the rulemaking and early implementation period. Interviewees were selected based on review of the public records and the evaluators' knowledge of key actors in these processes, supplemented by recommendations provided by the interviewees themselves (a "snowball" sampling approach). (Details of the interview process and analysis are contained in the appendix to this report). All interviewees were assured that their responses would be confidential; that is, their names and the names of their affiliated organizations would not be revealed.

## DEVELOPMENT OF THE HCH LEGISLATION

Interview respondents expressed a wide variety of views concerning why the HCH initiative was included as part of the 2008 health reform legislation, how its structure was developed and, ultimately, why the legislation was passed and signed into law. It was not always possible for respondents to distinguish between their views regarding the health reform legislation as a whole and the HCH initiative specifically as part of that legislation. In part, this was because many respondents (primarily those involved with the passage of the 2008 legislation rather than those involved in implementing HCH) thought of the legislation as a “package” of health reform components that culminated many years of health reform efforts in the Minnesota legislature. Others, however, were able to offer specific views about the HCH Initiative. With this limitation, the respondents’ assessments of the factors that influenced the overall design and subsequent passage of the legislation are categorized as:

- A) Legislative experience in passing health reform legislation in the past;
- B) A general public acceptance that primary care needed to be improved;
- C) Ongoing experiments in other states and nationally with the patient centered medical home concept;
- D) The use of “task forces” to lay the groundwork for the legislation; and
- E.) Timing.

Each of these factors is explained in more detail below.

### A. Experience With Previous Health Reform Legislation

The State legislature passed a very comprehensive package of health reforms in the early 1990s, and subsequently passed a nationally-recognized insurance program for low income Minnesotans who did not qualify for Medicaid. Many of the individuals involved in these efforts were no longer legislators, but some key leaders who knew the history and legacy of health reform legislation in Minnesota were. Legislators viewed the State as a “star” in the health care area, and saw it as “leading the way” in health care nationally. “We had a lot of pride that we were on the cutting edge, we were kind of the laboratory for experimentation.” These legislators were desirous of retaining this status and, based on past experience, were not intimidated by the thought of crafting and passing major health care legislation, including an HCH Initiative. But, as one respondent observed, “...it wasn’t like HCH is just standing out there by itself; it was a package of things we were trying to accomplish.”

### B. Consensus That Primary Care Needed to be Improved

As was the case nationally, there was an emerging consensus within the state of Minnesota that primary care needed to be improved. Indeed, the Institute for Clinical Systems Improvement, formed as an offshoot of the previous health reform legislation, had devoted over a decade to facilitating practice improvement within Minnesota, and Minnesota Community Measurement (a



collaborative non-profit performance measurement and reporting organization) had begun to report for the Statewide Quality Reporting Measurement System physician performance (at the medical group level) in treating diabetes, with early reports suggesting that there was room for considerable improvement. This consensus provided justification for inclusion of an initiative directed at improving primary care in any state health reform legislation. It also raised the question of what new steps could be taken to improve primary care.

C. Ongoing Experiments in Other States and Nationally

During the time that the State's health reform legislation was being crafted, the concept of patient-centered medical homes (PCMHs) was being discussed at a national level as one approach to improving primary care. The concept had a history as a way of delivering effective pediatric care, with some early attempts to pilot the model for adult care in the private sector, including in Minnesota. The National Committee for Quality Assurance (NCQA) was developing a certification process and set of standards for PCMHs. However, unlike at the present time where there are hundreds of patient-centered medical care models, programs and initiatives nationally, then there were still relatively few patient centered medical home programs. Therefore, the status of developing and testing of PCMH programs was in some respects ideal for inclusion of the HCH Initiative in the legislation: the basic concepts were well-known but there was room to gain attention on the national scene by implementing Minnesota's unique version. According to one respondent, "We created a unique Minnesota product. I don't think we would have had as much buy-in and as much sustained interest if we had just adopted something national and called it a day."

D. The Use of Task Forces to Lay the Groundwork

Interestingly, prior to the design and passage of the health reform legislation, two health care reform "task forces" were established—one by the legislature and another by the governor—to chart future directions for the State's health care system. The task forces were composed of community health care leaders, including key legislators and representatives from health plans, provider groups and associations, unions and consumer groups. There was some overlap in individuals serving on these task forces, and the task forces addressed similar issues. They facilitated discussions outside of the legislative process that helped forge consensus on the need for reform, including the improvement of primary care.

The Minnesota Medical Association surfaced as a strong supporter of the concept, based on its earlier work on health reform and an accompanying report, along with a bill relating to medical homes it helped craft in 2006-2007. While employers and health plans expressed some concern about whether they would be expected to spend additional money to support PCMH development, no strong, unified opposition emerged from the task force proceedings. "There was,

you know, so much intensive work done by the Governor's task force and the legislative task force that...everybody was pretty well educated, and they had done an awful lot of work to build consensus...there were other parts of the proposal that were much more controversial." This public discussion both provided momentum for health reform legislation, including inclusion of a HCH component, but also provided reassurance for legislative advocates that such legislation would have strong supporters in the community. One interviewee expressed the opinion that "...part of the reason so many people signed up is they feel like it's ours, it's ours, we created it." Just as important, based on the task force discussions, it was reasonable for legislators to conclude that there would be relatively little, if any, opposition to some sort of PCMH initiative. As one respondent observed, "I don't recall there was one particular group that stood out as...complete cheerleaders for the effort but I don't recall there being a ton of opposition around it..."

#### E. Timing

The discussion and forging of consensus around health reform legislation took place before the Great Recession and also the national debate of the Obama administration's health reform proposals. The Minnesota governor at that time was considered a potential candidate for President on the Republican ticket, while the Minnesota Senate and House were under Democratic control. The Governor's appointed commissioners of the Department of Health and of Human Services (which administered the Medicaid program in Minnesota) were considered to be supportive of the health care reform efforts, as were many Republican legislators (in part because of the task force process). There was a small group (6 to 8) of Democratic and Republican legislators that had worked co-operatively on health care issues and was seen by other legislators as possessing particular expertise in this complicated area. Other legislators were inclined to defer to their combined judgment on health care legislation. It was not expected that the Governor would veto the legislation, if passed, given the appearance of bipartisan support and the fact that components of the legislation were supported by the Governor's task force. Concerns about the reform legislation that existed were directed at payment components, with the HCH Initiative rarely appearing in the legislative debate. Nevertheless, there was some uncertainty about passage of the entire health care reform at the end, with some legislators unsuccessfully urging delay.

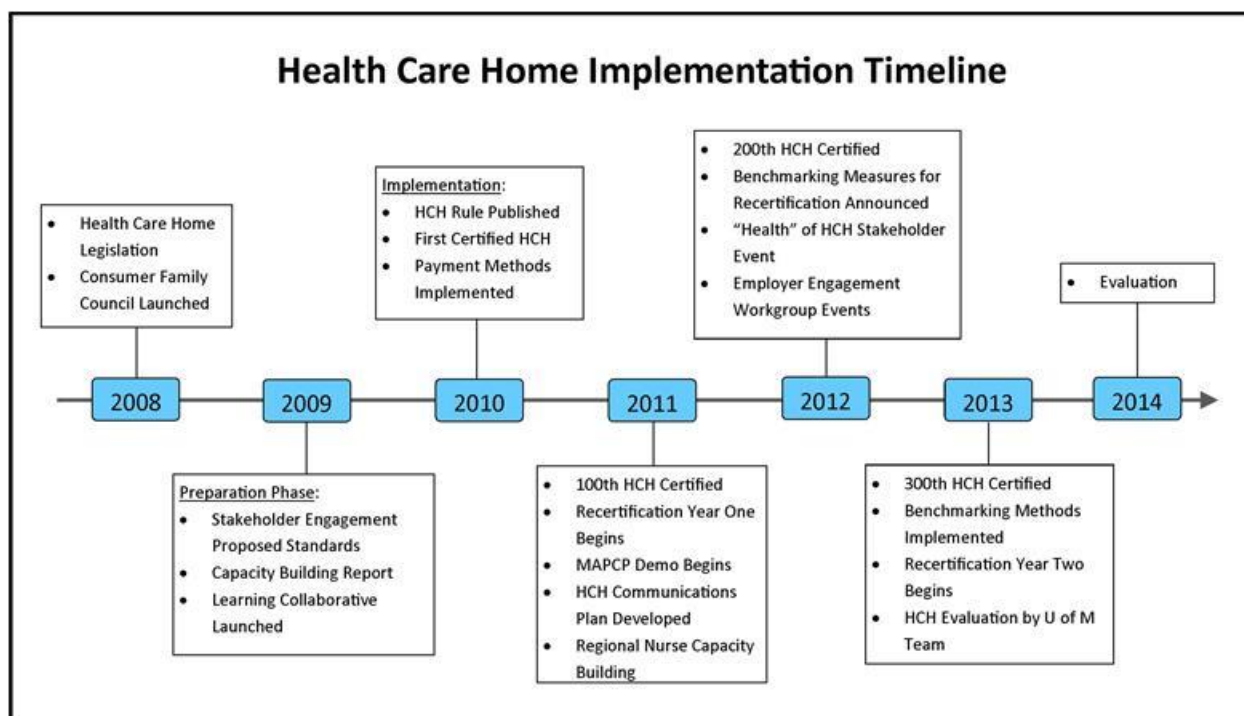
One feature of the legislation relative to the HCH Initiative was relatively unique and thus merits comment. Responsibility for administration of the initiative was split between DHS and the Minnesota Department of Health (MDH). "MDH was supposedly the lead for the implementation...the creating of standards, creating of evidence, the implementation...DHS was given the role of the payment methodology...So that's how it was split up." There was no clear consensus among the interview

respondents concerning the reasons for this. Some suggested that the expertise regarding the HCH model resided in DHS, where there was a physician who had been involved previously in implementing a successful PCMH program for the Academy of Pediatrics: “There were people, especially in DHS, who were very much proponents of HCHs.” Therefore, it made some sense to include that Department in administering the initiative even though the initiative was not limited to the Medicaid population, or other populations whose care was paid for by DHS. Others suggested that the MDH’s inclusion made sense because the “triple aim” objectives of the overall health reform legislation aligned well with that Department’s mission. Leaders of both Departments were reported to be supportive of the HCH Initiative and involved in discussions with the legislature during development of the health reform legislation. Clarifying the “on-the-ground” responsibilities of the two Departments regarding program administration was a challenge undertaken during the early part of program implementation.

## **HCH RULE DEVELOPMENT**

The implementation of the HCH commenced with the development of the rules which were shaped by the legislative requirements for the certification of HCH in Minnesota. Because the expedited rule-making requirement presented a challenge given its short timeline, a small core group with members from DHS and MDH served as a rule-writing team, and established the processes for the rule writing. The expectation was that the HCH program would be launched and clinic certification would begin in one-year. As it turned out, substantial foundational work helped guide the team’s work. This foundation included experience from the previous pediatric patient-centered medical home project, specifically its learning collaborative, and the use of the baseline principles from Dr. Edward Wagner’s chronic disease care model<sup>162, 163</sup>. The timeline for the implementation of the Health Care Homes program in Minnesota, which was also included in the prior evaluation report, is presented in the figure below.

Figure 1. Health Care Homes Implementation Timeline.



In December of 2008 the core rule development team held three meetings around the state to announce the plan for writing the rule and to solicit volunteers to participate in the process. Ultimately over 100 individuals, including consumers, physicians, nurses, mental health professionals, payers, clinic representatives, care coordinators, quality improvement experts, professional associations, and many other stakeholders participated. These individuals participated in interdisciplinary groups that collectively provided input and ideas into the standards that were collapsed into 12 different content areas, which served as the initial development of specific workgroups. When these volunteers worked in interdisciplinary groups, "It was collegial and they had great ideas and they listened to each other." However, when affinity groups of volunteers were used, they were less collaborative as they tended to define what they wanted to see in the standards primarily from their respective affinity groups.

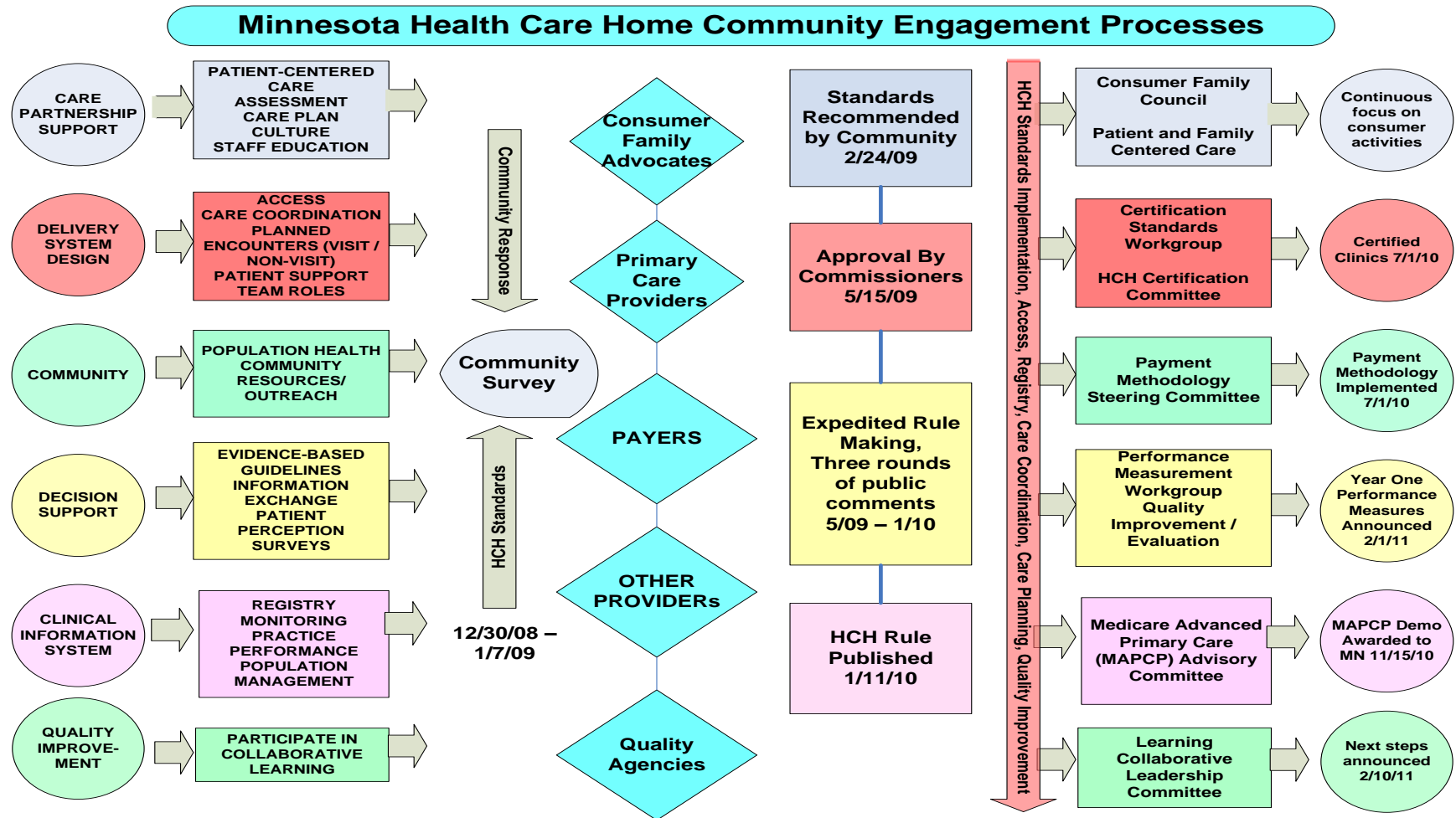
As part of the legislation, experts from around the country including NCQA, The Commonwealth Fund and the national PCMH organization, were invited to provide input into the rule standards at the last rule-writing group meeting after the standards had been narrowed and refined by the workgroups. These experts helped to confirm the state plan for standards development and, in the case of NCQA, were complimentary of the work and engaged in seeking input into how they might adopt some similar standards within their own certification process. Over 200 individuals attended the final meeting and many

provided input. A formal document was prepared for the Commissioners and work commenced on translating standards into the medical and legal language required for the final rule.

As the public comment process began, several presentations were given around the state and a survey was fielded to gain additional input. The results of that survey helped to shape the rule further and to gain insight into some tradeoff areas. Ultimately all comments and responses were recorded and used in shaping the final rule. The entire process, which was an expedited rule-making process, was kept within the expected timeline; however, it was described as challenging as it was vastly shorter than the average of “30 months to write a rule.” The final administrative rule included five broad categories for the basic standards for certification as a Health Care Home: (1) access and communication, (2) participant registry and tracking participant care activities, (3) care coordination, (4) comprehensive care plan, and (5) performance reporting and quality improvement. As reported in the first evaluation report, “In January of 2010, the administrative rule relating to Health Care Homes was published<sup>26</sup>. The rule defined certification and recertification procedures, health care home standards, criteria and conditions for variances, and a process for appeals, revocation, reinstatement, and surrender (p. 9).”<sup>171</sup> Once the rule was final, a series of workshops and presentations were held in key areas of the state and a large conference was held to explain the program and the certification process. MDH began to certify the first Health Care Homes in Minnesota with 47 certified in 2010, representing 428 total clinicians.

A conceptual model for the community engagement process work, which was also included in the prior evaluation report, is presented in Figure 2 below.

Figure 2. Health Care Homes Community Engagement Process



Prior to and concurrently with the core rule making team's work, several important efforts led by contractors were completed. One was a capacity assessment survey report<sup>20</sup> which was completed by a consortium of primary care professional associations. The results of this survey were used at various points during the implementation process. The report was seen as quite valuable to the HCH implementation because it helped to identify clinics' existing capabilities, differences between urban and rural capabilities, and the clinics existing components related to HCH work. In addition, having the collaboration of trusted professional associations leading this effort, rather than the state, provided a sense of legitimacy and trust building to the HCH work. The second major contracted effort which began early was the development and management of the learning collaborative. This work was done for "about 2 1/2 years" by the Institute for Clinical Systems Improvement (ICSI), which was seen as "a tremendous partner" for the state in its development of the HCH program; ICSI became involved in many aspects of the implementation over time.

## **CERTIFICATION OF CLINICS AS HEALTH CARE HOMES**

Administrative accountability for Minnesota's Health Care Homes Initiative, as defined in the legislation, was shared by DHS and MDH. Leaders from these two departments worked together with the many stakeholders described above in the engagement process to define what core functions of the HCH Initiative needed to be developed first:

[Certifying clinics] I think that was probably first... I think when you start breaking it out and piecemealing it and you start getting a framework and so forth, I feel like it actually helped make implementation more palatable, but I think... I mean it was pretty radical, right? I mean, what state has passed this kind of law" [requiring so much administrative heavy lifting]? (Interviewee)

Processes for engaging clinics to apply for HCH certification and for certifying and recertifying them became priority areas of focus:

"So we brought all of those up and then inside certification there were things like access, and registry, and care plans, and...quality improvement at the sites. So [we needed to] develop all those things. (Interviewee)

Accountability for these processes was a natural fit for MDH, which was charged with implementation. Therefore MDH took on the bulk of the early work, while DHS focused on payment methodology. An additional rationale for MDH's lead role was that the newly hired director of Minnesota's HCH implementation at MDH came with tremendous knowledge and experience in care coordination, change

management and quality improvement in clinic settings and had a vision for how implementation of HCHs could work across the state.

As the state HCH team began to deploy resources to complete the work, particularly for site visits, they found that the original policy of primarily using contractors was not as effective as hiring experienced staff, especially experienced clinical staff, who could readily establish rapport with clinic staff. These individuals were instrumental in the site visits, for which final determination of certification status proved to be very challenging to standardize and to systematize. Adequacy in completion of standards for certification proved to be “not so black and white.” A special workgroup, a verification workgroup that included a variety of stakeholder leaders including the president of the Minnesota Medical Association (MMA), established a verification document which defined exactly what documentation clinics should provide for their certification submission process. In practice, that proved to be not as straightforward as expected; ultimately it was determined that documentation could take a variety of formats. As the site visits of applicant HCHs proceeded, many site visits concluded with recommendations for improvement to meet the spirit of the standards and/or with variances applied which needed to be addressed in order for the clinic to be fully certified. These recommendations and variances became formalized in a written report developed from the pre-visit document analysis and observations of the clinic site visit team and were discussed in the debrief meeting at the culmination of each site visit. These recommendations and variances became the raw material for certification decisions and provided guidance for future site visits.

As the certification process, which was described in detail in the last evaluation report<sup>171</sup>, began, there were a variety of workgroups that spent many hours working to achieve the goals laid out by the original core team or new goals to address the needs that arose during the certification process. These workgroups included the certification database development group, the verification workgroup, the payment methodology structure group led by DHS, the consumer family council, the quality committee, a Medicare steering committee, a resources workgroup and the learning collaborative workgroup. An umbrella coordinating committee was suggested early on, but was not implemented until recently. Without the help of the enormous number of individuals on these workgroups, according to a respondent, “We never could have met the deadlines...My feeling was that the workgroups were very effective,” despite the fact that there were “many bumps in the road.” Several respondents noted that there is an “interesting dynamic [of collaboration] that exists in Minnesota” with the number of non-profit groups, associations and collaboratives the state needed to work with on HCHs. On one hand, they present a unique opportunity for broad collaborative decision making; on the other hand, they represent strongly organized blocks of special interests that sometimes seem to focus more on preserving the business model of their constituencies, according to one respondent. This tension “happens all the time” and can create some confusion, but in the end, “It was a very collaborative process, every step of the way.”



Of the workgroups, the most controversy was generated around the payment methodology and decisions from its three subgroups. The original vision for payment was that it would operate in a multi-payer system with criteria for patient complexity and quality measures and a process that rewarded reaching and exceeding specific goals. “To the extent that state government has purchasing power, we wanted to really have this apply as broadly and as uniformly as possible, and pretty quickly we came to the conclusion that that meant doing it in some uniform transactional way through claims.” However, that meant entering the realm of defining “what was the covered service” and how the payment would work across the variety of payers involved. Some would have preferred a grant process instead. Ultimately, there were concessions made for the variety of methods payers wanted to handle payments for care coordination for eligible patients. The system had to evolve to accommodate all payers. “It’s just that if you got on the island, you are on forever, but it still set a reasonably good floor [payment mechanism], which is why I think it’s been successful.” Nonetheless, there still exists some sentiment that the payment mechanism never really got resolved. “Ultimately, I think the payment methodology was too hard. It was just too hard to implement.”

In summary, the Health Care Homes implementation in Minnesota was described as successful for a variety of reasons. One major reason was the vast number of individuals, from consumers to clinical leaders, who provided an enormous number of work hours to help design a system that would work for the state and for all the stakeholders as well. A related reason was the initial philosophy of being transparent about every decision that was made. “I don’t think we’d be where we are right now, five years into the project [with almost 67% of the state clinics certified], if we had not been so transparent.” Having the variety of voices at the table and the right clinical leadership involved were crucial to the outcome. According to one respondent, “I think it was quite effective looking back on it now. When you are in it, it feels overwhelming, like a ton of meetings, like a slow process, but looking back on it, I think it was absolutely the way to do it.”

## APPENDIX C: POPULATION AND SAMPLE

The purpose of the HCH evaluation is to document for the Minnesota legislature the impact of the Health Care Homes (HCH) Initiative on health care quality, cost, and outcomes<sup>100</sup>. Both the state of Minnesota and Minnesota's primary care clinics have important roles in the Health Care Homes Initiative. The state's involvement focuses on encouraging health systems and clinics to participate in the HCH Initiative as certified HCHs by providing financial incentives, a learning collaborative, standards and certification, and transformation assistance. At the clinic level, the focus is on implementing effective clinical care systems and care coordination to improve patient access quality while reducing costs. Participation in the HCH Initiative is voluntary, but to become an HCH a clinic must pass a rigorous review and be certified as an HCH by the Minnesota Department of Health.

The HCH evaluation is a retrospective observational design using both quantitative and qualitative data. The evaluation period is 2009 to 2014. The goal of the analysis is to understand differences in access, cost, and quality between clinics certified as HCHs and not certified as HCHs that are eligible to be HCHs. The secondary goal is to understand the impact of Minnesota's HCH Initiative on HCH implementation.

Two units of analyses are used in this evaluation:

1. The patient unit of analysis is used to examine the effect of HCH certification on the triple aim of access, cost, and quality/patient experience outcomes among patients who are Medicaid, Medicare, and Dual beneficiaries and who are served by clinics that are eligible to be certified as HCHs (HCH eligible).
2. The clinic unit of analysis is used to examine the relationship between clinic characteristics, the decision to become certified as a HCH, and differences in implementing HCH practices, such as care coordination, registries, and other required HCH components among clinics.

The measurement period for the evaluation is January 1, 2009 through December 31<sup>st</sup> of 2014. The clinics included in the study are HCH eligible clinics and their patients. The 2009 data provides pre-certification data since the first HCH clinic was certified in July of 2010. This allows the effect of HCHs on outcomes, such as costs, to estimate the HCH effect on annual changes in beneficiary outcomes.

Since the evaluation examines HCH eligible clinics and the patients they serve, Minnesota statutes and data guide the definition of a clinic. A clinic is an operational entity through which personal clinicians or local trade area clinicians deliver health care services under a common set of operating policies and procedures using shared staff for administration and support. The operational entity may be a department or unit of a larger organization as long as it is a recognizable subgroup. Minnesota Statutes, section

256B.0751, subdivision 3, spells out the requirements for clinicians certified as practicing in health care homes: (a) A personal clinician or a primary care clinic may be certified as a health care home. If a primary care clinic is certified, all of the primary care clinic's clinicians must meet the criteria of a health care home."<sup>67</sup> Minnesota Community Measurement (MNCM), which collects clinic care quality measures under a contract to the Minnesota Statewide Quality Reporting and Measurement System (SQRMS)<sup>94</sup>, defines a clinic as "A clinic site location is a building, separate space, or an entity with a street address. It should be a functional unit that is easily understood by patients/consumers. The goal of reporting by clinic site is to provide patients/consumers with information about the entity with which they are most familiar and to provide information to clinics that is actionable for quality improvement purposes."<sup>88</sup> This definition of clinics has been implemented in the SQRMS provider and clinic registry which is collected annually and identifies all clinics and the providers in those clinics. HCH eligible clinics are those clinics that are primary care clinics.

Identifying the sample of HCH eligible clinics, the patients eligible to be included in the evaluation and the patients served in HCH eligible clinics is a multi-step process:

- 1) Identify HCH eligible clinics using the SQRMS clinic registry to identify primary care clinics. Primary care clinics were identified as clinics identified as primary care clinics in the SQRMS clinic registry or in the National Plan and Provider Enumeration System (NPPES) registry (see Appendix B – Attribution Methodology for a detailed description of this algorithm)
- 2) Identify those patients eligible for the study because they were continuously enrolled in the year, did not die during the year, were not in hospice during the year, and did not participate in Medicare Advantage
- 3) Attribute patients to clinics (see Appendix B – Attribution Methodology for a detailed description of this algorithm)
- 4) Sample patients who were cared for in a HCH eligible clinic

## POPULATION AND SAMPLE

The population consists of all patients enrolled in Medicaid, Medicare, or Dual Eligibility programs in the period 2009 to 2013 and Medicaid patients in 2014 (matching Medicare data was not provided). The sample frame consists of all Minnesota clinics eligible to be HCHs, including both certified and not certified clinics (see Appendix D for a description of the data sources). The clinics are identified using Minnesota Department of Health's Statewide Quality Reporting and Measurement System (SQRMS) registries of clinics collected by Minnesota Community Measurement (MNCM) under contract to Minnesota. The sample frame was chosen because a common identifier for clinics and information on provider identifiers (NPI) from HCH Certification and SQRMS quality measurement data supports the linking of providers to clinics.

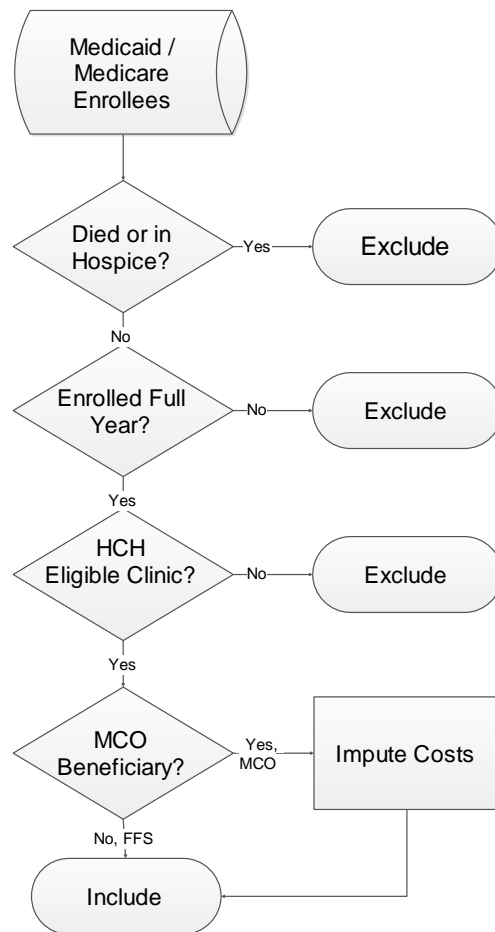
Patients were excluded from the study if they were not continuously enrolled for the year, died during the year, had hospice care during the year, or were enrolled in Medicare Advantage. Medicare Advantage patients are excluded because of a lack of claims. Patients who are not continuously enrolled are excluded because differences in enrollment periods are likely to be confounded with resource use and risk adjustment.

Figure 1 shows the inclusion rules for the evaluation. Because quality and cost measures require a full year of observation, patients without a full year of continuous enrollment are excluded. Continuous enrollment is defined as: “continuous medical enrollment for the measurement year and the year prior to the measurement year and continuous pharmacy benefit enrollment for the measurement year, with no more than one gap in enrollment of up to 45 days during each year of continuous enrollment. To determine continuous enrollment for a Medicaid beneficiary for whom enrollment is verified monthly, there may not be more than a 1-month gap in coverage. The patient must be enrolled as of December 31 of the measurement year.”<sup>104,p. 171</sup>

Patients who died or were in hospice care were excluded because they can have very high resource use associated with end of life care that is not generalizable to usual care conditions.

The analysis of costs requires that patients are enrolled in Fee-for-Service (FFS) or MCO Medicaid programs or in Medicare FFS. Medicare Advantage beneficiaries are excluded because of lack of paid amounts. To include Medicaid MCO beneficiaries, which did not include paid amounts prior to 2013, an imputation method for calculating paid amounts from charged amounts was used. The algorithm was provided by Minnesota’s Department of Human Services. To insure measurement consistency over time, this method was used with 2013 and 2014 data.

Figure 1: Exclusion and Inclusion



Because the study compares access, quality, and cost for clinics that are eligible to participate in the HCH program, patients who cannot be attributed to a HCH eligible clinic are excluded. Because Medicaid MCOs had not reported paid amounts in the earlier evaluation years, Medicaid MCO paid amounts is imputed.

Tables 1a to 1c shows the number of beneficiaries excluded by plan and year because of continuous enrollment (less than 12 months enrollment), death, hospice use, and participating in an Medicare Advantage (Dual and Medicare beneficiaries). For both Dual and Medicare beneficiaries participation in Medicare Advantage programs results in substantial exclusion. For Medicare beneficiaries the percent excluded because of Medicare Advantage has increased from 30% in 2009 to 47.1% in 2013. The second major cause of exclusion is not having continuous enrollment (< 12 Months enrollment). The most substantial reason for exclusion among Medicaid beneficiaries is not having continuous enrollment (< 12 Months enrollment). Through 2014 approximately 40% of Medicaid beneficiaries did not have continuous enrollment. In 2014 this percent declined to 32.2%, possibly because of implementation of eligibility requirements as part of implementing the Affordable Care Act.

The inclusion/exclusion rules affect measures such as the average Per Member Per Year (PMPY) costs when members who are excluded have a different level of PMPY than included members. For beneficiaries enrolled less than a full year the difference can be attributed to differences in the observational period. For Dual Eligible beneficiaries, the overall mean PMPY is \$30,381.68, with the average of excluded beneficiaries being \$28,046.47 and included beneficiaries being \$33,27.19. This difference is most likely due to the exclusion of Dual Eligible beneficiaries because of participation in Medicare Advantage. The PMPY for excluded Medicaid beneficiaries is \$2,605.16 and for included Medicaid beneficiaries is \$6,134.31. This difference is most likely due to the excluded beneficiaries not participating in Medicaid for a full year.

## **SUMMARY**

This appendix described the inclusion/exclusion rules for the evaluation and presented information by plan on the reasons for beneficiaries being excluded from the evaluation. Approximately 60% of Medicaid, 37% of Medicare, and 44% of Dual Eligible beneficiaries were included in the sample as enrolled full year, did not die, did not use hospice, and were not in Medicare Advantage. A major cause of exclusion for Medicare and Dual Eligible beneficiaries was participation in Medicare Advantage programs. For Medicaid beneficiaries a major reason for exclusion was not being enrolled a full year.

Reason for Exclusion	2009		2010		2011		2012		2013	
	N	%	N	%	N	%	N	%	N	%
<b>Sampled</b>	55,476	38.3	57,752	40.5	62,493	43.9	66,113	45.4	68,125	46.0
<b>Died</b>										
<b>Hospice</b>	159	0.1	154	0.1	156	0.1	166	0.1	184	0.1
<b>Medicare Advantage</b>	40,711	28.1	41,791	29.3	40,529	28.5	39,765	27.3	40,115	27.1
<b>Died, Medicare Advantage</b>	1	0.0	1	0.0	6	0.0	9	0.0	.	.
<b>Hospice, Medicare Advantage</b>	557	0.4	615	0.4	726	0.5	895	0.6	869	0.6
<b>Died, Hospice, Medicare Advantage</b>	.	.	.	.	.	.	3	0.0	.	.
<b>&lt; 12 Months</b>	32,117	22.2	25,559	17.9	21,660	15.2	21,757	14.9	22,382	15.1
<b>Died, &lt; 12 Months</b>	2,466	1.7	2,439	1.7	2,575	1.8	2,400	1.6	1,566	1.1
<b>Hospice, &lt; 12 Months</b>	93	0.1	99	0.1	50	0.0	79	0.1	315	0.2
<b>Died, Hospice, &lt; 12 Months</b>	610	0.4	615	0.4	599	0.4	672	0.5	439	0.3
<b>Medicare Advantage, &lt; 12 Months</b>	6,587	4.5	7,259	5.1	7,279	5.1	7,616	5.2	9,844	6.6
<b>Died, Medicare Advantage, &lt; 12 Months</b>	4,436	3.1	4,556	3.2	4,504	3.2	4,301	3.0	2,583	1.7
<b>Hospice, Medicare Advantage, &lt; 12 Months</b>	74	0.1	86	0.1	74	0.1	100	0.1	824	0.6
<b>Died, Hospice, Medicare Advantage, &lt; 12 Months</b>	1,538	1.1	1,620	1.1	1,654	1.2	1,683	1.2	1,002	0.7
<b>All</b>	144,825	100.0	142,546	100.0	142,306	100.0	145,563	100.0	148,248	100.0

**Table 1B: Sampling and Exclusions for Medicare Beneficiaries by Year**

Reason for Exclusion	2009		2010		2011		2012		2013	
	N	%	N	%	N	%	N	%	N	%
<b>Sampled</b>	323,049	43.7	295,700	39.9	273,749	38.9	260,549	35.8	247,333	32.9
<b>Hospice</b>	1,418	0.2	1,369	0.2	1,420	0.2	1,464	0.2	1,425	0.2
<b>Medicare Advantage</b>	224,329	30.3	263,158	35.5	289,199	41.1	319,832	44.0	353,520	47.1
<b>Hospice, Medicare Advantage</b>	806	0.1	928	0.1	1,043	0.1	1,195	0.2	1,366	0.2
<b>&lt; 12 Months</b>	152,724	20.6	141,141	19.0	93,930	13.4	97,528	13.4	98,124	13.1
<b>Died, &lt; 12 Months</b>	11,086	1.5	10,999	1.5	10,478	1.5	9,841	1.4	9,603	1.3
<b>Hospice, &lt; 12 Months</b>	47	0.0	48	0.0	53	0.0	56	0.0	63	0.0
<b>Died, Hospice, &lt; 12 Months</b>	3,078	0.4	3,213	0.4	3,056	0.4	3,221	0.4	3,275	0.4
<b>Medicare Advantage, &lt; 12 Months</b>	16,619	2.2	17,498	2.4	21,569	3.1	24,163	3.3	25,581	3.4
<b>Died, Medicare Advantage, &lt; 12 Months</b>	4,879	0.7	5,858	0.8	6,446	0.9	6,677	0.9	7,399	1.0
<b>Hospice, Medicare Advantage, &lt; 12 Months</b>	4	0.0	10	0.0	15	0.0	7	0.0	7	0.0
<b>Died, Hospice, Medicare Advantage, &lt; 12 Months</b>	1,670	0.2	2,067	0.3	2,253	0.3	2,559	0.4	2,941	0.4
<b>All</b>	739,709	100.0	741,989	100.0	703,211	100.0	727,092	100.0	750,637	100.0

<b>Table 1C: Sampling and Exclusions for Medicaid Beneficiaries by Year</b>						
<b>Reason for Exclusion</b>	<b>2009</b>		<b>2010</b>		<b>2011</b>	
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<b>Sampled</b>	482,513	55.9	540,144	57.8	576,135	58.5
<b>Died</b>						
<b>Hospice</b>	154	0.0	190	0.0	181	0.0
<b>Died, Hospice</b>	77	0.0	76	0.0	86	0.0
<b>&lt; 12 Months</b>	377,457	43.7	391,523	41.9	405,198	41.1
<b>Died, &lt; 12 Months</b>	2,169	0.3	2,161	0.2	2,275	0.2
<b>Hospice, &lt; 12 Months</b>	55	0.0	58	0.0	71	0.0
<b>Died, Hospice, &lt; 12 Months</b>	540	0.1	516	0.1	549	0.1
<b>All</b>	863,238	100.0	934,992	100.0	984,763	100.0
<b>Exclusion: Reason for Exclusion</b>	<b>2012</b>		<b>2013</b>		<b>2014</b>	
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<b>Sampled</b>	578,629	58.1	590,821	59.2	771,817	59.0
<b>Died</b>					238	.0
<b>Hospice</b>	200	0.0	297	0.0	162	0.0
<b>Died, Hospice</b>	78	0.0	.	.	49	0.0
<b>&lt; 12 Months</b>	414,362	41.6	405,045	40.6	367,733	32.2
<b>Died, &lt; 12 Months</b>	2,310	0.2	1,698	0.2	1,569	0.1
<b>Hospice, &lt; 12 Months</b>	81	0.0	270	0.0	73	0.0
<b>Died, Hospice, &lt; 12 Months</b>	596	0.1	369	0.0	409	0.0
<b>Dual Beneficiary, No Medicare Data</b>					165,466	12.7
<b>All</b>	996,588	100.0	998,500	100.0	1,307,516	100.0



## APPENDIX D: ATTRIBUTION METHODS

This appendix describes the methods used to attribute enrollees to clinics. Attribution is a term used to describe methods of assigning enrollees and their associated costs and quality measurements to health care providers, clinics, groups, or systems. The HCH evaluation attributes enrollees to clinics for two reasons: first to compare clinics that are certified as HCHs because their providers are certified as HCH providers and second, to measure a primary care relationship between the enrollee and clinic.

Primary care is a property of the relationship between an individual and a provider that involves first contact for a variety of conditions continuously over time<sup>131, 144, 147</sup>. While primary care relationships are more likely in practices such as family practice, pediatrics, and internal medicine, primary care relationships can occur in practices such as asthma and allergy, oncology, and behavioral health. The greater likelihood of some clinics having primary care relationships with enrollees is a reason to focus HCH certification and its evaluation on specific types of clinics that are HCH eligible. The possibility of enrollees having primary care relationships with other types of clinics means that the attribution algorithm should be sensitive to the possibility of primary care relationships being established in a wide variety of clinical settings in the Statewide Quality Reporting and Measurement System (SQRMS) registry or in the National Plan and Provider Enumeration System (NPPES) registry.

The three steps to attributing enrollees to clinics were:

1. Creating a registry of providers and clinics using information from the SQRMS provider and clinic registry information collected by Minnesota Community Measurement (MNCM) annually, information from the Health Care Homes certification registry and identifying clinics that are HCH eligible
2. Attributing providers to clinics using the provider and clinic registry and information from medical claims that identifies specific providers and clinics
3. Attributing enrollees to clinics using professional, outpatient, and care coordination encounters, evaluation and management encounters, and encounters in general

The attribution goal was to attribute enrollees to clinics in order to make inferences about the effect of a clinic being a HCH on outcomes. The nature of claims data affects the design of the algorithm to attribute enrollees to providers, providers to clinics, and enrollee to clinics through providers. Each professional service claim (e.g., physician, physician assistant or nurse practitioner) for services includes an enrollee identifier, a 'treating' provider National Plan and Provider Enumeration System (NPPES) national provider identifier (NPI), and a 'pay to' provider NPI. If the treating provider was coded consistently as an individual provider and the pay-to-provider was coded consistently as a clinic, the NPI information could be used to

attribute enrollees to clinics. But while the enrollee identifier is consistently coded, the same is not true for the 'treating' provider and the 'pay to' provider. The 'treating' provider NPI can include either the NPI of an individual provider (e.g., physician, nurse practitioner, psychologist) or a clinic or organizational NPI. The 'pay to' provider NPI can be a clinic NPI, a NPI for a group of clinics (e.g., primary care practices in a health system), or a health system NPI. Meaning NPIs cannot be the sole source of information used to attribute enrollees to clinics.

Minnesota Statutes, section 256B.0751, subdivision 3, spells out the requirements for clinicians certified as a HCH provider: (a) A personal clinician or a primary care clinic may be certified as a health care home. If a primary care clinic is certified, all of the primary care clinic's clinicians must meet the criteria of a health care home.<sup>67</sup> MNMCM, which collects clinic quality of care measures under a contract with SQRMS<sup>94</sup>, defines a clinic as "A clinic site location is a building, separate space, or an entity with a street address. It should be a functional unit that is easily understood by enrollees/consumers. The MNMCM definition has been used to implement the SQRMS provider and clinic registry which is collected by MNMCM. The clinic identifier is also used by MNMCM in collecting enrollee level care quality data, which includes the NPI of the provider accountable for caring for an enrollee, the SQRMS clinic identifier, and measures of care quality. The SQRMS registry clinic identifier is also used in the HCH certification registry, which includes provider NPIs and their clinic identifier.

Since the SQRMS clinic registry identifies specific providers and clinics and because this clinic identifier is used in multiple systems it provides information for attributing providers to clinics. This is better than using medical claims data because it includes: (a) the provider-clinic association in the HCH certification database, (b) the provider-clinic association in the SQRMS registry, and (c) the number of enrollees a provider is accountable for in the SQRMS care quality measures. HCH legislation requires individual providers to be certified and their clinics become certified through the certification of their providers. As a consequence of certification, the HCH certification database links individual providers to specific clinics. This information associating providers with clinics allows providers to be attributed to clinics. Subsequently enrollees are attributed to clinics through their encounters with providers.

A cautionary note is that attribution of enrollees is a widely employed method and is used by Commercial insurers, Medicare and Medicaid to 'assign' a patient to a particular provider or clinic who is considered to be an enrollee's primary care provider.<sup>76</sup> One major issue is that many Medicaid enrollees periodically go on and off Medicaid depending on their situation. This leads to situations where it is difficult to empirically determine from claims data alone if enrollees are establishing a consistent primary care relationship. This makes it not only challenging to attribute an enrollee to a provider but, more important, the enrollee often

does not have a primary care provider and any attribution method would result in either a faulty attribution or not being able to attribute the enrollee to a specific provider.

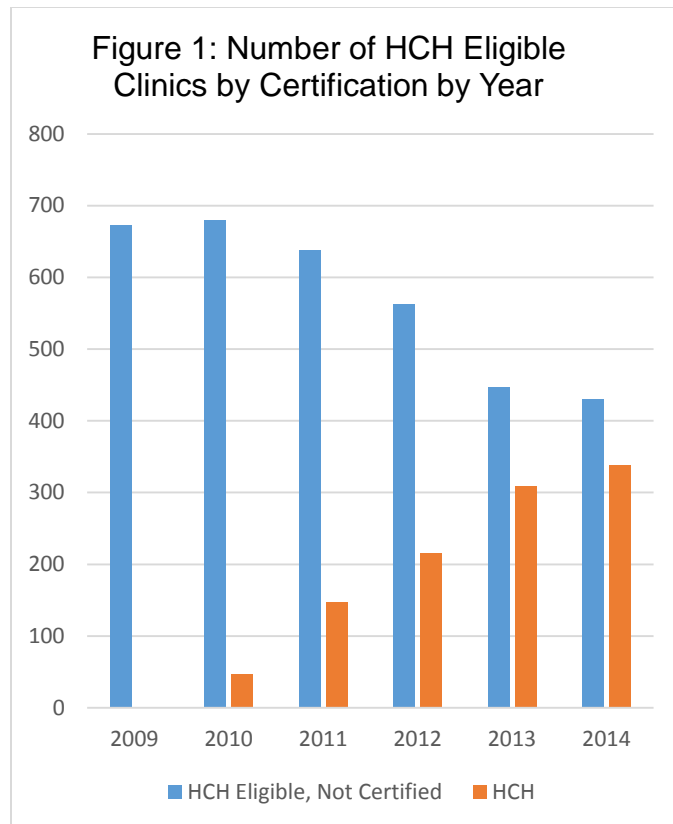
## PROVIDER AND CLINIC REGISTRIES

The two primary sources for identifying Minnesota providers and clinics were the SQRMS provider and clinic registry collected in the years 2009 to 2014 and the HCH certification database. Each clinic participating in SQRMS provides information about itself (e.g., address, medical group it is associated with) and identifies providers associated with the clinic. The HCH certification includes data on certified providers in a clinic and clinic information, including certification dates for providers and for the clinics. These data were supplemented with information from MNMCM on clinic specialty, NPPES information on each provider specialty, and health care claims data that had appropriate identifying information.

A significant strength of the SQRMS registries crucial to the HCH evaluation is that it includes a unique identifier for each clinic. While each clinician has a unique National Provider Identifier (NPI) from NPPES the same is not the case for clinics as multiple clinics within a system or organization which can share a common NPI. Table 1 shows the rate of common NPIs being shared by clinics in Minnesota. The first column shows that the percent of HCH eligible clinics with a unique NPI ranges from 51.27% in 2011 to 61.07% in 2010. Approximately 40% to 50% of all clinics share a NPI with at least one other clinic while some clinics share a NPI with more than 20 other clinics. The ability to link individual providers with specific clinics provided by the SQRMS registries was essential to evaluating the HCH program at the clinic level.

	Table 1: Shared NPIs Among Clinics									
	1 Clinic		2 to 5 Clinics		6 to 10 Clinics		11 to 20 Clinics		More than 20 Clinics	
	N	%	N	%	N	%	N	%	N	%
Registry Year										
2009	373	54.69	154	22.58	47	6.89	14	2.05	94	13.78
2010	444	61.07	154	21.18	37	5.09	14	1.93	78	10.73
2011	403	51.27	189	24.05	75	9.54	14	1.78	105	13.36
2012	409	52.23	187	23.88	76	9.71	17	2.17	94	12.01
2013	403	53.31	161	21.30	67	8.86	35	4.63	90	11.90
2014	401	52.21	173	22.53	57	7.42	43	5.60	94	12.24

The SQRMS provider registry was merged with the HCH certification database provider registry to obtain a registry of all provider-clinic relationships by year. The SQRMS clinic registry was processed by integrating the clinic from all years the clinic submitted SQRMS data between 2009 and 2014, and then filling in missing years (years the clinic did not report SQRMS data) by using the year prior to a missing observation (e.g., a clinic observed in 2010 and 2012 was assumed to be operating in 2011). Merging the HCH certification database with the SQRMS clinic registry added clinics when a clinic became certified and was not yet participating in SQRMS.



Year	HCH Eligible Clinic?		
	No	Yes	Total
2010	717 49.65	727 50.35	1444
2011	883 52.91	786 47.09	1669
2012	807 50.75	783 49.25	1590
2013	706 48.26	757 51.74	1463
2014	685 47.08	770 52.92	1455

HCH eligibility was determined by assessing whether a clinic was a primary care clinic. First, if the clinic specialty reported to MNCM was Family Medicine, Internal Medicine, Pediatric/Adolescent Medicine, Obstetrics/Gynecology, or Geriatric Medicine the clinic was flagged as a MNCM primary care clinic. (The MNCM primary care flag was considered to be a specific measure of whether the clinic was a primary care clinic.) Next, if the clinic was a NPPES type Agencies, Allopathic & Osteopathic Physicians, Ambulatory Health Care Facilities, or Physician Assistants & Advanced Practice Nursing Providers and the NPPES classification was Clinic/Center, Family Medicine, General Practice, Hospitals, Internal Medicine, Nurse Practitioner, Pediatrics, Public Health or Welfare, or Social Worker the clinic was flagged as a NPPES primary care clinic. The NPPES primary care was considered to be a sensitive measure of

whether the clinic was a primary care clinic. The clinics that were flagged as primary care by the NPPES primary care flag and not by the MNMCM primary care flag were reviewed by evaluation team members knowledgeable about practices in Minnesota supplemented with Google searches to determine which clinics were primary care clinics. These clinics, the clinics with the MNMCM primary care flag, and any clinic certified during the evaluation period were included as the HCH eligible clinics for the evaluation. Clinics that were HCH eligible in any year were assumed to be HCH eligible in the complete evaluation period. Table 2 shows the number of clinics in the SQRMS/HCH registry by year and the number that are HCH eligible. Figure 1 shows the number of clinics that were HCH eligible and not certified and HCH eligible and certified by year.

## **ATTRIBUTING PROVIDERS TO CLINICS**

The attribution methodology is designed to identify the primary clinic where a provider practices.

There are three primary sources for linking providers to clinics – the HCH certification database provider-clinic registry, the SQRMS provider-clinic registry and SQRMS quality reporting which provides information on the individual providers who are accountable for enrollee care in care quality measures. Medicaid medical claims provides a secondary source when it has a ‘treating provider’ NPI that is an individual provider and a pay-to-provider NPI that uniquely links to a HCH clinic

An issue that arises when using the HCH certification database provider-clinic registry combined with the SQRMS provider-clinic registry is that an individual provider may be associated with more than one clinic. This can occur when providers practice at several locations or because they relocate during a year. The informational value of the association is reduced because it does not clearly identify a one-to-one relationship between provider and clinic. This is addressed in the algorithm by reducing the importance of the provider-clinic association when a provider practices at more than one clinic. The association between providers and clinics from the SQRMS quality reporting and medical claims provides a measure of the strength of the association between a provider, a clinic and the number of patients seen at the clinic.

The algorithm for attribution of providers to clinics uses the HCH certification database provider-clinic registry, the SQRMS provider-clinic registry, the SQRMS quality reporting, and Medicaid claims based on these criteria:

- Calculate a score for the degree to which a provider links to a clinic. This score is the sum of all criteria met and demonstrates the importance of an association between a provider and clinic in the HCH registry, SQRMS quality reporting, SQRMS registry, and claims:

- If the provider is reported by HCH as linked to a clinic add 4 times the inverse of the number of clinics HCH reports the provider as linked to, if a provider is linked to one clinic, the score is 4, if the provider is linked to two clinics, the score is 2
- If the provider is reported by the SQRMS quality reporting as linked to a clinic add 3 times the inverse of the number of clinics in SQRMS quality reporting that the provider is linked to, if a provider is linked to one clinic, the score is 3, if the provider is linked to two clinics, the score is 1.5
- If the provider is reported by the SQRMS registry as linked to a clinic add 2 times the inverse of the number of clinics in SQRMS registry reporting that the provider is linked to, if a provider is linked to one clinic, the score is 2, if the provider is linked to two clinics, the score is 1
- If the provider is reported by the medical claims data as linked to a clinic add 1 times the inverse of the number of clinics in medical claims reporting that the provider is linked to, if a provider is linked to one clinic, the score is 1, if the provider is linked to two clinics, the score is .5
- Attribute the provider to the clinic where they have the most points.
- In the case of ties, select the clinic where a provider is HCH certified. If there are still ties, select the clinic with most SQRMS enrollees. If there are still ties, select the clinic with most Medicaid claims.

Table 3 shows the number of providers associated with a clinic and the source of information used to associate a provider with a clinic. The count in a cell shows the number of enrollees attributed by a specific combination of indicators. Approximately 50% of the providers are attributed to clinics using the SQRMS registry and approximately 16% are attributed using a combination of the SQRMS registry and SQRMS quality reporting. The proportion attributed using HCH Certification data (HCH, SQRMS Registry; HCH, SQRMS Quality, SQRMS Registry; Claims data) has increased over time. Multivariate analysis of the attribution score shows that primary care physicians (Family Medicine, General Practice, Internal Medicine, Nurse Practitioner, Pediatrics, Obstetrics & Gynecology, Physician Assistant) in certified clinics are more likely to be attributed. Table 3 also shows that SQRMS information about an enrollee's SQRMS provider is important for associating providers with clinics. This is strength for three reasons:

1. The HCH and SQRMS data specifically link a specific provider to a specific clinic. In contrast, such a relationship is only inferred from Medicaid claims data.
2. The HCH and SQRMS data links providers with specific clinics even when health systems or medical groups use one NPI to refer to multiple clinics. This is important because it allows the measurement of clinic performance even for health systems using a common NPI for many clinics.

3. The use of multiple sources, such as HCH and SQRMS and Medicaid claims, to associate a provider with a clinic increases the reliability of associating a provider with a clinic.

Source	2010		2011		2012		2013		2014	
	N	%	N	%	N	%	N	%	N	%
HCH	23	0.14	96	0.69	159	1.00	291	1.74	143	0.72
SQRMS Quall	1,536	9.12	991	7.09	2,392	15.09	1,592	9.50	969	4.87
HCH, SQRMS Quall	23	0.14	114	0.82	412	2.60	255	1.52	91	0.46
SQRMS Rag	9,648	57.31	5,252	37.60	6,916	43.63	7,544	45.02	10,632	53.44
HCH, SQRMS Rag	39	0.23	25	0.18	124	0.78	358	2.14	397	2.00
SQRMS Quall, SQRMS Rag	2,850	16.93	3,583	25.65	2,472	15.60	2,556	15.25	3,253	16.35
HCH, SQRMS Quall, SQRMS Rag	287	1.70	868	6.21	935	5.90	1,643	9.80	1,853	9.31
Claims, HCH	5	0.03	16	0.11	20	0.13	36	0.21	20	0.10
Claims, SQRMS Quall	37	0.22	293	2.10	509	3.21	407	2.43	260	1.31
Claims, HCH, SQRMS Quall	1	0.01	24	0.17	168	1.06	47	0.28	15	0.08
Claims, SQRMS Rag	1,796	10.67	1,133	8.11	626	3.95	876	5.23	1,073	5.39
Claims, HCH, SQRMS Rag	20	0.12	32	0.23	26	0.16	125	0.75	123	0.62
Claims, SQRMS Quall, SQRMS Rag	532	3.16	1,223	8.76	729	4.60	591	3.53	618	3.11
Claims, HCH, SQRMS Quall, SQRMS Rag	37	0.22	319	2.28	363	2.29	436	2.60	449	2.26
All	16,834	100.00	13,969	100.00	15,851	100.00	16,757	100.00	19,896	100.00

Table 4 shows the number of clinics and the median number of providers by clinic for HCH eligible clinics and non-HCH eligible clinics (the median was used because the distribution is skewed by some large clinics). HCH eligible clinics have more providers attributed to a clinic.

	Not HCH Eligible		HCH Eligible	
	N	Median	N	Median
2009	534	3.50	674	7.00
2010	714	4.00	723	8.00
2011	877	4.00	782	7.00
2012	788	4.00	777	7.00
2013	629	5.00	704	8.00
2014	682	5.00	765	8.00

## ATTRIBUTING ENROLLEES TO CLINICS

The third step in attribution is attributing enrollees to clinics. This step uses the professional and outpatient encounter data (typically physician office visits) because the goal is to identify HCH eligible clinics to which the enrollee will be attributed. The algorithm allows enrollees to be attributed to any clinic in the SQRMS/HCH registry because enrollees can form primary care relationships at any type of clinic. A primary care relationship is reflected in the enrollee's pattern of use of a clinic. HCHs are given preference because care coordination claims are given the highest weight because they are the strongest evidence of a primary care / care coordination relationship. The algorithm for this attribution is:

1. For each professional encounter, use the enrollee ID and treating provider NPI and the provider-clinic link to associate an enrollee professional encounter with a clinic.
  - a. If the treating provider NPI on the professional encounter is an individual provider (e.g., physician) use the provider NPI and the provider-clinic link table.
  - b. If the treating provider NPI on the professional encounter is a clinic NPI that distinctly identifies a HCH clinic, then link the enrollee to the clinic using that distinct link.
2. Count the number of encounters in a clinic that are with a MDs/Dos, NPs, or PAs
  - a. Care coordination encounters (procedure codes S0280 or S0281).
  - b. Evaluation and Management Encounters (procedure codes between 99201 and 99205, between 99211 and 99215 between 99381 and 99387, between 99391 and 99397, or equal to G0402, G0438, S0280, S0281)
  - c. Total number of encounters.
3. Determine the date of the last visit to the clinic.
4. Calculate a score associating an enrollee with a clinic (The values given the attribution score categories (8, 4, 2, 1) are chosen so that the higher values always dominate - if there is a care coordination claim no other combination of criteria can result in the care coordination claim not being given priority):
  - a. Where the maximum number of care coordination encounters occurred (the number must be greater than 0) add 8 to the score.
  - b. Where the maximum number of evaluation & management encounters occurred (the number must be greater than 0) add 4 to the score.
  - c. Where the maximum number of encounters with a primary care provider occurred (the number must be greater than 0) add 2 to the score.
  - d. Where the maximum number of encounters occurred (the number must be greater than 0) add 1 to the score.
  - e. If the enrollee had the enrollee's last encounter at the clinic add .5 to the score (first tie breaker).



- f. If the enrollee had their highest total expenses at the clinic add .25 to the score (second tie breaker).
5. Choose the enrollee clinic pair with the highest score.
6. To increase specificity, an enrollee was attributed to a clinic if at least 10% of the enrollee's professional services encounters occurred at the clinic (The number of enrollee's attributed is slightly larger than using a 20% rule and the ones that were attributed using a 20% rule were the same as those attributed using a 10% rule.

Table 5 shows the relationship between attribution scoring and attribution of an enrollee to a HCH eligible clinic. Each cell measures the number of enrollees who were attributed using all the indicators mentioned in the row title. Approximately 70% of the enrollees were attributed based on the combination of Evaluation & Management (E&M) encounters, primary care provider encounters, and total encounters. This means that all three indicators for attributing an enrollee to a clinic agreed. Over time, the number of enrollees attributed to a clinic using care coordination claims, the most specific attribution, measure increased. Multivariate analysis of whether an enrollee was attributed to a non-HCH clinic showed that: (a) children ( $\leq 18$ ) were more likely to be attributed to a HCH eligible clinic than adults ( $> 18$ ), which is consistent with the development of HCHs in pediatric populations; (b) enrollees with cancer or behavioral health conditions were less likely to be attributed to a HCH eligible clinic; (c) Medicaid enrollees were more likely to be attributed to a HCH eligible clinic than Dual Eligible enrollees who were more likely than Medicare enrollees; (d) while higher risk enrollees, measured using ACGs, were less likely to be attributed to a HCH eligible clinic, controlling for the ACG risk score enrollees in the highest resource utilization band (expected utilization) were most likely to be attributed to HCH eligible clinics. The order of attribution by year was 2012, 2010, 2009, 2013, 2014, and 2011.

	2010		2011		2012		2013		2014	
	N	%	N	%	N	%	N	%	N	%
Enctrs	7,288	1.06	5,176	0.75	6,452	0.93	5,371	0.79	6,615	1.18
PCP	1,898	0.28	1,741	0.25	1,828	0.26	1,707	0.25	1,638	0.29
Enctrs, PCP	30,556	4.46	28,366	4.11	28,498	4.09	26,940	3.97	19,181	3.42
EM	38,015	5.55	36,123	5.24	38,464	5.52	37,032	5.46	27,030	4.83
EM, Enctrs	25,176	3.68	21,078	3.06	21,736	3.12	22,624	3.33	18,297	3.27
EM, PCP	28,661	4.19	30,273	4.39	28,091	4.03	28,616	4.22	23,285	4.16
EM, PCP Enctrs	552,301	80.68	563,247	81.71	565,458	81.17	546,678	80.53	456,365	81.48
CC	63	0.01	235	0.03	412	0.06	640	0.09	478	0.09
CC, Enctrs	.	.	2	0.00	31	0.00	33	0.00	9	0.00
CC, PCP	49	0.01	120	0.02	138	0.02	235	0.03	178	0.03
CC, PCP, Enctrs	152	0.02	891	0.13	1,528	0.22	2,072	0.31	1,197	0.21
CC, EM	24	0.00	100	0.01	188	0.03	319	0.05	242	0.04
CC, EM, PCP	18	0.00	70	0.01	102	0.01	224	0.03	191	0.03
CC, EM, PCP, Enctrs	368	0.05	1,911	0.28	3,711	0.53	6,344	0.93	5,359	0.96
All	684,569	100.00	689,333	100.00	696,637	100.00	678,835	100.00	560,065	100.00

Enctrs – Total encounters, PCP – Encounters with a primary care provider, EM – Evaluation & Management Encounters, CC – Care coordination encounters

## CONCLUSION

Figures 2, 3, and 4 show the number of enrollees in a plan, the number who met the sampling criteria (enrolled full year, no hospice, did not die, not Medicare Advantage), the number who could be attributed to a SQRMS Registry / HCH Certification Database clinic, and the number who were attributed to a HCH eligible clinic. The largest amount of attrition occurred in meeting the sampling criteria for inclusion. A major reason for not meeting the sampling criteria among Medicare and Dual Eligible enrollees was participation in Medicare Advantage at some point during the year. Most enrollees who were enrolled full year, did not die, did not use Medicare Advantage, and did not use hospice were attributed to a clinic. Of those attributed to a clinic, most were attributed to a HCH eligible clinic.

Figure 2: Enrollment, Sampled, Attributed, and HCH Eligible Enrollees by Year for Medicaid Eligibles

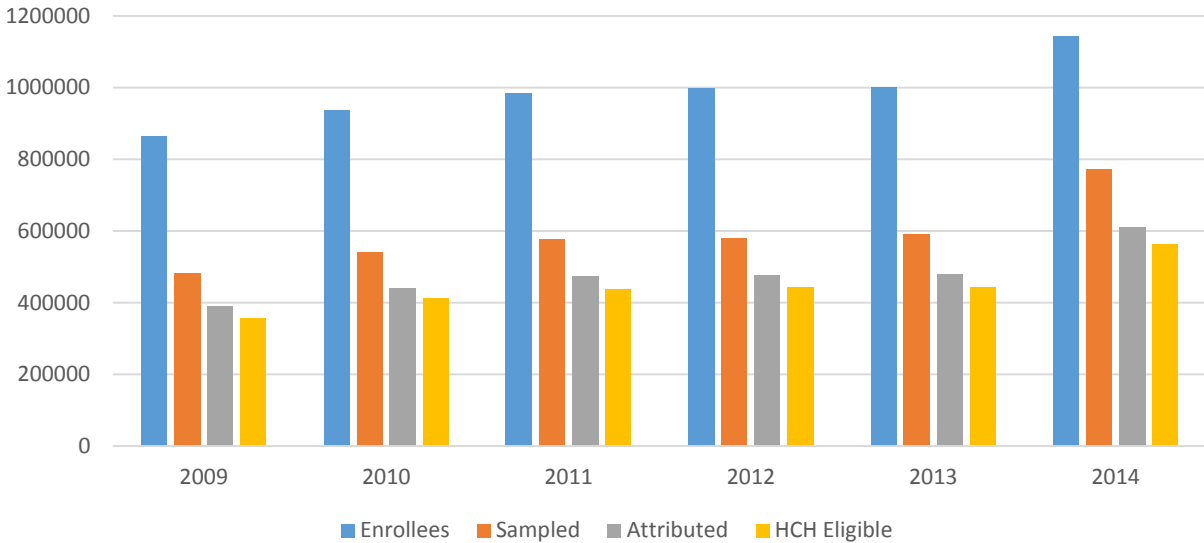


Figure 3: Enrollment, Sampled, Attributed, and HCH Eligible Enrollees by Year for Medicare

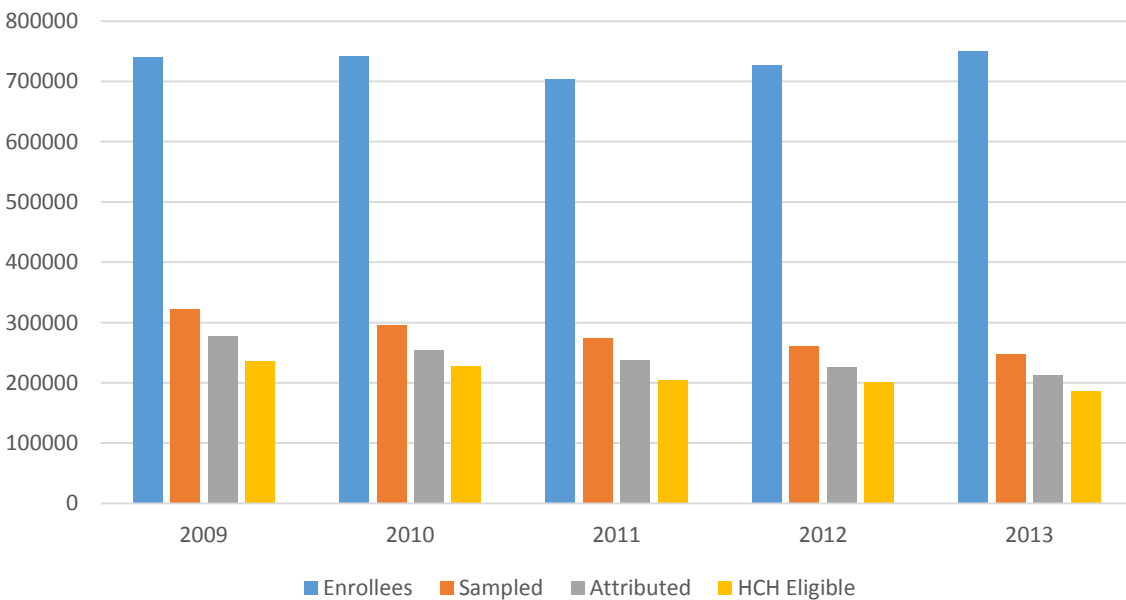
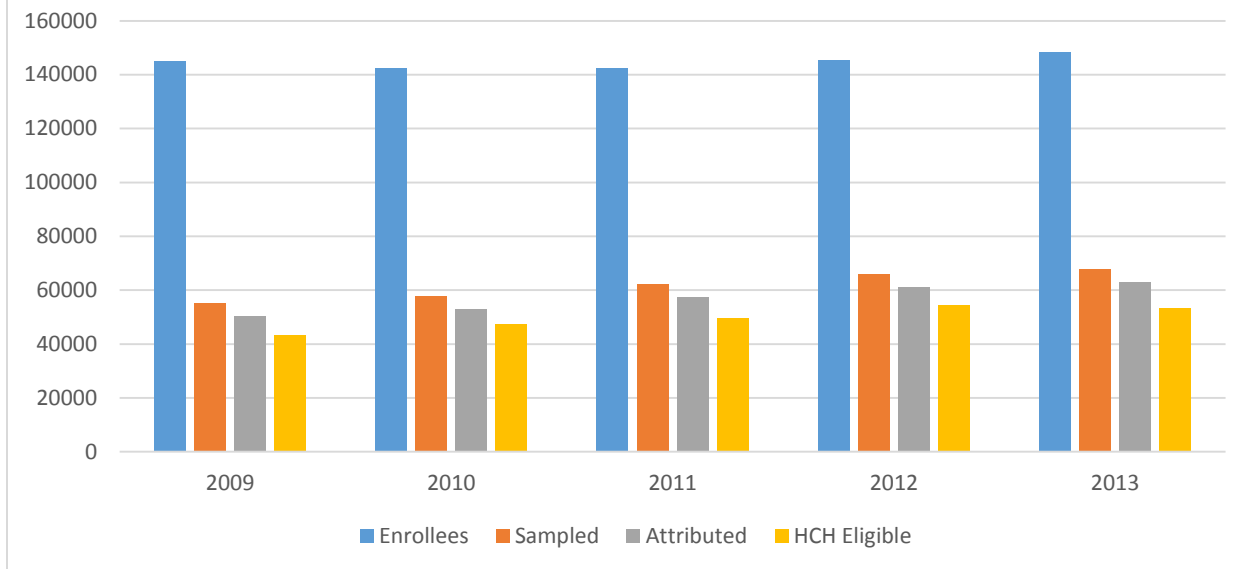


Figure 4: Enrollment, Sampled, Attributed, and HCH Eligible Enrollees by Year for Dual Eligibles



## **APPENDIX E: DATA SOURCES**

This appendix describes the data sources used in the evaluation: (a) HCH Certification Database; (b) Minnesota Statewide Quality Reporting And Measurement System (SQRMS) Provider and Clinic Registry; (c) Medical Claims; (d) Minnesota Statewide Quality Reporting And Measurement System (SQRMS) Measures. The Minnesota Statewide Quality Reporting and Measurement System information is collected by Minnesota Community Measurement (MNCM) under contract to the Minnesota Department of Health.

### **HCH CERTIFICATION DATABASE**

The HCH Certification database provides information on certified clinics and clinics interested in becoming certified. The data includes clinic contact information, the dates clinics became certified, and the certified providers associated with those clinics.

### **MDH/SQRMS PROVIDER AND CLINIC REGISTRY**

The MDH/SQRMS Database of Minnesota Clinics lists clinics in Minnesota participating in SQRMS or MDH measurement processes. There are 862 clinics identified from the MDH/SQRMS Database of Minnesota Clinics integrated with the HCH Certification Database. This was the clinic population on which the evaluation focused. Clinics that are not eligible to be HCH certified clinics, such as specialty clinics or clinics that are not located in Minnesota were excluded from the sample frame and the evaluation. There were 224 HCH certified clinics and 559 clinics that were not certified but eligible to be certified in the sample frame. The number of clinics in each particular analysis may vary due to inability to associate any Medicaid beneficiaries with the clinic identifier or the data for a clinic were not available. However, attempts were made to maintain the full population of interest in every analysis where possible.

Individual providers were linked to clinics using the SQRMS patient level data (described below), which included a provider's National Provider Identity (NPI) and a clinic's identifier.

### **MEDICAL CLAIMS DATA**

The data for evaluating access, cost, and utilization come from health care claims data for Minnesota Medicaid and Medicare programs which were provided by the Minnesota Department of Human Services. Dual patients are identified by matching Medicaid and Medicare claims using Medicare's Health Insurance Claim (HIC) which is Medicare's patient identifier and is coded in the Medicaid claims for Dual beneficiaries.

## Medicaid

The Medicaid claims data examined in this report include the years 2009 to 2014. These data include information on:

- Beneficiary – identifies gender, race, ethnicity (Hispanic), county of residence, type of coverage (e.g., community dwelling), dual eligibility for Medicare and Medicaid, and months enrolled in Medicaid, participation in waiver programs, language, educational level completed
- Inpatient services (swing bed, inpatient, regional treatment center, nursing facility, and Medicare crossover), including diagnoses, and procedures
- Professional services (professional services, dental, and Medicare crossovers), including diagnoses, and procedures
- Outpatient services (FQHC, renal dialysis, outpatient, ambulatory surgery, rural health, hospice, Medicare crossover), including diagnoses and procedures.
- Pharmacy
- Dental (professional services, dental, and Medicare crossovers)

The Medicaid beneficiary file was used to identify age, gender, ethnicity (Y = Hispanic or Latino; N = Not Hispanic or Latino; blank space = not entered/unknown), race (up to five race codes are present: A = Asian; B = Black or African American; N = American Indian/Alaskan Native; P = Pacific Islander/Native Hawaiian; U = Unable to Determine; W = White; Blank = Not entered; indicators were coded for each race entered); dual eligibility with Medicare; and continuous enrollment'

The Medicaid enrollee file was used to identify age, gender, ethnicity (Y = Hispanic or Latino; N = Not Hispanic or Latino; blank space = not entered/unknown), race (up to five race codes are present: A = Asian; B = Black or African American; N = American Indian/Alaskan Native; P = Pacific Islander/Native Hawaiian; U = Unable to Determine; W = White; Blank = Not entered; indicators were coded for each race entered); dual eligibility with Medicare; All costs from inpatient, outpatient, and professional services with multiple claim types were aggregated separately by claim type.

Prior to 2012, managed care organizations (MCOs) reimbursement amounts were not included in the claims data but were imputed. In 2012, MCO reimbursement was reported but to make comparisons over time consistent MCO reimbursement was imputed as in prior years. Imputation was accomplished by calculating the ratio of total reimbursements to total charges for each service category and for each pay-to-provider in fee-for-service (FFS) claims. This ratio was multiplied times the MCO charged amount to obtain the reimbursement the MCO would have received if it had been reimbursed at the same discount rate as occurred in FFS.

## Medicare

Medicare claims data was available for 2009 through 2013. These data include information on:

- Beneficiary – identifies gender, race, ethnicity (one of the race codes is Hispanic), type of coverage (e.g., Plan A, B, Medicare Advantage), months enrolled in by plan
- Inpatient / Skilled Nursing Facility services including provider identifiers, diagnoses, procedures, charges, and payments
- Professional services including provider identifiers, diagnoses, procedures, charges, and payments
- Outpatient services including provider identifiers, diagnoses, procedures, revenue codes, charges, and payments
- Home Health Agency including provider identifiers, diagnoses, procedures, revenue codes, charges, and payments
- Hospice including provider identifiers, diagnoses, procedures, revenue codes, charges, and payments
- Durable Medical Equipment including provider identifiers, diagnoses, procedures, revenue codes, charges, and payments

Since the payment amount for professional and outpatient services was reported at the claim level rather than the line within claim (e.g., the procedure within the claim) it was not possible to determine payments associated with specific procedure codes for care coordination (S0280 for the first month of care coordination, S0281 for each additional month)

## MINNESOTA STATEWIDE QUALITY REPORTING AND MEASUREMENT SYSTEM MEASURES

Minnesota Statewide Quality Reporting and Measurement System (SQRMS) measures are collected by Minnesota Community Measurement and used to examine care quality. The measures used for the 2012 SQRMS data submission and sample characteristics are described below.

### Standard SQRMS Measures

#### *Adult Asthma Care*

The Optimal Asthma Care measure is intended to determine the percentage of enrollees with Asthma who are optimally managed to reduce risk.<sup>75</sup> At the start of the measurement period, clinics report data to SQRMS on enrollees aged 5 to 50 recently seen by an eligible provider and diagnosed with Asthma. Within this population, enrollees are considered to have Optimal Asthma Care when they meet ALL of the

following targets: (1) well-controlled asthma (based on applicable Asthma Control Tests or Questionnaires), (2) not at elevated risk of exacerbation (based on number of patient-reported hospital and emergency department visits), and (3) educated about Asthma self-management and has a written Asthma management plan present in medical chart.<sup>75</sup>

#### *Colorectal Cancer Screening*

The SQRMS Colorectal Cancer Screening measure is intended to determine the proportion of patients who are up to date with regular colorectal cancer screenings.<sup>73</sup> Clinics report data to SQRMS on patients aged 51 to 75 seen in person by eligible providers at least twice during the two years previous to and including the measurement period, and seen in person by eligible providers at least once during the annual measurement period. Within this clinic population, patients are considered up to date with appropriate colorectal cancer screening exams if they have received either a colonoscopy within the measurement period or previous 9 years, a sigmoidoscopy within the measurement period or previous 4 years, or a stool blood test within the measurement period.<sup>73</sup> The population is enrollees aged 50 to 75 with dates of service between July 1, 2011 and June 30, 2012 who did not previously have colorectal cancer or a total colectomy, as represented in individual patient data submitted by Minnesota clinics.<sup>167</sup>

#### *Depression Remission at Six Months*

Depression Remission at Six Months measures whether enrollees had depression remission at six months after being identified as having a diagnosis of depression by an elevated Patient Health Questionnaire (PHQ) score (PHQ-9). The PHQ-9 is a low to high scoring system which measures a patient's depression status. The scale can be stratified into broad categories; 0 to 4 is no depression, 5 to 9 mild depression, 10 to 14 moderate depression, 15 to 19 moderately severe depression, and 20 to 27 severe depression. It has been validated for both screening purposes and measuring change in depression severity.<sup>56, 57, 65, 66</sup> Enrollees who receive an initial PHQ nine item depression scale (PHQ-9) score of greater than 9 and who receive a subsequent PHQ-9 score of less than five at six months (+/- 30 days) from the initial score are considered to have reached remission.<sup>84</sup> The population is adults aged 18 and older with an initial PHQ score of greater than 9 or a diagnosis of major depression or dysthymia during 2011 dates of service as represented in individual data submitted by Minnesota clinics.<sup>168</sup>

Data are reported to SQRMS on patients aged 18 or older at the index visit who had an initial PHQ-9 score greater than 9 or who had a diagnosis of Major Depression or Dysthymia and visited an eligible provider during the measurement period. Of this population, the numerator is the number of patients who receive a PHQ-9 score less than 5 within six months (plus or minus 30 days) from the index identification of Depression.<sup>74</sup>



Depression Remission at Six Months was measured at the individual patient level for HCH and non-HCH clinics. The denominator for Depression Remission was the number of patients who were followed up at six months after an index identification of depression, and the numerator was the number of patients who reached remission (PHQ-9 score less than 5) at six months (plus or minus 30 days) from identification.

#### *Optimal Diabetes Care*

Optimal Diabetes Care (ODC) measures management of adult enrollees with diabetes mellitus. Care is considered optimal when enrollees meet all of the following targets: 1) HbA1c level (<8.0), 2) LDL level (<100 mg/dL), 3) blood pressure (<140/90 mmHg), 4) no tobacco use, and 5) if the patient has a co-morbidity of ischemic vascular disease, aspirin use, or documentation of an accepted contraindication to aspirin use, is also required. The population is enrollees with diabetes aged 18 to 75.<sup>169</sup>

#### *Optimal Vascular Care*

Optimal Vascular Care measures management of Ischemic Vascular Disease. Care is considered optimal when enrollees meet all of the following targets: 1) LDL level (<100 mg/dL), 2) blood pressure (<140/90 mmHg), 3) no tobacco use, and 4) aspirin use or documentation of an accepted contraindication for aspirin use. The population is vascular disease enrollees aged 18 to 75.<sup>170</sup>

#### *Additional Quality Measures*

The use of the standard SQRMS measures were implemented with Depression Follow-up, Average Asthma Care, Average Diabetes Care, and Average Vascular Care analyses.

*Depression Follow-up at Six Months.* The denominator for this measure is the number of patients who were assessed as having Depression at the index visit. The numerator is the number of patients who had a follow-up visit with an eligible provider within six months (plus or minus 30 days) from the index identification of Depression. Depression Follow-up is a good measure of continuity of care, because it shows whether patients diagnosed with depression receive follow-up care to continually assess and care for their condition. The small population in the sample for Depression Remission led comparisons between HCH and non-HCH to not be statistically significant for this measure. There is a slightly larger population to assess in the Depression Follow-up measure, which gives us more statistical confidence in the results.

*Composite Average Measures for Asthma, Diabetes, and Vascular Care.* Two types of measures are constructed for conditions with multiple measures (Asthma, Diabetes, and Vascular). The first is an optimal, all-or-none, grand slam measure which occurs when an enrollee reaches all the measurement items (e.g., a diabetic enrollee would have controlled blood pressure, controlled cholesterol, controlled

blood sugar, and would not smoke). The second is a composite average measure which is constructed as the average number of condition care goals met. A composite average is used because it is a more reliable measure than the optimal measure<sup>127</sup> that has been used in similar evaluations of HCHs.<sup>114</sup>

The SQRMS optimal measure considers optimal care to have been reached when all of the measurement sub-parts are achieved. For example, in the Optimal Diabetes Care measure, a patient must meet all of 5 goals to have optimal care: (1) HbA1c <8.0, (2) LDL test <100, (3) Blood Pressure with a systolic value <140 and a diastolic value <90, (4) documentation of being a non-tobacco user, and (5) documentation that the patient is on daily aspirin or has an accepted contraindication if a co-morbidity of Ischemic Vascular Disease exists.

The composite average measure calculates the average (mean) number of care goals met for a condition. For example, for Average Diabetes Care, the mean number of the 5 care goals met were measured. The composite average measure allows for a more detailed look at quality measurement for these conditions, wherein the approximate percentage of the care goals met can be seen instead of an “all-or-none” measure where all of the goals must be met to achieve optimal care.

*Average Asthma Care* is the mean percentage of individual asthma targets met, based on the following targets: (1) well-controlled asthma (based on applicable Asthma Control Tests or Questionnaires), (2) not at elevated risk of exacerbation (based on number of patient-reported hospital and emergency department visits), and (3) educated about Asthma self-management and has a written Asthma management plan present in medical chart.

*Average Diabetes Care* is the mean percentage of individual asthma targets met, based on the following targets: 1) HbA1c level (<8.0), 2) LDL level (<100 mg/dL), 3) blood pressure (<140/90 mmHg), and 4) no tobacco use. If the patient has a co-morbidity of ischemic vascular disease, aspirin use or documentation of an accepted contraindication to aspirin use is also required. The population is enrollees with diabetes aged 18 to 75.

*Average Vascular Care* is the mean percentage of individual asthma targets met, based on the following targets: 1) LDL level (<100 mg/dL), 2) blood pressure (<140/90 mmHg), 3) no tobacco use, and 4) aspirin use or documentation of an accepted contraindication for aspirin use. The population is vascular disease enrollees aged 18 to 75.

## QUALITATIVE DATA

A variety of qualitative data sources were used to inform the analysis. These included:

- HCH program documentation, such as descriptions and process documentation for certification
- Selected committee reports
- Meetings with key informants who have been active in HCH implementation during evaluation team meetings (e.g., MDH and DHS staff participating in evaluation team meetings)
- Web-based resources documenting HCH processes and meetings
- Participation in learning collaborative meetings
- Textual fields in the HCH certification database, such as those describing certification variances and questions the certification site visit team feel should be explored
- Open-ended items on a survey of HCH clinics about care coordination payment processes and tiering

The key use of qualitative data was (a) documenting the certification process, including variances associated with certification (see Chapter 3) and (b) documenting clinic and health system response to the payment methodology (see Chapter 7).

The payment survey was from certified HCHs operating during the evaluation period (July 2010 – December 31, 2013). These data included information on financial practices and decision making related to HCH, billing practices, and patient tiering practices related to HCH. Survey data were collected between September and December of 2013. Mixed qualitative and quantitative analyses were conducted using the data depending on the individual question and related data type. For open-ended comment or essay questions, qualitative thematic content analysis was used to distill and understand the main ideas expressed. For closed-ended multiple choice or yes/no questions, quantitative analysis was used to determine simple rates and percentages of responses within the survey response population. A full description of payment survey data collection and analysis is provided in Chapter 7.

# APPENDIX F: PAYMENT SURVEY DESCRIPTION AND ANALYSIS

## METHODS

While many of the questions the evaluation team were asked to address could be answered using existing claims data, understanding *how* the state of Minnesota's HCH payment methodology was implemented in the HCH certified clinics required collecting primary data. This was accomplished through a set of three surveys administered to all HCH clinics certified during the analysis period.

The payment survey was administered to certified HCHs operating during the initial development of HCHs (July 2010 – December 31, 2013). These data included information on financial practices and decision making related to HCH, billing practices, and enrollee tiering practices related to HCH. Survey data were collected between September and December of 2013. Mixed qualitative and quantitative analyses were conducted using the data depending on the individual question and related data type. For open-ended comment or essay questions, qualitative thematic content analysis was used to distill and understand the main ideas expressed. For closed-ended multiple choice or yes/no questions, quantitative analysis was used to determine simple rates and percentages of responses within the survey response population. The survey asked specific, detailed questions about how payment methods were implemented (for example, what tiering tools were used by HCHs, and for what payers were HCHs billing for monthly care coordination payments). To learn how HCH organizations and clinics have implemented the state payment method, and their experiences with payment of care coordination fees and the clinic costs related to implementation, all clinics certified as HCHs as of December 31<sup>st</sup> 2012 (n=217 clinics, 35 organizations) were surveyed.

There are three main areas related to the payment methodology: finance, billing, and patient tiering. While all three areas are inter-related, they deal with unique day-to-day and decision-making processes within clinic operations. To reflect this, three different surveys were designed that were intended to be answered by individuals knowledgeable with each of these areas and decision making related to that aspect of their HCH clinic operation.

- The **billing practices survey** asked HCHs about decisions and preparations made for clinic billing for monthly care coordination services, about how the process works, about if they had to make changes to their billing system as part of HCH certification, and about additional feedback on billing.
- The **financial practices survey** asked HCHs about any financial analyses conducted prior to becoming certified as a HCH as well as if and how these affected the decision to become a HCH; about financial monitoring processes; about any impact on cost structure for operating as a HCH; about which types of payers they collect care coordination payments from; about the importance

of care coordination payments; and about additional comments on HCH certification and financial processes.

- The **patient tiering practices survey** asked HCHs about the tools and processes used to complete the tiering process; about if or how patient tiering connects with the billing process; about how effective they feel their current tiering process is; and about any additional feedback they have on patient tiering. Taken together, these three surveys provided the information required to examine in detail the implementation of the main aspects of the payment methodology and to understand HCH processes related to implementation.

The full text of each of the surveys is provided at the end of this Appendix.

## **SURVEY METHODS**

University of Minnesota evaluation team members developed a draft survey beginning in May, 2013. Input into survey goals and questions was provided iteratively by Minnesota Department of Health and Minnesota Department of Human Services staff. Multiple revisions to the survey were completed to incorporate MDH and DHS input and survey best practices. Draft final versions of the surveys were produced and questions were cognitively tested with three HCH key informants to determine completeness of the line of questioning and to test the wording interpretation of the survey questions.

Following review by MDH and DHS, final versions of each of the surveys were approved in early September, 2013. A notification regarding the surveys, including instructions for completing the surveys and internet links to each of the surveys, was sent to HCH respondents on September 11<sup>th</sup>, 2013. The survey was administered online through Survey Monkey®. HCHs were also given the option of completing paper or on-line versions of the surveys. A small number of surveys were completed on paper and the data were entered into the Survey Monkey database by a member of the University of Minnesota evaluation team.

After the survey notification email was sent, representatives from HCHs with more than one certified clinic site (multi-site HCHs) were contacted to discuss how they could administer surveys in their multi-clinic sites. Two weeks after survey notification (on September 24, 2013), non-respondents were emailed a reminder asking them to complete the surveys. After an additional week (on October 2-4, 2013), non-respondents were called to remind them of the survey, and to check if they needed any assistance or had questions regarding the survey. Additional follow-up contacts were made to non-respondents, including phone calls and personal visits to clinics from members of the University of Minnesota evaluation team, and a reminder email was sent from the Minnesota Department of Health. This extensive follow-up allowed us to increase survey responses to represent a large proportion of the HCH clinic population.

The survey was originally designed for a unit of analysis consisting of the individual certified HCH clinic, whether independent or within a larger HCH organization. However, the majority of the multi-site HCH organizations noted that the practices addressed in each of the surveys (billing, finance, and tiering) were largely standardized and many functions, such as billing, were centralized within their HCH organizations. Since individual clinics would not be knowledgeable of all of the procedures and processes involved, representatives from these multi-clinic HCH organizations completed the surveys for all clinics certified within their organization. Given this information, the HCH evaluation team shifted its unit of analysis from the HCH clinic to the HCH organization, as reflected in the analysis below.

The survey sample was all Minnesota Health Care Homes clinics certified between July 2010 and December 31, 2012. The surveyed population was 35 HCH organizations which included 217 HCH certified clinics. Survey response rates are shown in Table 1, and the organization types that responded are shown in Table 2 (as reported by survey respondents).

Survey	# of organizations responding	% of total organizations	# of clinics represented	% of total clinics represented
Finance	30	85.7%	211	97.2%
Billing	27	77.1%	199	91.7%
Tiering	26	74.3%	198	91.2%
Total sample	35	100%	217	100%

	Academic practice	Community health center	FQHC	Hospital based clinic	Independent medical group	Integrated delivery system	Rural health center	Other
Finance	10.0%	13.3%	13.3%	23.3%	30.0%	33.3%	3.3%	3.3%
Billing	11.1%	14.8%	14.8%	25.9%	25.9%	37.0%	3.7%	7.4%
Tiering	19.2%	7.7%	11.5%	15.4%	30.8%	38.5%	3.8%	3.8%

\*Respondents identified the type of organization they represented. Respondents could choose multiple designations to describe their organization.

## Survey Data Analysis

Survey responses were analyzed using quantitative and qualitative methods depending on the type of survey question. For multiple choice or scaled questions, the evaluation team produced descriptive

statistics for each question, including response frequency and distribution. Open-ended or essay questions were analyzed using qualitative methods to distill comments into broad content themes. Quotes are used to illustrate examples of themes where needed.

Responses that did not include a HCH organization or HCH clinic identifier or that were substantially incomplete (only the first 1-3 questions were answered) were excluded from analysis. Some HCH organizations submitted multiple responses to the same survey. In this case, survey responses were grouped by organization. When there were multiple surveys for one HCH organization with differing responses, the response marked most often for that organization was used. For open-ended questions, comments from multiple surveys for one HCH organization were grouped and analyzed as a single comment response. For questions where there were multiple surveys for one HCH organization, but only one of the organizational respondents provided an answer or comment for that question, that response was used.

SURVEY F:

HCH Payment Practices Financial Survey

Clinic Information

F Q1. Please tell us about you and your clinic. (Please note that we ask for your contact information in case we need to ask any follow-up questions and to remove your e-mail from survey reminder notifications. Your name and contact information are confidential and are only available to the research team for this HCH evaluation.)

Name of Clinic:

Your Name:

Position:

E-mail:

Telephone:

F Q2. What type of clinic is your HCH clinic? (Check all that apply)

- Academic practice
- Community health center
- Federally qualified health center
- Hospital-based clinic
- Independent medical group
- An integrated delivery system medical group
- Rural health center
- Other (please describe)

F Q3. What is the payer mix of your clinic's patient population? Please indicate the approximate percent of your clinic's patients with each type of insurance below.

Medicaid:

Medicare:

Commercial insurance:

Uninsured:

Self-pay:

Decisions Regarding HCH Implementation



F Q4. As your clinic considered becoming a HCH, were any financial analyses performed to assess the financial impact of becoming a HCH?

- No (skip to question 7)
- Don't know (skip to question 7)
- Yes (please briefly describe analysis)

F Q5. Were the results of the financial analysis you conducted:

- Financially favorable to your clinic
- Financially neutral to your clinic
- Financially unfavorable to your clinic
- Don't know

F Q6. How much did the financial analysis influence your decision to become a certified HCH?

- Not at all
- A little
- Somewhat
- A lot
- Don't know

Financial Monitoring for HCH

F Q7. Are you currently monitoring financial performance associated with being a HCH clinic?

- Yes
- No, but we plan to (skip to question 12)
- No, and we do not plan to (skip to question 12)
- Don't know (skip to question 12)
- Other (please describe)

F Q8. Who prepares financial monitoring assessments associated with your clinic HCH?

- Clinic staff

- ( ) Parent organization staff
- ( ) Contractor or third party
- ( ) Don't know
- ( ) Other (please describe)

F Q9. What aspects of Health Care Home clinic financial performance do you regularly monitor? (Check all that apply)

- ( ) Total revenues associated with HCH services
- ( ) Total expenditures associated with HCH services
- ( ) Ongoing financial performance against budget projections for HCH care coordination
- ( ) Do not track revenues/expenses related specifically to HCH care coordination services
- ( ) Don't know
- ( ) Other (please describe)

F Q10. What impact has operating as a Health Care Home clinic had on your cost structure? We have experienced:

- ( ) Significant cost savings
- ( ) Some cost savings
- ( ) Neither cost savings nor cost increases
- ( ) Some cost increases
- ( ) Significant cost increases
- ( ) Don't know

If you have experienced cost increases, please describe and explain why:

F Q11. What formal mechanisms do you use in your clinic to communicate the financial performance of your HCH care coordination services? (For example, in committee reports, or at clinic meetings) Please briefly describe.

Financial Reimbursement for HCH Care Coordination

F Q12. Through which payer sources and payment arrangements is your clinic currently paying for HCH

	Medicaid DHS administered	Medicaid Managed Care (PMAP)	Medicare FFS	Medicare Advantage	Managed Care (Non-Medicaid)	Commercial
Total cost of care arrangement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Grant arrangement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Per member per month claims	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fee-for-service claims	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

care coordination (through Medicaid, Medicare, and commercial payers)? (Check all that apply)

Comments:

F Q13. Does your clinic participate in the Medicare Multi-Payer Advanced Primary Care Practice demonstration project?

- Yes
- No
- Don't know

F Q14. Please indicate how much you agree or disagree with the following statement for each type of insurance: It is important to collect reimbursement for care coordination provided for my clinic's HCH

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Medicaid (DHS administered)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medicaid (PMAP)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medicare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Managed Care (non-Medicaid)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Commercial insurance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

patients in \_\_\_\_\_.

Comments:

F Q15. Please indicate how much you agree or disagree with the following statement for each type of insurance: My clinic captures HCH care coordination payments due to us for HCH patients in

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Medicaid (DHS administered)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medicaid (PMAP)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medicare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Managed Care (non-Medicaid)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Commercial insurance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\_\_\_\_\_.

Comments:

Medicaid Reimbursement for HCH

F Q16. To your knowledge, for what percentage of your HCH clinic's patients are you currently receiving Medicaid reimbursement for HCH care coordination services? (Approximate percentage)

F Q17. In your estimation, what percentage of your HCH clinic's patients do you believe are eligible for Medicaid HCH care coordination services base fee payment? (Approximate percentage)

F Q18. Do you intend to take steps to increase the percentage of HCH enrollees for whom you receive Medicaid HCH care coordination service payments within your clinic?

No

Don't know

Yes (please describe)

Additional HCH Feedback

F Q19. Do you have any other comments about financial matters related to HCH?

SURVEY B:

HCH Payment Practices Billing Survey

Clinic Information

B Q1. Please tell us about you and your clinic. (Please note that we ask for your contact information in case we need to ask any follow-up questions and to remove your e-mail from survey reminder notifications. Your name and contact information are confidential and are only available to the research team for this HCH evaluation.)

Name of Clinic:

Your Name:

Position:

E-mail:

Telephone:

B Q2. What type of clinic is your HCH clinic? (Check all that apply)

- Academic practice
- Community health center
- Federally qualified health center
- Hospital-based clinic
- Independent medical group
- An integrated delivery system medical group
- Rural health center
- Other (please describe)

B Q3. What is the payer mix of your clinic's patient population? Please indicate the approximate percent of your clinic's patients with each type of insurance below.

Medicaid:

Medicare:

Commercial insurance:

Uninsured:

Self-pay:

## Billing Process Decisions and Implementation

B Q4. What were the top three decisions about the billing workflow process that had to be made in order for your clinic to become a HCH? Please list these. (Note: You will rate each of these in importance to you in the next question.)

- 1.)
- 2.)
- 3.)

B Q5. For each of the three decisions you listed above about the billing workflow processes in your clinic, how much did it factor into your clinic's decision to become a HCH?

	Not at all	A little	Some	A lot	Don't Know
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

B Q6. Have you made any changes to your billing workflow processes related to being a HCH clinic?

- No (skip to question 8)
- Don't know (skip to question 8)
- Yes (please briefly describe)

B Q7. Approximately how long did it take to implement these changes in your billing workflow processes?

- < 1 month
- 1 – 3 months
- 3 – 6 months
- 6 months – 1 year
- > 1 year
- Changes not yet fully implemented

B Q8. Please list the top three lessons learned in implementing your billing processes for HCH coordination in your clinic or organization.

- 1.)

2.)

3.)

B Q9. Please list the top three challenges you faced in implementing your billing processes for HCH coordination in your clinic or organization.

1.)

2.)

3.)

B Q10. How satisfied are you that your current workflow process for submitting claims for HCH coordination is effective in your clinic?

Highly satisfied

Satisfied

Neither satisfied nor dissatisfied

Dissatisfied

Highly dissatisfied

Don't know

Current Billing Practices for HCH Payments

B Q11. Do you submit HCH care coordination claims? (Check all that apply)

Yes

No, we do not submit HCH care coordination claims and do not receive care coordination payment from other sources (skip to question 20)

No, we do not submit claims; care coordination payment is included in a grant arrangement (skip to question 20)

No, we do not submit claims; care coordination payment is included in a total cost of care contract (skip to question 20)

If you do not submit claims, please briefly explain why.

B Q12. To which payers do you submit HCH care coordination claims? (Check all that apply)

- Medicaid (DHS administered)
- Medicaid Managed Care (PMAP)
- Medicare
- Managed Care (Non-Medicaid)
- Commercial
- Other

Comments:

B Q13. Where is billing done for HCH coordination claims for your clinic?

- In-house clinic billing
- Outside third party billing service
- Parent organization billing service
- Don't know
- Other

B Q14. After submitting claims for HCH care coordination payment, have you received any denials?

- No
- Don't know
- Yes (please describe)

Patient Tiering and Billing Medicaid for HCH Care Coordination

B Q15. What patient tiering tools are you using to inform your billing process of patient tier for HCH care coordination payments? Check all tools that are used in your clinic.

- State of Minnesota Care Coordination Tier Assignment tool
- Minnesota Complexity Assessment Tool
- Pediatric CAHMI Assessment Tool
- Other tier assignment tool designed for use in my clinic
- Don't know
- Other (please describe)



B Q16. In what form is patient tiering information provided for billing purposes in your clinic or organization? (Check all that apply)

- Electronic
- Manual
- Other (please describe)

B Q17. What information is provided from clinical staff to billing staff to help with the processing of HCH claims in your clinic or organization? Check all that apply.

- Initial & management care coordination HCPCS codes
- Care coordination modifiers
- Diagnosis codes/DRG clusters for tiering level
- Don't know
- Other (please describe)

B Q18. How would you rate the usefulness of the Minnesota State Care Coordination Tier Assignment Tool for billing purposes for HCH Medicaid patient care coordination payments in your clinic?

- Do not use this tool
- Very useful
- Useful
- Neutral
- Not very useful
- Not at all useful

Please comment as needed.

B Q19. How would you rate the usefulness of other tiering tools you use for billing for HCH care coordination (other than the Minnesota State Care Coordination Tier Assignment Tool for Medicaid HCH patients)?

- Do not use other tools
- Very useful
- Useful
- Neutral

- ( ) Not very useful
- ( ) Not at all useful

Please comment as needed.

Additional HCH Feedback

B Q20. Is there anything else you would like to share with us about billing for HCH care coordination in your clinic?

SURVEY PT:  
HCH PAYMENT PRACTICES PATIENT TIERING SURVEY

Clinic Information

PT Q1. Please tell us about you and your clinic. (Please note that we ask for your contact information in case we need to ask any follow-up questions and to remove your e-mail from survey reminder notifications. Your name and contact information are confidential and are only available to the research team for this HCH evaluation.)

Name of Clinic:

Your Name:

Position:

E-mail:

Telephone:

PT Q2. What type of clinic is your HCH clinic? (Check all that apply)

- Academic practice
- Community health center
- Federally qualified health center
- Hospital-based clinic
- Independent medical group
- An integrated delivery system medical group
- Rural health center
- Other (please describe)

PT Q3. What is the payer mix of your clinic's patient population? Please indicate the approximate percent of your clinic's patients with each type of insurance below.

Medicaid:

Medicare:

Commercial insurance:

Uninsured:

Self-pay:

Implementing Tiering Practices for HCH Patients

PT Q4. Before becoming a HCH clinic, did you use a patient tier assignment tool for clinical or financial planning purposes? (For example, as an indicator of patient complexity or to predict intensity of resource use.)

- No
- Don't know
- Yes (please describe)

PT Q5. As part of becoming a HCH clinic, did you implement any new patient tier assignment tool(s)?

- No (skip to question 7)
- Don't know (skip to question 7)
- Yes (please describe)

PT Q6. Approximately how long did it take you to implement the patient tier assignment tool?

Use of MN State HCH Care Coordination Tier Assignment Tool for HCH Patients

PT Q7. Do you currently use the MN State HCH Care Coordination Tier Assignment Tool?

- Yes, for clinical purposes only
- Yes, for billing purposes only
- Yes, for both clinical and billing purposes
- No, we do not use this tool (skip to question 14)
- Don't know (skip to question 14)

PT Q8. What staff in your HCH clinic uses the MN State HCH Care Coordination Tier Assignment tool to determine what tier should be assigned for a given patient? (Check all that apply)

- Clinic HCH care coordinator
- Clinic nurse (other than care coordinator)
- Nursing assistant
- Primary care provider
- Billing staff
- Admissions staff

- Social worker
- Other (please describe)

PT Q9. Briefly describe your process for using the MN State HCH Care Coordination Tier Assignment Tool. (For example, when tool is completed, how tiering results are collected and then communicated to other clinic staff)

PT Q10. How effective do you feel the MN State HCH Care Coordination Tier Assignment Tool is at categorizing patients for clinical purposes?

- Very effective
- Effective
- Neither effective nor ineffective
- Ineffective
- Very ineffective
- Don't know

If ineffective or very ineffective, please explain:

PT Q11. Do you use any tiering or complexity assessment tools other than the MN State HCH Care Coordination Tier Assignment Tool to categorize patients for clinical purposes?

- No
- Don't know
- Yes (please describe)

PT Q12. How effective do you feel the MN State HCH Care Coordination Tier Assignment Tool is at categorizing patients for HCH care coordination billing purposes?

- Very effective
- Effective
- Neither effective nor ineffective
- Ineffective
- Very ineffective
- Don't know

If ineffective or very ineffective, please explain:

PT Q13. Do you use any tiering or complexity assessment tools other than the MN State HCH Care Coordination Tier Assignment Tool to categorize patients for HCH care coordination billing purposes?

- No
- Don't know
- Yes (please describe)

#### HCH Tiering Practices

PT Q14. What information related to tier assignment is provided from clinical to billing staff for billing purposes? (Check all that apply)

- Care coordination HCPCS codes
- Care coordination modifiers
- Diagnosis codes/DRG clusters for tiering level
- Don't know
- Other (please describe)

PT Q15. How is HCH patient tiering information transferred from clinical to billing staff?

- Electronically
- Manually
- Don't know
- Other (please describe)

PT Q16. Approximately what percent of your clinic's patients are identified as eligible for HCH care coordination services?

PT Q17. Of those who are eligible, approximately what percent of your clinic's patients are receiving HCH care coordination services?

#### Additional HCH Feedback

PT Q18. Is there anything else you would like to tell us about patient tiering within your HCH clinic?



# APPENDIX G: HEALTH CARE HOMES STANDARDS AND CERTIFICATION

## INTRODUCTION

Minnesota's approach to Health Care Homes is built on a private-public collaboration and broad health system engagement with patients and families. The HCH rules, developed based on the 2008 Minnesota Health Reform legislation, created a set of expectations for Health Care Homes that made Minnesota unique among states across the U.S.

Early in the process of laying the foundation for Minnesota's Health Care Homes Initiative, the Minnesota Department of Health and Department of Human Services developed a set of essential program components designed to guide the work of clinics and providers interested in becoming Health Care Homes.

As reported in the December 2009 Health Care Homes Annual Report to the Minnesota Legislature<sup>44</sup>, six elements were developed over the first year and one-half:

1. Capacity assessment
2. Certification standards
3. Certification process
4. Learning collaboratives
5. Outcome measures
6. Payment method

These six elements provided a structure for the work of transforming primary care practices throughout the state. These efforts were shaped by an initial capacity assessment designed to inform the HCH Initiative of the readiness and capacity of clinics in the state for transformation. Based on this assessment, certification standards and processes, as well as a series of learning modules, were developed to assist clinics with the whole-practice work redesign required to become a Health Care Homes. On a parallel track, payment methods were being designed by a Payment Methods Workgroup with representatives from key stakeholder groups (described in Chapter 4 of this report).

In particular, the certification standards and implementation of the certification process for ensuring fidelity to the standards through recertification over time are distinctive features of Minnesota's approach to Health Care Homes.



Although many clinics had begun preparation for the team-based, patient- and family-centered care approaches and the population-based health outcomes framework of a practicing Health Care Home, some found the scope of change more challenging than originally anticipated. Nevertheless, from July 2010 to December 2012 (the cutoff dates for this evaluation), 217 clinics in Minnesota successfully completed the requirements for certification as Health Care Homes clinics.

## **CERTIFICATION STANDARDS**

The standards for certifying Health Care Homes in Minnesota are based on evidence from the research literature and practical experience garnered from those that have incorporated chronic care delivery models, teams, patient-centered care, population health management expertise into their care delivery models. A facilitated community engagement process was used to create a set of Health Care Homes standards, which are used as both a self-guide for clinic and provider preparation for certification and as a tool for gauging the performance of clinic transformation in Health Care Homes. The standards development process is described in the 2009 report to the legislature.<sup>44</sup>

The standards for certification were incorporated into the Health Care Homes rule and focus on six components, each of which has demonstrated increased performance :

1. Access and communication
2. Process to track participant registry and care activity
3. Care coordination
4. Care plan
5. Performance reporting and quality improvement
6. Patient and family centered care

Within each of these standards are multiple criteria that must be met for HCH certification; some are required at initial certification, others at recertification.

## **CERTIFICATION PROCESS**

One of the distinctive features of Minnesota's approach to developing Health Care Homes is its systematic approach to implementation of the HCH certification process. Tools created for applicants include a Certification Application Process Checklist and the Certification Guide.<sup>43</sup> These provide a set of detailed instructions on the process for certification as a Health Care Home.

The certification process involves a series of steps conducted by both the applicant clinic and the Minnesota Department of Health. These steps include pre-application activities, clinic submission of a

letter of intent and application, MDH review of the application, site visit by MDH to the clinic, MDH review and certification decision, and recertification. Figure 1 summarizes this stepwise certification process.

Figure 1. Health Care Homes Certification Process

<b>Pre-application</b>	Applicant completes optional pre-application preparation activities, such as attending a pre-certification workshop, joining the HCH learning collaborative, and/or conducting a clinic self-assessment to determine readiness to apply.	Applicant
<b>Letter of Intent</b>	Applicant submits letter of intent for certification to the Minnesota Department of Health. Letter of intent includes information on who is applying for certification (individual clinician/s, clinic/s, or practice system); primary practice type; clinic organizational information such as address and annual visit volume; list of clinicians who will apply for certification at the site; information on how the applicant plans to implement the HCH model; and information on contact personnel at the site.	Applicant
<b>Application and Certification Assessment</b>	Applicant completes an online application and certification assessment form intended to verify that the applicant meets HCH standards and criteria. The application for certification includes: applicant demographic information; additional clinic information (numbers of people who are members of health care home team, providers and services available at clinic site, clinic days and hours of operation, clinic information systems such as EMR/EHR and information system capabilities, years working on system redesign); and clinic patient panel information (number of patients by gender, age, ethnicity, and race; percentage of patients by primary language and insurer). The certification assessment tool prompts applicants to provide detailed information on how their clinic meets the standards for certification. If needed, applicants submit a request for variance to meet one of the standards or sub-standards.	Applicant
	MDH completes a review of application and certification assessment documents, requests more documentation as needed, and determines applicant readiness for site visit. MDH prepares for site visit including scheduling site visits and evaluators, preparing materials for the visit tailored to the applicant.	MDH
<b>Site Visit</b>	Applicant prepares for site visit with MDH and arranges presentations and interviews with patients, staff, and providers. After MDH site visit review, if an HCH standard or subpart is not met, the clinic may decide if they would like to request a variance to meet the standard.	Applicant
	MDH completes pre-site assessment and comments to determine questions that need to be asked during site visit. MDH visits the applicant site. The site visit includes introductions and a clinic tour; applicant presentation on how HCH has been implemented in the clinic; MDH interviews with providers, staff, and patients; applicant presentation on quality plan and outcomes; MDH team review of documents and criteria; and a debrief and next steps session with MDH and the applicant. After the site visit, the MDH team reviews all submitted application materials and information from site visit to determine which HCH standards have been met or not met.	MDH
<b>Review and Certification Decision</b>	After the site visit and any additional required materials are submitted by the clinic to make a complete application, MDH completes its review of materials. A debrief team at MDH determines if the applicant meets the certification standards and develops a recommendation for certification. They then write a report to the Certification Committee that contains no identifying information about the applicant presenting a recommendation on certification. Recommendations for certification or denial of certification are reviewed by the 12-person Certification Committee. The Certification Committee makes a recommendation that is reviewed with the Commissioner of Health. The Commissioner of Health then signs an approval or denial letter which is sent to the HCH applicant.	MDH
	Applicants who have met all of the HCH standards and been approved by the Certification Committee and Commissioner receive a certification notice and a report on their application and may begin operating as an HCH. Applicants who are denied approval also receive a report identifying which standards are met and not met. For those standards which are not met, the clinic can request a variance, request support for technical assistance, develop a plan for remedy and reapply certification in the areas not met, or file an appeal.	Applicant
<b>Re-certification</b>	HCHs are recertified annually. HCHs submit a letter of intent for recertification 60 days before the end of their annual certification. HCHs then submit a recertification assessment, updated application, and list of clinicians.	HCH
	MDH reviews the material and requests additional information and schedules a meeting with the HCH as needed for clarification, then presents a final report to the Certification Committee to make a recommendation to the Commissioner. If recertification is approved by the Certification Committee and Commissioner, the HCH receives a signed recertification letter and list of recertified clinicians.	MDH

A certification guide, with detailed instructions for application, is provided for clinics that submit a letter of intent.<sup>43</sup> The Health Care Homes Certification Assessment Tool that is submitted with the application gives examples of how a clinic can fulfill each criterion and provides information on what documentation is needed to verify completion of each of the criteria. For these self-assessments, MDH relies on both the

supporting documentation provided by applicants and brief descriptions of how clinics meet the requirements. Based on each clinic's self-assessment and application, a certification site evaluation plan is designed for the clinic certification site visit, which includes observation, document review, and interviews to verify the information provided in the application. MDH conducts a site visit in addition to document review and includes interviews with patients as well as providers and clinic staff during the site visits to ensure that HCH processes are fully implemented and integrated into clinic culture.

## CERTIFICATION DATABASE

As of July 2010, when the first clinic in Minnesota was certified as a Health Care Home, MDH has retained all records pertaining to certification in a HCH certification database. The evaluation team reviewed the database contents for record retention, completeness of documentation, evidence of verification of standards at site visit, final disposition notes, and follow-up actions. Findings from the review of these documents indicate that a comprehensive systematic approach was developed for maintaining records that document each individual application and its ultimate disposition. Examples of database entries that demonstrate how these standard verifications are documented across clinics include the following:

From HCH Administrative Adopted Rule 4764.0040, subpart 1<sup>1</sup>: The clinic provides care delivery using a team of staff members (clinician, care coordinator, and other staff as defined by the patient's needs and clinic's resources) to engage with participants in providing whole person care delivery:

The organizational leadership demonstrated a commitment to patient-centered care through practice redesign. Primary care teams were restructured as care team lets that consisted of three PCPs, three medical assistants, one nurse, a scheduler, and in some teams a mid-level provider. Teams received extensive training centered on team building and quality improvement ... Patients are integrated in quality teams at both the clinic and organizational leadership levels. MDH conducted site visits at nine clinics. A total of 42 patients and 103 clinic staff were interviewed. An understanding of the basic principles of Health Care Homes and a commitment to the model was consistent across all clinics.

The applicant is two family medicine providers and one internal medicine provider at a rural clinic. The clinic provides primary care, specialty, and hospice/home care services as well as inpatient care. It is part of a larger health system that includes primary and specialty clinics and hospitals. The core primary care team consists of one provider and one licensed practical nurse (LPN)....One patient provided a clear picture of how the team model made a difference in her health. Prior to receiving care coordination the patient had been in the emergency department or was hospitalized every two to three weeks. She stated that she

was on the verge of suicide when her provider invited her to participate in the Health Care Homes pilot. Now that she has a team that she can contact whenever she needs them and knows that they support her she feels like her life is worth living.

From HCH Administrative Adopted Rule 4764.0040, subpart 10<sup>1</sup>: The HCH systematically organizes patient information and uses the information for population management to support care coordination:

Applicant utilizes AllScripts Professional EMR. Clinic site leadership staff generates reports from chronic disease registries on a monthly basis. These reports are utilized for all of their patients who receive panel management and are provided to the Care Coordinators for care coordination of HCH patients. A workflow was submitted. Patient registries for diabetes, vascular care, asthma, colon cancer screening and HCH are used. They have standard processes for support staff to identify gaps in care such as needed or missing lab work, calling patients and scheduling lab appointments. The care coordinator reviews the HCH registry at scheduled quarterly patient meetings and tracks numerous data fields for gaps in care.

MDH recommends further development and streamlining of decision support tools and registries, with training for Health Coaches on how to use the tools. MDH recommends that the applicant add a pediatric registry of data elements that will help track for gaps in care with pediatric patients.

From HCH Administrative Adopted Rule 4764.0040, subpart 27<sup>1</sup>: Quality improvement planning is critical to the success of the HCH:

The first words on the Health System's Annual Performance Improvement Plan are: "The Health Systems Way guides our philosophy of continuous improvement to be: 1) Patient Centered defining value through the Voice of the Customer, 2) Inclusive of the people involved in and affected by the process and 3) Data Driven with use of intelligent metrics and evidence based improvements." Numerous examples of quality improvement projects were presented including increasing LDL level compliance and improving patient experience by 1 point on the Press Ganey survey. A hand-washing PDSA was presented and involved patients completing brief questionnaire cards to monitor the hand-washing practices of their providers.

Criteria Met Recommendation: MDH recommends that the organization implement an organization wide approach to sharing patient experience data and having clinic work teams focus their improvement activities on areas identified by patients to improve patient

experience. MDH also recommends that this approach more broadly focus on patient experience as a goal of the team and not a goal of the provider only. While this is not a requirement of certification, it is a requirement for recertification.

## **CONCLUSION**

Minnesota's Health Care Homes model takes a unique and rigorous approach to certification, ensuring that established Health Care Homes standards are met by all participating clinics. The certification and re-certification processes further serve to require and support clinic continuous care and quality improvement.

# APPENDIX H: CONCEPTUALIZING HEALTH CARE HOMES: INSTITUTIONAL LOGICS, CORE FUNCTIONS AND MATURITY

## INTRODUCTION

Patient Centered Medical Homes (PCMHs) provide patient-centered care that has the goal of improving patient outcomes and the patient experience, lowering health care costs, and ultimately transforming primary care.<sup>32</sup> A PCMH is an inter-professional team approach to providing comprehensive, accessible, and coordinated primary care that is patient centered.<sup>5</sup> HCHs are a type of PCMHs. The transformation of clinics to becoming a PCMH has attracted strong interest from researchers, practitioners, and policymakers.<sup>25, 72, 141, 150, 164, 173</sup> The PCMH literature on transformation provides useful recommendations about leadership, implementing team-based care, and readiness for transformation. Even with these recommendations, transformation studies have noted that there is significant variation among transformed clinics, that there is overlap between transformed and untransformed clinics, and that there is variation in change and outcomes over time. One source of this variation could be that, while the literature defining PCMHs shares themes, the specific PCMH dimensions identified in the studies, such as access, care coordination, and information system support differ in their details.<sup>7, 47, 117, 123, 143, 160</sup> This could result in making transformation difficult because of confusion in understanding exactly what it means. A second reason for the variation is that the recommendations about transforming effectively are so generally stated (e.g., context matters, a well-developed infrastructure matters, leadership matters, transformation is difficult) they are difficult to use for guidance in specific implementation situations. A third reason for the variation is that rather than organizational components having independent effects on transformation, organizational components fit together in a configuration for transformation to fully occur.<sup>23, 27, 29, 35, 77, 136</sup>

This paper extends earlier work on HCH transformation by examining whether effective transformation requires a configurational fit in relation to three elements: (1) transforming a clinic's institutional logics to be consistent with a HCH's structures and processes; (2) implementing core HCH functions; and (3) implementing measurement and management processes to become a mature learning organization that optimizes HCH performance over time. The argument is that transforming institutional logics is necessary but insufficient for full transformation, and that implementing core HCH functions is necessary but insufficient for becoming a learning organization. The argument is that full transformation is most likely to occur when all three are aligned.

This paper builds on the HCH and organizational research literature to extend the understanding of HCH transformation. The core hypothesis for a HCH is that processes and functions cause better patient and provider outcomes, while also reducing costs. The argument is that the core HCH care management

functions are (1) managing populations, which consists of enrolling patients, knowing patients, targeting care, and systematically reviewing population outcomes; (2) assuring a primary care relationship; and (3) coordinating care. Two maturity functions that are necessary to achieve a learning HCH and improve the care management processes are (1) performance measurement and feedback and (2) quality improvement. Finally it is hypothesized that the performance of these functions are influenced by HCH context: (1) HCH design which is aligned with institutional logics; and (2) a supportive context and leaderships that promotes provider and staff engagement and empowerment. These categories are used to develop and test a structured interview instrument in order to assess HCH transformation.

## **HCHs: INSTITUTIONAL LOGICS, CORE FUNCTIONS AND MATURITY**

HCHs can be seen as ambidextrous organizations<sup>38, 107, 108</sup>. On the one hand, HCHs have exploited their existing capabilities by improving implemented practices to better meet the needs of their populations. On the other hand, HCHs need to be able to explore and address the needs of medically, behaviorally, and socially complex patients who are likely to require a more organized team derived from multiple types of professionals, such as physicians, behavioral health workers, social workers, and others, to diagnose and prioritize treatments and to coordinate the resulting care. While the former can be accomplished with formal organization, such as standardized roles, routines, pathways, and targets, the latter requires teams to achieve high reliability<sup>11, 22</sup>. The HCH needs to incorporate both structures to be ambidextrous in moving fluidly between them to provide proactive patient centered care in an efficient and effective manner for all patients. For usual care patients, a HCH should not waste resources on excessive sensemaking,<sup>165</sup> activities to gather and share more information than is needed to care for a patient effectively, and coordination, activities to coordinate care for patients who are capable of coordinating their own care. Just as HCHs should not waste resources when for patients who do not need them, HCH should not skimp on necessary sensemaking and coordination for complex patients.

It is argued that there are four major components to understanding HCH transformation: (1) adopting institutional logics that fit the HCH; (2) implementing population management, assuring a primary care relationship, and implementing care coordination; (3) implementing measurement and quality improvement processes that are cornerstones of a learning organization; and (4) creating a constructive context supporting transformation. Institutional logics are the taken-for-granted views of providers and staff about the organization of work in a clinic.<sup>78, 133</sup> It is argued here that HCHs are based on different institutional logics compared to traditional medical care, and that changing/transforming these logics is a necessary but insufficient cause of complete transformation. The cornerstones for structuring the delivery of patient centered care are population management, assuring a primary care relationship, and implementing care coordination. Once the appropriate PMCH structure is in place, implementing measurement and quality improvement are the key components for creating a learning organization that



has the capacity to mature. Finally, a constructive, supportive context, “a safe environment where information and ideas are freely exchanged and task processes are refined [including] psychological safety, constructive controversy, goal agreement, and minimal conflict”<sup>172,p. 1109</sup> facilitates the implementation of care management and learning functions.

## Institutional Logics

One hurdle is fundamentally transforming how clinic providers and staff understand and structure their activities. These “ways of ordering reality, and thereby rendering experience of time and space meaningful” are called *institutional logics* by sociologists.<sup>37,p. 243, 78, 133</sup> They are a component of a clinic’s culture – the unspoken, taken for granted, and common understandings about how things are done in the clinic. Although there are wide variety of institutional logics,<sup>133</sup> organizational and occupational research suggests two institutional logics to focus on to understand HCH transformation. It is hypothesized that HCH transformation will be more complete if there is also a change in institutional logics from medical to organizational control and from separation to integration of planning from execution.

First is the transformation from an institutional logic of medical control of work to organizational control of work.<sup>3, 36, 132</sup> In the medical model, physicians are dominant and the understanding of work is delivery of care services. In a medical model, care coordination is accomplished by care coordinators executing services such as hospital-to-home transitions and physicians maintaining control over the management of the population they serve. The medical model tends to be reactive because it reacts to patient events that require services through service delivery. The medical model also tends to revolve around physicians as a central hub, referring patients who need services to other providers. In the organizational control model, population management, monitoring populations for needed care, standardized routines, and standardized roles are used to improve situational awareness<sup>34, 137</sup> and patient centered care. In an organizational institutional logic, control also resides in the team and HCH as well as the physician. In a HCH the organizational model emphasizes proactive care – identifying patient populations, monitoring needs, anticipating events before they happen and providing services that increase patient and caregiver resilience.

Second is the transformation from a logic of separating planning from execution<sup>134,p. 41-43</sup> to a logic of *integrating* planning and execution. In clinics separating planning from execution can be seen as a form of top-down management in which health systems mandate routines and processes that are executed by staff who have little input in the design of the task. This would be observed by care coordinators focusing on a particular task such as hospital-to-home transitions for which they have a routine structured by the health system or superiors in a clinic. Another example of separating planning from execution are work-arounds in which providers or care coordinators develop individual tools to support their own work, such

as sending themselves in-basket messages as reminders. While these tools allow individuals to complete tasks, they may decrease patient safety<sup>142</sup> and they may decrease overall HCH efficiency by discouraging the implementation of care systems improvements.<sup>153</sup> Another example of separating planning from execution is the lack of inclusion of individuals performing a task in quality improvement activities. This results in their observations about how practices are actually implemented not being included in clinic-wide process improvement.

Finally, the separation of planning from execution also discourages the implementation of a learning organization and engaging all staff and providers in the quality improvement process, both of which require the integration of planning and execution. In HCHs, this quality improvement process is a component of certification standards.<sup>95</sup> Integrating planning and execution does not mean that staff are delegated the full responsibility of planning – it means that staff is actively engaged in the planning and improvement process for the tasks they perform. The lack of a transformation from separating planning and execution to integrating planning and transformation is seen when providers and staff say they are not participating in quality improvement processes related to their work or when they say that “someone higher up” is responsible for making decisions about how work will be done.

Transitions in institutional logics, from medical to organizational control and from the separation of planning from execution to the integration of planning and execution are difficult for a number of reasons. The first difficulty is that institutional logics are usually unspoken, commonly understood and taken for granted ways of working. If a transforming clinic does not transform these institutional logics then the clinic will use an inappropriate institutional logic (professional control, separation of planning from execution) while trying to implement HCH functions and will experience problems due to a lack of fit. The second difficulty is that “institutional transformations are simultaneously material and symbolic transformations of the world. They involve not only shifts in the structure of powers and interests, but in the definition of power and interest.”<sup>37,p. 246</sup> In other words, transformation is difficult because it significantly restructures the way that power, influence, and control are thought about. Solberg and colleagues comment that “it is not clear that transforming a medical practice to a HCH is fundamentally different from any other medical practice implementation, except perhaps in scope.”<sup>141,p. 6</sup> A change in institutional logics required to catalyze HCH implementation implies that the HCH implementation is a discontinuous change for many clinics.<sup>107, 108</sup> This means that not only do new structures and procedures need to be implemented, the core institutional logic of clinics has to change. The taken-for-granted, common understanding of institutional logics and the restructuring of power and control changing these logics makes transformation difficult. These arguments that the transformation in institutional logics, from medical to organizational control and from separation to integration of planning and execution, is a

catalyst for HCH implementation and that transforming institutional logics are necessary but insufficient for complete transformation.

## Core Functions and Maturity

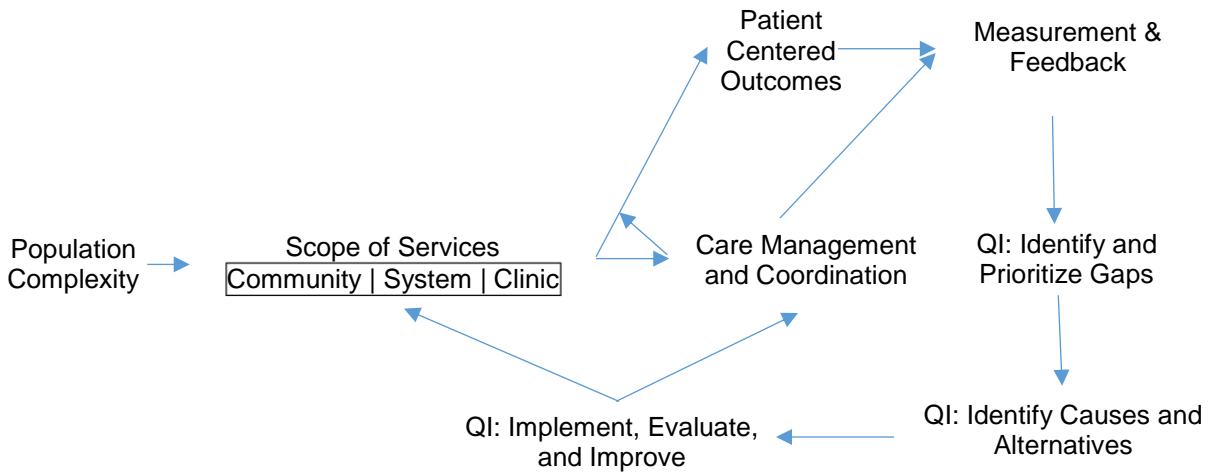
The second major transformation issue is transforming HCHs by implementing new routines and process such as population management, care coordination and care transitions, assuring access. This research proposes a core functions approach to understand HCH transformation. A core functions approach allows each clinic to implement a HCH using structures and processes that fits their unique population, providers, and community at a given point in time. In contrast to approaches which focus on specific structures and processes, a core functions approach focuses on whether a HCH effectively implements the core functions of (1) population management, (2) access and communication, (3) care coordination, (4) measurement and feedback, (5) quality improvement, and (6) transforming. The hypothesis is that performing the core functions well with a well-designed HCH in a supportive context will result in better patient outcomes.

The core functions HCH model is based on existing standards for PCMHs<sup>18, 103, 105, 111, 118, 123, 126, 159</sup>. The standards were reorganized to fit the proposed HCH core functions model (Figure 1) by separating items from dimensions in existing standards, defining HCH dimensions based on the proposed model, allocating items to the proposed dimensions, and, when necessary, developing items and standards suggested by organizational research, which is referenced when used. In the process of developing the core functions model, certain standards were removed that focused on outcomes rather than care management (e.g., continuity of care which is a function of effective care management) and clinical activities that are performed within the HCH structure (e.g., diabetic care management)<sup>16, 101</sup>.

Figure 1 shows the stylized core functions of the HCH model. The arrows represent key HCH management paths. Other potential relationships, such as from QI: Identify and Prioritize Gaps to Measurement & Feedback are omitted to simplify the argument. For example, the arrow from population complexity implies that scope of services should be organized for a HCH's population.

Community/system/clinic within the Scope of Needed Services (SNS) factor reflects the importance of knowing where a service is located (i.e. in the community, e.g., county social services, addiction treatment centers; within the health system, e.g., a rheumatologist who visits primary care clinics; or within the HCH). The care management and coordination functions include assuring a primary care relationship,<sup>145, 144, 147</sup> population health management, and care coordination. The right hand side and bottom of the model, including measurement & feedback as well as quality improvement are key components of a learning, maturing organization.

Figure 1: Stylized HCH Model



The arrow from scope of services to patient centered outcomes hypothesizes that the clinical services provided to patients are the cause of patient centered outcomes. The arrow from care management to the arrow from scope of services to patient centered outcomes hypothesizes that care management, such as population management care plans, care coordination, and assuring access moderates the effect of scope of services on patient centered outcomes. The arrows from patient centered outcomes and care management to measurement means that measurement and feedback should focus on both outcomes and processes. Measuring both is important for being able to assess the effect of processes on outcomes, which is included in the quality improvement evaluation component. The implementation of the HCH as a learning organization starts with measurement that is used to identify gaps in coordination and outcomes and provide performance feedback to providers. Measurement is used in quality improvement to identify performance gaps (problem) identification which informs root cause analysis and the development of alternatives to improve care processes and care coordination. Quality improvement requires the implementation and evaluation of selected alternatives. Interventions that evaluation shows are effective should then be diffused within the HCH and to the other HCHs.

The development of a HCH as a learning organization can be characterized using a maturity model. Maturity models typically have five levels: initial, managed, defined, quantitatively managed, and optimized.<sup>33, 113, 128</sup> The *initial* level reflects care organization and processes in a clinic of providers who share common resources and whose practice styles vary independently in the medical institutional logic. The *managed* level reflects efforts within the clinic to organize and standardize practice styles, pathways and protocols, and communication and the beginning of the transition to the organizational institutional logic. The *defined* level reflects the adoption of evidence based and national standards for care organization and management. The *quantitatively managed* level adds measurement for processes and outcomes that can be used to monitor, feedback, and evaluate performance and assess the relationship

between care processes and outcomes. The *optimization* stage adds quality improvement based on the measurement of processes and outcomes to create a learning clinic that uses measurement, analysis, and quality improvement to identify gaps and outcomes, the processes causing those gaps, and prioritize improvement efforts.

Table 1 describes the proposed HCH dimensions based in the model: (a) care management design; (2) population management; (3) care coordination - assuring communication and a primary care relationship (coordinating with patient and caregivers); (4) care coordination - coordinating care (coordinating among providers and the community); (5) maturity - measurement and feedback; (6) maturity - quality improvement; and (7) supportive context and climate.

<b>TABLE 1: PATIENT CENTERED MEDICAL HOME DESIGN AND FUNCTIONS</b>	
<b>MECHANISM</b>	<b>DESCRIPTION</b>
<b>DIMENSION 1: CARE MANAGEMENT DESIGN</b>	
1.1 Aligning Staffing with Population Needs	Degree to which staffing patterns for various professionals are aligned with patient population needs
1.2 Designing Care Management	Degree to which care management design is clearly specified and communicated. Care management design can be defined as carve out, ad hoc or not clearly described, or common pool resource. Degree to which providers are organized into defined or integrated groups in the clinic, according to rationale based upon patient population and need for coordination types of providers.
1.2 Locating Providers Meaningfully	Degree to which provider co-location and task structuring of providers creates perceived joint interdependence in work and patient outcomes (work interdependence is perceived as joint interdependence)
1.3 Fitting the Patient Population	Degree to which the care design for the clinic fits the clinic population. This mechanisms is analyzed in terms of fit between population characteristics, care architecture, care management knowledge, skills and ability of staff (KSAs), rationale for co-location and professional membership within the clinic.
1.4 Managing Care Management	Degree to which the clinic manages the care coordination process (e.g. using meetings or procedures), and extent of care coordinator and other staff involvement in care coordination process management.

<b>TABLE 1: PATIENT CENTERED MEDICAL HOME DESIGN AND FUNCTIONS</b>	
<b>MECHANISM</b>	<b>DESCRIPTION</b>
1.5 Fitting Institutional Logics to HCH	Degree to which an organizational institutional logic rather than a medical institutional logic is implemented; degree to which an institutional logic of integrating planning and execution rather than separating planning and execution is implemented.
<b>DIMENSION 2: POPULATION MANAGEMENT</b>	
2.1 Using Population Management Tools	Degree to which forms, protocols, and information management tools are well-defined and integrated for all patients and commonly used. Degree to which lists, rosters, panels, registries of patients are standardized and integrated
2.2 Determining HCH members	Degree to which the HCH has identified the patient population they are the primary care provider for; degree to which the HCH can accurately identify the population of patients they serve and has a registry of those patients which indicates their current status (past patient, current patient, transitioning to another clinic).
2.3 Integrating Patients	Degree to which HCH patients are integrated into the HCH with introductions, background information, documentation, and formal processes signifying they regard the HCH as their primary clinic.
2.4 Knowing Patient's Situation and Social Support	Degree to which social support and contact information for patient and caregiver/loved ones, insurance status, changes to housing, social support is known, updated, monitored, and usable
2.5 Knowing Patient's Levels of Complexity	Degree to which patient complexity, such as multi-morbidity, behavioral health needs, substance abuse, social needs, are known, updated, monitored, and usable.
2.6 Managing Sub-Populations Using Registries and Targeting High Risk Situations	Degree to which registries are used to monitor sub-population health, identify patients by type of complexity, and measure care quality and health; Degree to which high risk specific situations, such as falls, hospitalization, ED use, are identified using systematic real-time processes to inform targeting of care (proactive care)
2.7 Reviewing and Updating Population Care Management	Degree of completeness, consistency, regularity in review and updating of registries, health status information, social support/needs, medical complexity, and follow-up performance for services within and outside of clinic.

<b>TABLE 1: PATIENT CENTERED MEDICAL HOME DESIGN AND FUNCTIONS</b>	
<b>MECHANISM</b>	<b>DESCRIPTION</b>
<b>DIMENSION 3: CARE COORDINATION - ASSURING COMMUNICATION AND A PRIMARY CARE RELATIONSHIP (COORDINATING WITH PATIENT AND CAREGIVERS)</b>	
3.1 Assuring Communication from Patient and Caregiver and Access to Providers and Information	Degree to which the HCH assures longitudinal, first-contact care for all health related issues during regular hours and outside regular hours via telephone or electronic systems such as patient portals.
3.2 Assuring Communication to Patient and Caregivers from Providers and Coordinators	Degree to which the HCH assures communication and understanding of test results, schedules, medication information, health education, and care reminders; Degree to which HCH assures that patient interaction with clinic, such as labs, is completed and assures follow-up to patient questions.
<b>DIMENSION 4: CARE COORDINATION - COORDINATING CARE (COORDINATING AMONG PROVIDERS AND THE COMMUNITY)</b>	
4.1 Standardizing the Care Coordinator Role	Degree to which care coordination role is understood and used by providers in standard way; Degree to which the care coordinator role is standardized within the clinic to support reliability and predictability (routineness) with all staff; Degree to which care coordinator roles implement HCH population health management and care coordination rather than focusing solely on service provision (e.g., hospital-to-home care, targeting ED use); Degree to which care coordinator services are integrated with the context of a HCH's population health mission.
4.2 Assuring Effective Communication	Degree to which information about patient care needs and care was received and was followed up on appropriately by using tools to ensure reliable communication such as call-backs, acknowledgement and confirmation; Degree to which communication is monitored to identify messages that have not been acknowledged. Degree to which communication processes are standardized across care coordinators, providers, and staff; Degree to which huddles and face-to-face interaction are used as needed for organizing care for complex patients.

**TABLE 1: PATIENT CENTERED MEDICAL HOME DESIGN AND FUNCTIONS**

<b>MECHANISM</b>	<b>DESCRIPTION</b>
4.3 Assuring Effective Pathways, Routines, Step-up and Step-Down Management	Degree to which care transition tasks and pathways are clearly specified in terms of who is responsible for what, content of communication, and task to be performed; Degree to which protocols for anticipating step-up/step-down in care needs for patients is specified to target care proactively rather than reactively; Degree to which pathways and routines are designed to adjust to patient complexity and multi-morbidity
4.4 Integrating Diverse Perspectives in Care Plans	Degree to which perspectives of diverse types of providers and patients are included in understanding patient needs and developing care plans that are updated in a consistent reliable manner (e.g., on change of a patient's situation; on a regular interval determined by patient complexity); Degree to which care plans are created, used, updated, shared, by patients, caregivers, and providers; Degree to which information about diagnoses and treatments is shared, integrated, and prioritized among team members in clear, complete, understandable, and inclusive process; Degree to which tasks and schedules are clearly defined; Degree to which patient, caregiver, and provider goals are clear.
4.5 Coordinating Care & Integrating Information Within and Between Health System	Degree to which processes for sharing and coordinating information that is outside the clinic and within the health system are possible and support care coordination through reminders, follow-ups, messaging. Degree to which up-to-date patient status, health, and contact information can be shared within the health system; Degree to which care coordination information can be shared with other health systems for care management purposes.
4.6 Coordinating Care & Integrating Information Within the Community	Degree to which processes for sharing and coordinating information with the community, such as aging agencies, counties, behavioral health, public health, are routinely used for care coordination and care transitions.



<b>TABLE 1: PATIENT CENTERED MEDICAL HOME DESIGN AND FUNCTIONS</b>	
<b>MECHANISM</b>	<b>DESCRIPTION</b>
<b>DIMENSION 5: MATURITY - MEASUREMENT AND FEEDBACK</b>	
5.1 Measuring Care Management Processes & Providing Feedback	Degree to which care coordinators are aware of measurement and feedback related to care coordination processes, activities, and decisions (e.g. proportion of current care plans, proportion of missing communications such as lab results, accuracy of sub-population registries, proportion of patients followed-up about medications or health education) that can be used to monitor and improve care coordination processes.
5.2 Measuring Patient / Caregiver Outcomes & Providing Feedback	Degree to which care coordinators are aware of patient outcomes and utilization; Degree of the breadth of outcomes measures: (a) medical outcomes (e.g., diabetes, vascular care); (b) patient satisfaction; (c) supporting patient and caregivers in their life; (d.) quality of life; Degree to which measures are timely enough to support population health management as well as public reporting; Degree to which there are feedback mechanisms for these measures that are used to monitor managing care management and improving care coordination; Degree to which these measures are used to monitor provider performance.
5.3 Measuring Resource Use & Providing Feedback	Degree to which resource use is measured (e.g., overall costs per patient per year, lab use, ED use, hospitalization); Degree to which there are feedback mechanisms for these measures that are used to monitor managing care management and improving care coordination.
5.4 Measuring Provider Outcomes & Providing Feedback	Degree to which provider outcomes such as satisfaction, burnout, and workload and perceptions of supportive clinic climate; Degree to which there are feedback mechanisms for these measures that are used to monitor managing care management and improving care coordination.

<b>TABLE 1: PATIENT CENTERED MEDICAL HOME DESIGN AND FUNCTIONS</b>	
<b>MECHANISM</b>	<b>DESCRIPTION</b>
<b>DIMENSION 6: MATURITY - QUALITY IMPROVEMENT</b>	
6.1 Integrating Planning and Execution in Quality Improvement - Inclusiveness	Degree to which care coordinators, providers, staff, and community stakeholders are included in quality improvement processes, activities, and decisions; Degree to which care coordinator observations about task execution are included in quality improvement efforts; Degree to which quality improvement is reflective of care coordination management needs, especially those arising from workflow patterns (e.g. care coordination, care management, and population management tool utilization and workarounds) and outcomes tracking (e.g. care plan goal attainment).
6.2 Targeting Quality Improvement and Problem Definition	Degree to which processes are identified for quality improvement efforts using tools such as Pareto Charts, Control Charts, Process Capability Analysis; Degree to which there is a consistent vision underlying selection of quality improvement efforts (e.g., cumulative hill-climbing versus ad hoc squeaky wheel); Degree to which the target for quality improvement is identified as a gap between desired and current performance levels on an outcome (rather than being defined as a process issue).
6.3 Identifying Root Causes	Degree to which the root cause analysis focuses on identifying the cause of a performance gap identified in targeting quality improvement; Degree to which root cause analysis tools such as cause-effect charts, timelines, logic models, fish-bone charts, are systematically used to identify root causes.
6.4 Identifying Alternatives	Degree to which alternative generation flows from root cause analysis (alternatives should not be “solutions chasing problems” – alternatives should flow from root cause analysis); Degree of breadth exploring alternatives external to HCH such as evidence based practice, learning collaboratives, visiting other HCHs; Degree of breadth of exploiting expertise within HCH by obtaining alternatives suggested by HCH providers and staff. Degree to which the HCH is ambidextrous and balances exploring and exploiting.

<b>TABLE 1: PATIENT CENTERED MEDICAL HOME DESIGN AND FUNCTIONS</b>	
<b>MECHANISM</b>	<b>DESCRIPTION</b>
6.5 Implementing and Evaluating Interventions	Degree to which the outcome for the intervention is specified in a manner that allows clear and specific measurement; Degree to which interventions (implemented alternatives) are systematically implemented by specifying who is responsible for each task and when it is to be completed; Degree to which interventions are systematically evaluated using tools such as measurement, control charts, interrupted time series analysis, or statistical tests.
6.6 Establishing Quality Improvement	Degree to which an intervention that has been evaluated as successful is implemented as standard practice throughout HCH; Degree to which successful interventions are communicated to stakeholders outside HCH (health system, learning collaboratives).
<b>DIMENSION 7: SUPPORTIVE CONTEXT AND CLIMATE</b>	
7.1 Communicating a Patient Centered Vision	Degree to which the vision in the clinic reflects patient centered care and optimizing patient outcomes rather than focusing on productivity and costs. Degree to which care management policies and processes are linked to population health needs and patient outcomes.
7.2 Assuring Autonomy and Delegating Authority	Degree to which HCH provider and staff are delegated responsibility and autonomy for implementing HCH care management processes within their clinic; Degree to which HCH provider and staff can adapt and tailor HCH structures and processes to fit their own clinic; Degree to which they integrating planning and execution of HCH in their own clinic.
7.3 Monitoring and Resolving Problems	Degree to which the HCH has systematic and fair processes to identify and resolve conflicts among providers/staff; Degree to which providers and staff have psychological safety and a constructive context in participating in implementing, operating, and improving the HCH; Degree to which providers and staff feel that conflict can be resolved through procedurally fair processes.

TABLE 1: PATIENT CENTERED MEDICAL HOME DESIGN AND FUNCTIONS	
MECHANISM	DESCRIPTION
7.4 Rewarding Performance as a Group and as Individuals	Degree of integration of group and individuals outcomes in a hybrid incentive system that facilitate working toward common patient centered outcomes produced by the HCH as a whole and performing individual tasks proficiently; Degree to which incentives incorporate a balanced scorecard that rewards patient centered outcomes, effective resource use, HCH learning, provider/staff outcomes Degree to which incentives discourage free-riding/shirking on overall group performance and focusing on sub-goal optimization and siloing by focusing only on a specific task.
7.5 Supporting the HCH	Degree to which infrastructural needs are supported (e.g., EHR, Measurement systems, QI and IT support); Degree to which HCH providers and staff have input in the decisions that affect the HCH, such as policies, budgets, staffing, technology, measurement, and processes.

*Dimension 1: Care Management Design.* Dimension 1 focuses on the design of the HCH. A core assumption is that the types of providers and the scope of services varies across HCHs as a function of their patient population. It is expected that effective HCHs will have a methodology for measuring the needs of their population and using that measurement to guide selecting providers, either in the HCH, health system or community. In contrast, it is expected that less effective HCHs, or HCHs based on a medical institutional logic will focus on implementing HCHs as adding a care coordinator role. A second assumption is that HCHs will tend to be organized either as stand-alone teams responsible for a specific population or HCHs will be organized as a care coordination team that supports all the providers in a clinic. The latter is referred to as a common resource pool because all providers share the care coordination team services. Examples of stand-alone teams include the Coordinated Care Center at Hennepin County Medical Center<sup>46</sup> and prepared practice teams<sup>48, 139</sup>. In stand-alone teams a provider team is accountable for caring for a specific population. The third assumption is that the choice of provider types and HCH organization affects the implementation of coordination. When providers are co-located in stand-alone teams' coordination mechanisms such as huddles, team meetings, or informal conversations can be used as a coordination mechanism. In HCHs with organization based as a common pool of resources coordination mechanisms such as standardized care coordinator roles, standardized community and pathway protocols, schedules and targets will be more important. The fourth assumption is that the better the fit of the HCH design with the patient population needs, the more effective is the HCH. While HCHs serving a less complex population can rely on more formal approaches such as rules,

targets, guidelines, and schedules. As the average complexity of patients in the population increases, effective HCHs will increasingly rely on face-to-face interaction among diverse types of providers for sensemaking and prioritizing treatment. The fourth assumption is that HCHs which have inclusive regular meetings to manage HCH organization and processes will be more effective in transforming because they integrate planning and execution.

*Dimension 2: Population Management.* The population management dimension refers to the functions used to manage patient population. Consistent with organizational control, all the tools used for population health management should be standardized, integrated, and have a common look and feel so that using the tools requires minimal adaptation across tools, which minimizes safety risks and maximizes ease and efficiency of use (2.1). Dimensions 2.2 and 2.3 state that the HCH should know who their patients are and that the patients should acknowledge their relationship with the HCH. These functions are important because the relationship between a HCH and a patient can be ambiguous because patients can have multiple provider relationships. An effective HCH should have functions to reduce this ambiguity. Dimensions 2.4 and 2.5 state that an effective HCH will have mechanisms for assessing, monitoring, and updating information, social support, social complexity, and medical complexity. Dimension 2.6 states that a HCH should be able to use sub-population registries and social and medical complexity information to target care. For example, a HCH should be aware of a change in a patient's social support network capacity, such as a spouse's ability to provide support being degraded by changes in the spouse's health, should be addressed by adding capacity to the patient's social support network<sup>135</sup>. Dimension 2.7 measures the consistency, regularity, and reliability of the processes for updating population management information and the processes for retrieving information. One risk of assessment tools is that while assessment is initially completed, procedures for updating and retrieving the information is less developed. Effective patient and population information management requires competency in creating, storing, retrieving, and updating the information<sup>9</sup>.

*Dimension 3: Care Coordination - Assuring Communication and a Primary Care Relationship.* Dimension 1 measures "front-stage"<sup>39</sup> care coordination between the HCH and patients/caregivers and whether the HCH has established an effective bi-directional primary care relationship with patients that supports a longitudinal, first-contact relationship for a broad variety of conditions<sup>145, 144, 147</sup>. The patient should be able to access the HCH through a variety of modalities, such as the ability to arrange a same day visit, contact care coordinators, contact clinic staff, or use EHR based patient portals to provide and obtain information. Having a variety of modalities is important because each modality supports different types of interactions and patients vary in the modalities they are comfortable with. The bi-directional component captures the importance of care coordinators or the HCH being able to follow-up with patients and

caregivers about their understanding of provider and medication instructions and check on unmet needs after transitions.

*Dimension 4: Care Coordination - Coordinating Care.* Dimension 4 measures “back-stage” care<sup>39</sup> coordination among providers meeting patient/caregiver needs. Dimension 4.1 argues that the care coordinators protocols, routines, and processes should be standardized across all providers. This dimension is more important in common pool resource situations where care coordinators support multiple providers. In teams, the high degree of contact between providers can substitute a bit for role standardization (although role standardization is beneficial). Role standardization increases reliability, safety, and efficiency in task execution. This dimension most clearly reflects the difference between an institutional logic of medical control and one of organizational control. Role standardization across all providers is considered organizational control. Care coordinators having to adjust their behaviors to fit individual provider preference is considered medical control. This suggests that medical control increases the risk of errors being made and reduces efficiency because the care coordinator has to maintain idiosyncratic processes for each provider. Dimensions 4.2 and 4.3 make a similar point about communication<sup>6</sup> and clearly defined pathways and protocols. The content of the role, communication, and pathway standardization will vary as a function of the specific needs of HCH’s population, which will be a function of race, ethnicity, morbidity, income and other factors.

Dimension 4.4 identifies the importance of HCH processes to integrate diverse perspectives and implement inter-professional work. The implementation of this dimension will vary by HCH population. In HCHs serving a population that primarily has low to moderate medical complexity and low social complexity (on average), the HCH may be able to rely on primary care physicians for most sensemaking (colligation), diagnosing, and treating<sup>3</sup>. In a setting with more medically and socially complex patients, such as a safety-net hospital or federally qualified health center, sensemaking, diagnosing, and treating will require organizational mechanisms for integrating diverse professional perspectives<sup>53, 68, 158</sup>. Sensemaking, diagnosing, and treatment will vary by profession. For example, medically and socially complex patient may require social work, behavioral health, medical, and spiritual assistance. Each one of these professions will focus on different attributes of the patient and caregiver’s situation and determine diagnoses and treatments based in that profession’s knowledge. A behavioral health specialist, social worker and physician all may make valid diagnoses and treatments that differ. Effective care management will require procedures for integrating the disparate diagnoses to obtain a holistic view of the patient and caregivers and then prioritize and sequence treatments (e.g., is housing necessary before medical treatment or should medical treatment precede housing). Inappropriate dominance by a particular provider, such as a physician, in this situation can result in ineffective information sharing and care<sup>31</sup>. In HCHs serving medically and socially complex patients there should be organizational mechanisms that

facilitate information integration and reduce the possibility of care being dominated by a particular type of provider.

Dimensions 4.5 and 4.6 call attention to boundary-spanning coordination with either other clinics in a health system or with other providers in the community. The HCH should know which providers outside the HCH are likely to be needed by their population and have established formal coordination mechanisms with those providers who they share a significant number of patients with<sup>19, 58, 59, 112, 120, 151</sup>.

*Dimension 5: Maturity - Measurement and Feedback.* A core hypothesis of HCHs is that the better the execution of care coordination the better are patient and provider outcomes. While Dimensions 2 (population management), 3 (assuring a primary care relationship) and 4 (care coordination among providers) are the key maturity dimension of defining care organization, dimension 5, measurement and feedback, is the next step in HCH maturity. An effective HCH should have procedures for measuring care processes (e.g., missed/delayed laboratory reports, delays in responding to patients, non-standard communication), and measuring patient and provider outcomes. Providing these measures to providers and staff help them assess their own performance and provide ideas for quality improvement<sup>124</sup>. Using these measures to assess the effect on processes on outcomes is a key component of guiding HCH improvement using evidence.

The most effective measurement will have a strong foundation in the specific HCH's functions (population management, assuring primary care, care coordination) and the outcomes that the HCH's population values rather than primarily focusing on outcomes that the HCH is accountable for such as costly outcomes (admissions, ED visits, readmissions)<sup>54</sup> and quality measures such as those used by Minnesota Community Measurement (MNCM) and Minnesota Statewide Quality Reporting and Measurement System (SQRMS). While these measures are important, the strongest measurement will have a solid foundation in the specific HCH's organization.

*Dimension 6: Maturity - Quality Improvement.* Dimension 6 measures the implementation of the HCH as a learning organization that uses measurement (Dimension 5) as a foundation for continual learning. Dimension 6.1 captures inclusion in the improvement process and is a strong measure for the transformation of the institutional logic of separating planning from execution to integrating planning from execution. A very strong HCH will include community members so that improvement efforts will be targeted to and informed by key stakeholders. While care coordinators may not lead quality improvement efforts, in a strong HCH they should be included in the meetings for two reasons. First, their observations of how tools are working are the most accurate reflection of how HCH tools work in practice. Second, their

inclusion in meetings provides them information on the broader context, organization and goals of care which will assist them in coordinating their actions with other clinic members.

Dimensions 6.2 through 6.6 capture the discrete, separate steps in a robust quality improvement process. Quality improvement should be targeted in a cumulative, hill-climbing fashion to the HCH's core vision and goals rather than being targeted to a squeaky wheel. The problem definition should be stated as the gap/difference between a desired state (e.g., waiting times for patients, provider burnout) and the current state. Root cause analyses should be used to determine the levers most likely to reduce the gap and to avoid the risk of solutions chasing problems. Alternatives should flow directly from the root cause analysis and be based in both exploring alternatives others have developed, such as in evidence based practice standards, learning collaboratives, and visiting leading HCHs, and exploiting alternatives developed within the HCH to improve existing processes<sup>69, 106, 154</sup>. Alternatives should be systematically implemented and evaluated<sup>50</sup> and then diffused to the HCH and the community of practice, such as through learning collaboratives, when they work.

*Dimension 7: Supportive Context and Climate.* The last dimension captures the overall constructive and supportive context of the HCH. Dimension 7.1 measures having a patient centered vision, rather than productivity or cost reduction, vision. A patient centered vision is important for two reasons. First, it results in a focus on improving patient centered outcomes and provides a decision-mechanism for coordinating action (what will improve patient centered outcomes). Second, it increases motivation and identity. A key dimension of job design is the meaningfulness of work<sup>42</sup> and a patient centered vision provides a strong focus on meaningful work. Research shows that a shared vision, such as a patient centered core vision, combined with perceived outcome and work interdependence will result in identity with an organization such as a HCH.<sup>60</sup> In turn, identity results in stronger engagement, positive affect, and organizational citizenship behaviors (helping).<sup>61</sup> In sum, a patient centered core vision is much more likely to be associated with transformation than a vision focusing on productivity or costs.

Dimension 7.2, assuring autonomy and delegating authority, reflects the transformation separating planning and execution to integrating planning and execution. Or, this dimension could be relabeled – Avoiding Micro-Management. This dimension also comes from the job design literature which shows autonomy is associated with motivation<sup>42</sup> and the teamwork literature which points to the importance of delegating authority to manage their own activities to a team.<sup>161</sup> While health systems should provide tools and infrastructure (Dimension 7,5), the HCH should be charged with fitting to their specific context and meeting performance goals.



Dimensions 7.3, monitoring and resolving problems, and 7.4, hybrid incentives, measure social control processes. In an effective organization, members will experience procedural fairness and will be able to have legitimate procedures to address grievances and problems. This procedural fairness and ability to bring up issues will improve performance.<sup>109, 155</sup> By linking individual outcomes to group performance, hybrid incentives reduce the probability of siloing of functions and tasks while individual incentives reduce the probability of individuals social loafing.<sup>116</sup>

## Summary

A core function approach to HCH transformation has been proposed. The core functions for HCH performance are population management (Dimension 2), assuring primary care (Dimension 3), and care coordination (Dimension 4). The core functions for creating a learning organization that matures are measurement and feedback (Dimension 5) and quality improvement (Dimension 6). The implementation of these functions is affected by the context created by HCH design (Dimension 1) and HCH constructive context (Dimension 7).

# APPENDIX I: TRANSFORMATION SURVEY DESIGN AND METHODS

## POPULATION AND SAMPLING

The study design is a retrospective survey of medical home/care coordination capability in primary care clinics. The unit of analysis is primary care clinics. The population is all Minnesota primary care clinics that are eligible to be Health Care Homes. The sampling frame is that the primary care clinics that have provided vascular or diabetes quality measurement data to Minnesota Community Measurement as part of the Minnesota Statewide Quality Reporting and Measurement System (*SQRMS*). In 2014 532 clinics provided diabetes and or quality data for the 2013 operating year. Only primary care clinics reporting 30 or more patients are included in the sample because this improves the reliability of the measurements used in stratifying patients. 503 primary care clinics reported more than 30 patients.

The research aims are:

- Understand the relationship between medical home/care coordination capability and HCH certification status, patient population, and rurality
- Understand the relationship between quality and cost and medical home/care coordination capability controlling for HCH certification status, patient population, and rurality.

Clinics will be stratified into cells and one clinic will be randomly sampled within each cells. The data to do the stratification comes from the database being used by the Health Care Homes evaluation team to evaluate Health Care Homes performance. The stratification cells are:

- HCH Certified (Not certified, Certified 1 year, Certified 3 or more years)
- Geography (Urban, Micropolitan, Rural (Small Town/Frontier))
- Quality (High and low quality)
- Cost/Severity (High cost/severity, Low cost/severity)
- Patient population mix (FQHC/Medicaid, Commercial/Medicare)

The number of cells in the stratification is 72 ( $3 \times 3 \times 2 \times 2 \times 2 = 72$  cells) and one clinic will be 1 clinic sampled in each cell. This will support the comparison of clinics within each strata of the 72 divided by the number of strata categories (e.g., there will be 24 clinics in each HCH certification category and 36 clinics in each patient mix category). Sampling will continue until at least one clinic in each cell is recruited.

## **CLINIC RECRUITMENT PROTOCOL**

The first step in clinic recruitment was notification of major Minnesota health systems of the study explaining the rationale for studying individual clinics, the role of the study in the legislatively mandated evaluation, and seeking health system cooperation. The health system letter will be sent from Minnesota Department of Health office in charge of implementing the Health Care Homes program.

The second step in clinic recruitment will be Clinic Recruitment Letters from the University of Minnesota Evaluation team to each sampled clinic. Letters explaining the rationale for studying individual clinics, the role of the study in the legislatively mandated evaluation, seeking clinic cooperation, and asking for the contact information for the individual within the clinic best able to respond to the survey.

The Clinic Recruitment letter will include a pre-addressed and stamped postcard with space for them to write the name and contact info of the person the evaluation team should contact to arrange an interview.

Within two weeks of sending the Clinic Recruitment letter the evaluation team will start calling clinics (either with general phone number on record or from contact information on returned postcard) for recruitment.

This process will continue until all clinics are recruited. Information on clinics contacted (sampling strata) and participation will be saved to analyze differences in participation rates across strata that may bias the study.

The respondent requested for the interview will be the senior care coordinator in the clinic or the care coordinator in the clinic who is most knowledgeable about HCH implementation.

## **CLINIC INTERVIEW ADMINISTRATION**

- Procedures to Manage Clinic Interview Process
  - The research team will maintain an Excel log of all clinic contacts that shows the date, the time, the person contacting the clinic, the person at the clinic contacted, context of exchange, whether or not a message was left, and the response of the clinic to the request.
- Procedures for Conducting the Interview
  - The clinics who agree to participate will be sent the consent form which asks for permission to conduct and record the study.
  - Schedule a time for phone interview with respondent
  - Conduct the phone interview, recording the call if permission has been received

## INTERVIEW

### **1.0 Dimension 1: Care Coordination and Care Management Organization**

- 1. Would you please briefly describe how care happens in your clinic, how it is coordinated and managed for the patients your clinic has?**
  - a. In what ways do providers work with each other in the clinic?**
  - b. How are providers and patients organized into different sorts of groups in the clinic?**
  - c. What is your patient population like?**

#### Scored Items

- 1.1 Care Architecture
- 1.2 Patient Population
- 1.3 Care Management: KSA

- 2. What types of providers do you have at your clinic and how are they do they serve your patient population?**
- 3. How are the providers located to each other?**
- 4. How does your clinic go about managing care coordination; what types of meetings or procedures for managing the care coordination process and who is involved in them?**

#### Scored Items

- 1.4 Inter-Professional Membership
- 1.5 Co-location
- 1.6 Care Management

### **2.0 Dimension 2: Population Management**

- 1. What are some ways of knowing that patients are enrolled at your clinic? That is, what kinds of tools and processes for managing population information at your clinic?**
  - a. Do you have registries, quality measurement tools, preventive care assessments for all patients, or for certain types of patients?**
  - b. What types of populations within the PCMH population do you have population management tools (e.g., identify patients by morbidity or multi-morbidity)? Typical registries include Asthma, Cancer (any type), Chronic Obstructive Pulmonary Disease (COPD), Congestive heart failure, Dementia/Alzheimer, Depression, Diabetes, End stage renal disease, Hypertension, Obesity, Stroke, Vascular disease.**
  - c. Are you or other care coordinators involved in development or selection of new population management tools? How so?**

#### Scored Items

- 2.1.1 Population Management
- 2.1.2 Determining PCMH members
- 2.1.3 Integrating Patients

### **2.2 Proactively Knowing Patient Context and Complexity and 7.3 Supportive Organization**

- 1. What are some ways of knowing what kind of social support patients at your clinic have?**
- 2. What are some ways of knowing about patients' medical or social complexities**
- 3. What types of infrastructure support does your clinic have (e.g., EHR, QI)?**

Scored Items

- 2.2.1 Knowing Social Support and Services
- 2.2.2 Knowing Complexity
- 7.3 Supportive Organization

**2.3 Anticipating Population Care Management**

1. **What are some ways your clinic identifies patients who might benefit from PCMH or care coordination-type services?**
2. **How do you assess and anticipate patient needs over time?**

Scored Items

- 2.3.1 Targeting
- 2.3.2 Review and Update

**3.0 Dimension 3: Patient Access and Communication, Coordination**

1. **What are ways that you field or handle information for patients' access as well as for providers in your clinic, and even those outside of your clinic?**
2. **When you field or handle information for patient care, such as referral information, reminders, or medication follow ups, what are some ways that you can know whether information was received or followed up on?**

Scored Items

- 3.1.1 Assuring Patient Access to Providers and Information
  - 4.1.2 Assuring that Communication Happens Effectively

**4.0 Dimension 4: Coordinating Care**

1. **How do you think other providers in your clinic see your role?**
2. **What are some routine ways of handling very complex patients, and those who are less complex, at your clinic, and how are transitions in care or steps up and down in care coordinated along with other providers' workflow?**

Scored Items

- 4.2.1 Coordinator Role Clarity
- 4.2.2 Routines and Patient Complexity

**4.3 Sharing and Integrating Information**

1. **How are different types of tools or processes used for caring for different types of patients?**
2. **What are some ways that information is shared and integrated among team members?**

Scored Items

- 4.3.3 Information Integration & Communication
- 4.3.4 Integrating Diverse Perspectives

**4.4 Coordinating Care & Integrating Information within health system and community**

1. **How do the information sharing and coordination processes you've just described compare with the ways you might work with providers outside of your clinic in a broader health system, and in the community?**

Scored Items

4.4.1 Coordinating Care & Integrating Information within health system

4.4.2 Coordinating Care & Integrating Information within community

**5.0 Dimension 5: Measurement and Feedback and 7.0 Dimension 7: Supportive Context for Transforming & Social Control**

**5.1 Measuring Core Functions and Processes**

1. **What types of processes does your clinic include in measurement and feedback activities? For example, how are you or other care coordinators aware of measurement of:**
  - a. **Population management?**
  - b. **Patient access (such as wait times)?**
  - c. **Coordination?**
  - d. **Quality improvement?**
2. **What types of providers at your clinic are involved in measurement and feedback processes and activities & decisions?**

Scored Items

5.1 Process Measurement

7.1.1 Autonomy and Engagement: process measurement

7.2 Monitoring / Problem Resolution

**5.2 Measuring Outcomes and 7.0 Dimension 7: Supportive Context for Transforming & Social Control**

1. **Are you or other care coordinators aware of or included on measurement activities for outcomes?**
  - a. **Patient outcomes?**  
**Provider outcomes?**
  - b. **Resource use?**
2. **Are some specific outcomes measured for special patient populations or providers?**
3. **How would you say your clinic decides what to measure? How much are providers and coordinators involved in determining what to measure and how to do the measurement?**
4. **What are some ways that staff at your clinic know when they are doing something well or as expected, or when they are doing something less well or not as expected?**
  - a. **Probe: Who might approach the staff member with feedback, and what range of procedures are available for responding to feedback?**

Scored Items

5.2.1 Patient / Caregiver Outcomes Measurement

5.2.2 Provider Outcomes Measurement

5.2.3 Resource Use Measurement

7.1.2 Autonomy and Engagement: outcomes measurement

**6.0 Dimension 6: Quality Improvement**

1. Are you or other care coordinators aware of or included on quality improvement activities in your clinic?
  - a. What staff are involved in QI?
  - b. How would you say that processes such as “PDSA” (plan, do, study, act) are applied in your QI initiatives?
  - c. How are people outside of the clinic involved in any of these phases?
  - d. How does your clinic communicate about QI goals and actions with clinic staff?

Scored Items

- 6.1 QI Activity
- 6.2 Targeting QI
- 6.3 Plan
- 6.4 Do
- 6.5 Study
- 6.6 Act

**7.0 Dimension 7: Supportive Context for Transforming & Social Control**

**7.1 Engagement**

1. Directions: Select the best description for how employees are involved with decisions and goals at this clinic.
2. Probes
  - a. How are providers and staff at this clinic rewarded?
  - b. Where would you say purpose and vision of this clinic comes from?

Scored Items

- 7.1.1 Incentives
- 7.1.3 Purpose and Vision

**7.3 Supportive Organization**

1. Questions: When something special is needed by your clinic, or by a staff member at your clinic, what ways might the clinic try to get needs met by the health system, or by community partners, or other entities?
  - a. What types of involvement in learning activities are supported or encouraged?
2. How many opportunities exist for your clinic and clinic staff to voice needs within the organization?

Scored Items

- 7.1.5 Autonomy and Engagement: Participation and Voice

**8.0** I'm interested in what you feel are critical elements that enable your clinic to move toward its goals and to provide appropriate care. Is there anything else about care coordination and care management at your clinic that you would like to tell us?

## APPENDIX J: INDEX OF ABBREVIATIONS

<b>Abbreviation</b>	<b>Definition</b>
ACG	Ambulatory Care Groups (Johns Hopkins)
ACO	Accountable Care Organization
CAH	Critical Access Hospital
CC	Care Coordination
CMS	Centers for Medicare and Medicaid Services
DHS	Minnesota Department of Human Services
DiD	Difference in Differences
E&M/EM	Evaluation & Management
ED	Emergency Department
EHR	Interoperable Electronic Health Record
ERISA	Employee Retirement Income Security Act
FFS	Fee-for-Service
FQHC	Federally Qualified Health Clinic
HbA1c	Hemoglobin A1c
HCC	Hierarchical Condition Categories
HCFA	Health Care Financing Administration
HCH	Health Care Home
HCPCS	Health Care Common Procedure Coding System
HEDIS	Healthcare Effectiveness Data and Information Set
HIT	Health Information Technology
ICSI	Institute for Clinical Systems Improvement
IID	independent and identically distributed
LDL	Low-density lipoprotein
MAPCP	Multi-payer Advanced Primary Care Practice
MCO	Managed Care Organization
MDH	Minnesota Department of Health
MNCM	Minnesota Community Measurement
NCQA	National Committee for Quality Assurance
NPI	National Provider Identifier
NPPES	National Plan and Provider Enumeration System
OMB	Office of Management and Budget
PCMH	Patient-Centered Medical Home
PCP	Primary Care Provider
PHQ-9	Patient Health Questionnaire 9 item depression scale
PMAP	Prepaid Medical Assistance Program
PMPY	Per member per year
RUB	Resource Utilization Band



SCHSAC	State Community Health Services Advisory Committee
SQRMS	Statewide Quality Reporting & Measurement System
TCOC	Total Cost of Care (HealthPartners tool)



## REFERENCES

1. Minnesota Administrative Rules 4764.0010-4764.0070. In: Statutes MOotRo, ed. *Administrative Rule 4764.0010-4764.0070*. Vol Saint Paul, MN: Minnesota Office of the Revisor of Statutes; 2010.
2. (MHCP) MHCP. MN–ITS Interactive User Guide: HCH Tier e-Tool. In: Services MDoH, edSt. Paul, MN: Minnesota Department of Human Services.
3. Abbott A. *The System of Professions: An Essay on the Division of Labor*. Chicago: The University of Chicago Press; 1988.
4. Agency for Health Care Research & Quality. Patient Experience Measures from the CAHPS® Clinician & Group Surveys. In: Quality AfHCR, edMD: Agency for Health Care Research & Quality; 2012.
5. Agency for Healthcare Research and Quality. Defining the PCMH. 2014; <http://pcmh.ahrq.gov/page/defining-pcmh>. Accessed February 227, 2014.
6. Agency for Healthcare Research and Quality. TeamSTEPPS Primary Care Version. 2015; <http://www.ahrq.gov/professionals/education/curriculum-tools/teamstepps/primarycare/index.html>. Accessed November 24, 2015.
7. Alexander JA, Bae D. Does the patient-centred medical home work? A critical synthesis of research on patient-centred medical homes and patient-related outcomes. *Health Services Management Research*. May 1, 2012 2012;25(2):51-59.
8. Allness DJ, Knoedler WH. *A Manual for ACT Start-Up: Based on the PACT Model of Community Treatment for Persons with Severe and Persistent Mental Illnesses*. Arlington, VA: NAMI: National Alliance for the Mentally Ill; 2003.
9. Argote L, McEvily B, Reagans R. Managing Knowledge in Organizations: An Integrative Framework and Review of Emerging Themes. *Management Science*. 2003/04// 2003;49(4):571.
10. Argyris C. Single-Loop and Double-Loop Models in Research on Decision-Making. *Administrative Science Quarterly*. 1976;21(3):363-375.
11. Baker DP, Day R, Salas E. Teamwork as an Essential Component of High-Reliability Organizations. *Health Services Research*. 2006;41(4p2):1576-1598.
12. Bloom N, Propper C, Seiler S, Van Reenen J. *Management practices in the NHS*. London, England: Centre for Economic Performance, London School of Economics;2010.
13. Bloom N, Van Reenen J. Measuring and Explaining Management Practices Across Firms and Countries. *The Quarterly Journal of Economics*. November 1, 2007 2007;122(4):1351-1408.
14. Bloom N, Van Reenen J. New approaches to surveying organizations. *American economic review*. May 2010;100(2):105-109.
15. Bloom N, Van Reenen J. Why Do Management Practices Differ across Firms and Countries? *Journal of Economic Perspectives*. 2010;24(1):203-224.
16. Bond GR, Drake RE, McHugo GJ, Rapp CA, Whitley R. Strategies for Improving Fidelity in the National Evidence-Based Practices Project. *Research on Social Work Practice*. September 1, 2009 2009;19(5):569-581.
17. Buntin MB, Zaslavsky AM. Too much ado about two-part models and transformation?: Comparing methods of modeling Medicare expenditures. *Journal of Health Economics*. 5// 2004;23(3):525-542.
18. Burton RA, Devers KJ, Berenson RA. *Patient-Centered Medical Home Recognition Tools: A Comparison of Ten Surveys' Content and Operational Details*. Washington, DC: The Urban Institute, Health Policy Center;2012.
19. Bynum JPW, Ross JS. A Measure of Care Coordination? *Journal of General Internal Medicine*. 11/21 2013;28(3):336-338.
20. Cairns K, Hargens L, Barzan V, Balfour L, Liberty C. Minnesota Health Care Home Capacity Assessment: Clinics and consumers identify their readiness for health care reform and Health Care Home implementation. In: Health MDo, edSt Paul, MN: Minnesota Department of Helth; 2009.
21. Cameron AC, Trivedi PK. *Microeconometric Using Stata*. College Station, TX: Stata Press Publications; 2009.

22. Carroll JS, Rudolph JW. Design of high reliability organizations in health care. *Quality and Safety in Health Care*. December 1, 2006 2006;15(suppl 1):i4-i9.
23. Chuang E, Dill JD, Morgan JC, Konrad TR. A configurational approach to the relationship between high-performance work practices and frontline health care worker outcomes. *Health Services Research*. Aug 2012;47(4):1460-1481.
24. Corbin JS, Strauss A. Managing chronic illness at home: Three lines of work. *Qualitative Sociology*. 1985;8(3):224-247.
25. Crabtree BF, Nutting PA, Miller WL, et al. Primary Care Practice Transformation is Hard Work: Insights From a 15-year Developmental Program of Research. *Medical Care*. 2011;49:S28-S35 10.1097/MLR.1090b1013e3181cad1065c.
26. Department Of Health. Minnesota Administrative Rules: Chapter 4764, Health Care Homes. In: Statutes MOotRo, ed. 4764.0010-4764.0070. Vol St. Paul, Minnesota: Office of the Revisor of Statutes; 2010, 2013.
27. Devers KJ, Lallemand NC, Burton RA, Kahwati L, McCall N, Zuckerman S. Using Qualitative Comparative Analysis (QCA) to Study Patient-Centered Medical Homes. 2013. <http://www.urban.org/UploadedPDF/412969-Using-Qualitative-Comparative-Analysis-%28QCA%29-to-Study-Patient-Centered-Medical-Homes.pdf>. Accessed September 2013.
28. Diehr P, Yanez D, Ash A, Hornbrook M, Lin DY. Methods For Analyzing Health Care Utilization And Costs. *Annual Review of Public Health*. 1999;20(1):125-144.
29. Doty DH, Glick WH, Huber GP. Fit, equifinality, and organizational effectiveness: A test of two configurational theories. *Academy of Management Journal*. 1993/12// 1993;36(6):1196.
30. Dudley RA, Medlin CA, Hammann LB, et al. The best of both worlds? Potential of hybrid prospective/concurrent risk adjustment. *Medical Care*. Jan 2003;41(1):56-69.
31. Edmondson AC, Bohmer RM, Pisano GP. Disrupted routines: Team learning and new technology implementation in hospitals. *Administrative Science Quarterly*. 2001;46(4):685-717.
32. Edwards ST, Bitton A, Hong J, Landon BE. Patient-Centered Medical Home Initiatives Expanded In 2009–13: Providers, Patients, And Payment Incentives Increased. *Health Affairs*. October 1, 2014 2014;33(10):1823-1831.
33. Elwyn G, Rhydderch M, Edwards A, et al. Assessing organisational development in primary medical care using a group based assessment: the Maturity Matrix™. *Quality and Safety in Health Care*. August 1, 2004 2004;13(4):287-294.
34. Endsley MR. Theoretical underpinnings of situation awareness: A critical review. In: Endsley MR, Garland DJ, eds. *Situation Awareness Analysis and Measurement*. Mahwah, NJ: Lawrence Erlbaum and Associates; 2000:3-28.
35. Fiss PC. A Set-Theoretic Approach To Organizational Configurations. *Academy of Management Review*. 2007;32(4):1180-1198.
36. Freidson E. *Professionalism: The Third Logic*. Chicago: University of Chicago Press; 2001.
37. Friedland R, Alford RR. Bringing society back in: Symbols, practices and institutional contradictions. In: Powell WW, DiMaggio PJ, eds. *The New Institutionalism in Organizational Analysis*. Chicago, IL: The University of Chicago Press; 1991:232-263.
38. Gibson CB, Birkinshaw J. The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity. *Academy of Management Journal*. April 1, 2004 2004;47(2):209-226.
39. Goffman E. *The presentation of self in everyday life*. New York: Random House; 1959.
40. Gollwitzer PM. Implementation intentions: Strong effects of simple plans. *American Psychologist*. 1999;54(7):493-503.
41. Gollwitzer PM, Sheeran P. Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in experimental social psychology*. Vol 38: ACADEMIC PRESS INC LTD; 2006:69-119.
42. Hackman J, Lawler EE. Employee reactions to job characteristics. *Journal of Applied Psychology*. Jun 1971;. 55(3):259-286.
43. Health MDo. Health Care Homes: Certification and Recertification: Certification & Recertification Requirements and Process.

- <http://www.health.state.mn.us/healthreform/homes/certification/index.html>. Accessed 10/8/2013, 2013.
44. Health MDo, Services MDoH. *Health Care Homes: Annual Report on Implementation: Report to the Minnesota Legislature 2009*. Saint Paul, MN: Minnesota Department of Health; December, 2009 2009.
  45. Heckman JJ. Sample selection bias as a specification error. *Econometrica: Journal of the econometric society*. 1979;47(1):153-161.
  46. Hennepin County Medical Center. Coordinated Care Center. 2014; [http://www.hcmc.org/clinics/HCMC\\_P\\_048828](http://www.hcmc.org/clinics/HCMC_P_048828). Accessed March 25, 2014.
  47. Hoff T, Weller W, DePuccio M. The Patient-Centered Medical Home: A Review of Recent Research. *Medical Care Research and Review*. December 1, 2012 2012;69(6):619-644.
  48. Hroschikowski MC, Solberg LI, Sperl-Hillen JM, Harper PG, McGrail MP, Crabtree BF. Challenges of change: a qualitative study of chronic care model implementation. *Ann Fam Med*. Jul-Aug 2006;4(4):317-326.
  49. Jackson GL, Powers BJ, Chatterjee R, et al. The Patient-Centered Medical Home A Systematic Review. *Annals of Internal Medicine*. 2013;158(3):169-178.
  50. Jimmerson C, Weber D, Sobek DK, 2nd. Reducing waste and errors: piloting lean principles at Intermountain Healthcare. *Jt Comm J Qual Patient Saf*. May 2005;31(5):249-257.
  51. *The Johns Hopkins ACG® System Version 11.0 Applications Guide* [computer program]. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health Department of Health Policy and Management; 2014.
  52. *The Johns Hopkins ACG® System Version 11.0 Technical Reference Guide* [computer program]. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health Department of Health Policy and Management; 2014.
  53. Kalinoski ZT, Steele-Johnson D, Peyton EJ, Leas KA, Steinke J, Bowling NA. A meta-analytic evaluation of diversity training outcomes. *Journal of Organizational Behavior*. 2013;34(8):1076-1104.
  54. Kerr EA, Mittman BS, Hays RD, Siu AL, Leake B, Brook RH. Managed care and capitation in California: how do physicians at financial risk control their own utilization? *Annals of Internal Medicine*. 1995;123(7):500-504.
  55. King G, Keohane RO, Verba S. *Designing social inquiry: Scientific inference in qualitative research*. Princeton, NJ: Princeton University Press; 1994.
  56. Kroenke K, Spitzer R. The PHQ-9: a new depression diagnostic and severity measure. *Psychiatric Annals*. 2002;32(9):1-7.
  57. Kroenke K, Spitzer RL, Williams JBW. The PHQ-9. *JGIM: Journal of General Internal Medicine*. Vol 16. Springer Science & Business Media B.V.; 2001:606-613.
  58. Landon BE, Keating Nancy L. , Barnett ML, et al. Variation in patient-sharing networks of physicians across the united states. *JAMA: The Journal of the American Medical Association*. 2012;308(3):265-273.
  59. Landon BE, Onnela J-P, Keating NL, et al. Using administrative data to identify naturally occurring networks of physicians. *Medical Care*. 2013;51(8):715-721.
  60. Lawler EJ, Thye SR, Yoon J. *Social commitments in a depersonalized world*. New York: Russell Sage Foundation Publications; 2009.
  61. Lee ES, Park TY, Koo B. Identifying organizational identification as a basis for attitudes and behaviors: A meta-analytic review. *Psychol Bull*. Sep 2015;141(5):1049-1080.
  62. Lee S-Y, Weiner BJ, Harrison MI, Belden CM. Organizational transformation: a systematic review of empirical research in health care and other industries. *Med Care Res Rev*. Apr 2013;70(2):115-142.
  63. Levitt B, March JG. Organizational learning. *Annual Review of Sociology*. 1988;14:319-340.
  64. Lighter D, Fair D. *Quality management in health care: principles and methods*: Jones & Bartlett Learning; 2004.
  65. Löwe B, Kroenke K, Herzog W, Gräfe K. Measuring depression outcome with a brief self-report instrument: sensitivity to change of the Patient Health Questionnaire (PHQ-9). *Journal of Affective Disorders*. 2004;81(1):61-66.

66. Löwe B, Unützer J, Callahan CM, Perkins AJ, Kroenke K. Monitoring Depression Treatment Outcomes With the Patient Health Questionnaire-9. *Medical Care*. 2004;42(12):1194-1201.
67. Magnan S, Commissioner, Minnesota Department of Health. Request for Approval of Minnesota Administrative Rules, Chapter 4764 Certification of Health Care Homes In: Minnesota Department of Health, edSt. Paul, Minnesota: Minnesota Department of Health,; 2002:48.
68. Mannix E, Neale MA. What Differences Make a Difference? The Promise and Reality of Diverse Teams in Organizations. *Psychological Science in the Public Interest*. 2005;6(2):31-55.
69. March JG. Exploration and Exploitation in Organizational Learning. *Organization Science*. Feb 1991;2(1):71-87.
70. Martsolf GR, Alexander JA, Shi Y, et al. The Patient-Centered Medical Home and Patient Experience. *Health Services Research*. 2012;47(6):2273-2295.
71. McConnell KJ, Lindrooth RC, Wholey DR, Maddox TM, Bloom N. Management practices and the quality of care in cardiac units. *JAMA Internal Medicine*. 2013;173(8):684-692.
72. McNellis RJ, Genevro JL, Meyers DS. Lessons learned from the study of primary care transformation. *Ann Fam Med*. May-Jun 2013;11 Suppl 1:S1-5.
73. Measurement MC. *Colorectal Cancer Screening Specifications 2013 (07/01/2012 to 06/30/2013 Dates of Service) Revised 08/10/2012*. Minneapolis, MN: Minnesota Community Measurement; 08/10/2012 2012.
74. Measurement MC. *Depression Remission at Six Months Specifications 2013 (02/01/2012 to 01/31/2013 Dates of Service) Revised 08/10/2012*. Minneapolis, MN: Minnesota Community Measurement; 8/10/2012 2012.
75. Measurement MC. *Optimal Asthma Care Specifications 2013 (07/01/2012 to 6/30/2013 Dates of Service) Revised 08/10/2012*. Minneapolis, MN: Minnesota Community Measurement; 08/10/2012 2012.
76. Mehrotra A, Adams JL, Thomas JW, McGlynn EA. The Effect of Different Attribution Rules on Individual Physician Cost Profiles. *Annals of Internal Medicine*. May 18, 2010 2010;152(10):649-654.
77. Meyer AD, Tsui AS, Hinings CR. Configurational approaches to organizational analysis. *Academy of Management Journal*. 1993/12// 1993;36(6):1175.
78. Meyer JW, Rowan B. Institutionalized organizations: Formal structure as myth and ceremony. *American Journal of Sociology*. 1977;83(2):340-363.
79. Mihaylova B, Briggs A, O'Hagan A, Thompson SG. Review of statistical methods for analysing healthcare resources and costs. *Health Econ*. Aug 2011;20(8):897-916.
80. Minnesota Community Measurement. *Data Collection Guide: Direct Data Submission Optimal Asthma Care 2010-2011 Dates of Service*. Minneapolis, MN: Minnesota Community Measurement;2011.
81. Minnesota Community Measurement. *Data Collection Guide: Optimal Diabetes Care (2010 Dates of Service)*. Minneapolis, MN: Minnesota Community Measurement;2011.
82. Minnesota Community Measurement. *Data Collection Guide: Optimal Vascular Care 2011 (2010 Dates of Service)*. Minneapolis, MN: Minnesota Community Measurement;2011.
83. Minnesota Community Measurement. *Data Collection Guide: Direct Data Submission Colorectal Cancer Screening 2012 (7/1/2011 – 6/30/2012 Dates of Service)*. Minneapolis, MN: Minnesota Community Measurement;2012.
84. Minnesota Community Measurement. *Data Collection Guide: Direct Data Submission Depression Care Measures 2012 (February 2011- January 2012 Dates of Service)*. Minneapolis, MN: Minnesota Community Measurement;2012.
85. Minnesota Community Measurement. *Data Collection Guide: Direct Data Submission Optimal Asthma Care 2011-2012 Dates of Service)*. Minneapolis, MN: Minnesota Community Measurement;2012.
86. Minnesota Community Measurement. *Data Collection Guide: Optimal Diabetes Care (2011 Dates of Service)*. Minneapolis, MN: Minnesota Community Measurement;2012.
87. Minnesota Community Measurement. *Data Collection Guide: Optimal Vascular Care 2012 (2011 Dates of Service)*. Minneapolis, MN: Minnesota Community Measurement;2012.

88. Minnesota Community Measurement. Clinic and Provider Registration Instructions, 2013. Minneapolis, MN: Minnesota Community Measurement; 2013.
89. Minnesota Community Measurement. *Data Collection Guide: Optimal Diabetes Care (2012 Dates of Service)*. Minneapolis, MN: Minnesota Community Measurement; 2013.
90. Minnesota Community Measurement. *Data Collection Guide: Optimal Vascular Care 2013 (2012 Dates of Service)*. Minneapolis, MN: Minnesota Community Measurement; 2013.
91. Minnesota Department of Health. Electronic Prescribing in Minnesota. 2005; <http://www.health.state.mn.us/e-health/eprescribing/>. Accessed December 31, 2013.
92. Minnesota Department of Health. Minnesota's 2015 Interoperable Electronic Health Record Mandate. 2005; <http://www.health.state.mn.us/e-health/hitimp/>. Accessed December 10, 2013.
93. Minnesota Department of Health. Health Reform. 2008; <http://www.health.state.mn.us/healthreform/>. Accessed December 10, 2013.
94. Minnesota Department of Health. Health Care Quality Measures Adopted Rule - November 13, 2012. 2009; <http://www.health.state.mn.us/healthreform/measurement/adoptedrule/>. Accessed December 9, 2013.
95. Minnesota Department of Health. Health Care Homes - Certification Assessment Tool- With Examples. In: Minnesota Department of Health, ed. St. Paul, MN: Minnesota Department of Health; 2012.
96. Minnesota Department of Health. Health Care Homes (aka Medical Homes). 2012; <http://www.health.state.mn.us/healthreform/homes/index.html>. Accessed November 25, 2012.
97. Minnesota Department of Health. Health Care Homes (aka Medical Homes) - Payment Methodology Development. 2012; <http://www.health.state.mn.us/healthreform/homes/payment/index.html>. Accessed November 25, 2012.
98. Minnesota Department of Human Services. Health Care Homes (HCH). 2013; [http://www.dhs.state.mn.us/main/idcplg?IdcService=GET\\_DYNAMIC\\_CONVERSION&RevisionS electionMethod=LatestReleased&dDocName=dhs16\\_151066](http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionS electionMethod=LatestReleased&dDocName=dhs16_151066). Accessed December 31, 2015.
99. Minnesota Department of Transportation. Transportation Planning Partners. 2012; <http://www.dot.state.mn.us/planning/program/MPORDC.html>. Accessed December 3, 2013.
100. Health Care Homes, Minnesota Statutes 256B.0751 (2009).
101. Monroe-DeVita M, Morse G, Bond GR. Program Fidelity and Beyond: Multiple Strategies and Criteria for Ensuring Quality of Assertive Community Treatment *Psychiatric Services*. 2012.
102. Mowbray CT, Holter MC, Teague GB, Bybee D. Fidelity Criteria: Development, Measurement, and Validation. *American Journal of Evaluation*. September 1, 2003 2003;24(3):315-340.
103. National Center for Medical Home Implementation. Medical Home Recognition & Accreditation Programs 2014; [http://www.medicalhomeinfo.org/national/recognition\\_programs.aspx](http://www.medicalhomeinfo.org/national/recognition_programs.aspx). Accessed August 19, 2014.
104. National Committee for Quality Assurance. *HEDIS® 2012 Technical Specifications for Physician Measurement* 2011.
105. National Committee for Quality Assurance. PCMH 2011–PCMH 2014 Crosswalk. 2014; <http://www.ncqa.org/Programs/Recognition/Practices/PatientCenteredMedicalHomePCMH/PCMH 2011PCMH2014Crosswalk.aspx>. Accessed August 19, 2014.
106. Nembhard IM, Tucker AL. Deliberate Learning to Improve Performance in Dynamic Service Settings: Evidence from Hospital Intensive Care Units. *Organization Science*. July 1, 2011 2011;22(4):907-922.
107. O'Reilly III CA, Tushman ML. The Ambidextrous Organization. *Harvard Business Review*. 2004;82(4):74-81.
108. O'Reilly III CA, Tushman ML. Organizational Ambidexterity: Past, Present, And Future. *Academy of Management Perspectives*. 2013;27(4):324-338.
109. Ostrom E. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press; 1990.
110. Øvretveit J. *Does clinical coordination improve quality and save money? Volume 1: A summary review of the evidence*. London: The Health Foundation; June 2011.

111. Patient-Centered Primary Care Collaborative. Defining the Medical Home: A patient-centered philosophy that drives primary care excellence. 2014; <http://www.pcpcc.org/about/medical-home>. Accessed August 19, 2014.
112. Paul S, Keating NL, Landon BE, O'Malley AJ. Results from using a new dyadic-dependence model to analyze sociocentric physician networks. *Social Science & Medicine*. 9// 2014;117:67-75.
113. Paulk MC, Curtis B, Chrissis MB, Weber CV. Capability maturity model, version 1.1. *Software, IEEE*. 1993;10(4):18-27.
114. Paustian ML, Alexander JA, El Reda DK, Wise CG, Green LA, Fetters MD. Partial and Incremental PCMH Practice Transformation: Implications for Quality and Costs. *Health Services Research*. Jul 5 2013.
115. Pawson R, Greenhalgh T, Harvey G, Walshe K. Realist review-a new method of systematic review designed for complex policy interventions. *Journal of Health Services Research and Policy*. 2005;14(3, Supplement 1):21-34.
116. Pearsall MJ, Christian MS, Ellis APJ. Motivating interdependent teams: Individual rewards, shared rewards, or something in between? *Journal of Applied Psychology*. 2010;95(1):183-191.
117. Peek C, Oftedahl G. A consensus operational definition of patient-centered medical home (PCMH) also known as health care home2010.
118. Peek CJ. *Task 2: Report on the Current "State of the Art" for Medical / Health Care Home*. Minneapolis, MN: Institute for Clinical Systems Improvement; 12/30 2008.
119. Peikes D, Zutshi A, Genevro J, Smith K, Parchman M, Meyers D. Early Evidence on the Patient-Centered Medical Home. In: Quality AfHRa, edRockville, MD: Agency for Healthcare Research and Quality; 2012.
120. Pollack CE, Weissman GE, Lemke KW, Hussey PS, Weiner JP. Patient sharing among physicians and costs of care: a network analytic approach to care coordination using claims data. *Journal of General Internal Medicine*. Mar 2013;28(3):459-465.
121. Pope GC, Kautter J, Ellis RP, et al. Risk Adjustment of Medicare Capitation Payments Using the CMS-HCC Model. *Health Care Financing Review*. Summer2004 2004;25(4):119-141.
122. Pope GC, Kautter J, Ingber MJ, Freeman S, Sekar R, Newhart C. Evaluation of the CMS-HCC Risk Adjustment Model. *RTI International and the Centers for Medicare & Medicaid Services (March 2011)*. [https://www.cms.gov/MedicareAdvtgSpecRateStats/downloads/Evaluation\\_Risk\\_Adj\\_Mod\\_el\\_2011.pdf](https://www.cms.gov/MedicareAdvtgSpecRateStats/downloads/Evaluation_Risk_Adj_Mod_el_2011.pdf). 2011.
123. Primary Care Development Corporation. Crosswalk of Medical Home Standards/Certification: Primary Care Development Corporation; 2011.
124. Pritchard RD, Weaver SJ, Ashwood EL. *Evidence-based productivity improvement: a practical guide to the productivity measurement and enhancement system (ProMES)*. New York: Routledge; 2011.
125. Ragin C. Comparative sociology and the comparative method. In: Armer JM, Marsh RM, eds. *Comparative Sociological Research in the 1960s and 1970s*. Vol 22. Netherlands: Leiden - E.J. Brill; 1982:102-120.
126. Rebecca A. Malouin, Barbara Starfield, Martin Jose Sepulveda. Evaluating the Tools Used to Assess the Medical Home. *Managed Care*. 2009(June):44-48.
127. Reeves DP, Campbell SMP, Adams JP, Shekelle PGMDP, Kontopantelis EP, Roland MODM. Combining Multiple Indicators of Clinical Quality: An Evaluation of Different Analytic Approaches. *Medical Care*. 2007;45(6):489-496.
128. Rhydderch M, Edwards A, Marshall M, et al. Maturity Matrix: a criterion validity study of an instrument to assess organisational development in European general practice. *Quality in Primary Care*. 2006;14:133-143.
129. Rothman AJ, Salovey P. The reciprocal relation between principles and practice: Social psychology and health behavior. *Social psychology: Handbook of basic principles (2nd ed.)*. New York, NY, US: Guilford Press; 2007:826-849.
130. Saultz JW. Defining and Measuring Interpersonal Continuity of Care. *Ann Fam Med*. September 1, 2003 2003;1(3):134-143.



131. Saultz JW, Albedaiwi W. Interpersonal continuity of care and patient satisfaction: a critical review. *Ann Fam Med*. Sep-Oct 2004;2(5):445-451.
132. Scott WR. Reactions to Supervision in a Heteronomous Professional Organization. *Administrative Science Quarterly*. 1965;10(1):65-81.
133. Scott WR. *Institutions and Organizations: Ideas, Interests, and Identities, 4th Edition*. los Angeles: Sage Publications; 2013.
134. Scott WR, Davis GF. *Organizations and organizing: Rational, natural, and open system perspectives*. Upper Saddle River, NJ: Pearson Prentice Hall; 2007.
135. Shippee ND, Shah ND, May CR, Mair FS, Montori VM. Cumulative complexity: a functional, patient-centered model of patient complexity can improve research and practice. *Journal of Clinical Epidemiology*. 10// 2012;65(10):1041-1051.
136. Short JC, Payne GT, Ketchen DJ. Research on Organizational Configurations: Past Accomplishments and Future Challenges. *Journal of Management*. December 1, 2008 2008;34(6):1053-1079.
137. Singh H, Giardina TD, Petersen LA, et al. Exploring situational awareness in diagnostic errors in primary care. *BMJ Quality & Safety*. January 1, 2012 2012;21(1):30-38.
138. Soderberg K. 2015 MN Clinic HIT Survey: Data Dictionary. In: Health MDo, ed. St. Paul, MN: Minnesota Department of Health; 2015.
139. Solberg LI, Crain AL, Sperl-Hillen JM, Hroschikoski MC, Engebretson KI, O'Connor PJ. Care Quality and Implementation of the Chronic Care Model: A Quantitative Study. *The Annals of Family Medicine*. July 1, 2006 2006;4(4):310-316.
140. Solberg LI, Crain AL, Tillema J, Scholle SH, Fontaine P, Whitebird R. Medical Home Transformation: A Gradual Process and a Continuum of Attainment. *The Annals of Family Medicine*. May 1, 2013 2013;11(Suppl 1):S108-S114.
141. Solberg LI, Stuck LH, Crain AL, et al. Organizational Factors and Change Strategies Associated With Medical Home Transformation. *American Journal of Medical Quality*. May 1, 2014 2014.
142. Spear SJ, Schmidhofer M. Ambiguity and Workarounds as Contributors to Medical Error. *Annals of Internal Medicine*. 2005;142(8):627-630.
143. Stange KC, Nutting PA, Miller WL, et al. Defining and measuring the patient-centered medical home. *Journal of General Internal Medicine*. Jun 2010;25(6):601-612.
144. Starfield B. *Primary Care: Concept, Evaluation, and Policy*. New York: Oxford University Press.; 1992.
145. Starfield B. Is primary care essential? *The Lancet*. 10/22/ 1994;344(8930):1129-1133.
146. Starfield B, Shi L. The Medical Home, Access to Care, and Insurance: A Review of Evidence. *Pediatrics*. May 1, 2004 2004;113(Supplement 4):1493-1498.
147. Starfield B, Shi L, Macinko J. Contribution of Primary Care to Health Systems and Health. *Milbank Quarterly*. 2005;83(3):457-502.
148. Starfield B, Weiner J, Mumford L, Steinwachs D. Ambulatory care groups: a categorization of diagnoses for research and management. *Health Services Research*. 1991;26(1):53-74.
149. Stewart M, Brown JB, Donner A, et al. The impact of patient-centered care on outcomes. *Journal of Family Practice*. Sep 2000;49(9):796-804.
150. Stout S, Weeg S. The Practice Perspective on Transformation: Experience and Learning from the Frontlines. *Medical Care*. 2014;52:S23-S25 10.1097/MLR.0000000000000239.
151. Stukel TA, Glazier RH, Schultz SE, et al. Multispecialty physician networks in Ontario. *Open Medicine*. 2013;7(2):e40-e55.
152. Tamuz M, Harrison MI. Improving Patient Safety in Hospitals: Contributions of High-Reliability Theory and Normal Accident Theory. *Health Services Research*. 2006;41(4p2):1654-1676.
153. Tucker AL, Edmondson AC. Why hospitals don't learn from failures: Organizational and psychological dynamics that inhibit system change. *California Management Review*. 2003;45(2 (Winter)):55-72.
154. Tucker AL, Nembhard IM, Edmondson AC. Implementing New Practices: An Empirical Study of Organizational Learning in Hospital Intensive Care Units. *Management Science*. 2007;53(6):894-907.

155. Tyler TR, Blader SL. The Group Engagement Model: Procedural Justice, Social Identity, and Cooperative Behavior. *Personality and Social Psychology Review*. November 1, 2003 2003;7(4):349-361.
156. United States Department of Agriculture. Urban Influence Codes. 2013; <http://www.ers.usda.gov/data-products/urban-influence-codes.aspx#.Up4UusuKDmMN>. Accessed December 3, 2013.
157. USDA Economic Research Services. USDA ERS - Rural-Urban Commuting Area Codes : Documentation. In: US Department of Agriculture, ed2014.
158. van Knippenberg D, De Dreu CKW, Homan AC. Work Group Diversity and Group Performance: An Integrative Model and Research Agenda. *Journal of Applied Psychology*. 2004/12// 2004;89(6):1008-1022.
159. Vest JR, Bolin JN, Miller TR, Gamm LD, Siegrist TE, Martinez LE. Medical homes: "where you stand on definitions depends on where you sit". *Med Care Res Rev*. Aug 2010;67(4):393-411.
160. Vest JR, Bolin JN, Miller TR, Gamm LD, Siegrist TE, Martinez LE. Review: Medical Homes: "Where You Stand on Definitions Depends on Where You Sit". *Medical Care Research and Review*. August 1, 2010 2010;67(4):393-411.
161. Wageman R. Critical success factors for creating superb self-managing teams. *Organizational Dynamics*. 1997 1997;26(1):49-61.
162. Wagner EH. The role of patient care teams in chronic disease management. *British Medical Journal*. Feb 26 2000;320(7234):569-572.
163. Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. *Milbank Quarterly*. 1996;74(4):511-544.
164. Wagner EH,MDMPH, Gupta RMD, Coleman KM. Practice Transformation in the Safety Net Medical Home Initiative: A Qualitative Look. *Medical Care*. 2014;52 Issue 11, Supplement 4, Transforming Care for Vulnerable(Populations):Lessons from the Safety Net Medical Home Initiative:S18-S22.
165. Weick KE, Sutcliffe KM, Obstfeld D. Organizing and the Process of Sensemaking. *Organization Science*. 2005/08/01 2005;16(4):409-421.
166. Weiner JP, Starfield BH, Steinwachs DM, Mumford LM. Development and Application of a Population-Oriented Measure of Ambulatory Care Case-Mix. *Medical Care*. 1991;29(5):452-472.
167. Wholey D, Barry R, Zeglin J. Risk Adjustment of Colorectal Cancer Screening Measure (July 1, 2011 – June 30, 2012 dates of service)2013. Located at: Risk Adjustment Report Submitted to Minnesota Community Measurement under the MDH State Quality Reporting and Measurement System Subcontract, University of Minnesota.
168. Wholey D, Barry R, Zeglin J. Risk Adjustment of Depression Remission at Six Months Measure (2011 dates of service)2013. Located at: Risk Adjustment Report Submitted to Minnesota Community Measurement under the MDH State Quality Reporting and Measurement System Subcontract, University of Minnesota.
169. Wholey D, Barry R, Zeglin J. Risk Adjustment of Optimal Diabetes Care (2011 dates of service)2013. Located at: Risk Adjustment Report Submitted to Minnesota Community Measurement under the MDH State Quality Reporting and Measurement System Subcontract, University of Minnesota.
170. Wholey D, Barry R, Zeglin J. Risk Adjustment of Optimal Vascular Care (2011 dates of service)2013. Located at: Risk Adjustment Report Submitted to Minnesota Community Measurement under the MDH State Quality Reporting and Measurement System Subcontract, University of Minnesota.
171. Wholey DR, Finch M, White KM, et al. Evaluation of the State of Minnesota's Health Care Home Initiative: Evaluation Report for years 2010-2012. In: Health MDo, edSt. Paul, MN: Minnesota Department of Health; 2014.
172. Wholey DR, Zhu X, Knoke D, Shah P, Zellmer-Bruhn M, Witheridge TF. The Teamwork in Assertive Community Treatment (TACT) Scale: Development and Validation. *Psychiatric Services*. 2012;63(11):1108-1117.

173. Wise CG, Alexander JA, Green LA, Cohen GR, Koster CR. Journey toward a Patient-Centered Medical Home: Readiness for Change in Primary Care Practices. *Milbank Quarterly*. 2011;89(3):399-424.
174. WWAMI Rural Health Research Center. Rural-Urban Commuting Area Codes. 2010; <http://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx>. Accessed May 1, 2013.
175. Zohar D. Safety climate: Conceptual and measurement issues. In: Quick JC, Tetrick LE, eds. *Handbook of occupational health psychology*. Washington, DC: American Psychological Association; 2003:123-142.
176. Zyphur MJ, Zammuto RF, Zhang Z. Multilevel Latent Polynomial Regression for Modeling (In)Congruence Across Organizational Groups: The Case of Organizational Culture Research. *Organizational Research Methods*. July 10, 2015 2015.