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Data Source: CHNCT, Inc.

CHNCT Longitudinal Studies Summaries

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2018 Longitudinal Studies

"HUSKY Health Program Breast Cancer Screening Longitudinal Study"

Routine screening for breast cancer through mammography can identify the early stages of breast cancer when the disease is most treatable and less costly. Unfortunately, there are disparities surrounding the use of mammography. Women in underserved populations are less likely to have a mammogram and are diagnosed with a later stage of breast cancer when screened compared to women with higher socioeconomic statuses.[1] CHNCT sought to determine the impact of regular mammography screening on patient outcomes and cost compared to women who did not undergo regular mammography screening.

For the purposes of this study, CHNCT developed a baseline population using the Breast Cancer Screening (BCS) HEDIS® measure's criteria outlined in the technical specifications published by the NCQA. Individuals included in the study were assigned to the following cohorts based on the frequency of breast cancer screenings over the three-year study period: "Received Recommended Screening" (RRS) and "Did Not Receive Recommended Screening" (DNRRS). Patients who met the numerator criteria three out of three years or two out of three years were defined as "Received Recommended Screenings (RRS)." Patients who met the numerator criteria in either one out of three years or zero out of three years were defined as "Did Not Receive Recommended Screenings (DNRRS)."

CHNCT conducted a retrospective analysis of claims data to determine the onset of breast cancer for each patient included in the study. Patients without a diagnosis of breast cancer were assigned to the control group. Patients with a diagnosis of breast cancer were assigned to the following groups: developed breast cancer prior to study period (<1/1/2013), developed breast cancer during the 1/1/2013-12/31/2015 study period, and developed cancer after the study period (≥1/1/2016). CHNCT then calculated a "total cost of care" per member per month (PMPM) rate for each of the defined cohorts to determine whether patients who were in the "RRS" group had a lower total cost of care than the "DNRRS" group.

Of the 11,228 members meeting the initial and subsequent eligibility criteria, there were 148 patients who developed breast cancer during the study period (CY 2013-CY 2015). Of the 148 patients who developed breast cancer during the study period, 48 cases developed in CY 2013, 57 developed in CY 2014, and 43 developed in CY 2015. The results show that when a diagnosis of breast cancer was documented, the total cost of care PMPM rates for patients in the RRS group were lower than the DNRRS group in the years after the first diagnosis of breast cancer. Additionally, PMPM rates for patients with breast cancer were higher than patients in the control group.

Our analysis of the HUSKY Health female members eligible for mammography screenings for breast cancer suggest that 65.7% of the eligible population in this review were considered to have received

[1] Tangka FK, Subramanian S, Mobley LR, et al. Racial and ethnic disparities among state Medicaid programs for breast cancer screening. *Prev. Med*. 2017; 102:59-64.

recommended screenings for breast cancer over a three-year period, which is relatively consistent with the NCQA Quality Compass® 75th percentile benchmarks for the Medicaid product line during the CY 2013-CY 2015 study timeline. The longitudinal review on breast cancer screening suggests that women who receive mammography services are more likely to have better health outcomes resulting in less cost to the State of Connecticut. Additional information outside of claims data is necessary, along with a larger cohort population, to validate these findings.

"A Study of Control of Hemoglobin A1C Levels Relative to the Development of Long-Term Complications and the Impact on the Total Cost of Care on HUSKY Health Members with Diabetes"

It is well established that controlling blood glucose levels in diabetes can prevent long-term complications of the disease and improve patient outcomes. HbA1c testing is an important indicator of long-term glycemic control as it reflects the cumulative glycemic history of the previous two to three months. HbA1c provides a reliable measure of chronic hyperglycemia and also correlates well with the risk of long-term complications.[2] The Diabetes Control and Complications Trial (DCCT) demonstrated that better glycemic control in patients with type I diabetes was associated with a significantly decreased rate in the development and progression of microvascular complications associated with diabetes (retinopathy, nephropathy, and neuropathy).[3] This longitudinal study sought to evaluate if HUSKY Health members aged 18-75 years with poorly controlled diabetes as demonstrated by HbA1c levels greater than 8%, experienced more chronic complications associated with the disease, specifically retinopathy, nephropathy and lower limb amputations, than HUSKY Health members with diabetes in the same age range who present with adequate control as reflected by the HbA1c level. Additionally, the cost of treating members with an uncontrolled HbA1c level (greater than 8%) was explored using a PMPM cost analysis compared to members with controlled HbA1c levels (lower than 8%).

CHNCT developed its baseline population using the Comprehensive Diabetes Care - HbA1c Controlled HEDIS® measure's criteria outlined in the NCQA technical specifications. The members included in the longitudinal study's baseline population met the HEDIS® denominator criteria in CY 2013. Members who fell into the" HbA1c < 7%" or "HbA1c 7%-8%" were assigned to the "controlled" cohort. Members had an HbA1c 8%-9% or HbA1c > 9% categories were assigned to the "uncontrolled" cohort. The claims and enrollment data for this analysis was extracted on 12/5/2018. For the analysis of CY 2018 PMPM rates, member months were capped at 11 months, to account for claims that were incurred but not yet reported.

HUSKY Health members aged 18-74 years with an HBA1c level greater than 8% in CY 2013 were more likely to suffer from nephropathy, retinopathy, or a lower-limb amputation. A lower limb amputation occurred twice as often in individuals with uncontrolled diabetes (HbA1c >8%) than in members with controlled diabetes (HbA1c <8%). Members that did not have an HBA1c reading ("No Reading" group) had a higher rate of lower- limb amputations but a slightly lower rate for nephropathy and retinopathy

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[2] Sherwani SI, Khan HA, Ekhzaimy A, Masood A, Sakharkar MK. Significance of HbA1c Test in Diagnosis and Prognosis of Diabetic Patients. Biomark Insights. 2016; 11:95-104. Published 2016 Jul 3. doi:10.4137/BMI.S38440. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4933534/

[3] American Diabetes Association. 2. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes-2018. *Diabetes Care* 2018;41(Suppl. 1): S55-S64

than those members with an HbA1c <8% ("Controlled" group). This may be because the members in the "No Reading" group may experience more barriers with diabetes management and routine care as evidenced by not having an HbA1c level in CY 2013. The lack of claims data for nephropathy or retinopathy may be due to not having the preventive screenings to test for these conditions or that the manifestations of these conditions are less apparent until they become severe, while the symptoms that precipitate the need for a lower-limb amputation may bring the individual into seek medical care more immediately. PMPM rates for the 9,897 members who were defined as having uncontrolled diabetes (>8%) were over five percentage points higher than the 3,203 patients defined as "Controlled." Although the 3,554 members in the "No Reading" group had the lowest overall PMPM costs, this group's PMPM rates increased by 32.2%, which is 2.6 percentage points higher than the "Controlled" group.

CHNCT's review demonstrated that members with consistently high HbA1c readings over 9% in either four out of five years or five out of five years had a higher PMPM cost year over year than those members with a consistently high HbA1c over the course of two or three out of five years.

2019 Longitudinal Studies

"A Retrospective Review of the Impact of Regular Cervical Cancer Screenings on Staging, Treatment and Cost of Care in the HUSKY Population – A Longitudinal Study"

Cervical cancer used to be the leading cause of cancer death for women in the United States. However, over the past 40 years, the number of cervical cancer cases and the number of deaths from cervical cancer have decreased significantly. This decline is the result of many women getting regular Pap tests, which can find cervical pre-cancer before it turns into cancer.[4]

Medicaid expansions during the period from 2000 to 2010 were associated with improved cervical cancer screening rates, which is critical for early cervical cancer detection and prevention of cancer morbidity and mortality in women.[5] A Medicaid and CHIP Payment and Access Commission (MACPAC) Issue Brief from November of 2016 showed that rates of screening in Medicaid enrollees were only slightly lower than those with private insurance over 138% of the federal poverty level (FPL) and higher than those with private insurance below 138% of FPL.[6]

Because of the importance of screening and early detection, the rate of cervical cancer screening is a frequently reported health outcomes measure. The National Committee on Quality Assurance (NCQA) has adopted this measure as part of HEDIS®. In this longitudinal study, CHNCT set out to examine how regular screenings in eligible women in the HUSKY Health program impacts the stage of cervical cancer at diagnosis as well as the associated cost of care. CHNCT hypothesized that regular screenings will

[4] National Institutes of Health. Cervical Cancer. NIH Consensus Statement. 1996;14(1):1–38. Regular Pap screening decreases cervix cancer incidence and mortality by at least 80%. "Cervical Cancer Screening (PDQ®)–Health Professional Version." National Cancer Institute.
[5] Sabik, Lindsay M et al. "Medicaid Expansions and Cervical Cancer Screening for Low-Income Women." Health services research vol. 53 Suppl 1, Suppl Suppl 1 (2018): 2870-2891. doi:10.1111/1475-6773.12732
[6] Access in Brief: Use of Cervical, Breast, and Colon Cancer Tests among Adult Medicaid Enrollees. https://www.macpac.gov/wp-content/uploads/2016/11/Use-of-Cervical-Breast-and-Colon-Cancer-Tests-among-Adult-Medicaid-Enrollees.pdf. Published November 2016. Accessed August 21, 2020.

result in early detection and in more treatable stages of the disease, which over time, will lead to higher rates of early-stage treatments, thus lowering the overall cost of treating cervical cancer.

For this study, CHNCT developed a baseline population using the HEDIS® Cervical Cancer Screening (CCS) measure criteria outlined in the technical specifications published by the NCQA. Individuals included in the study were assigned to the following cohorts based on the frequency of cervical cancer screenings over the six-year study period: "Consistent Screens", "Some Screens", "No screens".

A total of 51,304 members were included in the CCS measure for the six consecutive years between CY 2013 and CY 2018, and they represent the baseline longitudinal study population. Of the 51,304 members who made up the study population, CHNCT identified 710 women who developed cervical cancer between CY 2014 and CY 2018. The majority (454, 64%) of members who developed cervical cancer during the study period met the recommended CCS screening frequency in all the years leading up to their first cancer diagnosis. Of the 710 members who developed cervical cancer, 90 (13%) did not meet the screening criteria in any year leading up to their first cancer diagnosis. The remaining 166 (23%) members who developed cervical cancer during the study period made up the "Some Screens" group.

Of the 454 cervical cancer members who received consistent screening leading up to their cervical cancer diagnosis, only 11 (2.4%) ended up receiving late-stage treatments. Members who received some screens prior to their cervical cancer diagnosis were slightly more likely to receive late-stage treatments, with 4.8% (8) members receiving late-stage treatments. The most profound results came in the members who were not screened at all, leading up to their cervical cancer diagnosis. Nearly 17% (15) of the 90 members in the "No Screens" cohort received some form of late-stage cervical cancer treatments. In each study group, late-stage treatments were most used on patients whose first diagnosis was a malignant diagnosis, followed by cases that progressed from in-situ to malignant. This longitudinal review of data on cervical cancer screening in the HUSKY Health population suggests that women who receive a pap smear/HPV testing may be more likely to have better health outcomes and lower costs of care.

"The Impact of Consistent Use of Asthma Controller Medications in Inpatient Stays, Emergency Department Visits, and Total Cost of Care in the HUSKY Population – A Longitudinal Study"

Asthma in the United States is a highly prevalent and costly disease. According to the CDC, 1 in 13 people have asthma, which is more than 25 million Americans. This represents 7.7 percent of adults and 8.4 percent of children. Asthma has been increasing since the early 1980s in all age, sex, and racial groups.[7] A study in the Annals of the American Thoracic Society published in 2018 estimated the annual costs of asthma to the US economy to be more than $80 billion based on a review of data from 2008 through 2013. This $80 billion figure included asthma-related medical expenses, days missed from work and school due to asthma, and years of life lost due to asthma-related deaths. This study also showed

[7] CDC.gov. (2018). CDC - Asthma - Data and Surveillance - Asthma Surveillance Data. [online] Available at: http://www.cdc.gov/asthma/asthmadata.htm. Accessed August 21, 2020.

that about 15.5 million had treated asthma, meaning that about 1 in 3 persons with current asthma had no asthma-related encounter with a medical provider or pharmacy in that year.[8]

Socioeconomic status has an impact on the prevalence of asthma in large patient populations. Studies show that asthma is more common among individuals living below the poverty line. On average, annual healthcare costs for individuals with an asthma diagnosis are more than twice as high as those without an asthma diagnosis.

In this longitudinal study, CHNCT set out to examine the impact of consistent use of asthma controller medications in the HUSKY Health program in terms of IP hospital and ED use as well as the cost of care associated with a diagnosis of asthma. CHNCT hypothesized that consistent use of a controller medication regimen will result in fewer ED visits and IP stays, which will lower the overall cost of care, sustained over time.

CHNCT established an initial study population using members in the HEDIS® Medication Management for People with Asthma (MMA) measure denominator in calendar years 2015 through 2018. Members included in the MMA measure were aged between 5 and 64, diagnosed with persistent asthma and must have been continuously enrolled during the measurement year and the year prior to the measurement year. This resulted in 33,508 unique members included in the MMA measure in CY 2015 through CY 2018. Continuous enrollment for 11 months was required for inclusion in any one year but was not required year to year.

The MMA measure specifications break out the patient population into three patient populations, described in the definitions below.

- **Group A –** Percent of members who achieved a proportion of days covered (PDC) of at least 75% for their asthma controller medications during the measurement period. A higher rate indicates better performance.
- **Group B –** Percent of members who achieved a PDC of at least 50% for their asthma controller medication during the measurement period. A lower rate indicates better performance.
- **Group C –** Percent of members who achieved a PDC between 50% and 75% for their asthma controller medication during the measurement period.

CHNCT's study examined health outcomes for Group A and Group B outlined above. In each calendar year from 2015 through 2018, asthma-related inpatient admissions per 1,000 members and asthma-related ED visits per 1,000 members were calculated for Group A and Group B; and total cost of care per member per month (PMPM) rates were calculated for each of the three groups.

This longitudinal study did not completely support the initial hypothesis. While those members with a PDC of above 75% had lower ED and IP admission rates, this did not result in a lower overall cost of care. The study demonstrated that patients who were most adherent to their asthma medication, those in Group A in both the MMA and study populations, experienced higher overall costs. It appears that

[8] Nurmagambetov, T., Kuwahara, R., and Garbe, P. The Economic Burden of Asthma in the United States, 2008-2013. Supported by the Centers for Disease Control and Prevention. Retrieved from https://www.atsjournals.org/doi/pdf/10.1513/AnnalsATS.201703-259OC.

although members who were consistently prescribed controller medications demonstrated higher overall PMPM costs in nearly all categories of expense (COE), ED, and IP visits related to asthma are lower in these groups than in the comparison groups. These members also had a higher number of chronic conditions and a higher risk score, which may begin to explain the reason for the higher PDC for asthma medication. In other words, members who had a high number of chronic conditions were more likely to display a higher PDC for asthma medication. This finding supports the need for interventions and supports for members with higher risk scores and multiple chronic conditions, including asthma. CHNCT can also conclude that the pediatric population was less likely to achieve a PDC of 75% for their asthma controller medications than the adult population. This provides an opportunity to tailor asthma medication adherence strategies specific to the pediatric population.

Health inequities related to race/ethnicity were apparent when looking at data in the MMA measure. As we reviewed in the study, Black/African American and Hispanic members were less likely to have a PDC above 75% for asthma controller medication. While improvements in coverage were seen in both the Black/African American and Hispanic groups, increases in rates in the White/Caucasian group matched any gains, resulting in no narrowing of the gap. CHNCT is working toward closing the racial and ethnic disparities in health measures, including asthma. Efforts related to addressing social determinants of health will also assist with narrowing this gap.

2020 Longitudinal Studies

"HUSKY Health Program Breast Cancer Screening Updated Longitudinal Study"

Please note this updated longitudinal study is not included in this packet but can be provided once available for release.

Breast cancer affects women of all ages, socioeconomic backgrounds, and race and ethnicities; however, women in underserved populations are less likely to have a mammogram and are diagnosed with a later stage of breast cancer when screened compared to women with higher socioeconomic statuses.[9] It has been shown that screening mammography can significantly reduce breast cancer mortality. In the past decade, compliance with screening mammography has leveled off; in 2015, only 65% of women over age 40 had a mammogram within the past two years.[10]

Women covered under the HUSKY Health program who do not take part in routine mammography screenings and develop breast cancer may miss the opportunity for an earlier, more treatable diagnosis, must undergo more aggressive and invasive treatment, and incur greater costs and increased mortality rates compared to those who receive mammograms at recommended intervals. In the initial version of this study, submitted to DSS in December of 2018, CHNCT analyzed the total cost of care for women who developed breast cancer from 2013 to 2015 who had regular screenings compared to those who did not. Of the eligible population, 65.7% were identified as adherent to breast cancer screening during

[9] Tangka FK, Subramanian S, Mobley LR, et al. Racial and ethnic disparities among state Medicaid programs for breast cancer screening. *Prev. Med*. 2017; 102:59-64.

[10] 2018 Annual Meeting, Official Proceedings, Volume XIX Scientific Session Abstracts, Impact of Screening Mammography interval on stage and treatment of women diagnosed with breast cancer https://www.breastsurgeons.org/docs2018/2018_Official_Proceedings_ASBrS.pdf.

the three-year study period. Although the cohort of women who developed breast cancer during the review period is small, it demonstrated that higher costs are associated with the breast cancer diagnosis year-over-year of those individuals who received fewer than recommended breast cancer screenings (0 to 1) in the three years in the study period. This update for this longitudinal analysis follows the same cohort of women for an additional four years (CY 2016 - CY 2020) to examine costs and mortality in an extended study period.

Individuals included in the study were assigned to cohorts based on adherence to screenings over the initial study period: Adherent, which indicates the member met the numerator criteria in one or two out of three years; and non-Adherent, which indicates the member met the numerator criteria in zero out of three years. Of the 11,228 members in the study period, 148 members (1.3%) developed breast cancer for the first time during the study period, 353 members (3.1%) had a diagnosis of breast cancer prior to the study period, and 111 members (1.0%) developed breast cancer after the study period. The remaining 10,616 were placed in a control group.

The results of the initial study indicated that although the adherent members had increased per member per month (PMPM) rates in the year of diagnosis, in subsequent years, the adherent members had lower PMPM rates than those of the non-adherent members in the study. The additional study years (CY 2018 - CY 2020) continue to support the initial findings. During the study expansion, mortality rates were calculated based on deaths occurring between the date of the member's first breast cancer diagnosis and the end of CY 2020. Among the 612 cases of breast cancer identified within the 11,228 members meeting the initial and subsequent eligibility criteria for this study, the 103 members who were non-adherent to the breast cancer screening regimen saw a 25.24% mortality rate. By comparison, the 509 members in the adherent category had a 7.66% mortality rate. This supports the hypothesis that early diagnosis and intervention through screening is correlated with better survival outcomes. HUSKY C members were the most prevalent population in the study group (52.3%) and had a proportionally higher rate of non-adherence (53.3%).

"Health Equity Examining Primary Care Provider Attribution and Emergency Department Utilization – A Longitudinal Study"

Racial disparities exist in primary care utilization. Black/African Americans have historically used the ED as their primary source of care at higher rates than their white counterparts.[11] This preferential use of non-primary care sites for usual sources of care limits the access to potential benefits of primary care experiences. These benefits include improved quality of clinical care (care coordination and care continuity), a greater focus on prevention, early management of health problems, and reduction of unnecessary and potentially harmful specialist care.[12] The use of the ED for non-urgent conditions may

[11] Arnett MJ, Thorpe RJ Jr, Gaskin DJ, Bowie JV, LaVeist TA. Race, Medical Mistrust, and Segregation in Primary Care as Usual Source of Care: Findings from the Exploring Health Disparities in Integrated Communities Study. *J Urban Health*. 2016;93(3):456-467. doi:10.1007/s11524-016-0054-9

[12] Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q*. 2005;83(3):457-502. doi:10.1111/j.1468-0009.2005. 00409.x

also lead to needless or redundant testing and excessive healthcare costs.[13] As a result, the use of the ED as a usual source of care correlates with poorer health outcomes.

In this study, CHNCT focused on racial, ethnic, and geographic disparities related to PCP attribution and ED utilization. The *HEDIS® MY 2015 - 2019 Ambulatory Care (AMB)* ED Visits (per 1,000 member months [MM][14]) metric was used to examine ED utilization and excludes ED visits for mental health or chemical dependent services. Our hypothesis was that members who are attributed to a PCP would use the ED as a usual source of care less often than those who are not attributed to a PCP. The results of this study provided valuable, although unexpected data as the findings did not support the hypothesis.

The *HEDIS® MY 2019 AMB* rate for attributed members (65.8) was higher than for unattributed members (41.0). However, the study identified racial disparities. The results by race showed that the Hispanic population had the highest rate, followed by the Black/African American Non-Hispanic population, and White/Caucasian Non-Hispanic population.

Data showed that the FQHC population had the highest rate at 81.9, followed by PCMH/GP practices at 58.8 and non-PCMH practices at 55.8. CPTS discussions with practices revealed that patient non-compliance and missed appointments significantly contributed to the loss of continuity and gaps in care. Potential explanations included members with a suspected or defined behavioral health diagnosis, transportation issues, limited staff during extended hours may make it harder for some members to get an appointment, and the limited number of behavioral health providers available.

Results indicated that members who were attributed to a PCP for the entire five-year study period, had a steady decrease in ED utilization by 21.7%; the rate started at 82.6 in 2015 to 64.6 in 2019, which is still above the statewide average of 58.8. Members who were unattributed the entire study, had the lowest ED utilization rates throughout the study.

CHNCT performed an analysis of the top chronic conditions for the members in the *HEDIS® MY 2015 - 2019 AMB* measure. The three most prevalent conditions were asthma, diabetes, and hypertension. Results showed that members with one or more chronic conditions are more likely to be attributed to a PCP and that the increase in ED use may be due to the underlying chronic condition.

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[13] Uscher-Pines, L., Pines, J., Kellermann, A., Gillen, E., & Mehrotra, A. (2013). Emergency department visits for non-urgent conditions: systematic literature review. *The American journal of managed care*, *19*(1), 47–59.

Note: there are differences in the DSS and HEDIS® methodology for calculating member months. In the DSS methodology, a member month is counted if a member is enrolled for any one day in the month. In the HEDIS® methodology, a member month is counted if a member is enrolled on a specific, pre-determined day of the month. Any members whose enrollment ends before the specified date, or whose enrollment starts after the specified date would not be counted for that month.

HUSKY Health Program

A Longitudinal Study of Breast Cancer Screening on the Incidence and Cost of Caring for Breast Cancer in the HUSKY Health Program

December 31, 2018

Contents

Introduction

Breast cancer affects women of all ages, socioeconomic backgrounds, and race and ethnicities. It is the leading *new* cancer diagnoses and the second leading cancer cause of death in women living in the United States[1]. Often times, women do not have any symptoms of breast cancer in the early stages of the disease which is why routine mammography is so important in managing women's health. Routine screening for breast cancer through mammography can identify the early stages of breast cancer when the disease is most treatable and less costly. Unfortunately, there are disparities surrounding the use of mammography. Women in underserved populations are less likely to have a mammogram, and are diagnosed with a later stage of breast cancer when screened compared to women with higher socioeconomic statuses[2].

The Centers for Disease Control and Prevention (CDC) notes that in 2015, there were 242,476 new cases (125 per 100,000 women) of female breast cancer reported in the United States. Occurrence of new cases of breast cancer in females by race/ethnicity showed that White women had the highest incidence of new cases (125.6 per 100,000 women), while Black women had the next highest rate of new cases (123.3 cases per 100,000), followed by Asian/Pacific Islanders (94.3 per 100,000), Hispanics (93.6 per 100,000 women) and American Indian/Alaska Native women (71.2 per 100,000)[3]. However when looking at the CDC data on cancer deaths by race/ethnicity, Black women were more likely to die from breast cancer (27.6 per 100,000 women) than White women (19.8 per 100,000), Hispanic women (13.6 per 100,000), American Indian/Alaska Native (12.9 per 100,000), and Asian/Pacific Islander women (11.8 per 100,000). The CDC cancer statistics further show that in Connecticut (CT), the rate of new breast cancers was higher than the rest of the country (144 new cases per 100,000 women), with White women having the highest incidence of new cases (145.3 per 100,000 women) and deaths from breast cancer (17.7 per 100,000 women) than the other races/ ethnicities available. The incidence of new breast cancer cases among Hispanic women (133.2 per 100,000) was greater than those among Black women (121 per 100,000), and Asian/Pacific Islander women (98.9 per 100,000)[4]. However the CDC data indicates that Black women had a higher rate of breast cancer deaths (14.7 per 100,000 women) than Hispanic women (10.7 per 100,000). In American Indian/Alaska Native women, data was suppressed for CT in accordance with CDC's process of suppressing data where there were fewer than 16 cases reported.

The United States Preventive Services Task Force (USPSTF) recommends biennial breast cancer screening from ages 50-74 years. In their final recommendation, the USPSTF recommends that for women aged 40-49, the decision to get a mammogram would be a personal one because there are a larger number of false positives and unnecessary biopsies than in any other age group. For this age group, mammography does

[1] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool based on November 2017 submission data (1999-2015): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2018.
[2] Tangka FK, Subramanian S, Mobley LR, et al. Racial and ethnic disparities among state Medicaid programs for breast cancer screening. *Prev. Med*. 2017; 102:59-64.
[3] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool based on November 2017 submission data (1999-2015): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2018.
[4] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool based on November 2017 submission data (1999-2015): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2018.

show a mortality benefit, but the number of deaths averted is smaller. It is likely that the benefits to risk ratio shows more benefit as women in this group age into their late 40s. Additionally, the USPSTF feels that if women begin getting mammograms earlier or more frequently, they will suffer from a phenomenon called "over diagnosis" by being diagnosed and treated for noninvasive and invasive cancer that might not have become apparent, much less a threat to their overall health, in their lifetime. Finally, the Task Force states that women in the 40-49 age groups may gain more benefit from mammography if they have a parent, sibling or child with breast cancer since their risk is higher[5]. Although the age to begin screening remains controversial among agencies that publish evidence based guidelines due to overtreatment and false positive findings adversely affecting the benefit, the benefits of early detection resulting in the minimization of medical and surgical treatments needed to improve survival rates are significant over age 50.

Breast cancer screening using mammography can significantly reduce mortality. In the past decade compliance with screening mammography has leveled off—"in 2015, only 65% of women over age 40 had a mammogram within the past two years"[6]. Researchers at the Icahn School of Medicine at Mount Sinai in New York, NY, reviewed cancer screening data from September 2008 to May 2016 to see how interval of breast cancer screening (or none at all) affected the treatment that women received. The conclusion of this study was that breast cancer screening is associated with decreased stage at diagnosis, as well as decreased receipt of more extensive medical and surgical treatment. It can be inferred that the cost of treatment associated with breast cancer screening when women have mammograms at the recommended intervals would be lower than that of women who had screening outside of the recommendations or not at all[7].

H. Blumen, et.al, published a retrospective analysis of claims data based on a population of commercially covered patients[8]. The goal was to establish costs of treatment by stage of breast cancer. The study looked at women aged 18-64 years with a new diagnosis of breast cancer who had two or more claims in 2010 that were 30 days or more apart. Two years of post-diagnosis claims were analyzed by stage at diagnosis stratification: 0, I/II, III, and IV. The cost differences were largely driven by chemotherapy and non-cancer treatments. Costs were defined as all costs allowed by the insurance company from the date of the diagnosis through the next 24 months. Cost categories include: inpatient breast cancer surgery, outpatient breast cancer surgery, all costs incurred on the day of infused chemotherapy, oral chemotherapy drugs, radiation therapy, other prescription drugs, and other medical costs. The costs were based upon 8,360 women who met study criteria: Stage 0 – 2, 300; Stage I/II – 4, 425; Stage III – 1,134; and Stage IV – 501. Seven thousand two hundred women remained in the study; others either died or lost eligibility. Using an algorithm to determine the stage of the cancer based on claims data, the average costs by breast cancer stage in the 12 months after diagnosis were Stage 0 - $60,637, Stage I/II - $82,121, Stage III - $129,387, and

[5] USPSTF Final Recommendation Statement: Breast Cancer: Screening, Women aged 50-74;https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/breast-cancer-screening1

[6] 2018 Annual Meeting, Official Proceedings, Volume XIX Scientific Session Abstracts, Impact of Screening Mammography interval on stage and treatment of women diagnosed with breast cancer https://www.breastsurgeons.org/docs2018/2018_Official_Proceedings_ASBrS.pdf

[7] 2018 Annual Meeting, Official Proceedings, Volume XIX Scientific Session Abstracts, Impact of Screening Mammography interval on stage and treatment of women diagnosed with breast cancer https://www.breastsurgeons.org/docs2018/2018_Official_Proceedings_ASBrS.pdf

[8] Blumen, H., Fitch, K., and Polkus, V. Comparison of Treatment Costs for Breast Cancer, by Tumor Stage and Type of Service. Am Health Drug Benefits, 2016;9(1):23-32

Stage IV – 134,682. Costs for the second year of treatment after the diagnosis were $13,523, $18,514, $35,801, and $69,464, respectively. The findings of this study suggest that costs are higher by stage of breast cancer at diagnosis, and that earlier detection of breast cancer by routine screening leads to a diagnosis at an earlier stage, hence lowering the costs of treatment.

Community Health Network of Connecticut, Inc. (CHNCT) conducted a review of administrative claims data on women enrolled in the HUSKY Health Program from CY 2013 - CY 2018 to identify trends in routine mammography utilization and the occurrence and costs associated with a primary diagnosis of breast cancer.

Methods

Hypothesis

As with that observed in commercially covered populations, women covered under the HUSKY Health Program who do not take part in routine mammography screenings for breast cancer may miss the opportunity for an earlier, more treatable diagnosis and incur greater costs with worse outcomes compared to those who undergo routine mammograms for breast cancer screening.

Data Collection and Study Design

As the Administrative Services Organization (ASO) for Connecticut's Medicaid HUSKY Health program, CHCNT annually reports on the National Committee for Quality Assurance's (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS®) quality metrics for the population.

For the purposes of this study, CHNCT developed a baseline population using the Breast Cancer Screening (BCS) HEDIS® measure's criteria outlined in the technical specifications published by NCQA. In accordance with HEDIS® specifications, the baseline population in the study includes women aged between 50 and 74 with no gaps in enrolment longer than 45 days in a calendar year. Additionally, the study baseline population met the HEDIS® denominator criteria in calendar years 2013, 2014, and 2015. Any patients who met the denominator criteria for less than three years were excluded from the study. Additional criteria on patients included in the study can be found in the appendix**.**

Individuals included in the study were assigned to the following cohorts based on the frequency of breast cancer screenings over the three year study period:

- **Received Recommended Screening (RRS)**:
  - Met numerator criteria in three out of three years
  - Met numerator criteria in two out of three years
- **Did Not Receive Recommended Screening (DNRRS)**
  - Met numerator criteria in one out of three years
  - Met numerator criteria in zero out of three years

Patients who met the numerator criteria three out of three years or two out of three years were defined as "Received Recommended Screenings (RRS)" ". Patients who met the numerator criteria in either one out of

three years or zero out of three years were defined as “Did Not Receive Recommended Screenings (DNRRS)”.

CHNCT conducted a retrospective analysis of administrative claims data to determine the onset of breast cancer for each patient included in the study. Patients without a diagnosis of breast cancer were assigned to the control group. Patients with a diagnosis of breast cancer were assigned to the following groups: developed breast cancer prior to study period (<1/1/2013), developed breast cancer during (1/1/2013 – 12/31/2015) study period, and developed cancer after the study period (>=1/1/2016). CHNCT then calculated a “total cost of care” per member per month (PMPM) rate for each of the defined cohorts to determine whether or not patients who were in the “RRS” group had a lower “total cost of care than the “DNRRS” group. A further definition of “total cost of care” can be found in the Appendix.

Statistical Analysis/Data Analysis

A total of 11,228 patients met the defined criteria for the longitudinal study. The race/ethnicity breakdown of the patients included in the study can be found in Table 1A. The breakdown by HUSKY Health Program can be found in Table 1B. Of the 11,228 patients in the study period, 148 (1.3%) patients developed breast cancer for the first time during the study period, 353 (3.1%) patients had a diagnosis of breast cancer prior to the study period, and 111 (1.0%) patients developed breast cancer after the study period. The remaining 10,616 were placed in a control group. For patients who developed breast cancer for the first time during the study period, we examined annual PMPM rates over a three year period from 2016 to 2018 to determine whether or not consistently receiving annual breast cancer screenings resulted in a lower total cost of care than members who did not receive routine screenings.

The cost analysis of the study encompasses the 148 patients who developed breast cancer during the study period. These 148 patients total cost of care PMPM rates were examined during and after the study period to determine whether or not the RRS patients had a lower PMPM cost than the DNRRS patients.

Table 1A – Race / Ethnicity Breakdown

Race / Ethnicity	RSS	DNRRS	Grand Total
Hispanic	2,558	813	3,371
Black/African American Non-Hispanic	1,355	777	2,132
White/Caucasian Non-Hispanic	2,343	1,711	4,054
Asian Non-Hispanic	222	118	340
All Other/Multiple Races/Unknown	895	436	1,331
Total	**7,373**	**3,855**	**11,228**

Table 1B – Program Breakdown

Program	RSS	DNRRS	Grand Total
HUSKY A	1,060	453	1,513
HUSKY C	3,819	2,053	5,872
HUSKY D	2,494	1,349	3,843
Total	**7,373**	**3,855**	**11,228**

Table 2A – Presence of Breast Cancer Diagnosis

Group	No Breast Cancer Diagnosis	Breast Cancer Diagnosis	Total
RRS	6,864	509	7,373
DNRRS	3,752	103	3,855
Total	**10,616**	**612**	**11,228**

Table 2B – Timing of Breast Cancer Diagnosis

Group	*Period of First Breast Cancer Diagnosis*			Total
	< 1/1/2013	1/1/2013-12/31/2015	>= 1/1/2016	
RRS	306	131	72	509
DNRRS	47	17	39	103
Total	**353**	**148**	**111**	**612**

Results

Of 11,228 members meeting the initial and subsequent eligibility criteria, there were 148 patients who developed breast cancer during the study period (CY 2013-CY 2015). Of the 148 patients who developed breast cancer during the study period, 48 cases developed in CY 2013, 57 developed in CY 2014, and 43 developed in CY 2015. The total cost of care PMPM rates for the "RSS" and "DNRSS" groups can be found in Table 3A. Of the 148 patients who developed breast cancer during the study period, 124 (2013 cases: 41 out of 48, 2014 cases: 50 out of 57, 2015 cases: 33 out of 43) had continuous enrolment through November 2018. The total cost of care PMPM rates were assessed for the patients who developed breast cancer during the study period using claims paid through November 2018.

Table 3A – PMPM Rates by Year of First Breast Cancer Diagnosis

Breast Cancer Cases – First Diagnosis Occurring in 2013

Group	2013	2014	2015	2016	2017	2018
RRS	**$ 3,048.87**	$ 3,106.12	$ 2,054.31	$ 2,420.47	$ 2,039.58	$ 1,818.81
DNRRS	**$ 7,115.20**	$ 3,150.74	$ 6,847.64	$ 6,058.89		
Combined	**$ 3,218.60**	**$ 3,107.98**	**$ 2,254.03**	**$ 2,551.11**	**$ 2,039.58**	**$ 1,818.81**

Breast Cancer Cases – First Diagnosis Occurring in 2014

Group	2014	2014	2015	2016	2017	2018
RRS	$ 1,393.13	$ 3,888.35	$ 3,152.06	$ 3,332.50	$ 1,973.71	$ 1,491.92
DNRRS	$ 980.14	$ 3,854.02	$ 7,496.96	$ 6,500.15		
Combined	**$ 1,378.64**	**$ 3,887.14**	**$ 3,304.73**	**$ 3,450.92**	**$ 2,092.52**	**$ 1,733.86**

Breast Cancer Cases – First Diagnosis Occurring in 2015

Group	2013	2014	2015	2016	2017	2018
RRS	$ 1,627.03	$ 1,764.60	$ 3,979.83	$ 3,593.90	$ 2,803.42	$ 1,809.08
DNRRS	$ 3,101.86	$ 4,105.02	$ 6,136.72	$ 8,127.42	$ 4,148.42	$ 4,279.25
Combined	**$ 1,860.21**	**$ 2,215.43**	**$ 4,117.46**	**$ 4,219.69**	**$ 2,737.22**	**$ 1,947.08**

Table 3B – Control Group – No Diagnosis of Breast Cancer

Control Group - No Diagnosis of Breast Cancer						
Group	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
RRS	$ 1,348.96	$ 1,578.78	$ 1,805.91	$ 1,907.32	$ 1,942.84	$1,762.96
DNRRS	$ 1,677.55	$ 1,927.28	$ 2,187.76	$ 2,436.36	$ 2,365.39	$ 2,097.31
Combined	**$ 1,465.10**	**$ 1,701.95**	**$ 1,940.84**	**$ 2,092.51**	**$ 2,089.93**	**$ 1,878.65**

The results show that when a diagnosis of breast cancer was documented, the total cost of care PMPM rates for patients in the RRS group were lower than the DNRRS group in the years after the first diagnosis of breast cancer. Additionally, PMPM rates for patients with breast cancer are higher than patients in the control group (Table 3B). This makes intuitive sense, the cost of breast cancer treatment is well documented in the research section of this study.

Limitations

Managed Care Claims Data – Diagnoses Prior to 2012

Complete data prior to January 1st, 2012 is not available due to the multiple payer environment of Connecticut's Managed Medicaid program, which operated until December 31, 2011. Managed Care data was used to identify patients who developed breast cancer prior to the study period. We have concerns that this patient population is underrepresented due to the nature of managed care claims data prior to 2012.

The Nature of Administrative Claims Data – Impact on Breast Cancer Staging

Administrative claims data provides a limited view into the severity of patient conditions, particularly when it comes to breast cancer. While ICD 10 code sets can identify the location of breast cancer, the disease classification system does not have a specific set of codes for breast cancer stages. One study identified during our research inferred breast cancer stages through CPT codes and pharmacy claims. While this methodology has been referenced in another study, the validity of accurately inferring cancer stages through administrative claims data remains in question. Without data on breast cancer stages at the time of diagnosis significantly limits the ability to perform a stage-based PMPM analysis. While the "RRS" group presented with lower PMPM costs during and in the three years after the study period, it is possible that the blend of earlier stages is higher in the "RRS" group. The contrary may be true in the "DNRRS" group. Future analysis would require linking members included in the study with electronic health record (EHR) data as the most accurate method to identify breast cancer stages.

Accuracy of Race / Ethnicity Data

Prior to 2017, there was a systemic issue with overstating the White/Caucasian population due to a classification error. While we understand that DSS is working through this race/ethnicity classification issue, there is certainly a limitation around the accuracy of race/ethnicity data.

Patient Risk Stratification

Patients included in the study may have conditions aside from breast cancer that can contribute to driving up the total cost of care rates. The "total cost of care" approach does not isolate claims associated with breast cancer, but rather includes costs that could be associated with any patient condition.

Patient Population Size

The small number of breast cancer cases that met the study's criteria (148) inhibits the results to be considered statistically significant.

Discussion

Our analysis of the HUSKY Health female members eligible for mammography screenings for breast cancer suggest that 65.7% of the eligible population in this review were considered to have received recommended screenings to breast cancer screenings over a three year period, which is relatively consistent to the NCQA Quality Compass® 75th percentile benchmarks for the Medicaid product line during the CY 2013-CY 2015 study timeline. In addition, one study identified in our research suggests a 65% mammography compliance rate with women over the age of 40 years; however it does not specify the product line used to calculate

this rate. According to the journal articles referenced in our review, Medicaid recipients are less likely to partake in mammography testing because of socioeconomic challenges they face as barriers to routine care.

In regards to membership demographics, our review suggests that the members who received routine screenings are likely to be Hispanic (35%) or White (32%) although there were limitations noted in the ability to apply race/ethnicity to our findings. HUSKY Health C (51.8%) members were more likely to have a screening than HUSKY D (33.8%) and HUSKY A (14.4%) members.

One of the most important health outcome findings of our review indicates that of the 612 members with a diagnosis of breast cancer, 509 (83.2%) members had two or more mammography screenings during the study period. The 131 (88.5%) members in the "RRS" group received their diagnosis following a screening during the study period (CY 2013- CY 2015). Therefore, mammography screening likely led to a breast cancer diagnosis in these members.

Although the cohort of women who developed breast cancer during the study period is small (148), what remains evident is the higher cost associated with the breast cancer diagnosis of those individuals who did not receive a breast cancer screening or received only one screening within the three years of the study period (CY 2012 – CY 2015).

Conclusion

The longitudinal review on breast cancer screening suggests that women who seek a mammography may be more likely to have better health outcomes resulting in less cost to the state of Connecticut. Additional information outside of claims data is necessary, along with a larger cohort population, to validate these findings. The ability to identify the stage of the breast cancer and specific costs associated with treating the disease through medical record review is necessary to attribute the true cost of breast cancer in the population.

Appendix

HEDIS® Technical Specifications 2014 – Breast Cancer Screening (BCS)

Description

The percentage of women 50–74 years of age who had a mammogram to screen for breast cancer.

Eligible Population

Product lines	Commercial, Medicaid, Medicare (report each product line separately).
Ages	Women 52–74 years as of December 31 of the measurement year.
Continuous enrollment	October 1 two years prior to the measurement year through December 31 of the measurement year.
Allowable gap	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, the member may not have more than a 1-month gap in coverage during each year of continuous enrollment.
Anchor date	December 31 of the measurement year.
Benefit	Medical.
Event/diagnosis	None.

Administrative Specification

Denominator	The eligible population.
Numerator	One or more mammograms (Mammography Value Set) any time on or between October 1 two years prior to the measurement year and December 31 of the measurement year.

Exclusions

Bilateral mastectomy any time during the member's history through December 31 of the measurement year. Any of the following meet criteria for bilateral mastectomy:

- Bilateral mastectomy (Bilateral Mastectomy Value Set).
- Unilateral mastectomy (Unilateral Mastectomy Value Set) ***with*** a bilateral modifier (Bilateral Modifier Value Set).
- Two unilateral mastectomies (Unilateral Mastectomy Value Set) on different dates of service.

- Both of the following (on the same or a different date of service):
  - Unilateral mastectomy (Unilateral Mastectomy Value Set) ***with*** a right-side modifier (Right Modifier Value Set) (same date of service).
  - Unilateral mastectomy (Unilateral Mastectomy Value Set) ***with*** a left-side modifier (Left Modifier Value Set) (same date of service).

List of Services Included in Total Cost of Care Calculation:

COE Description
All Other
Clinic Services
Dental
Durable Medical Equipment
FQHC – Dental
FQHC – Medical
FQHC – Mental Health
Home Health Services
Hospice
Hospital Inpatient
Hospital Outpatient – All Other
Hospital Outpatient – Emergency Room
Independent Lab
Independent Radiology
Medicare Crossover
Other Practitioner
Pharmacy
Physician Services – All
Vision

A Study of Control of Hemoglobin A1C Levels Relative to the Development of Long Term Complications And the Impact on the Total Cost of Care On HUSKY Health Members with Diabetes

December 31, 2018

Contents

Introduction

Diabetes is a complex chronic condition that requires adequate glycemic control to prevent short-term and long-term complications associated with the disease. It is a disease that progresses overtime and once diagnosed, involves ongoing medical management that must be both patient-centred and patient-driven. Poorly controlled diabetes is associated with significant long-term complications affecting multiple organ systems. While short term control of diabetes is often documented through logs of serum glucose measures, longer term control is most commonly measured through glycosylated hemoglobin (HbA1c) levels, with elevated levels in the hemoglobin being reflective of levels over the life of a red corpuscle (blood cell). Longer term poor control of diabetes results in microvascular disease. Research suggests that glucose-dependent factors, such as the formation of advanced glycation end products that interact with specific receptors and lead to overexpression of a range of cytokines, may play an important role in diabetic vascular complications. Retinopathy, nephropathy and lower-limb amputations are three complications of uncontrolled diabetes with a microvascular etiology.

According to the National Diabetes Statistics report in 2017, approximately 30.3 million people of all ages have diabetes (9.4% of the U.S. population) and of those, 7.2 million people are undiagnosed[1]. The large volume of individuals who are undiagnosed is concerning since the symptoms of diabetes are often unnoticed or ignored in the early stages of the disease, preventing the ability to monitor and control blood glucose levels. Individuals are frequently diagnosed with the disease following an acute event as a result of hyperglycemia.

The American Diabetes Association (ADA) classifies diabetes into four general categories; type 1, type 2, gestational diabetes mellitus, and diabetes due to other causes such as monogenic diabetes syndromes, diseases of the exocrine pancreas, and drug or chemical induced diabetes. Type 1 diabetes is due to an autoimmune destruction of the β cells of the pancreas and accounts for 5-10% of diabetes, where as type 2 diabetes is characterized by insulin deficiency and peripheral insulin resistance and accounts for 90-95% of all diabetes[2].

It is well established that controlling blood glucose levels in diabetes can prevent the long-term complications of the disease and improve patient outcomes. HbA1c testing is an important indicator of long-term glycemic control as it reflects the cumulative glycemic history of the previous two to three months. HbA1c provides a reliable measure of chronic hyperglycemia and also correlates well with the risk of long-term complications[3]. The Diabetes Control and Complications Trial (DCCT) demonstrated that intense glycemic control in patients with type 1 diabetes demonstrated that better glycemic control was associated

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[1] Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA; Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2017. Available from http://www.diabetes.org/assets/pdfs/basics/cdc-statistics-report-2017.pdf

[2]American Diabetes Association. 2. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes-2018. *Diabetes Care* 2018;41(Suppl. 1):S13-S27

[3] Sherwani SI, Khan HA, Ekhzaimy A, Masood A, Sakharkar MK. Significance of HbA1c Test in Diagnosis and Prognosis of Diabetic Patients. Biomark Insights. 2016;11:95-104. Published 2016 Jul 3. doi:10.4137/BMI.S38440. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4933534/

with a significantly decreased rate in the development and progression of microvascular complications associated with diabetes (retinopathy, nephropathy and neuropathy)[4].

The ADA evidence-based guidelines recommend that an HbA1c test be performed once every six months for patients who have well-controlled diabetes and who are meeting treatment goals. For those patients that have poorly controlled diabetes or who are making changes in their therapeutic regimen, it is advised that the HbA1c testing interval be once every three months[5]. The currently accepted HbA1c goal for most non-pregnant adults is <7%. A more stringent HbA1c goal such as <6.5% for selected patients if this can be achieved without significant hypoglycemia or other adverse effects of treatment. Less stringent HbA1c goals such as <8% may be appropriate for patients with a history of severe hypoglycemia, limited life expectancy, advanced microvascular or macrovascular complications, extensive comorbid conditions, or those who have long-standing diabetes for whom the goal is difficult to achieve. In 2018 a review was performed of all the guidelines regarding HbA1c goals and a recommendation was made to personalize the HbA1c goals for individual patients. Quaseem et. al. found that benefits and risks of more versus less intensive glycemic control may be finely balanced and varies according to duration of treatment, comorbid conditions, risk factors for hypoglycemia and choice of medication. The researchers' review of the guidelines revealed that an HbA1c of 7% or less compared with targets around 8% did not reduce death or macrovascular events over 5 to 10 years of treatment but did result in substantial harms, including hypoglycemia. Results from this study recommend an HbA1c target range "between 7% and 8% in most patients with type 2 diabetes"[6].

Diabetic retinopathy is the most common cause of vision impairment and blindness among working-age adults in the United States. Diabetic retinopathy occurs when diabetes affects the blood vessels in the retina causing them to leak and distort vision. If not found and treated early, diabetic retinopathy can cause permanent vision loss. A recent study conducted by the Centers for Disease Control and Prevention found that the prevalence of diabetic retinopathy affected almost one-third of adults with diabetes[7].

Diabetic nephropathy is a common complication of diabetes. High blood glucose levels can damage the kidneys and cause chronic kidney disease (CKD). If not treated, CKD usually gets worse and can lead to kidney failure. The prevalence of chronic kidney disease in adults with diabetes increased from 20% in 1999-2004 to 25% in 2011-2014. Nationally in 2016 33% of diabetics had chronic kidney disease[8].

Lower extremity amputation in patients with diabetes results in high mortality, reduced quality of life, and increased medical costs. The incidence of lower extremity amputation in the diabetic population of the United States ranged from 78 to 104 per 100,000 person-years. The increasing number of people diagnosed

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[4] American Diabetes Association. 2. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes-2018. *Diabetes Care* 2018;41(Suppl. 1):S55-S64

[5] *American Diabetes Association Diabetes Care 2018 Jan; 41(Supplement 1): S55-S64. https://doi.org/10.2337/dc18-S006*

[6] *Qaseem A, Wilt TJ, Kansagara D, Horwitch C, Barry MJ, Forciea MA, et al. Hemoglobin A_{1c} Targets for Glycemic Control With Pharmacologic Therapy for Nonpregnant Adults With Type 2 Diabetes Mellitus: A Guidance Statement Update From the American College of Physicians. Ann Intern Med. ;168:569–576. doi: 10.7326/M17-0939 http://annals.org/aim/fullarticle/2674121/hemoglobin-1c-targets-glycemic-control-pharmacologic-therapy-nonpregnant-adults-type#*

[7] *Centers for Disease Control and Prevention, Putting the Brakes on Diabetes Complications: Diabetic Retinopathy Factsheet. Available from: https://www.cdc.gov/visionhealth/pdf/factsheet.pdf*

[8] *Chronic Kidney Disease Surveillance System, Centers for Disease Control and Prevention, Available from: https://nccd.cdc.gov/ckd/detail.aspx?Qnum=Q79&Strat=Code%2C+Diabetes%2C+Year*

with diabetes leads to increasing numbers of individuals with diabetic foot disease. Lower extremity amputations are being performed on up to 75% of those patients with diabetic foot disease. This reduces quality of life and increases mortality as well as medical costs. Review of studies revealed that men were more likely than women to have lower extremity amputations and men were younger at the time of the amputation than women. In the United States, studies found that there was a higher incidence of lower extremity amputations among African-Americans than Caucasians. Risk factors such as smoking, low socio-economic status, and poor access to healthcare may contribute to ethical disparities. In England, a recent study found no significant difference in the rates of lower extremity amputations between black and white residents. The reason for these differences could be due to the organization of the healthcare systems. Interestingly, one study demonstrated a lower incidence of lower extremity amputation in Asian diabetic patients than in white patients. The fact that there is a lower prevalence of peripheral artery disease or neuropathy among Asians may be the possible protective factors[9]. According to the National Diabetes Statistics Report, 2017, there were 108,000 hospitalizations in the United States in 2014 for lower extremity amputations, 5.0 per 1,000 persons with diabetes[10].

The total direct and indirect estimated cost of diagnosed diabetes in the United States in 2012 was $245 billion. The average medical expenditures for people diagnosed with diabetes were about $13,700 per year. About $7,900 of that amount was attributed to diabetes. After adjusting for age and sex, the average medical expenditures among people diagnosed with diabetes were about 2.3 times higher than expenditures for people without diabetes[11].

Methods

Hypothesis

HUSKY Health members aged 18-75 years with poorly controlled diabetes as demonstrated by HbA1c levels greater than 8%, will experience more chronic complications associated with the disease, specifically retinopathy, nephropathy and lower limb amputations, than HUSKY Health members with diabetes in the same age range who present with adequate control as reflected by the HbA1c level. Additionally, HUSKY Health members with an uncontrolled HbA1c level (greater than 8%) experience higher per member per month (PMPM) costs than members with controlled HbA1c levels (lower than 8%).

Data Collection and Study Design

For the purposes of this study, CHNCT developed its baseline population using the Comprehensive Diabetes Care - HbA1c Controlled HEDIS® measure's criteria outlined in the technical specifications. In accordance with HEDIS® measure specifications, the baseline population in the study includes all members aged between 18 and 74 years with a diagnosis of diabetes and with no more than one gap in enrolment up to 45 days during the measurement year. The members included in the longitudinal study's baseline population

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[9] Narres M, Kvitkina T, Claessen H, et al. Incidence of lower extremity amputations in the diabetic compared with the non-diabetic population: A systematic review. PLoS One. 2017;12(8):e0182081. Published 2017 Aug 28. doi:10.1371/journal.pone.0182081. Available from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5573217/#pone.0182081.ref001

[10] Centers for Disease Control and Prevention. National Diabetes Statistics Report, 2017. Atlanta, GA; Centers for Disease Control and Prevention, U.S. Dept of Health and Human Services; 2017. Available from http://www.diabetes.org/assets/pdfs/basics/cdc-statistics-report-2017.pdf

[11] Centers for Disease Control and Prevention, Deaths and Costs. Available from: https://www.cdc.gov/diabetes/data/statistics-report/deaths-cost.html

met the HEDIS® denominator criteria in CY 2013. The HEDIS® measure categorizes members into two overarching categories: *eligible to have an HbA1c level under 7*, and *not eligible to have an HbA1c level under 7*. The latter includes members with medical conditions that make tighter control of diabetes riskier, such as a history of coronary artery bypass graft surgery, and thus are considered exclusions to the eligible population. The HEDIS® technical specifications further define all study cohorts which can be found in the Appendix. The members included in the study can fall into the categories shown in Table 1A.

Table 1A Cohort Assignment by HBA1c Level

CY 2013 HEDIS® Reading	
Eligible Under 7	**Not Eligible Under 7**
HbA1c <7% - (Controlled)	
HbA1c 7-8% - (Controlled)	HbA1c 7-8%
HbA1c 8-9% - (Uncontrolled)	HbA1c 8-9%
HbA1c >9% - (Uncontrolled)	HbA1c >9%
No Reading	No Reading

Members who fell into the"HbA1c < 7%" or "HbA1c 7%-8%" were assigned to the "Controlled" cohort. Members who fell into the"HbA1c 8%-9%" or "HbA1c > 9%" categories were assigned to the 'Uncontrolled' cohort. These categories are supported by the clinical research outlined in the Introduction. Additionally, these categories provide statistically significant population counts for analysis.

The administrative claims and enrolment data for this analysis were extracted on 12/5/2018. For the analysis of CY 2018 PMPM rates, member months were capped at 11 months, to account for claims that were incurred but not yet reported.

Statistical Analysis/Data Analysis

Of the 22,134 members in the study's base population 76.7% (16,974 out of 22,134) remained enrolled throughout the entire study period. A breakdown of the population sizes of each cohort can be found in Table 1B. There were 16,654 members in the "eligible under 7" group, 78% (12,993) of which had at least 1 member month in each year in the study period. In the "not eligible under 7" group, there were 5,480 members in the base year, 3,981 (73%) of which had at least 1 member month in each year in the study period. A further definition of the "eligible under 7" criteria can be found in the measure's technical specifications, which can be found in the Appendix.

Table 1B Cohort Sizes

CY 2013 Reading	Under 7 Eligible	Not Under 7 Eligible	Total
Controlled	3,203	999	4,202
Uncontrolled	9,897	3,543	13,440
No Reading	3,554	938	4,492
Grand Total	**16,654**	**5,480**	**22,134**

The cohort of members for this study revolves around the 16,654 members who were “eligible under 7” in the CY 2013 base year. Members deemed “ineligible under 7” were excluded.

CHNCT conducted a retrospective analysis of enrolment and administrative claims data to determine the ”total cost of care” per member per month (PMPM) rates for the base population from 2013 through November 2018. PMPM rates were then calculated for each cohort (Controlled, Uncontrolled, and No Reading). In order to accurately analyse the PMPM increase year over year, a medical cost trend factor using actual Connecticut Medicaid cost trends was built into the calculation. These medical cost trend factors can be found in the Appendix.

CHNCT used the International Classification of Disease (ICD) value sets and administrative claims data to determine the members who had the following list of complications: lower limb amputation, retinopathy, and nephropathy. These value sets can be made available upon request. We calculated the percentage of members who developed each complication during the study period to determine the likelihood of developing a complication based on HbA1c reading. Members who developed these conditions during the study period were then analysed to determine the rates of utilization and PMPM costs prior to, in the year of, and in the years subsequent to the first occurrence of the complication. We selected members who developed one or more of these conditions in CY 2016 as the base population for this portion of the study. In CY 2016, there were 525 members who developed nephropathy, 59 who had a lower limb amputation, and 463 who developed retinopathy. The purpose of this portion of the study is to a) determine the likelihood of developing one of the selected complications based on HbA1c reading and b) to determine the financial impact of developing one of the selected complications.

The final section of our study is a drill-down analysis on the members who had an HbA1c reading above 9 in CY 2013. We examined the patients who had a reading above 9 in CY 2013 and met the HEDIS® criteria to be ”under 7 eligible” for 5 consecutive years from CY 2013 to CY 2017. This population was represented by 1,873 members. We assigned these 1,873 members to one of the five categories shown below. We then analysed the PMPM rates for each of the five groups.

Table 1C – Member counts with HBA1c > 9 by Study Year

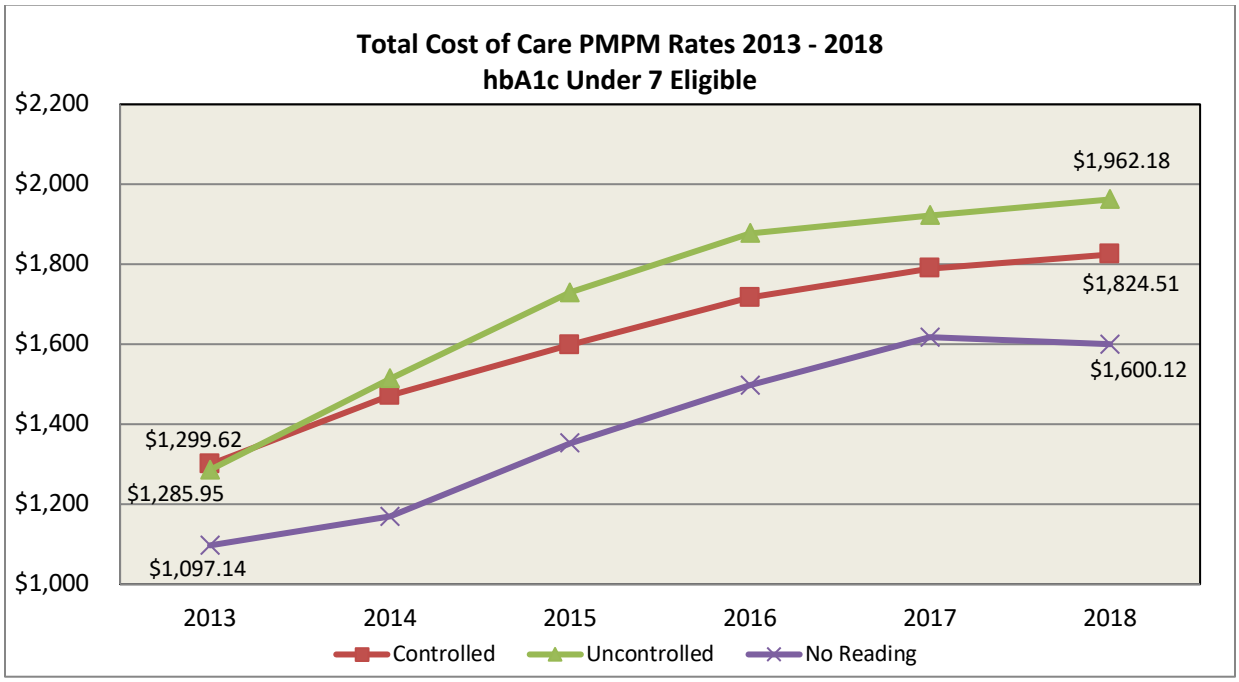
Subcategory	**Member Count**
> 9 - 5/5 years	760
>9 - 4 / 5 years	508
>9 - 3/ 5 years	320
>9 - 2/5 years	212
>9 2013 Only	73
Grand Total	**1,873**

Results

Total Cost of Care PMPM Comparison – CY 2013 to CY 2018

Total cost of care PMPM rates were examined for the 16,654 members who fell into the "eligible under 7" category. The following statements build in a year to year medical cost trend factor based on actual Connecticut Medicaid cost trends. Over the study's six year period, members in the "Uncontrolled" cohort experienced the highest increase in total cost of care PMPM rates, as represented by the graph below. The "Uncontrolled" cohort's total cost of care PMPM increased by $690.95, or 35.2%. The "Controlled" cohort experienced a PMPM increase of 29.6% ($536.76), the lowest percentage increase of the three groups. The "No Reading" cohort's PMPM rate increased by 32.2% ($515.53) over the course of the study period. Members who met the criteria of having a "Controlled" HbA1c reading in 2013 experienced lower overall costs when compared to members who met the "Uncontrolled" criteria. Members who fell into the "No Reading" group had the lowest overall PMPM throughout the study period, but experienced a PMPM percentage increase in between the "Controlled" and "Uncontrolled" group at 32.2%.

Figure 1 - PMPM Cost Comparison by Year for Study Cohorts



Incidence of Complication Occurrence

We calculated the percentage of members in the 16,654 "eligible under 7" base population who developed the three complications listed above during the study period. As shown above, the likelihood of developing one of the three listed complications is highest in the "Uncontrolled" cohort. Amputations were more than twice as common in the "Uncontrolled" group when compared to the "Controlled" group. Cases of nephropathy and retinopathy were more common in the "Uncontrolled" group as well. The percentages of each complication and cohort can be found in Table 2A. A further breakdown by HBA1c level is depicted in Table 2B.

Table 2A Incidence of Complication by Cohort Group

2013 Reading	Complications First Diagnosed Between 2013 - 2018						Study Population
	Amputation		*Nephropathy*		*Retinopathy*		
Controlled	20	0.6%	397	12.4%	450	14.0%	3,203
Uncontrolled	194	2.0%	1,642	16.6%	1978	20.0%	9,897
No Reading	53	1.5%	392	11.0%	411	11.6%	3,554
Grand Total	**267**	**1.6%**	**2,431**	**14.6%**	**2839**	**17.0%**	**16,654**

Table 2B Incidence of Complication by HBA1c Levels

Category 2013 Levels	Under 7 Eligible			
	Amputation	Nephropathy	Retinopathy	No Complications
HbA1c <7	0.7%	13.7%	18.8%	70.6%
HbA1c 7-8	1.4%	20.9%	30.5%	55.9%
HbA1c 8-9	1.5%	22.2%	38.2%	50.8%
HbA1c >9	2.3%	23.0%	31.7%	56.1%
No Reading	1.7%	13.9%	16.7%	73.9%
Grand Total	**1.9%**	**19.6%**	**26.9%**	**61.8%**

In addition to analysing the likelihood of developing complications in each of the defined cohorts, we examined the actual PMPM increase of the years prior to, the year during, and the years after developing one of the three selected complications. For the purposes of this study, we selected cases that were first diagnosed in CY 2016. The total cost of care PMPM rates were then analysed throughout the study period. The results of this analysis can be found in Figures 2A – 2C. The total cost of care PMPM rates increase by over 195% in lower limb amputation cases in the year of the first diagnosis of a lower limb amputation, from $2,236.26 in CY 2015 to $6,614.62 in CY 2016. Total cost of care PMPM rates for members with a lower limb amputation remained above $4,000 for the remainder of the study period. A total cost of care PMPM rate above $4,000 is over $2,000 higher than the study group average. Cases of nephropathy that were first diagnosed in CY 2016 displayed similar results, though not as drastic. Members who were first diagnosed with nephropathy in CY 2016 experienced a $852.99 (37.5%) total cost of care PMPM increase. Members who developed retinopathy in CY 2016 displayed higher overall costs as well, as shown in Figure 2C.

Figure 2A Total Cost of Care by Year for Members with an Amputation

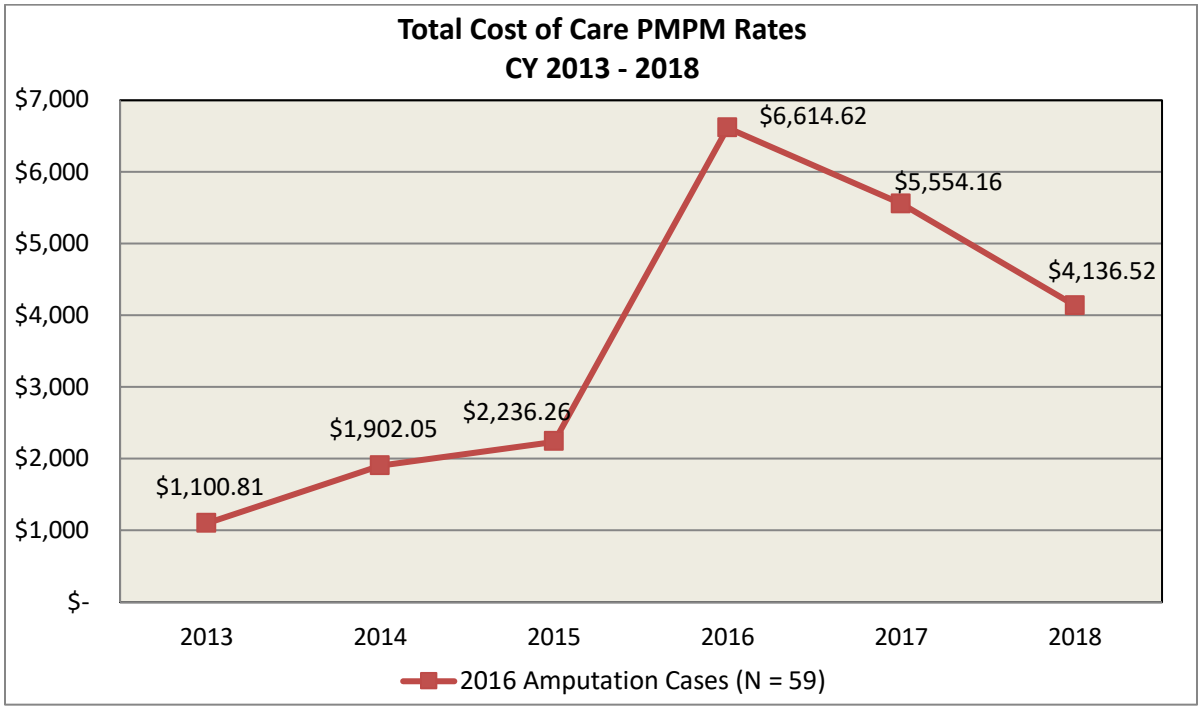


Figure 2B Total Cost of Care by Year for Members who Develop Nephropathy

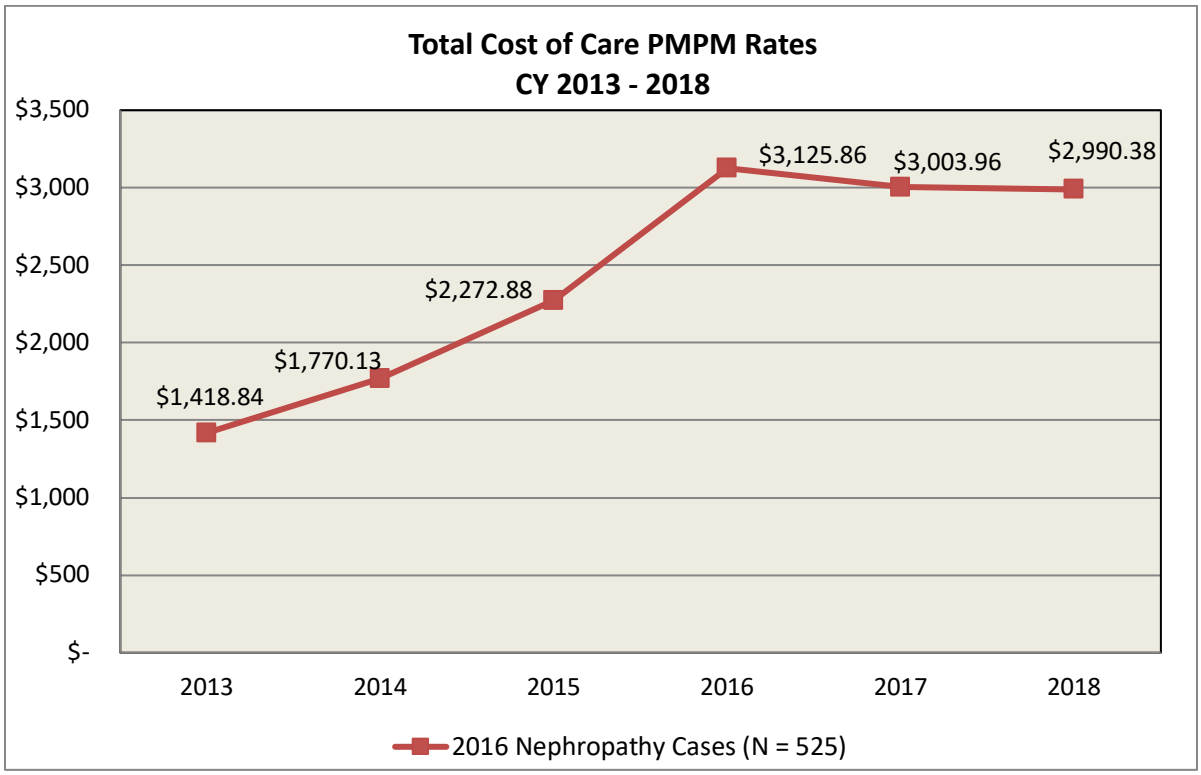
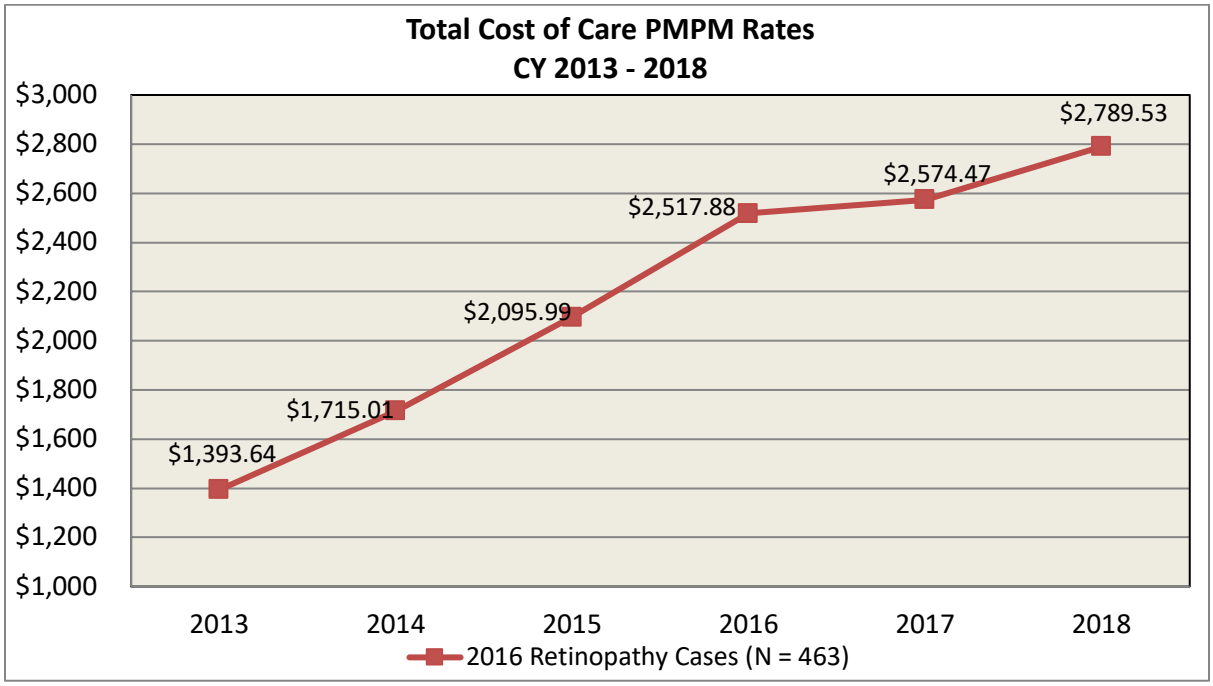


Figure 2C Total Cost of Care by Year for Members who Develop Retinopathy



Drill Down: HbA1c Greater Than 9 Over a Five Year Period

A drill down analysis was conducted to determine the total cost of care PMPM rates for members who consistently had HbA1c readings above 9 between 2013 and 2017. Members who had an HbA1c reading over 9 in five out of five years experienced a total cost of care PMPM increase of $615.74 between 2013 and 2017. Similarly, total cost of care PMPM rates for members who had an HbA1c over 9 in four out of five years was $614.35. Members who had an HbA1c reading in three out of five years and two out of five years experienced a lower increase over the five year period of $440.21 and $394.43, respectively.

Table 3

Subcategory	2013	2014	2015	2016	2017
Over 9 5 out of 5	$1,496.52	$ 1,640.12	$ 1,773.46	$ 1,951.77	$ 2,112.25
Over 9 4 out of 5	$ 1,296.39	$ 1,535.48	$ 1,726.50	$ 1,875.66	$ 1,910.74
Over 9 3 out of 5	$ 1,175.69	$ 1,316.11	$ 1,561.41	$ 1,599.99	$ 1,615.90
Over 9 2 out of 5	$ 1,360.13	$ 1,626.97	$ 1,732.40	$ 1,926.98	$ 1,754.56

Limitations

HbA1c Fluctuation

One of the main limitations of the study is the potential fluctuation of HbA1c readings. The HEDIS® criteria for the Comprehensive Diabetes Care measure use the most recent reading in a given calendar year; there is potential for members to fluctuate between HbA1c readings over the course of a year. Additionally, this longitudinal study uses CY2013 as the base year for analysis. Members' HbA1c levels could change over the course of a five year period. From a clinical standpoint, the HbA1c level may be impacted by conditions that affect red blood cell turnover such as anemias, blood transfusions, end-stage renal disease, and pregnancy[12]

Patients with Multiple Chronic Conditions

Members included in the study may have conditions aside from diabetes and affiliated complications that can contribute to driving up the total cost of care rates. The "total cost of care "approach does not allocate claims associated with diabetes or its associated complications, but rather includes costs that could be associated with any patient condition. In regards to diabetes as a chronic condition, it is well established that diabetes progression worsens as an individual ages and as the duration of the disease increases. Therefore, one would expect to see that chronic conditions and costs would be greater in the older adults and/or those with a longer history of the disease.

Discussion

HUSKY Health members aged 18-74 years with an HBA1c level greater than 8% in CY 2013 were more likely to suffer from nephropathy, retinopathy, or a lower-limb amputation. A lower limb amputation occurred

[12]American Diabetes Association. 2. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes-2018. Diabetes Care 2018; 41(Suppl. 1):S55-S64.

twice as often in individuals with uncontrolled diabetes (HbA1c >8%) than in members with controlled diabetes (HbA1c <8%). Members that did not have an HBA1c reading ("No Reading" group) had a higher rate of lower- limb amputations but a slightly lower rate for nephropathy and retinopathy than those members with an HbA1c <8% ("Controlled" group). This may be due to the fact that the members in the "No Reading" group may experience more barriers with diabetes management and routine care as evidenced by not having an HbA1c level in CY 2013. The lack of claims data for nephropathy or retinopathy may be due to not having the preventive screenings to test for these conditions or that the manifestations of these conditions are less apparent until they become severe, while the symptoms that precipitate the need for a lower-limb amputation may bring the individual into seek medical care more immediately. PMPM rates for the 9,897 members who were defined as having uncontrolled diabetes (>8%) were over five percentage points higher than the 3,203 patients defined as "controlled". Although the 3,554 members in the "No Reading" group had the lowest overall PMPM costs, this group's PMPM rates increased by 32.2%, which is 2.6 percentage points higher than the "controlled" group.

Our review demonstrated that members with consistently high HbA1c readings over 9% in either four out of five years or five out of five years had a higher PMPM cost year over year than those members with a consistently high HbA1c over the course of in two or three out of five years.

Conclusion

This longitudinal analysis of HBA1c levels in members with a diagnosis of diabetes suggests that HUSKY Health adult members with adequate blood glucose control at the beginning of the study period, as indicated by an HBA1c level of less than 8%, are less likely to suffer from nephropathy, retinopathy, or lower limb amputations and have lower PMPM costs than members with diabetes who are not well controlled. Contrary, members with consistent HbA1c >9% readings over a 5 year duration were more likely to have increased total costs of care year over year than members with HbA1c readings >9% over a shorter duration, as demonstrated in Table 3. The ability to identify costs specific to diabetes will better define the costs of diabetes of the HUSKY Health population.

Appendix

CDC – HbA1c Controlled 2014 (CY2013) Technical Specifications

SUMMARY OF CHANGES TO HEDIS 2014

- Removed coding tables and replaced all coding table references with value set references.
- Added canagliflozin to the description of "Sodium glucose cotransporter 2 (SGLT2) inhibitor" in Table CDC-A.
- Clarified requirements for using the HbA1c Level 7.0–9.0 Value Set for the HbA1c Control (<8.0%) indicator.
- Clarified hybrid requirements for the HbA1c Control indicators.
- Clarified medical record documentation requirements for a negative retinal or dilated eye exam.
- Clarified that a finding (e.g., normal, within normal limits) is acceptable for the LDL-C Screening indicator.
- Clarified hybrid requirements for the LDL-C Control (<100 mg/dL) indicator.
- Clarified step 2 of the numerator for BP Control indicators in the *Hybrid Specifications* to state when a BP reading is not compliant.
- Clarified in the *Note* section that organizations must use the most recent result for indicators that require it, regardless of data source.

Description

The percentage of members 18–75 years of age with diabetes (type 1 and type 2) who had each of the following:

- Hemoglobin A1c (HbA1c) testing.
- HbA1c poor control (>9.0%).
- HbA1c control (<8.0%).
- HbA1c control (<7.0%) for a selected population*.
- Eye exam (retinal) performed.
- LDL-C screening.
- LDL-C control (<100 mg/dL).
- Medical attention for nephropathy.
- BP control (<140/80 mm Hg).
- BP control (<140/90 mm Hg).

**Additional exclusion criteria are required for this indicator that will result in a different eligible population from all other indicators. This indicator is only reported for the commercial and Medicaid product lines.*

Eligible Population

Product lines	Commercial, Medicaid, Medicare (report each product line separately).
Ages	18–75 years as of December 31 of the measurement year.
Continuous enrollment	The measurement year.
Allowable gap	No more than one gap in enrollment of up to 45 days during the measurement year. To determine continuous enrollment for a Medicaid beneficiary for whom enrollment is verified monthly, the member may not have more than a 1-month gap in coverage (i.e., a member whose coverage lapses for 2 months [60 days] is not considered continuously enrolled).
Anchor date	December 31 of the measurement year.

Benefit Medical.

Event/ diagnosis There are two ways to identify members with diabetes: by claim/encounter data and by pharmacy data. The organization must use both methods to identify the eligible population, but a member only needs to be identified by one method to be included in the measure. Members may be identified as having diabetes during the measurement year or the year prior to the measurement year.

Claim/encounter data. Members who met any of the following criteria during the measurement year or the year prior to the measurement year (count services that occur over both years):

- At least two outpatient visits (Outpatient Value Set), observation visits (Observation Value Set) or nonacute inpatient encounters (Nonacute Inpatient Value Set) on different dates of service, with a diagnosis of diabetes (Diabetes Value Set). Visit type need not be the same for the two visits.
- At least one acute inpatient encounter (Acute Inpatient Value Set) with a diagnosis of diabetes (Diabetes Value Set).
- At least one ED visit (ED Value Set) with a diagnosis of diabetes (Diabetes Value Set).

Pharmacy data. Members who were dispensed insulin or hypoglycemics/ antihyperglycemics on an ambulatory basis during the measurement year or the year prior to the measurement year (Table CDC-A).

Table CDC-A: Prescriptions to Identify Members with Diabetes

Description	Prescription
Alpha-glucosidase inhibitors	• Acarbose • Miglitol
Amylin analogs	• Pramlinitide
Antidiabetic combinations	• Glimepiride-pioglitazone • Glimepiride-rosiglitazone • Glipizide-metformin • Glyburide-metformin • Linagliptin-metformin • Metformin-pioglitazone • Metformin-rosiglitazone • Metformin-saxagliptin • Metformin-sitagliptin • Saxagliptin • Sitagliptin-simvastatin
Insulin	• Insulin aspart • Insulin aspart-insulin aspart protamine • Insulin detemir • Insulin glargine • Insulin glulisine • Insulin inhalation • Insulin isophane beef-pork • Insulin isophane human • Insulin isophane-insulin regular • Insulin lispro • Insulin lispro-insulin lispro protamine • Insulin regular human
Meglitinides	• Nateglinide • Repaglinide
Miscellaneous antidiabetic agents	• Exenatide • Linagliptin • Liraglutide • Metformin-repaglinide • Sitagliptin
Sodium glucose cotransporter 2 (SGLT2) inhibitor	• Canagliflozin
Sulfonylureas	• Acetohexamide • Chlorpropamide • Glimepiride • Glipizide • Glyburide • Tolazamide • Tolbutamide
Thiazolidinediones	• Pioglitazone • Rosiglitazone

Note: *Glucophage/metformin is not included because it is used to treat conditions other than diabetes; members with diabetes on these medications are identified through diagnosis codes only. NCQA will post a complete list of medications and NDC codes to www.ncqa.org by November 1, 2013.*

Administrative Specification

Denominator

The eligible population.

Note: *The eligible population for the HbA1c Control <7% for a Selected Population indicator is reported after required exclusions are applied.*

Required exclusions for HbA1c Control <7% for a Selected Population indicator

Exclude members who meet any of the following criteria:

- 65 years of age and older as of December 31 of the measurement year.
- *CABG*. Members discharged alive for CABG (CABG Value Set) during the measurement year or the year prior to the measurement year. Use both facility and professional claims to identify CABG and include inpatient claims only.
- *PCI*. Members who had PCI (PCI Value Set), in any setting, during the measurement year or the year prior to the measurement year.
- *IVD.* Members who met at least one of the following criteria during both the measurement year and the year prior to the measurement year. Criteria need not be the same across both years.
  - At least one outpatient visit (Outpatient Value Set) with an IVD diagnosis (IVD Value Set).
  - At least one acute inpatient encounter (Acute Inpatient Value Set) with an IVD diagnosis (IVD Value Set).
- *Thoracic aortic aneurysm.* Members who met at least one of the following criteria during both the measurement year and the year prior to the measurement year. Criteria need not be the same across both years.
  - At least one outpatient visit (Outpatient Value Set), with a diagnosis of thoracic aortic aneurysm (Thoracic Aortic Aneurysm Value Set).
  - At least one acute inpatient encounter (Acute Inpatient Value Set), with a diagnosis of thoracic aortic aneurysm (Thoracic Aortic Aneurysm Value Set).
- Any of the following, in any setting, any time during the member's history through December 31 of the measurement year.
  - *Chronic heart failure (CHF)*. A diagnosis of CHF (CHF Value Set).
  - *Prior MI*. A diagnosis of MI (MI Value Set).
  - *ESRD*. ESRD (ESRD Value Set; ESRD Obsolete Value Set).
  - *Chronic kidney disease (stage 4)*. Stage 4 chronic kidney disease (CKD Stage 4 Value Set).
  - *Dementia*. A diagnosis of dementia (Dementia Value Set; Frontotemporal Dementia Value Set).
  - *Blindness*. A diagnosis of blindness (Blindness Value Set).
  - *Amputation (lower extremity)*. Lower extremity amputation (Lower Extremity Amputation Value Set).

Numerators

HbA1c Testing An HbA1c test (HbA1c Tests Value Set) performed during the measurement year, as identified by claim/encounter or automated laboratory data.

HbA1c Poor Control >9% Use codes in the HbA1c Tests Value Set to identify the *most recent* HbA1c test during the measurement year. The member is numerator compliant if the most recent HbA1c level is >9.0% or is missing a result, or if an HbA1c test was not done during the measurement year. The member is not numerator compliant if the result for the most recent HbA1c test during the measurement year is ≤9.0%.

Organizations that use CPT Category II codes to identify numerator compliance for this indicator must search for all codes in the following value sets and use the most recent code during the measurement year to evaluate whether the member is numerator compliant.

Value Set	Numerator Compliance
HbA1c Level Less Than 7.0 Value Set	Not compliant
HbA1c Level 7.0–9.0 Value Set	Not compliant
HbA1c Level Greater Than 9.0 Value Set	Compliant

Note: *A lower rate indicates better performance for this indicator (i.e., low rates of poor control indicate better care).*

HbA1c Control <8% Use codes in the HbA1c Tests Value Set to identify the *most recent* HbA1c test during the measurement year. The member is numerator compliant if the most recent HbA1c level is <8.0%. The member is not numerator compliant if the result for the most recent HbA1c test is ≥8.0% or is missing a result, or if an HbA1c test was not done during the measurement year.

Organizations that use CPT Category II codes to identify numerator compliance for this indicator must search for all codes in the following value sets and use the most recent code during the measurement year to evaluate whether the member is numerator compliant.

Value Set	Numerator Compliance
HbA1c Level Less Than 7.0 Value Set	Compliant
HbA1c Level 7.0–9.0 Value Set	Not compliant*
HbA1c Level Greater Than 9.0 Value Set	Not compliant

*****The CPT Category II code (3045F) in this value set indicates most recent HbA1c (HbA1c) level 7.0%–9.0% and is not specific enough to denote numerator compliance for this indicator. For members with this code, the organization must use other sources (laboratory data, hybrid reporting method) to identify the actual value and determine if the HbA1c result was <8%. Because providers assign the Category II code after reviewing test results, the date of service for the Category II code may not match the date of service for the HbA1c test found in other sources; if dates differ, use the date of service when the test was performed.

Value Set	Numerator Compliance
HbA1c Level Less Than 7.0 Value Set	Compliant
HbA1c Level 7.0–9.0 Value Set	Not compliant
HbA1c Level Greater Than 9.0 Value Set	Not compliant

Note: *This indicator uses the eligible population with additional eligible population criteria (e.g., removing members with required exclusions).*

Service Categories Included in Total Cost of Care

COE Description
All Other
Clinic Services
Dental
Durable Medical Equipment
FQHC – Dental
FQHC – Medical
FQHC – Mental Health
Home Health Services
Hospice
Hospital Inpatient
Hospital Outpatient – All Other
Hospital Outpatient – Emergency Room
Independent Lab
Independent Radiology
Medicare Crossover
Other Practitioner
Pharmacy
Physician Services – All
Vision

Study Period YoY Medical Cost Trend Factors

Year	2014	2015	2016	2017	2018
Medical Cost Percentage Increase (CT Actual)	4.50%	-4.61%	-2.62%	4.02%	-2.10%

A Retrospective Review of the Impact of Regular Cervical Cancer Screenings on Staging, Treatment and Cost of Care in the HUSKY Population – A Longitudinal Study

Table of Contents

Introduction:

According to the Surveillance, Epidemiology, and End Results (SEER) Program, approximately 0.6 percent of women will be diagnosed with cervical cancer at some point during their lifetime.[1] Cervical cancer used to be the leading cause of cancer death for women in the United States. However, over the past 40 years, the number of cervical cancer cases and the number of deaths from cervical cancer have decreased significantly. This decline is the result of many women getting regular Pap tests, which can find cervical pre-cancer before it turns into cancer.[2]

Cervical cancer tends to occur in midlife and is most frequently diagnosed in women between the ages of 35 and 44. In the United States, Hispanic women are most likely to be diagnosed with cervical cancer, followed by African-Americans, Asians and Pacific Islanders, and whites. American Indians and Alaskan natives have the lowest risk of developing cervical cancer. [3]

Medicaid expansions during the period from 2000 to 2010 were associated with improved cervical cancer screening rates, which is critical for early cervical cancer detection and prevention of cancer morbidity and mortality in women.[4] A MACPAC Issue Brief from November of 2016 showed that rates of screening in Medicaid enrollees was only slightly lower than those with private insurance over 138% of the federal poverty level (FPL) and higher than those with private insurance below 138% of FPL.[5]

Education campaigns for the early detection of cervical cancer have been legislatively mandated in CT since 1995. [6] Despite efforts for consumer outreach by the CT Department of Public Health through the ongoing Connecticut Early Detection and Prevention Program over the last decade, screening rates have remained relatively unchanged.[7] [8] According to the National Cancer Institute, age adjusted incidence rates for women with cervical cancer between 2012 and 2016 was 6.5 per 100,000 in Connecticut compared to 7.6 in the country. Mortality rates were 1.5 per 100,000 in Connecticut and 2.3 in the country.[9] The HUSKY rate of malignant cervical cancer cases between CY 2014 and CY 2018 was 9.0 per 100,000 women.

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[1] "Cancer of the Cervix Uteri - Cancer Stat Facts." SEER, https://seer.cancer.gov/statfacts/html/cervix.html. https://www.cancer.gov/types/cervical/hp/cervical-screening-pdq.

[2] National Institutes of Health. Cervical Cancer. NIH Consensus Statement. 1996;14(1):1–38. Regular Pap screening decreases cervix cancer incidence and mortality by at least 80%."Cervical Cancer Screening (PDQ®)–Health Professional Version." National Cancer Institute.

[3] "Cervical Cancer Statistics | Key Facts About Cervical Cancer". Cancer.Org, 2020, https://www.cancer.org/cancer/cervical-cancer/about/key-statistics.html.

[4] Sabik, Lindsay M et al. "Medicaid Expansions and Cervical Cancer Screening for Low-Income Women." Health services research vol. 53 Suppl 1,Suppl Suppl 1 (2018): 2870-2891. doi:10.1111/1475-6773.12732

[5] https://www.macpac.gov/wp-content/uploads/2016/11/Use-of-Cervical-Breast-and-Colon-Cancer-Tests-among-Adult-Medicaid-Enrollees.pdf

[6] https://www.cga.ct.gov/ps95/fc/739.htm

[7] https://portal.ct.gov/DPH/Comprehensive-Cancer/Comprehensive-Cancer/The-Connecticut-Early-Detection-and-Prevention-Program-CEDPP

[8] https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/state_health_planning/PDF/CTWomensHealthChp1120pdf.pdf?la=en

[9] State Cancer Profiles, https://statecancerprofiles.cancer.gov/quick-profiles/index.php?statename=connecticut.

Almost all cervical cancers are caused by persistent infection with certain types of human papillomavirus (HPV). HPV infections are common in healthy women and only rarely cause cervical cancer. Vaccines that protect against the types of HPV that cause 90% of cervical cancers, as well as several other diseases and cancers, are routinely recommended for children ages 11 to 12 and the CDC currently recommends vaccinating all boys and girls by age 13.[10] The HPV vaccine is also recommended for everyone up to the age of 26. HPV vaccination is not recommended for everyone older than age 26 years due to the likelihood of exposure to the HPV virus.[11] HPV vaccines cannot protect against established infections, nor do they protect against all types of HPV, which is why HPV-vaccinated women should still be screened for cervical cancer. Screening can also prevent cervical cancer through detection and treatment of precancerous lesions, which in today's landscape are detected far more frequently than invasive cancer. The HPV test, which detects HPV infections associated with cervical cancer, can forecast cervical cancer risk many years into the future and is currently recommended for use in conjunction with the Pap test in women ages 30 to 65, or when Pap test results are uncertain.[12]

Two screening tests can help prevent cervical cancer or lead to its early detection. The first is the Papanicolaou (Pap) test (or Pap smear) which looks for evidence of precancerous cellular changes on the cervix that might become cervical cancer if not treated appropriately. The second is the HPV test, which detects the presence of HPV, the virus that causes cervical cancer.[13]

In 2019, it is estimated that 13,170 cases of invasive cervical cancer will be diagnosed and that 4,250 women will die of the disease in the United States.[14] From 2006 to 2015, overall incidence rates stabilized. From 2007 to 2016, the death rate decreased by about 1% per year in women aged 50 years and older but did not change in women younger than 50 years. The improvement has been attributed largely to screening. Regular screening of women for cervical cancer with the Pap test reduces mortality from cervical cancer.[15] Cervical cancer is the easiest gynecologic cancer to prevent with regular screening tests and follow-up. It also is highly curable when found and treated early.[16] Carcinoma in situ (CIS) is the earliest form of cervical cancer affecting only the surface layer of the cervix. The American Cancer society states that all cases of CIS can be cured with the right treatment. [17] Most women diagnosed with cervical cancer had not been recently screened.[18]

[10] https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2019.html.
[11] https://www.cdc.gov/cancer/cervical/basic_info/prevention.htm
[12] "Cancer Facts & Figures 2019." American Cancer Society, https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2019.html.
[13] https://www.cdc.gov/cancer/cervical/basic_info/prevention.htm
[14] "Cancer Facts & Figures 2019." American Cancer Society, https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2019.html.
[15] https://www.cancer.gov/types/cervical/hp/cervical-screening-pdq.
[16] https://www.cdc.gov/cancer/cervical/pdf/cervical_facts.pdf
[17] "Treatment Options for Cervical Cancer, by Stage." American Cancer Society, https://www.cancer.org/cancer/cervical-cancer/treating/by-stage.html.
[18] "Cancer Facts & Figures 2019." American Cancer Society, https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2019.html.

The cancer stage at diagnosis, which refers to the extent to which a cancer has developed and spread in the body, determines treatment options and strongly influences the length of survival. In general, if the cancer is found only in the part of the body where it started, it is considered localized (sometimes referred to as stage 0- 1). If it has spread to a different part of the body, the stage is regional or distant (stages 2-4). The earlier cervical cancer is identified, the better chance a person has of surviving five years after being diagnosed. The 5-year survival for localized cervical cancer is 91.8%.[19]

Purpose/Hypothesis

Because of the importance of screening and early detection, the rate of cervical cancer screening is a frequently reported health outcomes measure. The measure has been adopted by the National Committee on Quality Assurance (NCQA) as part of the Healthcare Effectiveness Data and Information Set (HEDIS®).[20] In this longitudinal study, Community Health Network of Connecticut, Inc.® (CHNCT) set out to examine how regular screenings in eligible women in the HUSKY Health Program impacts the stage of cervical cancer at diagnosis as well as the associated cost of care. CHNCT hypothesizes that regular screenings will result in early detection and in more treatable stages of the disease, which over time, will lead to higher rates of early stage treatments, thus lowering the overall cost of treating cervical cancer.

The HEDIS® Cervical Cancer Screening (CCS) measure assesses women 21-64 years of age who were screened for cervical cancer using either of the following criteria: women aged 21-64 who had a cervical cytology performed every three years or women aged 30-64 who had cervical cytology and human papillomavirus (HPV) co-testing performed every five years.[21] The specifications for the HEDIS® CCS measure remained the same throughout the study period.

Cervical Cancer Screening (CCS) Measure Overview

CHNCT used members in the CCS HEDIS® denominator between calendar years 2013 and 2018 to establish its baseline population. HUSKY Health state-wide administrative rates for the cervical cancer screening measure can be found below.

Table 1: Cervical Cancer Screening (CCS) Rates CY 2013-CY 2018

Description	Numerator	Denominator	CCS Rate
HEDIS 2014 (CY 2013)	79,198	118,433	66.9%
HEDIS 2015 (CY 2014)	97,404	153,144	63.6%
HEDIS 2016 (CY 2015)	97,319	158,332	61.5%
HEDIS 2017 (CY 2016)	92,018	144,915	63.5%
HEDIS 2018 (CY 2017)	94,683	152,722	62.0%
HEDIS 2019 (CY 2018)	99,541	166,090	59.9%

[19] SEER Cancer Stat Facts: Cervical Cancer. National Cancer Institute. Bethesda, MD, https://seer.cancer.gov/statfacts/html/cervix.html

[20] The Healthcare Effectiveness Data and Information Set (HEDIS®) is a registered trademark of NCQA.

[21] "Cervical Cancer Screening." NCQA, https://www.ncqa.org/hedis/measures/cervical-cancer-screening/.

The HUSKY Health administrative HEDIS rates for cervical cancer screenings ranged from 59.5-66.9% between CY 2013 and CY 2018. The Medicaid health plan median benchmark for HEDIS® 2013 was 66.4.[22]

Table 2: Cervical Cancer Screening (CCS) Rates by Race/Ethnicity CY 2016-CY 2018

Race	CY 2016	CY 2017	CY 2018
White/Caucasian Non-Hispanic	59.6%	58.0%	56.6%
Black/African American Non-Hispanic	64.5%	63.3%	61.6%
Asian Non-Hispanic	58.8%	49.1%	49.2%
Hispanic	70.1%	68.2%	65.4%
All Other/Multiple Races/Unknown	65.2%	61.8%	59.2%
CCS Total	**63.5%**	**62.0%**	**59.9%**

HUSKY Health's race data prior to CY 2016 is not considered reliable; therefore only three years of the study period are reported in Table 2. In this study, Hispanic women consistently had the highest screening rates followed by Black/African American, All Others, and Whites. Asian Non-Hispanic had the lowest screening rates. According to an article in the Journal of Cancer Education, compared to other racial/ethnic groups, Korean, Filipino, and Vietnamese American women experience high incidence rates of cervical cancer and low rates of cervical cancer screenings.[23] The findings in Table 2 are also consistent with the North American Association of Cancer Registries data. [24]

Table 3: Cervical Cancer Screening (CCS) Rates by Setting CY 2013-CY 2018

Setting	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018
PCMH GP	72.6%	68.4%	64.6%	67.5%	67.0%	65.8%
FQHC	71.8%	69.4%	67.1%	68.3%	67.6%	66.6%
Non-PCMH Practices	71.6%	65.9%	64.1%	65.1%	64.5%	61.8%
Unattributed	56.5%	54.2%	51.2%	53.1%	50.2%	47.8%
Plan wide Rate	**66.9%**	**63.6%**	**61.5%**	**63.5%**	**62.0%**	**59.9%**

Table 3 shows the rates of cervical cancer screenings by setting and demonstrates that women who do not have a primary source of care (unattributed) are less likely to be screened than those who are

[22] https://www.medicaid.gov/medicaid/quality-of-care/downloads/adultbenchmarkreport.pdf. (2020). [online] Available at: https://www.medicaid.gov/medicaid/quality-of-care/downloads/adultbenchmarkreport.pdf [Accessed 3 Jan. 2020].

[23] Yoo, Grace J, et al. "Cervical Cancer Screening: Attitudes and Behaviors of Young Asian American Women." Journal of Cancer Education : the Official Journal of the American Association for Cancer Education, U.S. National Library of Medicine, Dec. 2011, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3880118/.

[24] "American Cancer Society: Cancer Facts & Statistics." American Cancer Society | Cancer Facts & Statistics, https://cancerstatisticscenter.cancer.org/?_ga=2.108191810.198983222.1575553312-142404415.1572963929#!/cancer-site/Cervix.

attributed to a practice. Across the six year study period, unattributed members are 29% less likely to meet the numerator criteria than all other settings combined. These findings are consistent with the research from a recent article regarding patterns and trends in cancer screenings which showed women with no usual source of care, or those with public insurance only, were less likely to report having had a recent screening.[25] Members who were attributed to Federally Qualified Health Centers (FQHCs) were the most likely to be screened compared to all other attribution groups in calendar years 2014 to 2018.

Exhibit 1: Unattributed Members Cervical Cancer Screening (CCS) Rates by Program CY 2013-CY 2018

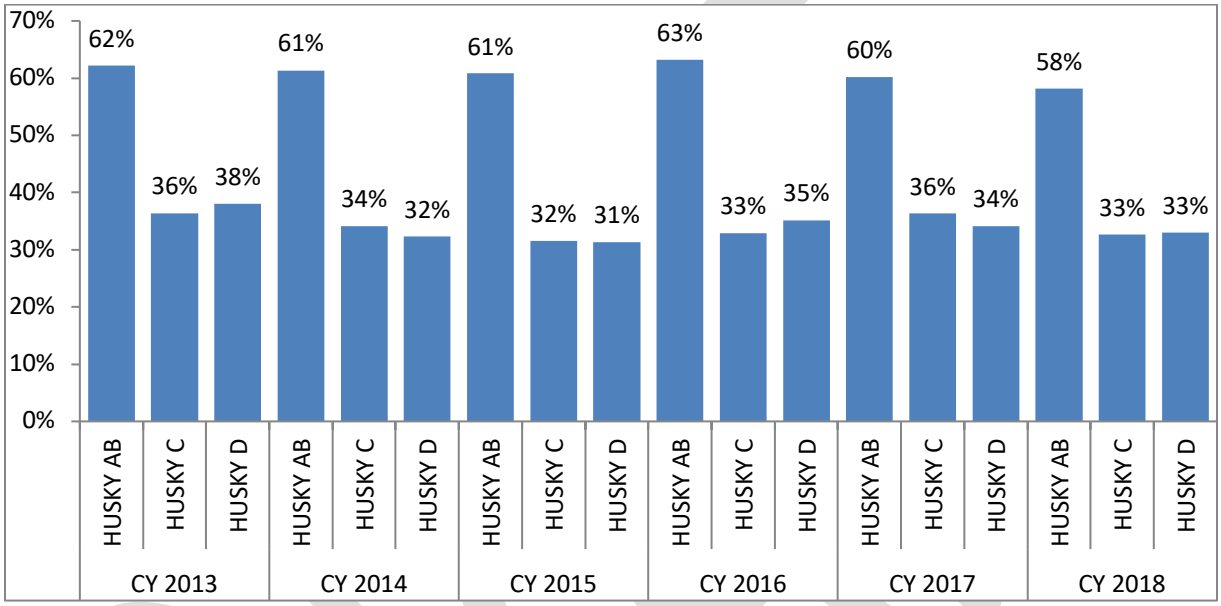


Exhibit 1 describes cervical cancer screening rates by program. HUSKY A/B is consistently higher and may be attributed to higher screening rates when women are of childbearing age with regular visits to an OB/GYN provider. Lower rates of screening noted in the HUSKY C and D groups may be age related and correlate to the data provided in Exhibit 2.

[25] Hall IJ, Tangka FK, Sabatino SA, Thompson TD, Graubard BI, Breen N. Patterns and Trends in Cancer Screening in the United States. Prev Chronic Dis 2018;15:170465. DOI: http://dx.doi.org/10.5888/pcd15.170465external icon.

Exhibit 2: Cervical Cancer Screening (CCS) Rates by Age Group CY 2013-CY 2018 Combined

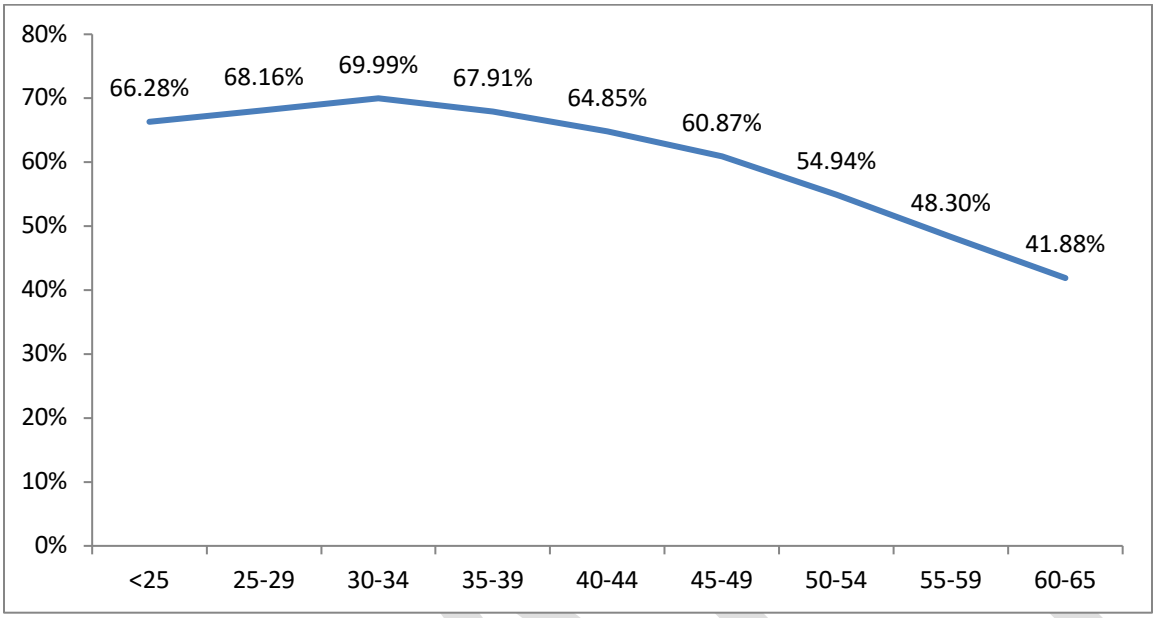


Exhibit 2 shows cervical cancer screenings by age and shows a decline for post-menopausal women. The highest rates, 66.28-69.99, are among women less than age 40 that would most likely be seen by a primary care or OB/GYN provider for routine care including cervical cancer screenings. A recent study also found that some women do not continue to get screened for cervical cancer as they get closer to 65 years old[26], which is seen in the HUSKY data with the lowest screening rate of 41.88% in those ages 60-65.

Methodology

A total of 247,349 unique members made up the CCS denominator over the course of a six year period between CY 2013 and CY 2018. Cervical cancer screening rates fluctuated over a six year period. The highest rate (66.9%) occurred in CY 2013 and the lowest rate (59.9%) occurred in CY 2018.

This study focuses on the 51,304 continuously eligible members who remained in the measure denominator for the entire six year period. In an effort to determine whether or not consistent adherence to the screening recommendations of the American Cancer Society[27] resulted in better health outcomes for individuals who developed cervical cancer, CHNCT developed three groups.

[26] White MC, Shoemaker ML, Benard VB. Cervical cancer screening and incidence by age: unmet needs near and after the stopping age for screening.external icon American Journal of Preventive Medicine 2017;53(3):392–395.
[27] http://www.cancer.org/cancer/cervical-cancer/prevention-and-early-detection/cervical-cancer-screening-guidelines.html

Table 4: Longitudinal Study Population Numerator Value Criteria

Study Group	2013	2014	2015	2016	2017	2018
Consistent Screens	1	2	3	4	5	6
Some Screens		1-2	1-3	1-4	1-5	1-6
No Screens	0	0	0	0	0	0

Table 4 is used to group members who developed cervical cancer in the following year in order to analyze the importance of adhering to the HEDIS measure and its effect on cervical cancer outcomes. The counts in Table 4 represent the number of times members met the HEDIS® CCS numerator criteria in each year leading up to their cancer diagnosis, and does not indicate the number of screening tests they had. The counts in Table 4 incorporate the three-year lookback period that is built into the CCS measure. CHNCT measured the number of members who met the recommended screening criteria up to the calendar year prior to the year in which the first cervical cancer diagnosis occurred. For example, an individual who developed cervical cancer on 5/10/2017 and had met the HEDIS® screening criteria requirements in 2013, 2014, and 2016 would be placed in the "Some Screens" group. A member who developed cervical cancer on 1/5/2016 and had met the HEDIS® screening requirements in 2013, 2014, and 2015 would be placed in the "Consistent Screens" group. A member who developed cervical cancer on 6/7/2017 and did not meet the HEDIS® screening requirements at all between 2013 and 2016 would be placed in the "No Screens" group.

In order to examine the differences among the three groups, CHNCT defined criteria for health outcomes that will be described and analyzed in the results section of this study: early vs late stage treatments, average cost of cervical cancer treatment, and malignant vs in-situ cases.

Malignant and In-Situ

CHNCT developed customized value sets using ICD 10 diagnosis codes for in-situ and malignant cervical cancer. The value set CHNCT used to calculate rates of in-situ and malignant cervical cancer cases can be found in the Appendix A. Using claims data, CHNCT classified members in an In-Situ or Malignant group based on the first diagnosis of cervical cancer recorded. The "CIS to Malignant" cohort shows the percentage of in-situ cases that progressed from in-situ to malignant over the course of the study period.

Early Stage Treatments

CHNCT developed customized value sets based on clinical research to determine which procedures are commonly performed in early stage cervical cancer treatments. These procedures include: the loop electrosurgical excision procedure (LEEP), conization, cautery, and excision. The corresponding value sets for each of these early stage treatments can be found in the Appendix B. Rates of early stage treatments were calculated across the study population.

Late Stage Treatments

CHNCT developed customized value sets based on clinical research to determine which procedures are commonly performed as part of late stage cervical cancer treatment. These procedures include: chemotherapy and radiation. No cases of trachelectomy or pelvic exenteration were noted in the claims data examined. The corresponding value sets for each of these late stage treatments can be found in the Appendix B. Rates of late stage treatments were calculated across the study population.

Hysterectomy

Hysterectomy may be an aged-based treatment option for cervical cancer rather than a stage-based option in order to maintain fertility and childbearing options in younger women. The value sets CHNCT used to identify a hysterectomy can be found in the Appendix B. Rates of hysterectomies were calculated across the study population.

Cost of Cervical Cancer Treatment

Using paid claims data, CHNCT identified all claims associated with the cervical cancer value set and calculated the total cost of all healthcare encounters with a cervical cancer diagnosis, categorized by who received what form of treatment. These paid amounts were then averaged across the established screening groups and among the treatment groups. All cost data included in this analysis required a cervical cancer diagnosis in any of the 12 diagnosis locations on a claim.

Cost of Treatment Types (LEEP, Conization, Cautery, Hysterectomy, Radiation, Chemotherapy)

CHNCT identified the claims associated with each of the treatments reflected in Appendix B. Using these data, the cost of each treatment type was calculated. The cost of treatment includes the line in the claim where the treatment occurred rather than the entire claim itself. This method aims to isolate the actual cost of each treatment given to members with cervical cancer.

Results/Discussion

CHNCT examined administrative claims data for women enrolled in the HUSKY Health Program from CY 2013 - CY 2018 to identify trends in how adherence with the HEDIS® cervical cancer screening measure impacts health outcomes for individuals who develop cervical cancer.

Consistent adherence to the frequency of screenings recommended in the HEDIS® CCS measure resulted in better health outcomes for women who develop cervical cancer.

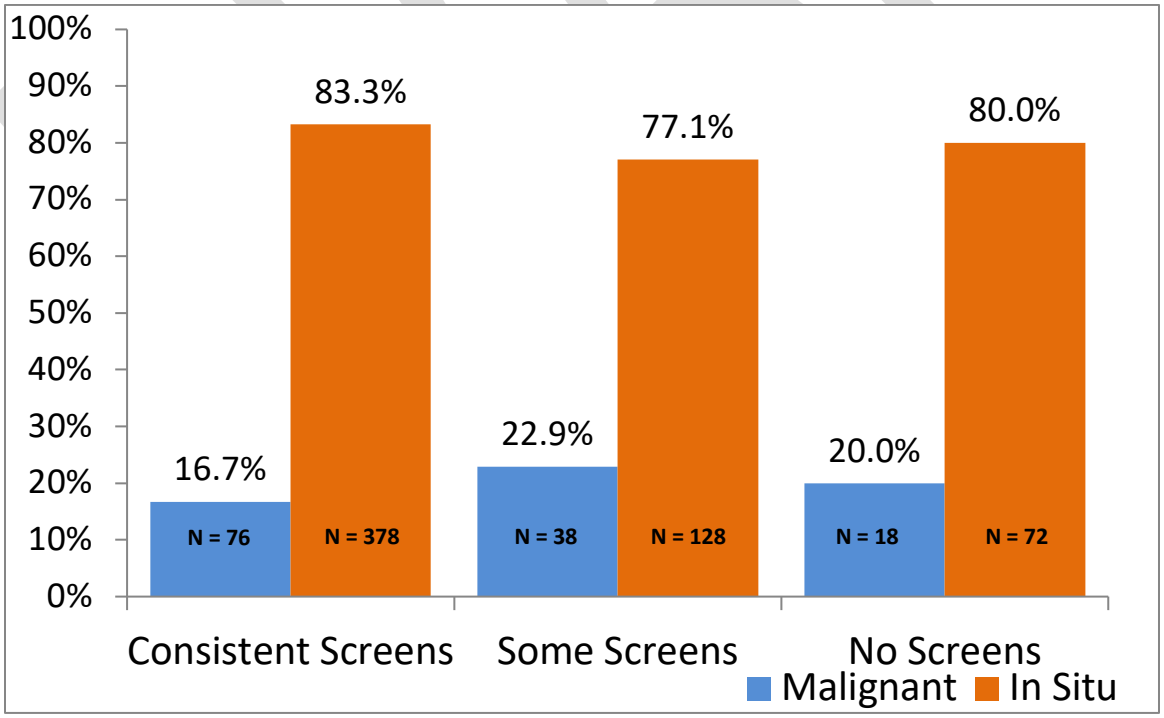
A total of 51,304 members were included in the CCS measure for six consecutive years between CY 2013 and CY 2018. These 51,304 members represent the baseline longitudinal study population.

Table 5: Member Counts - Cervical Cancer Cases by Calendar Year

Screening Group	2014	2015	2016	2017	2018	Total
Consistent Screens	138	104	85	77	50	454
Some Screens	0	33	43	44	46	166
No Screens	38	20	11	10	11	90
Total Cervical Cancer Cases	**176**	**157**	**139**	**131**	**107**	**710**

Of the 51,304 members who made up the longitudinal study population, CHNCT identified 710 women who developed cervical cancer between CY 2014 and CY 2018. Table 5 shows a simple count of members who developed cervical cancer during the study period and the group they belonged to, based on screening history. The majority (454, 64%) of members who developed cervical cancer during the study period met the recommended CCS screening frequency in all of the years leading up to their first cancer diagnosis. The percentage of members who were consistently screened in the later study years declined due to the criteria outlined in Table 4 becoming stricter as time goes on. Of the 710 members who developed cervical cancer, 90 (13%) did not meet the screening criteria in any year leading up to their first cancer diagnosis. The remaining 166 (23%) of the members who developed cervical cancer during the study period made up the some screens group.

Exhibit 3: Rate of Malignant and In-Situ Cervical Cancer Cases 2014-2018 Combined



Using claims data, CHNCT determined the first diagnosis reiceved for each member who developed cervical cancer. Exhibit 3 shows the rate of in-situ and the rate of malignant cancer cases among the study groups based on the first cervical cancer diagnosis. The study's hypothesis expected rates of in-situ cases to be higher in members who were in the consistent screens group. While the consistent screens group did show the lowest rates of malignant cancer, the differences in in-situ/malignant rates among the study groups are not statistically signficant.

Table 6: Odds Ratio of In-Situ and Malignant Cervical Cancer Cases 2014-2018 Combined

Study Group	Malignant / In-Situ Odds Ratio
Consistent Screens	20.0%
Some Screens	29.7%
No Screens	25.0%

Table 6 calculates the odds ratios of malignant cases vs in-situ cases in each study group, which represents the odds that a specific outcome will occur. When we compare the consistent screens group to the no screens group, the no screens group has a 25% higher chance of a malignant diagnosis compared to the consistent screens group.

Exhibit 4: Rates of In-Situ, Malignant, and In-Situ that Progressed to Malignant Cervical Cancer Cases 2013-2018 Combined

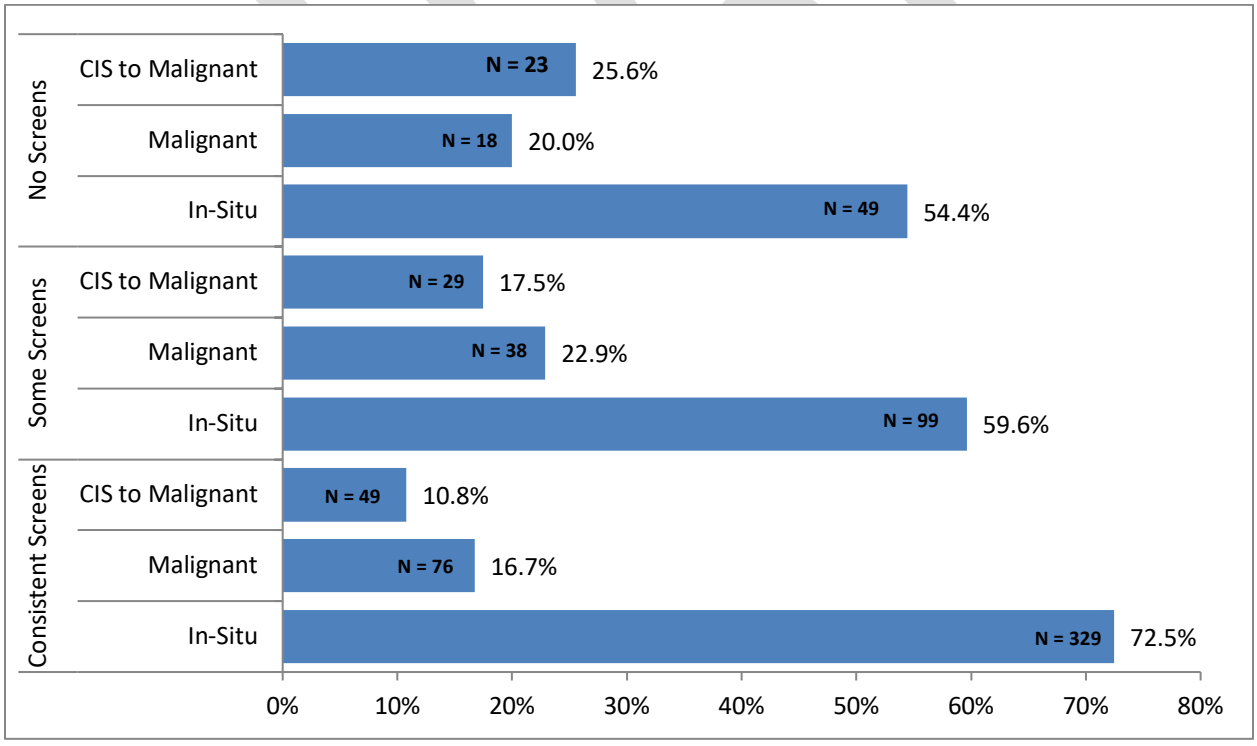
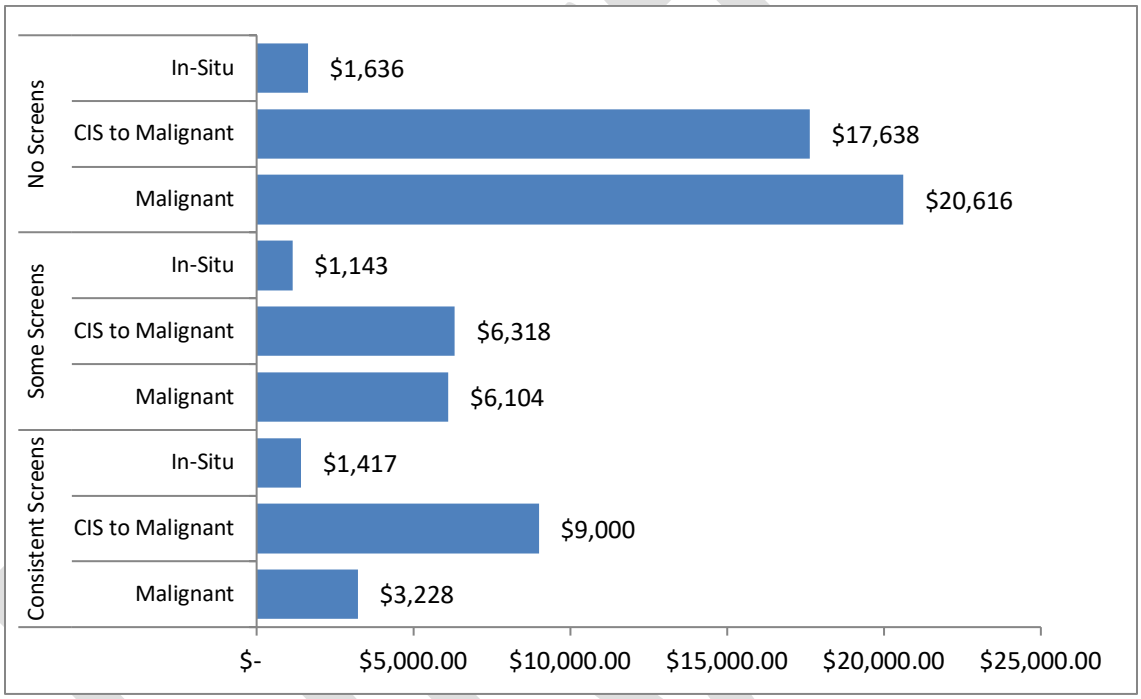


Exhibit 4 adds a cohort called “CIS to Malignant.” The CIS to Malignant cohort shows the percentage of in-situ cases that progressed from in-situ to malignant over the course of the study period. Members who were not screened at all had the highest rate (25.6%) of cases that progressed from in-situ to malignant. Members who received consistent screens experienced the lowest rate (16.74%) of malignant cases and the lowest rate of in-situ cases that progressed to malignant (10.79%). The some screens group’s rate of cases that progressed from in-situ to malignant was 17.47%, 62% higher than the consistent screens group.

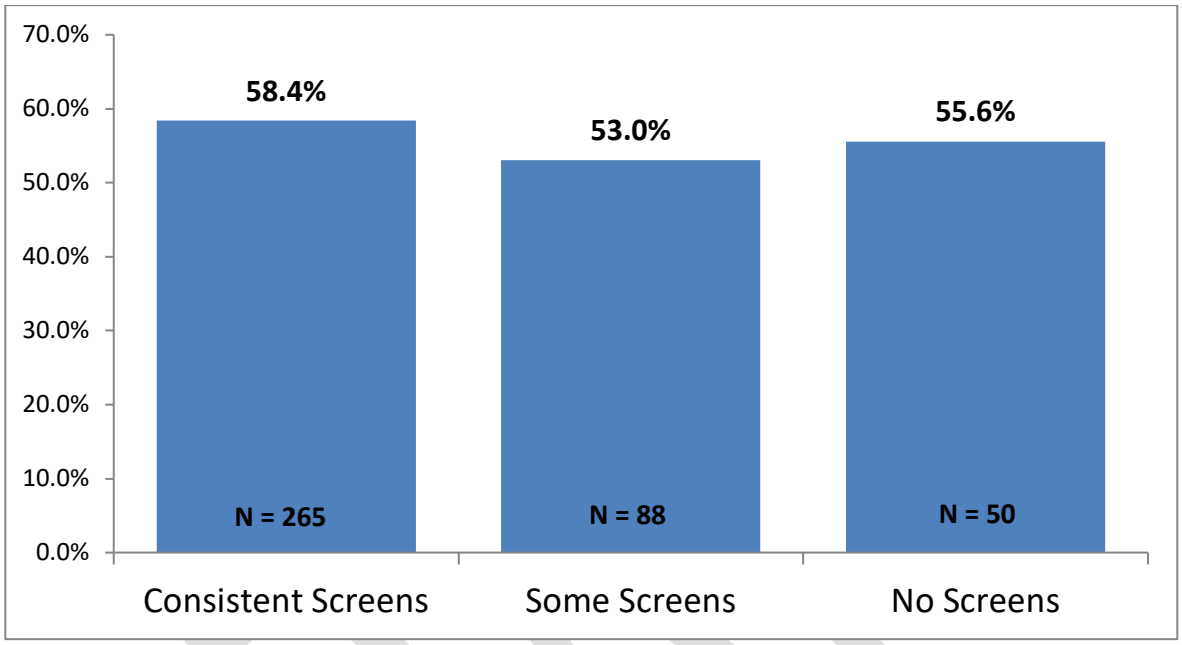
Exhibit 5: Average Per Member Cost of In-Situ, Malignant, and In-Situ that Progressed to Malignant Cervical Cancer Cases 2013-2018 Combined



The cost of treating cervical cancer differed greatly depending cervical cancer diagnosis. The costs shown in Exhibit 5 sum up all claims that had a cervical cancer diagnosis in each case and divides that figure over the number of cases in each cohort to show the average cost of treatment per member. The overall average cost of treating cervical cancer where the first diagnosis was an in-situ diagnosis was $1,417 in the consistent screens group, $1,143 in the some screens group, and $1,636 in the no screens group. Overall, the cost of treating an in-situ case was $1,382. The cost of treating a cervical cancer case that was first diagnosed as malignant was higher than the in-situ cases. In the consistent screens group, the average cost of treating a malignant case was $3,228. Treatment of malignant cases in the some screens group cost $6,104 on average. In the no screens group, the cost of treating a malignant cervical cancer case was $20,616. The cost of treating a cervical cancer case that was discovered at a malignant stage in the no screens group was $6,427. Cases that started off as in-situ and progressed to malignant exhibited high costs in each of the three study groups. The cost of treatment for these cases was $9,000

in the consistent screens group. The cost of treating an in-situ case that progressed to malignant for members in the some screens group was $6,318 on average and was $17,638 for members who received no screens.

Exhibit 6: Percent of Members with Cervical Cancer Receiving Early Stage Treatments 2014-2018 Combined



Additionally, CHNCT examined the rates of early stage treatments among the 710 members who developed cervical cancer in the study population. Early stage treatments included the loop electrosurgical excision procedure (LEEP), conization, cautery, and excision.

CHNCT hypothesized that a percentage of individuals who were consistently screened would show higher rates of early stage treatments when compared to the other two study groups. While the consistent screen group did show the highest percentage of members who received an early stage treatment, there were no statisticaly significant differences in early stage treatment rates among the three groups. In each of the three groups, early stage treatments were used to treat cervical cancer in more than half of the cases.

Table 7: Percent of Members Receiving Early Stage Treatments by Treatment Type 2014-2018 Combined

Screening Group	LEEP	Conization	Cautery	Multiple Early Stage Treatments
Consistent Screens	11.0%	48.2%	2.9%	3.7%
Some Screens	7.8%	48.2%	1.8%	4.8%
No Screens	7.8%	51.1%	0.0%	3.3%
Overall	**9.9%**	**48.6%**	**2.3%**	**3.9%**

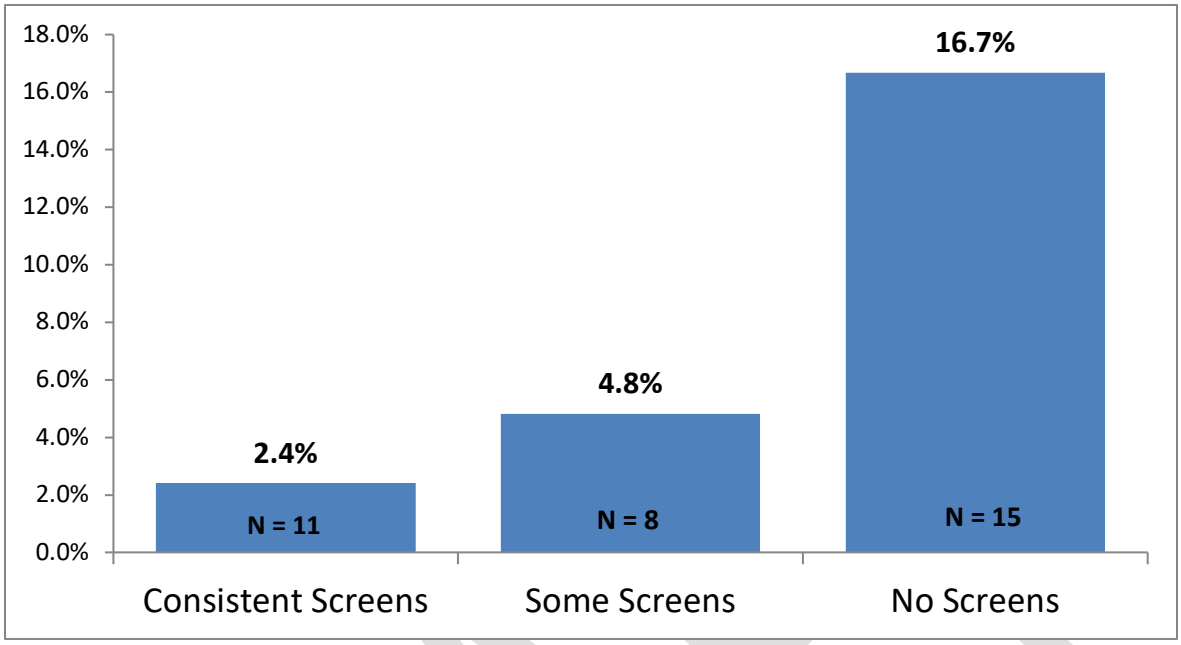
Conizations were the most common form of cervical cancer treatment across each study group, most commonly used in the no screens group, where just over 51% of all cases received a conization. Of the 710 members in the study, 345 (48.6%) recieved a conization procedure as treatment for cervical cancer. LEEP procedures were most common in the consistent screens group, where 11% (50) 454 consistent screen members received the treatment. The cautery procedure was the least common early stage treatment of the three, where 2.3% of the study population received the treatment. There were 28 (3.9%) members who received multiple forms of early stage treatments.

Table 8: Percent of Members Receiving Early Stage Treatments by Treatment Type 2014-2018 Combined

Cautery	
Office	$ 273.00
On Campus-Outpatient Hospital	$ 2,638.19
Average Cost	**$ 864.61**
Conization	
Ambulatory Surgical Center	$ 1,062.07
Inpatient Hospital	$ 1,776.35
Off Campus-Outpatient Hospital	$ 2,480.96
Office	$ 194.81
On Campus-Outpatient Hospital	$ 1,726.52
Other Place of Service	$ 545.16
Average Cost	**$ 1,564.48**
LEEP	
Inpatient Hospital	$ 2,260.06
Office	$ 330.19
On Campus-Outpatient Hospital	$ 791.22
Average Cost	**$ 903.59**

The cost of early stage cervical cancer treatments varied greatly depending on the place of service that the procedure was administered. The overall average cost of a cautery was $864.61 over the course of the study period. Cauteries were much more expensive when conducted in the “On-Campus Outpatient Hospital” when compared to the “Office” place of service. Conizations and LEEP procedures followed the same pattern, where the cost of the procedure was significantly lower in the “Office” setting.

Exhibit 7: Rate of Members with Cervical Cancer Who Received Late Stage Treatments 2014-2018



CHNCT examined the rates of late stage treatments among the 710 members who developed cervical cancer in the study population. The corresponding value sets for each of the late stage treatments can be found in Appendix B.

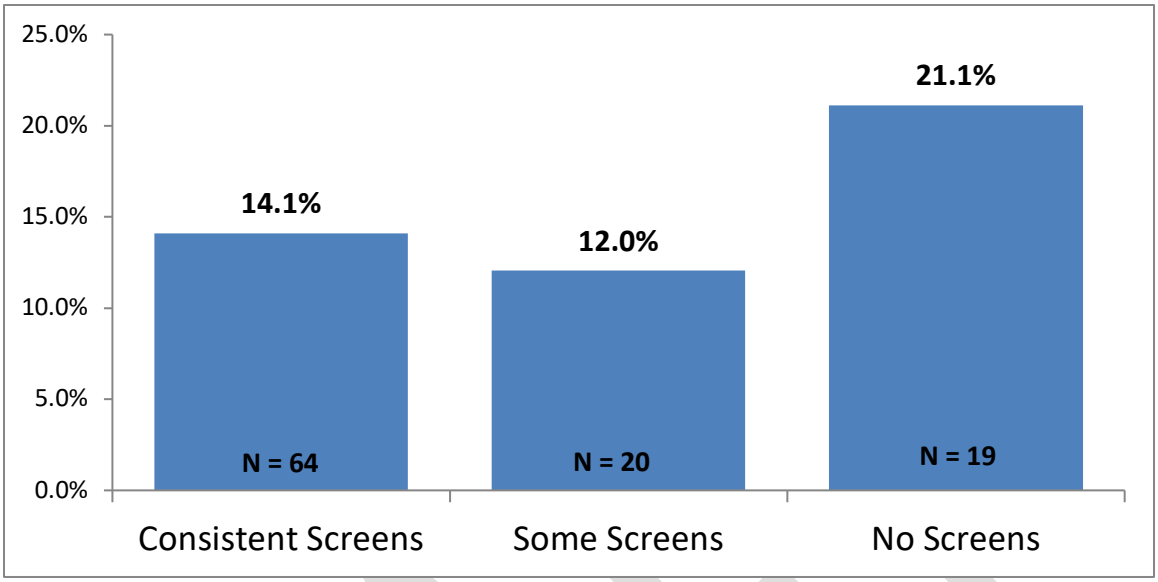
Of the 454 cervical cancer members who were consistently screened leading up to their cervical cancer diagnosis, only 11 (2.4%) ended up receiving late stage treatments. Members who received some screens prior to their cervical cancer diagnosis were slightly more likely to receive late stage treatments, with 4.8% (8) members receiving late stage treatments. The most profound results came in the members who were not screened at all leading up to their cervical cancer diagnosis. Nearly 17% (15) of the 90 members in the no screens cohort received some form of late stage cervical cancer treatments. In each study group, late stage treatments were most commonly used on patients whose first diagnosis was malignant diagnosis, followed by cases that progressed from in-situ to malignant.

Table 9: Late Stage Treatment Metrics by Screening Group 2014-2018 Combined

Radiation				
Screening Group	**Member Count**	**Percent of Study Group**	**Average Number of Encounters**	**Average Cost per Member**
Consistent Screens	6	1.3%	18.71	$ 4,144.53
Some Screens	5	3.0%	7.86	$ 1,842.64
No Screens	12	13.3%	4.83	$ 2,094.05
Grand Total	**23**	**3.2%**	**9.38**	**$ 2,578.42**
Chemotherapy				
Screening Group	**Member Count**	**Percent of Study Group**	**Average Number of Encounters**	**Average Cost per Member**
Consistent Screens	7	1.5%	30.67	$ 11,692.41
Some Screens	7	4.2%	34.00	$ 13,579.54
No Screens	12	13.3%	40.58	$ 17,430.24
Grand Total	**26**	**3.7%**	**36.57**	**$ 15,096.31**

Table 9 reviews the actual cost of late stage treatments among the three study groups. The two late stage treatment types CHNCT analyzed were radiation and chemotherapy. Overall, 3.2% (23) of the 710 members received radiation and 3.7% (26) received chemotherapy to treat cervical cancer. Radiation and chemotherapy were more common in the no screens group than the other two study groups. The no screens group had a lower number of radiation encounters per member than the other two groups. Members in the consistently screened group had a larger number of encouters than the other two groups which lead to higher costs. Chemotherapy overall is a much more costly treatment for members who developed cervical cancer compared to radiation treatment. This is likely due to radiation being used as a modality for locally invasive tumors, while chemotherapy is used for distant metastatic disease.

Exhibit 8: Percentage of Members with Cervical Cancer Who Received Hysterectomy 2014-2018 Combined



Hysterectomy is widely considered to be an aged based treatment option for cervical cancer rather than a stage-based option in order to maintain fertility and childbearing options in younger women. The average age of each cohort is presented in the table below.

Table 10: Average Age of Members with Cervical Cancer Who Received Hysterectomy 2014-2018 Combined

Screen Group	Average Age
Consistent Screens	35.50
Some Screens	38.52
No Screens	37.38
All CC Members	**36.39**

There is no apparent correlation between the rates of hysterectomy in each study group and the average age. Of the hysterectomy cases, 43% were conducted in in-situ cases, 39% were conducted in cases where an in-situ initial diagnosis progressed to malignant, and 18% were conducted in malignant cases. In order to truly understand the rates of hysterectomies among each cohort, each individual case would need to be reviewed.

Limitations

Although an advantage of the current Medicaid Administrative Services Organization (ASO) model is a unified set of claims data for dates of service 1/1/2011 and forward, the absence of a state wide database housing claims from all payers (HUSKY Health, commercial and Medicare) hinders the ability to access all testing data when members change coverage between HUSKY Health, a commercial carrier and Medicare. To mitigate the possibility of missing screening data, the CCS measure is reported to NCQA as a hybrid rate, which allows for medical record abstraction of a randomly selected, statistically significant cohort of members for evidence of past screenings. Another important data limitation is the reliance on coding accuracy from the provider community. The study's cervical cancer population is determined by ICD 10 coding on claims. In addition, treatment costs associated with cervical cancer rely on accurate coding from providers to capture the cost of care. In some instances, there may have been costs associated with cervical cancer treatment that were not coded correctly and therefore excluded from the analysis. A small N (710) of cervical cancer patients is an inherent limitation. As the study population was broken down into smaller groups, it became impossible to test for statistical significance in certain figures.

Conclusion

This longitudinal review of data on cervical cancer screening in the HUSKY Health population suggests that women who receive a pap smear/HPV testing may be more likely to have better health outcomes and lower costs of care.

The total number of women who were found to have cervical cancer after having consistent screens was 454 versus the 90 who had no screens, suggesting that screening is indeed effective in early detection. Of members diagnosed with cancer, those who were screened-83%, were In-situ with the lowest number of malignancies being 16.7%. The number of women receiving early stage treatments was similar for all three groups but late stage treatments for those who were not screened was 16.7% compared to those who were consistently screened at only 2.4%. Women who were not screened, or only had some screening, were more likely to be diagnosed with malignant cancer leading to hysterectomies and later stage treatments which are more costly. There were two members of the 710 in the study who died, both occurring in CY 2019. The actual cause of death for these two members is unknown.

Women who did not have a primary source of care and those who were beyond childbearing age were least likely to be screened for cervical cancer which could lead to a later diagnosis, an increase in late stage treatments, increased costs of care, and overall poorer health outcomes. Additional information outside of claims data would be necessary, along with a larger cohort population, to validate these findings. The ability to identify the stage of the cervical cancer and specific costs associated with treating the disease through medical record review would be necessary to attribute the true cost of cervical cancer in the population.

A recent study suggests that widespread coverage of both HPV vaccination and cervical screening from 2020 onwards has the potential to avert up to 12·5–13·4 million cervical cancer cases by 2069, and could achieve average cervical cancer incidence of around four per 100 000 women per year or less, for all country Human Development Index categories, by the end of the century.[28]

As demonstrated in figure 3, the cervical cancer screening rate for members attributed to Non-PCMH practices and those who are unattributed was lowest in calendar year 2018. Low screening rates in these two categories contributed to the overall decline in cervical cancer screening rates in HUSKY members. CHNCT anticipates that initiatives to improve attribution rates and convert Non-PCMH practices to PCMH will improve overall preventive screening rates.

This study can be used as a means to inform targeted approaches for members who are less likely to be screened as recommended. CHNCT continues its efforts to positively impact the health outcomes of its members and improve the HEDIS® rates through multiple interventions aimed at increasing cervical cancer screening rates as well as HPV vaccine promotion.

Appendix

A. 
CCS Study Value Set.xlsx

B. 
Treatment Value Set.xlsx

[28] Simms, Kate T, et al. "Impact of Scaled up Human Papillomavirus Vaccination and Cervical Screening and the Potential for Global Elimination of Cervical Cancer in 181 Countries, 2020-99: a Modelling Study." Lancet Oncol, vol. 20, Mar. 2019, pp. 394–407.

The Impact of Consistent Use of Asthma Controller Medications on Inpatient Stays, Emergency Department Visits, and Total Cost of Care in the HUSKY Population – A Longitudinal Study

Contents

Introduction

Asthma in the United States is a highly prevalent and costly disease. According to the Centers for Disease Control and Prevention (CDC), 1 in 13 people have asthma, which is more than 25 million Americans. This represents 7.7 percent of adults and 8.4 percent of children. Asthma has been increasing since the early 1980s in all age, sex and racial groups.[1] A study in the Annals of the American Thoracic Society published in 2018 estimated the annual costs of asthma to the US economy to be more than $80 Billion based on a review of data from 2008 through 2013. This $80 billion figure included asthma-related medical expenses, days missed from work and school due to asthma, and years of life lost due to asthma-related deaths. This study also showed that about 15.5 million had treated asthma, meaning that about 1 in 3 persons with current asthma had no asthma-related encounter with a medical provider or pharmacy in that year. [2]

Adherence to prescribed therapies establishes improved asthma control and consequently a better quality of life.[3] A 2015 study showed that higher levels of adherence were associated with a reduced risk of severe asthma exacerbations.[4] There was a definite relationship between consistent use of long-term controller medication and short-acting beta2-agonists. Increased short-acting beta2-agonist use was a predictor of increased oral corticosteroid use, which indicates poor asthma control.[5]

Socioeconomic status has an impact on the prevalence of asthma in large patient populations. Studies show that asthma is more common among individuals living below the poverty line. On average, annual healthcare costs for individuals with an asthma diagnosis are more than twice as high as those without an asthma diagnosis.

The CDC, in their most recent asthma data for calendar year 2017, show more than 299,000 people with asthma in the state of Connecticut, representing 10.7% of all residents.[6] The Connecticut State Department of Public Health (DPH) shows that in 2018 there were 290,300 adults and 62,400 children with asthma.[7] HUSKY Health data show that in 2018, there were 59,057 adults and 40,801 children under the age of 18 with a diagnosis of asthma; this means that in the state of Connecticut, the HUSKY Health program covers 20.3% of the adults, and 65.3% of the children with asthma.

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[1] CDC.gov. (2018). CDC - Asthma - Data and Surveillance - Asthma Surveillance Data. [online] Available at: http://www.cdc.gov/asthma/asthmadata.htm

[2] Nurmagambetov, T., Kuwahara, R., and Garbe, P. The Economic Burden of Asthma in the United States, 2008-2013. Supported by the Centers for Disease Control and Prevention. Retrieved from https://www.atsjournals.org/doi/pdf/10.1513/AnnalsATS.201703-259OC

[3] Hossny E, Caraballo L, Casale T, El-Gamal Y, Rosenwasser L. Severe asthma and quality of life. *World Allergy Organ J*. 2017;10(1):28. Published 2017 Aug 21. doi:10.1186/s40413-017-0159-y

[4] Marjolein Engelkes, Hettie M. Janssens, Johan C. de Jongste, Miriam C.J.M. Sturkenboom, Katia M.C. Verhamme (2015). Medication adherence and the risk of severe asthma exacerbations: a systematic review. European Respiratory Journal 2015 45: 396-407; **DOI:** 10.1183/09031936.00075614

[5] Makhinova T[1], Barner JC, Richards KM, Rascati KL. (2015). Asthma Controller Medication Adherehce, Risk of Exacerbation, and Use of Rescue Agents Among Texas Medicaid Patients with Persistent Asthma. J Manag Care Spec Pharm, 2015 Dec;21(12):1124-32.

[6] https://www.cdc.gov/asthma/most_recent_data_states.htm

[7] https://portal.ct.gov/DPH/Health-Education-Management--Surveillance/Asthma/Asthma-Statistics

DPH data shows the rates of asthma-related emergency room visits and hospitalizations dropped in many Connecticut communities. Overall, 58 percent of communities saw a decrease in the age-adjusted rate of emergency room visits, while 63 percent saw a decrease in the rate of hospitalizations for asthma, according to a C-HIT analysis of the data. Some 36 percent saw improvement in both areas. Meanwhile, the state's overall rate for emergency room visits in 2014 was lower than recent years but still was higher than it was 10 years ago. The state's cities continue to have high rates of hospitalizations and emergency room visits for asthma. The data compares age-adjusted rates for each town for 2005-2009 and for 2010-2014 per 10,000 people.[8]

Purpose/Hypothesis

Measuring consistent use of asthma medications has been adopted by the National Committee on Quality Assurance (NCQA) as part of the Healthcare Effectiveness Data and Information Set (HEDIS®).[9] The Asthma Medication Ratio (AMR) measure reports rates of ratios between rescue medications, usually short acting inhaled beta agonists, to controller medications such as inhaled corticosteroids. The Medication Management for People with Asthma (MMA) measure reports for those members who were identified as having persistent asthma, the rate of proportion of days covered (PDC) by a prescription asthma controller medication for at least 50% or at least 75% during the measurement period, or the HEDIS® year. In this longitudinal study, Community Health Network of Connecticut, Inc. (CHNCT) set out to examine the impact of consistent use of asthma controller medications in the HUSKY Health Program in terms of inpatient (IP) hospital and emergency department (ED) use as well as cost of care associated with a diagnosis asthma. CHNCT hypothesizes that consistent use of a controller medication regimen will result in fewer ED visits and IP stays, which will lower overall cost of care, sustained over time.

Methodology

MMA Population

CHNCT established an initial study population using members in the HEDIS® Medication Management for People with Asthma (MMA) measure denominator in calendar years 2015 through 2018. Members included in the MMA measure are aged between 5 and 64 diagnosed with persistent asthma, and must have been continuously enrolled during the measurement year and the year prior to the measurement year. This resulted in 33,508 unique members included in the MMA measure in calendar years 2015 through 2018. Continuous enrollment for 11 months was required for inclusion in any one year, but was not required year to year.

The MMA measure specifications break out the patient population into three patient populations, described in the definitions below.

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[8] Gil, Jodie. "Asthma ER Visits And Hospitalizations Drop In Many Communities - Connecticut Health Investigative Team". Connecticut Health Investigative Team, 2020, http://c-hit.org/2016/09/14/asthma-er-visits-and-hospitalizations-drop-in-many-communities/.

[9] The Healthcare Effectiveness Data and Information Set (HEDIS®) is a registered trademark of NCQA.

- **Group A –** Percent of members who achieved a PDC of at least 75% for their asthma controller medications during the measurement period. A higher rate indicates better performance.
- **Group B –** Percent of members who achieved a PDC of at least 50% for their asthma controller medication- during the measurement period. A lower rate indicates better performance.
- **Group C –** Percent of members who achieved a PDC between 50% and 75% for their asthma controller medication during the measurement period.

CHNCT's study examined health outcomes for Group A and Group B outlined above. In each calendar year from 2015 through 2018, asthma-related inpatient admissions per 1,000 members and asthma-related ED visits per 1,000 members were calculated for Group A and Group B; and total cost of care per member per month rates were calculated for each of the three groups.

Study Population

CHNCT established a study population which required four years of continuous enrollment, as well as inclusion in the MMA measure denominator for HEDIS® reporting in calendar years 2015 through 2018. Of the 33,508 unique members included in the MMA measure in calendar years 2015 through 2018, 4,578 were in the measure denominator for all four years.

In an effort to analyze the effects of consistent use of asthma controller medications on health outcomes, CHNCT established three groups for the study population.

- **Study Group A –** Percent of members who achieved a PDC of at least 75% for their asthma controller medications during the measurement period in four consecutive years from CY 2015 through CY 2018. A higher rate indicates better performance.
- **Study Group B** – Percent of members who achieved a PDC of at least 50% for their asthma controller medications during the measurement period for four consecutive years from CY 2015 through CY 2018. A lower rate indicates better performance.
- **Study Group C** – Percent of members who achieved a variable PDC for the measurement period for four consecutive years from CY 2015 through CY 2018.

Limitations

Inclusion in the HEDIS® MMA measure numerator is determined by dispensing of asthma controller medications to adequately cover the time period between the initial (index) prescribing event during the measurement year and the end of that calendar year. There are limitations to the MMA specifications for a number of reasons. First, the measure potentially penalizes the appropriate step-down of well controlled asthma patients to lower doses of controller medication as recommended by Expert Panel Report 3 guidelines.[10] This measure may also include members whose providers use evidence-based

[10] Crans Yoon A, Crawford W, Sheikh J, Nakahiro R, Gong A, Schatz M. 2015. The HEDIS Medication Management for People with Asthma Measure is Not Related to Improved Asthma Outcomes. J Allergy Clin Immunol Pract. 2015 Jul-Aug;3(4):547-52. doi: 10.1016/j.jaip.2015.02.002. Epub 2015 Mar 7. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/25758917

guidelines to treat patients with seasonal asthma or viral-induced asthma exacerbations but have accrued enough utilization to meet the HEDIS® criteria for persistent asthma. The time period used to determine inclusion in the MMA measure numerator is another general limitation of using this measure to segment members into groups. Another limitation of the study is that the criteria are solely based on dispensed medication. There is no mechanism to identify whether or not the medication was consumed appropriately, or at all. Because members in Group C in the MMA and Longitudinal Study groups had variable performance throughout the study years, the data related to IP and ED rates is volatile and is largely not interpretable. Therefore this group is excluded from analysis.

Beginning in late 2017 and continuing into 2018, CHNCT saw an increase in denied pharmacy claims. Denied claims do not necessarily indicate that a member did not receive a medication, and these claims were included in the calculation of the rates for the pharmacy related HEDIS® measures in preceding measurement years. Discussions were held with DSS to discover payment changes that may have impacted the processing of claims and could have led to increased denials; however, no clear reason has been identified. Due to the large number of denied claims, and the year over year increase in denied claims volumes, CHNCT's NCQA certified HEDIS® auditors instructed CHNCT to remove the denied claims from the rate calculation on these measures. The MMA measure was impacted as a result of this change, where the overall medication compliance 75% rate decreased by about 7.5%. This impacted the 2018 rates reported in this study.

Another data limitation is the relatively small number of inpatient admissions related to asthma within the MMA study population. With a small N, a small change in the number of inpatient admissions related to asthma in a given year can cause a significant change in rate.

In the longitudinal study population, Study Group B had a very small N of 147 members. When CHNCT examined utilization metrics within this population, a small number of encounters caused a significant change in metric. The small N in study Group B is an inherent limitation.

Results/Discussion MMA Population

Table 1: Total* MMA Population by Group and Calendar Year

MMA Group	2015	2016	2017	2018**
Group A	6,080 (39.03%)	6,629 (44.41%)	8,043 (47.30%)	7,189 (44.20%)
Group B	5,747 (36.90%)	4,863 (32.58%)	5,171 (30.41%)	5,349 (32.89%)
Group C	3,749 (24.07%)	3,434 (23.01%)	3,791 (22.29%)	3,726 (22.91%)

*Members aged 5-64

**Exclusion of denied pharmacy claims negatively impacted 2018 MMA Rate

The number of members in CHNCT's MMA population fluctuated over the course of the study period. The largest population in each period was represented by members in Group A. In all four years, less than one quarter of the members in the MMA denominator was included in Group C. In CY 2015, over one third of the members in the MMA denominator were included in Group B. The rate of members in

Group B then fell below one third of the MMA population in each year between CY 2016 and CY 2018. For the purposes of this study the pediatric MMA population includes members from five to nineteen years of age.

Table 2: Pediatric* MMA Population by Group and Calendar Year

MMA Group	2015	2016	2017	2018**
Group A	2,783 (33.76%)	2,922 (38.76%)	3,479 (41.27%)	2,788 (36.59%)
Group B	3,431 (41.62%)	2,792 (37.04%)	2,950 (35.00%)	3,006 (39.45%)
Group C	2,030 (24.62%)	1,824 (24.20%)	2,000 (23.73%)	1,825 (23.95%)

*Members aged 5-19
**Exclusion of denied pharmacy claims negatively impacted 2018 MMA Rate

Table 3: Adult* MMA Population by Group and Calendar Year

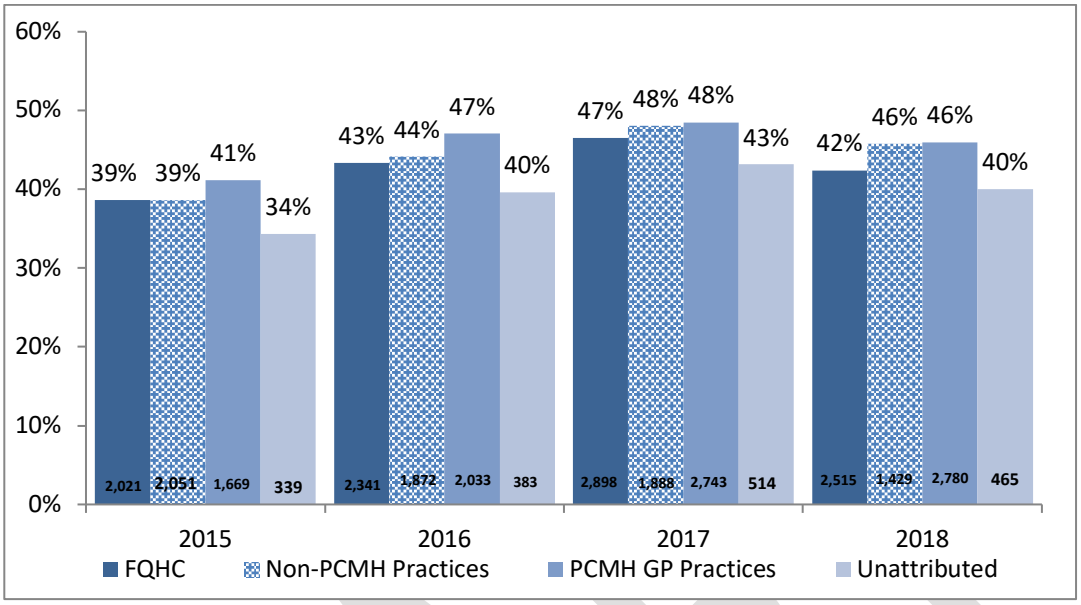
MMA Group	2015	2016	2017	2018**
Group A	3,297 (44.97%)	3,707 (50.18%)	4,564 (53.22%)	4,401 (50.91%)
Group B	2,316 (31.59%)	2,071 (28.03%)	2,221 (25.90%)	2,343 (27.10%)
Group C	1,719 (23.45%)	1,610 (21.79%)	1,791 (20.88%)	1,901 (21.99%)

*Members aged 20-64
**Exclusion of denied pharmacy claims negatively impacted 2018 MMA Rate

In Group A, pediatric members had lower rates than adult members in all of the years, but showed improvement between 2015 and 2017. Rates in 2018 are not comparable, due to the exclusion of denied pharmacy claims as explained in the Limitations section of this document.

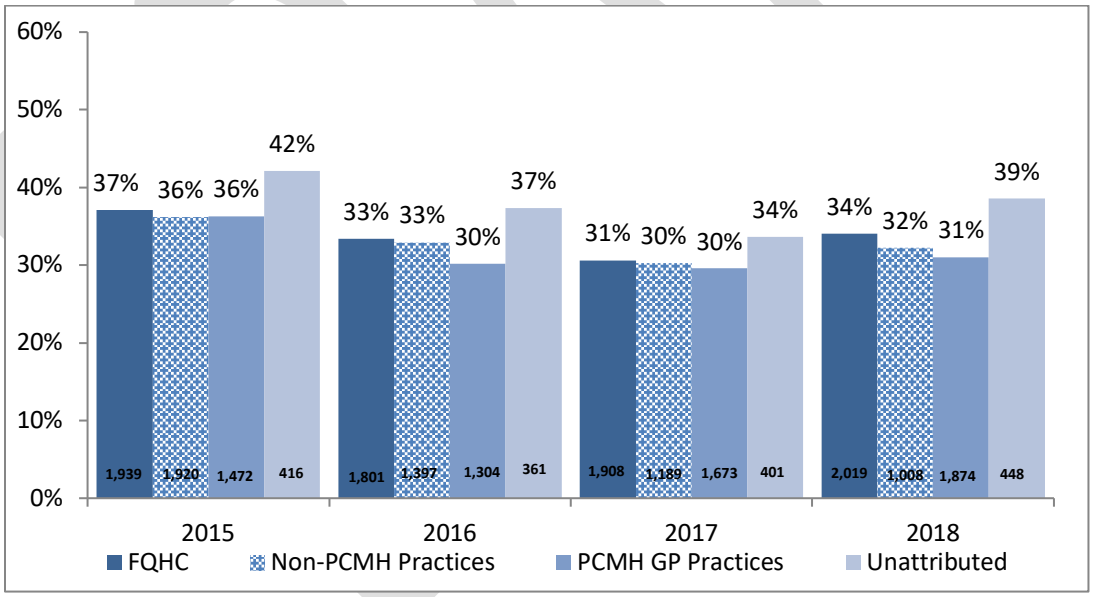
The rates for the MMA measure were reviewed by practice setting in Exhibits 4-5. The data are broken out by Federally Qualified Health Centers (FQHC), Person-Centered Medical Homes (PCMH) and Glide Path (GP) practices, non-PCMH practices, and unattributed members.

Exhibit 4: MMA Rates – Group A* by Practice Setting



*Higher rate indicates better result

Exhibit 5: MMA Rates – Group B* by Practice Setting

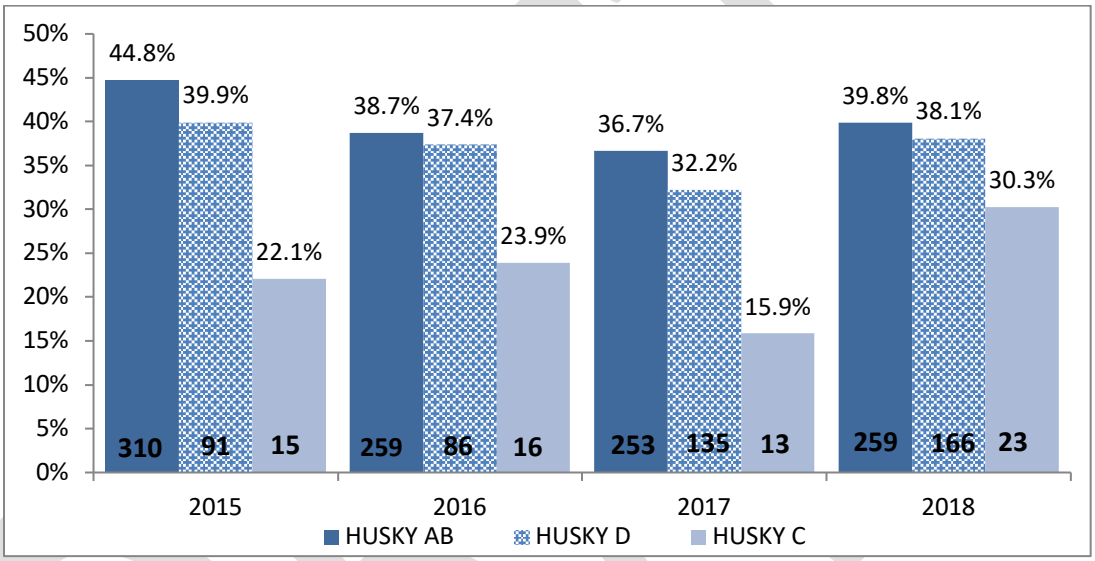


*Lower rate indicates better result

The unattributed group had lower percentage of members in Group A than all other practice settings. This trend was consistent in every year shown in Exhibit 4. PCMH and GP practices were combined in this representation of the MMA data in Exhibits 4-5. PCMH and GP practices had the highest rate in Group A in all four years of the study. In CY 2017 and CY 2018, the rate for non-PCMH practices in Group A was nearly equal to PCMH and GP practices. Compared to PCMH and GP Practices and non-PCMH Practices, FQHCs had lower rates in Group A in each of the four years presented. Exhibit 5 shows that the unattributed population had the highest rate in Group B.

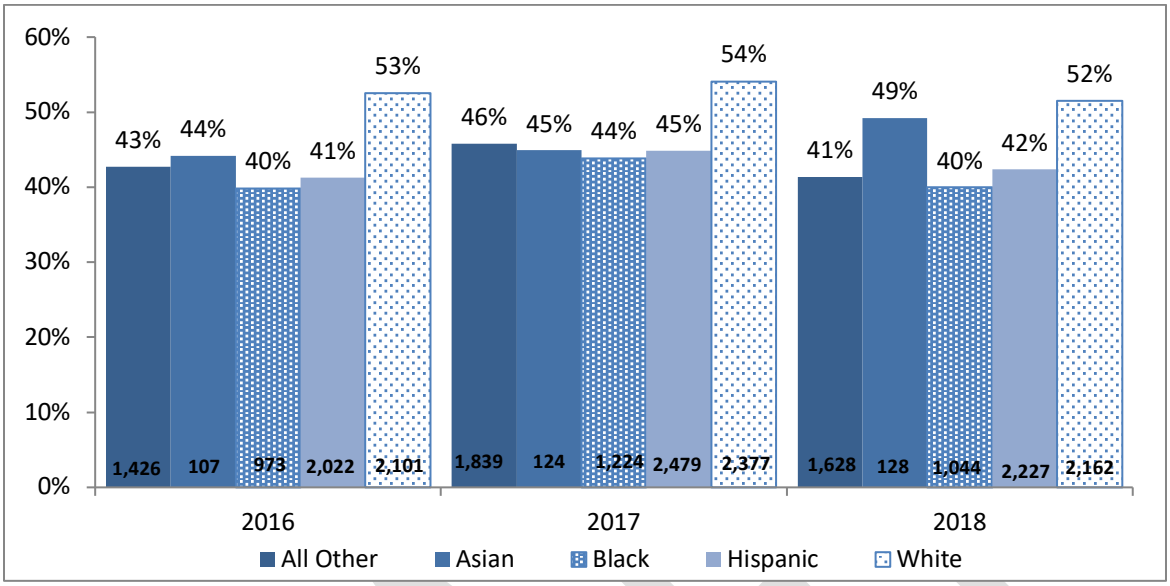
Exhibit 6 shows a breakdown of rates for the unattributed members in Group B by program.

Exhibit 6: MMA Rates – Unattributed Members Group B by Program



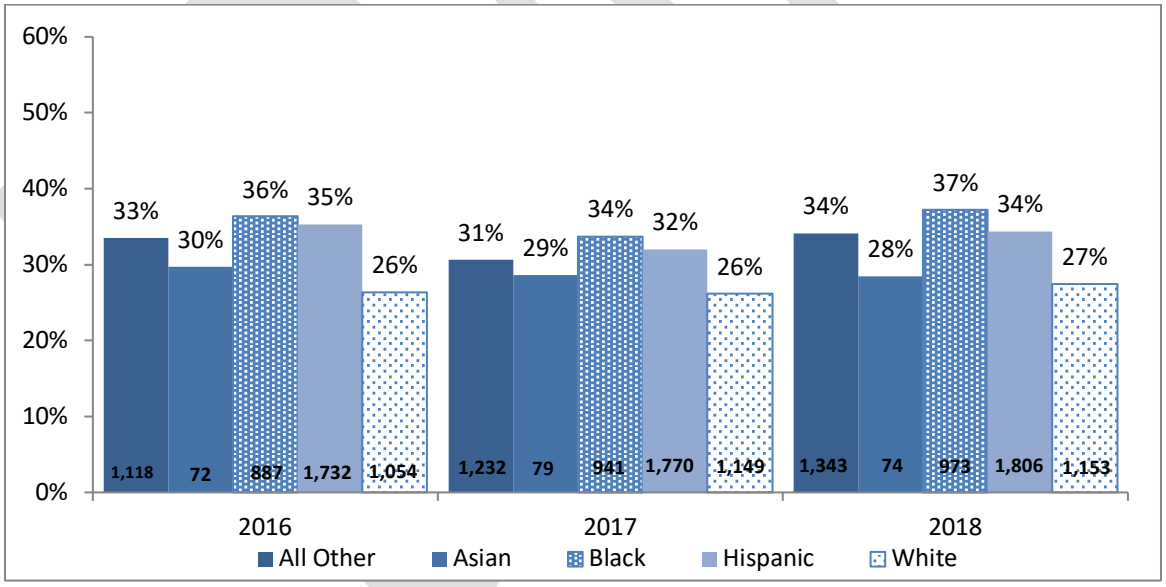
The rate of unattributed members who were in Group B was largest in the HUSKY AB population, closely followed by HUSKY D. HUSKY C had the lowest rate of unattributed members in Group B as compared to other programs. In 2015, nearly 45% of unattributed members in HUSKY AB were in Group B. The rate decreased in CY 2016 and CY 2017, followed by a slight increase from 36.7% to 39.8% from CY 2017 to CY 2018.

Exhibit 7: MMA Rates – Group A* by Race/Ethnicity



*Higher rate indicates better result

Exhibit 8: MMA Rates – Group B* by Race/Ethnicity



*Lower rate indicates better result

Exhibits 7 and 8 examine the MMA data in an effort to identify differences in the three MMA groups by race/ethnicity. CHNCT removed CY 2015 from Exhibits 7 and 8 due to inaccuracies in race/ethnicity data prior to 2016. Overall, White/Caucasian Non-Hispanics, denoted as "White," had the highest rate of members in Group A. Whites were also the least likely race to be in Group B. Out of the five race classifications examined, Black African American (BAA)/Non-Hispanics, denoted as "Black," had the lowest rate of members in Group A.

In order to assess existing racial inequities, CHNCT further examined rates among three race/ethnicity groups, as reported in the eligibility data: Hispanics, Whites, and Blacks. There were 10,542 unique Hispanic members in the MMA measure across the four year study period, the largest race group. Overall, the rate of Hispanic members in Group A was 10 percentage points lower than White members. The gap between Hispanics and Whites was smallest in CY 2018, where the rate of Hispanic members in Group A was 9.15 percentage points lower than the rate of White members in Group A. Black members, which represent the fourth largest race population, made up 16.36% of the MMA population. Black members had the lowest rate of members in Group A in each of the four years in the study. In CY 2018, the rate of Black members in Group A was 11.55% lower than White members. Although CHNCT had health equity targets in place during this time related to closing the racial equality gap in this measure, an increase in the rate of White members in Group A resulted in no narrowing of the gap. There was an increase in the rates of members in Group A in the Black and Hispanic populations between CY 2017 and CY 2018.

MMA Population – ED Utilization

Using claims data, CHNCT determined the number of ED visits for each member in the MMA measure from CY 2015 through CY 2018.

Exhibit 9: Total MMA Population - ED Visits per 1,000 Members by Group

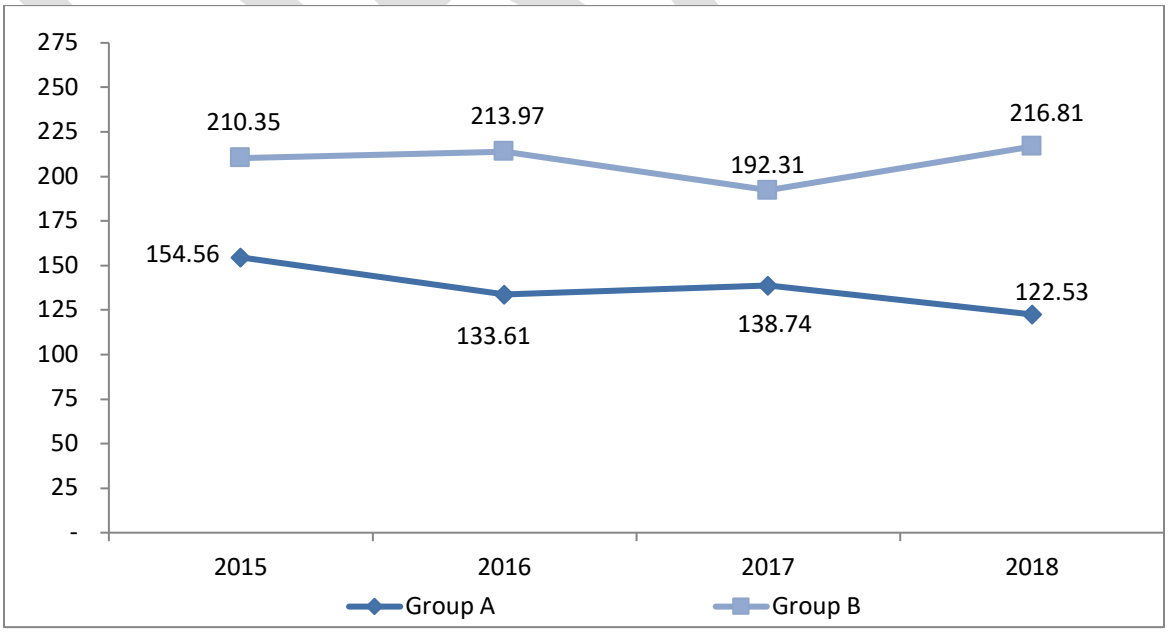


Exhibit 10: *Pediatric* MMA Population - ED Visits per 1,000 Members by Group

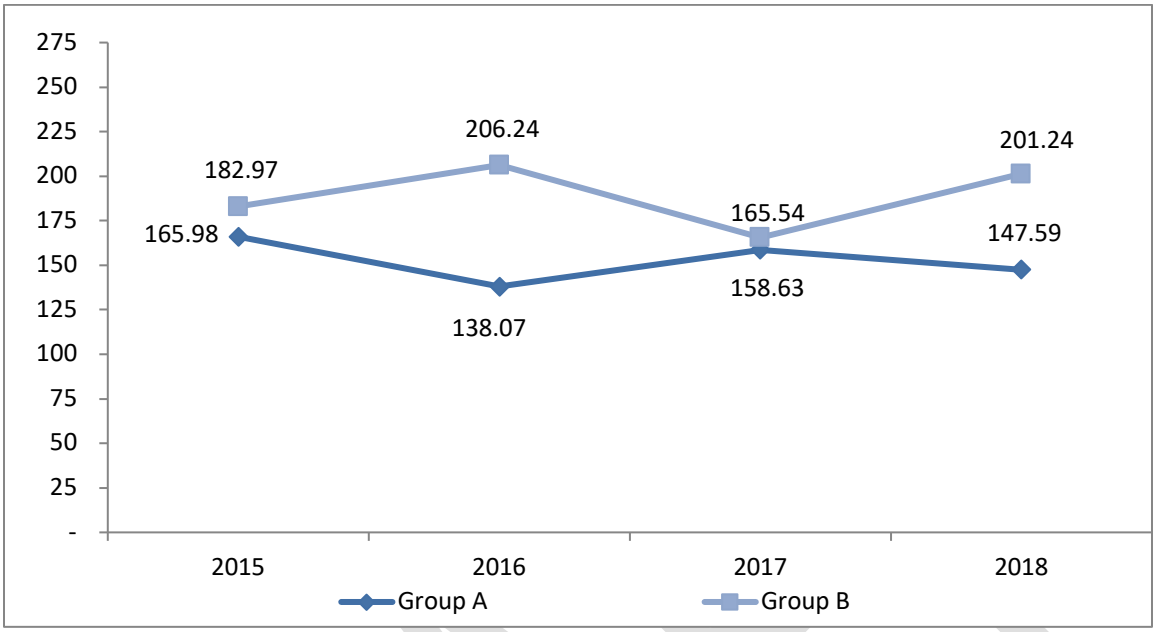
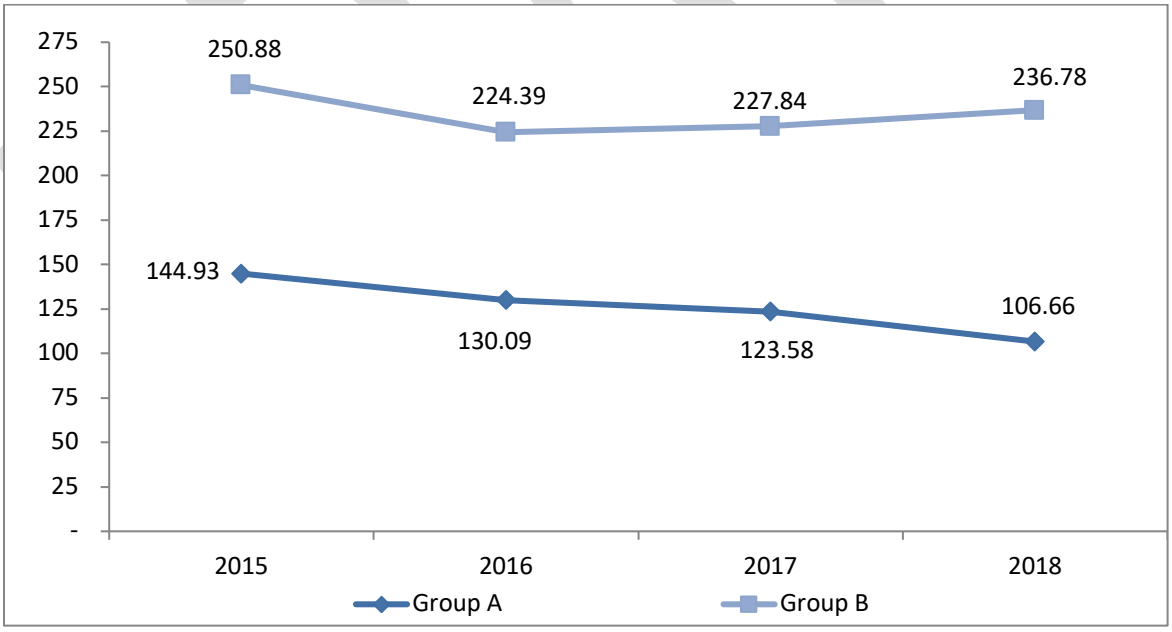


Exhibit 11: *Adult* MMA Population - ED Visits per 1,000 Members by Group



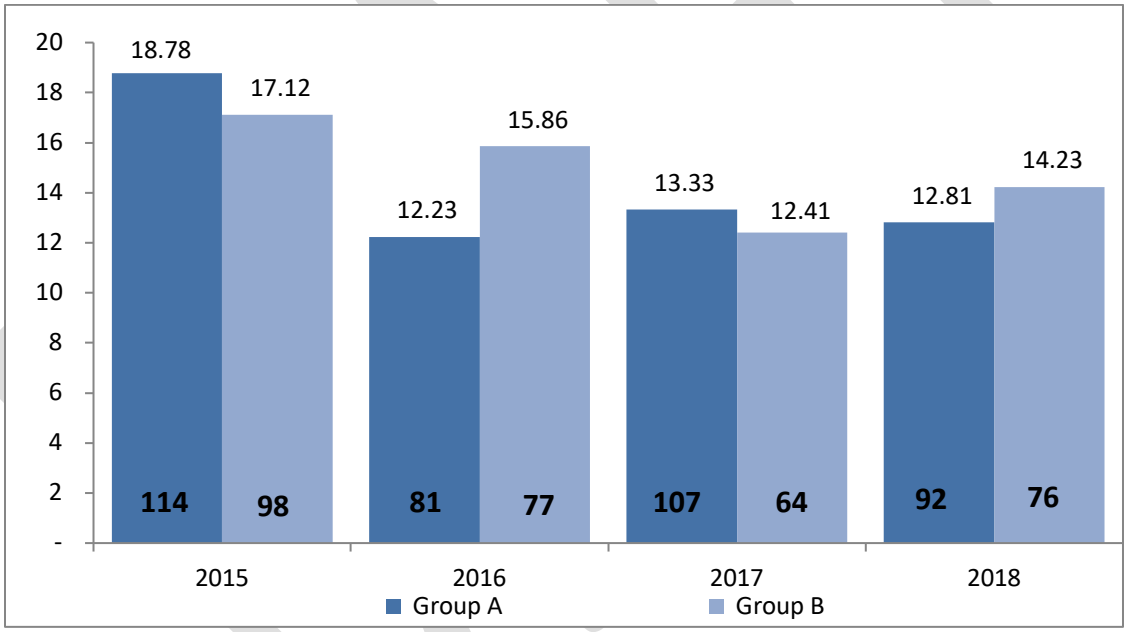
In the overall MMA population, Group A (above 75% PDC) exhibited lower ED visit rates per 1,000 members related to asthma than the other two groups. Members in Group B (at least 50% PDC) frequented the ED at higher rates than the other two groups. Exhibit 9 shows a statistically significant difference in ED visits related to asthma per 1,000 members between the two groups.

The differences in ED visit rates are more evident between the adult MMA groups than in the pediatric MMA groups in all years. Group B demonstrated a higher rate of ED visits related to asthma per 1,000 members than Group A. An analysis of CT statewide asthma data related to ED and IP admission rates from 2016 showed that 58 percent of communities saw a decrease in the age-adjusted rate of ED visits.[11] While this decline is evident in Group A, Group B saw an increase in the rate of ED visits overall and for pediatrics in CY 2016. A regression test performed on the relationship between ED visits and MMA group showed a statistically significant impact in the overall population.

MMA Population – Inpatient Utilization

CHNCT calculated the rate of asthma related inpatient admissions per 1,000 members among the three groups in the MMA population from CY 2015 through CY 2018. CHNCT hypothesized that members who remained on an asthma controller medication for at least 75% of the measurement period would have lower rates of inpatient admissions related to asthma. Inpatient Admissions per 1,000 Members by group in the adult and pediatric population can be found in Appendix A.

Exhibit 12: Total MMA Population – Inpatient Admissions per 1,000 Members by Group



The asthma related inpatient utilization patterns shown in Exhibit 12 supports the hypothesis in CY 2016; however not in CY 2015, CY 2017 or CY 2018. The rate for inpatient admissions for asthma is lowest in Group A in CY 2016. This appears to be driven by the increase in Pediatric inpatient admissions in CY 2018, which changed from 17.27 to 21.55. According to the DPH, asthma is the single most avoidable cause of hospitalization, yet it is consistently one of the most common admitting diagnoses in

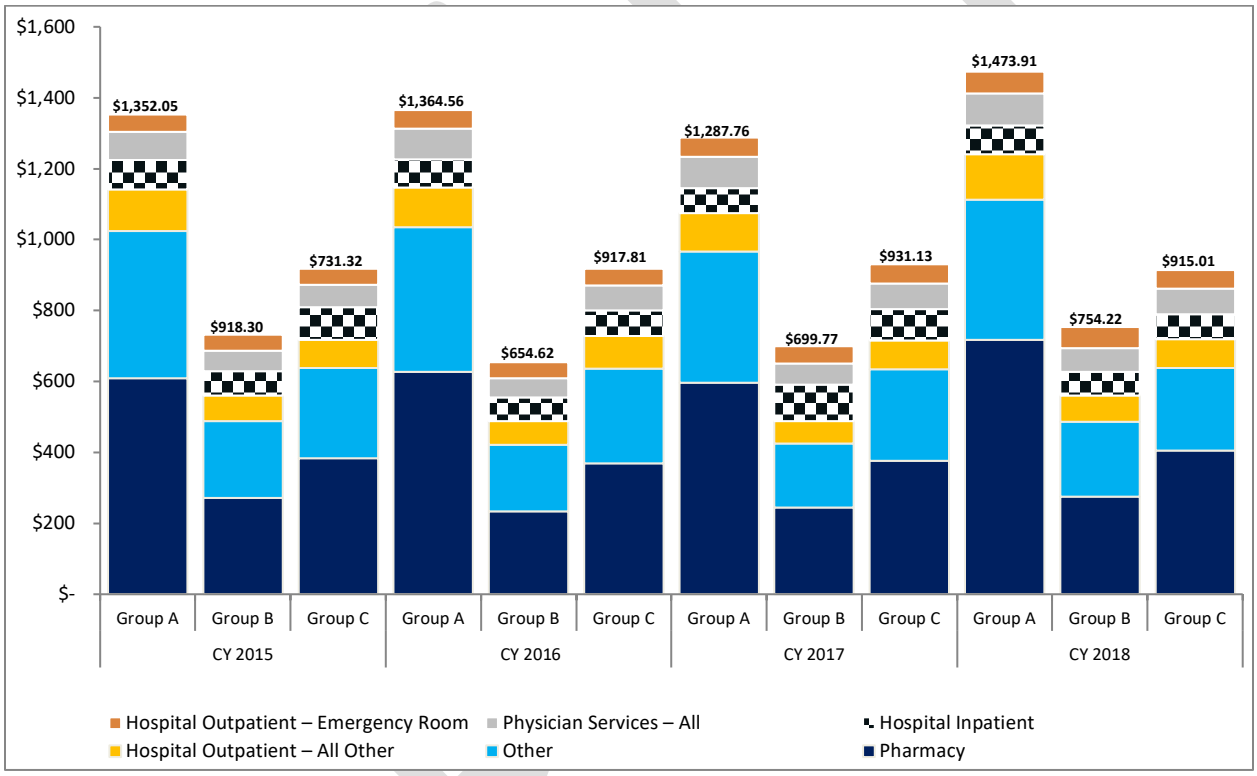
[11] Asthma ER Visits And Hospitalizations Drop In Many Communities. (2019, October 10). Retrieved from http://c-hit.org/2016/09/14/asthma-er-visits-and-hospitalizations-drop-in-many-communities/

pediatrics.[12] In 2018, there were about 2,400 hospitalizations for asthma. The combined asthma-related inpatient admission rate for all populations over the course of the four year period is 15.13. There is variability in inpatient admission rates across all four years of the study. Overall, Group A exhibited the lowest inpatient admission rate.

MMA Population - Cost of Care Comparisons

CHNCT calculated the total cost of care per member per month (PMPM) rates for each member in the MMA measure from CY 2015 through CY 2018. The total cost of care metric in Exhibit 13 includes all types of services and all service lines. Pharmacy costs are represented by the bottom section of the stacked bar graph. Other categories of expense (COE), using the Qlikview® Utilization and Cost Analyzer module, are also shown. CHNCT's hypothesis was that members who remained on asthma controller medications for at least 75% of the measurement period would have exhibited lower PMPM rates overall. A breakdown of PMPM rates by MMA group and COE can be found in Appendix A.

Exhibit 13: Total MMA Population – Total Cost of Care PMPM by COE by Cohort



The results shown in Exhibit 13 are strikingly different than CHNCT's hypothesis. In each year presented, the members in Group A (above 75% PDC) showed higher PMPM rates than Group B (at least 50% PDC) and Group C (50-74% PDC). Across the four year period, pharmacy costs represented more than 46% ($637.75) of the total cost of care PMPM rate for Group A, the largest share of any group. Pharmacy

[12] Asthma Program. *CT.gov – Connecticut's Official State Website. N.p., 2020. Web. 10 Jan. 2020* *https://portal.ct.gov/DPH/Health-Education-Management--Surveillance/Asthma/Asthma-Program*

costs represented 36% ($256.27) of the total cost of care PMPM rate in Group B and 42% ($383.67) in Group C.

CHNCT calculated the average risk score for the entire MMA population.

Table 14: Total MMA Population: Average Risk Score by Year

MMA Group	2015		2016		2017		2018	
	Pediatric	Adult	Pediatric	Adult	Pediatric	Adult	Pediatric	Adult
Group A	1.38	3.00	1.32	2.78	1.45	2.67	1.42	2.63
Group B	1.11	2.52	1.15	2.46	1.13	2.29	1.10	2.28
Group C	1.28	2.59	1.26	2.48	1.23	2.44	1.24	2.24
Grand Total	**1.24**	**2.76**	**1.24**	**2.63**	**1.28**	**2.52**	**1.25**	**2.45**

Table 15: Total MMA Population: Chronic Condition Count – Adults and Pediatrics

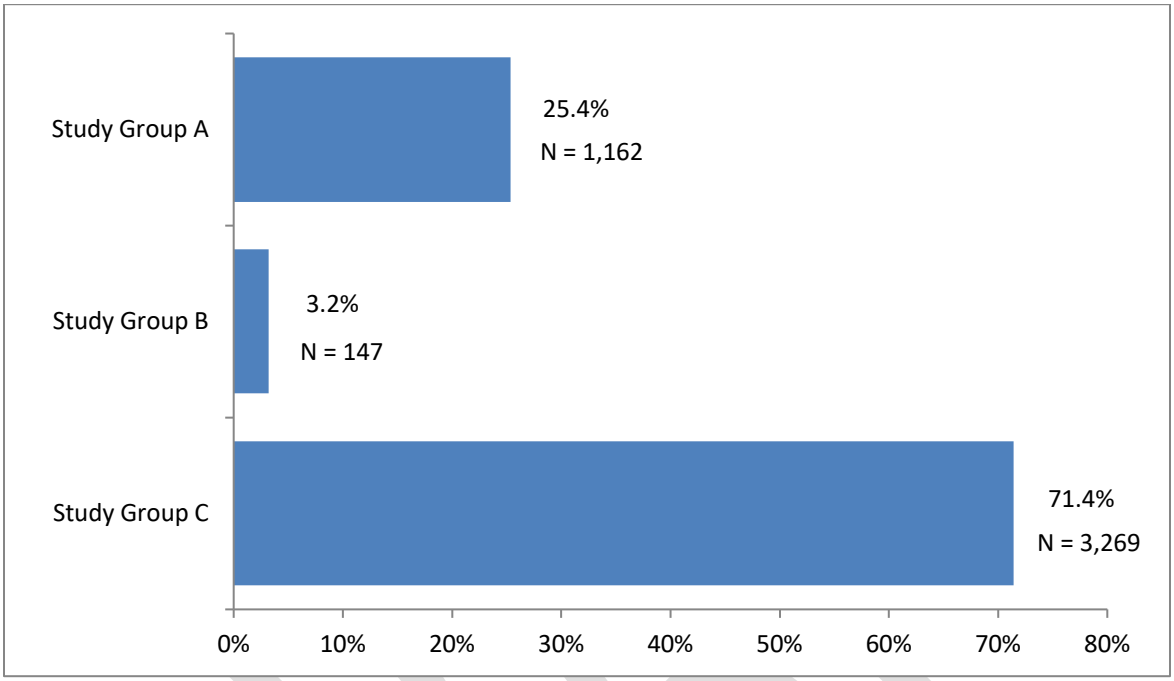
MMA Group	2015		2016		2017		2018	
	Pediatric	Adult	Pediatric	Adult	Pediatric	Adult	Pediatric	Adult
Group A	2.04	4.74	2.25	5.02	2.32	5.07	2.41	5.25
Group B	1.71	3.71	1.94	4.19	1.89	4.20	1.94	4.27
Group C	1.91	3.94	2.07	4.33	2.02	4.45	2.12	4.35
Grand Total	**1.87**	**4.22**	**2.09**	**4.64**	**2.10**	**4.71**	**2.16**	**4.79**

The average risk score was higher for both pediatrics and adults in Group A in all four years indicating that these members have a higher disease burden than the other two groups overall. The higher risk scores in Group A are associated with higher total costs. In reviewing the chronic conditions that accompany asthma for the members in each MMA group, the members in Group A consistently had more chronic conditions. A few of the most common comorbidities across all three MMA groups in the adult population were: hypertension, depression, obesity, disorders of lipid metabolism, and type 2 diabetes. The prevalence of these five comorbidities was highest in Group A. In the pediatric population, the most common comorbidities were: attention deficit disorder, obesity, adjustment disorder, acute lower respiratory tract infection, and anxiety.

Results/Discussion Longitudinal Study Population

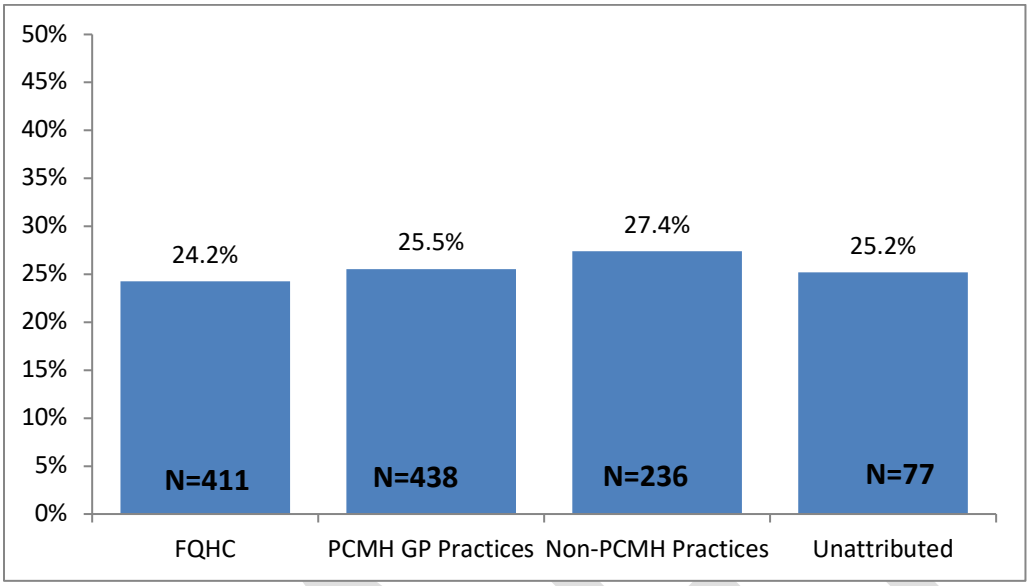
This section of the study will review the 4,578 members who were in the MMA denominator for four consecutive years, from CY 2015 through CY 2018.

Exhibit 16: Longitudinal Study Group Membership



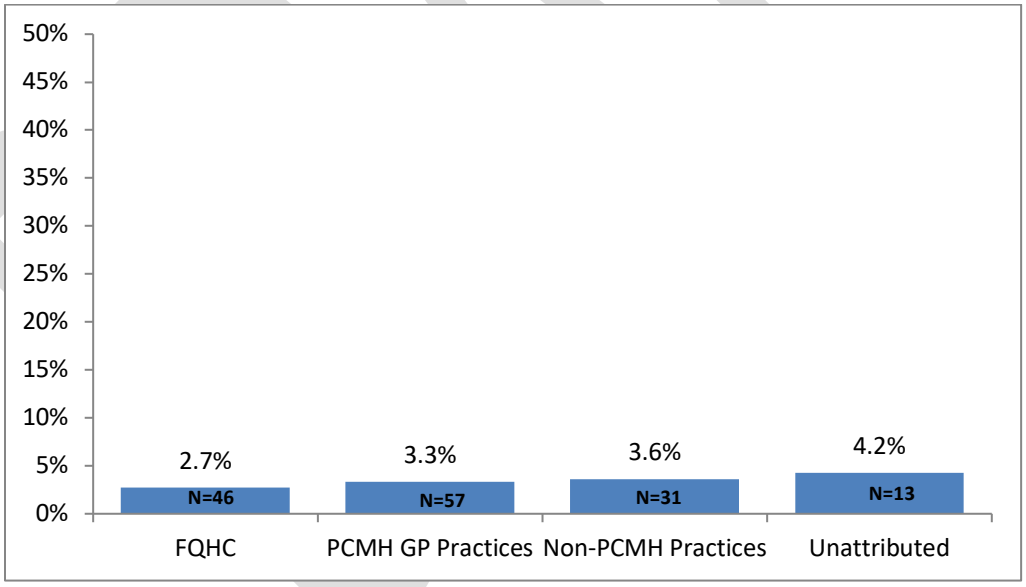
The majority of the study population (3,269, 71.4%) had variable PDCs and therefore was included in Study Group C. CHNCT further examined cost and utilization patterns in the longitudinal study population in an effort to analyze consistent asthma medication behavior over time and its impact on health outcomes.

Exhibit 17: Study Group A Rates by Practice Setting*



*2018 Attribution

Exhibit 18: Study Group B by Practice Setting*



*2018 Attribution

CHNCT analyzed the longitudinal study population groups by practice setting in Exhibits 17 and 18. Unattributed members (4.2%) were the most likely to be included in Study Group B, followed by Non-PCMH practices (3.6%), PCMH GP practices (3.3%), and FQHCs (2.7%). Non-PCMH Practices had the largest rate of members in Study Group A over the four year period (27.4%), followed by PCMH and GP

Practices (25.5%), and unattributed members (25.2%). FQHCs had the lowest rate in Study Group A (24.2%).

Exhibit 19: Total Longitudinal Study Population Count by Race/Ethnicity

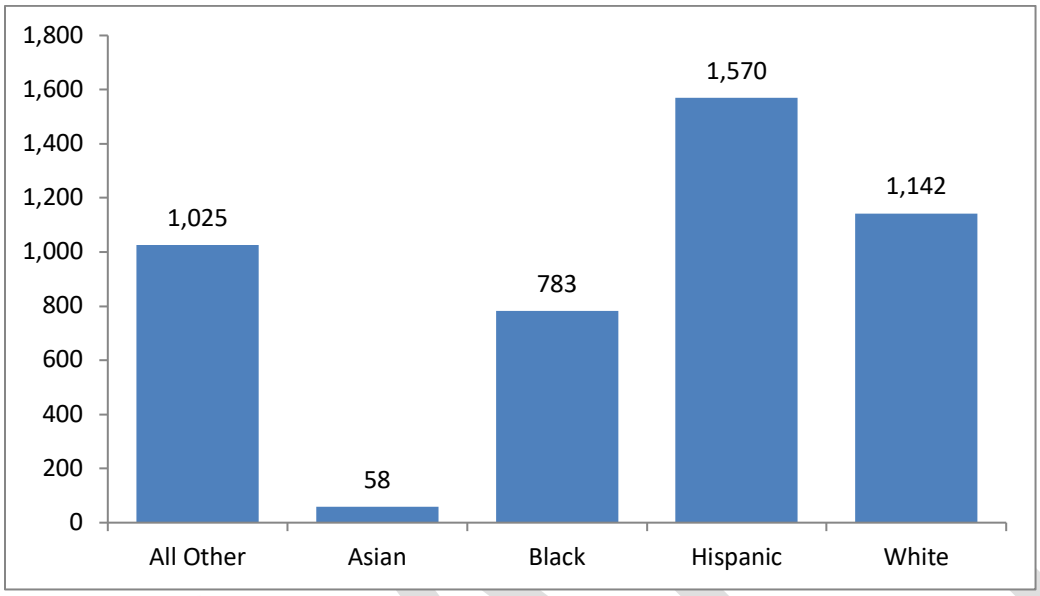


Exhibit 20: Study Group A - Rates by Race/Ethnicity

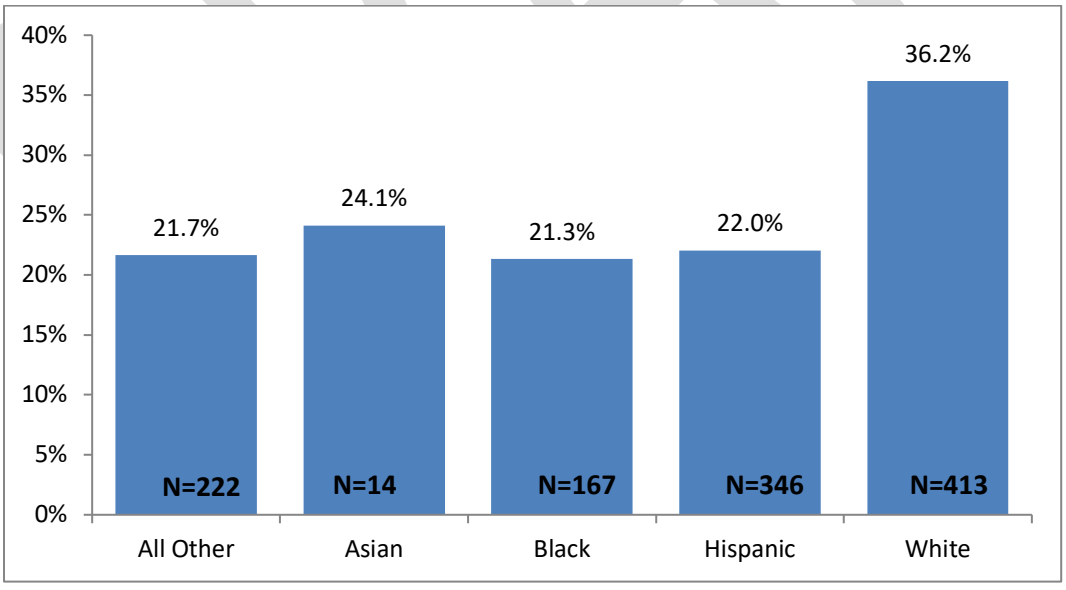
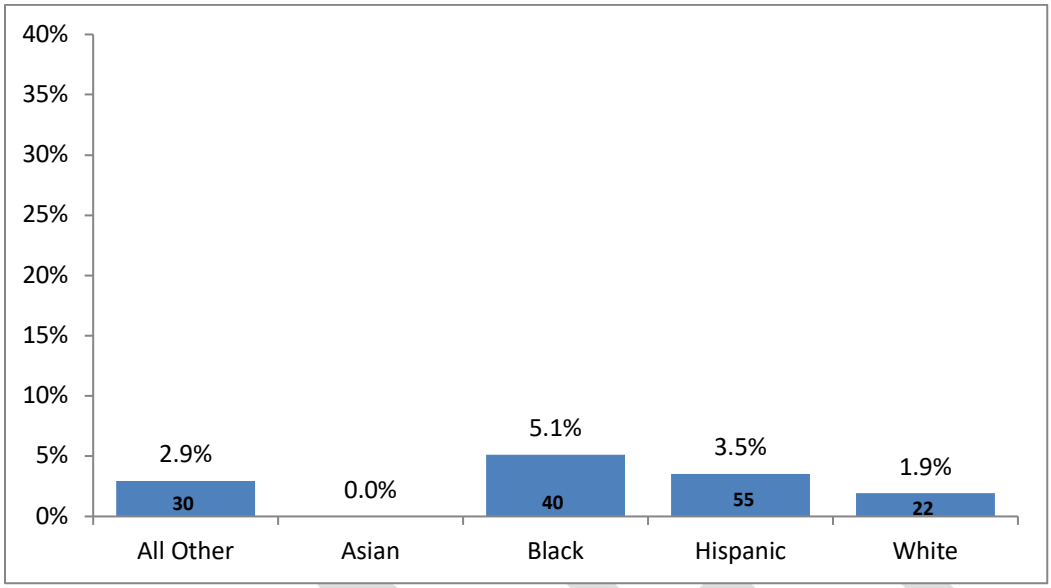


Exhibit 21: Study Group B - Rates by Race/Ethnicity



Exhibits 20 and 21 compare the longitudinal study groups among five race/ethnicity classifications: White/Caucasian Non-Hispanics, denoted as "White," Black African American/Non-Hispanics, denoted as "Black," Hispanics, Asians Non-Hispanic, denoted as "Asian," and All Other. Out of the 4,578 members in the longitudinal study, the most common race/ethnicity was Hispanic, making up 34.3% (1,570). Whites were more likely to be in Study Group A (over the four year study period) when compared to the other race/ethnicity classifications. The percentage of members who were in Study Group A was more than 14% higher for Whites than it was for Blacks and Hispanics.

Longitudinal Study Population - ED Utilization

Exhibit 22: Total Longitudinal Study Population - ED Visits per 1,000

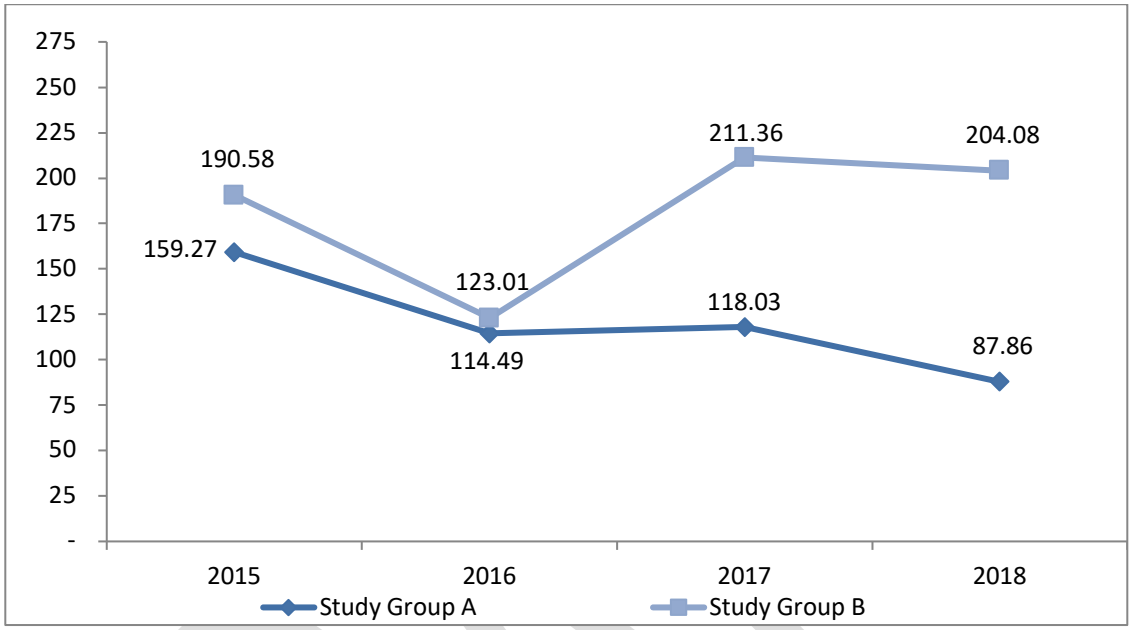
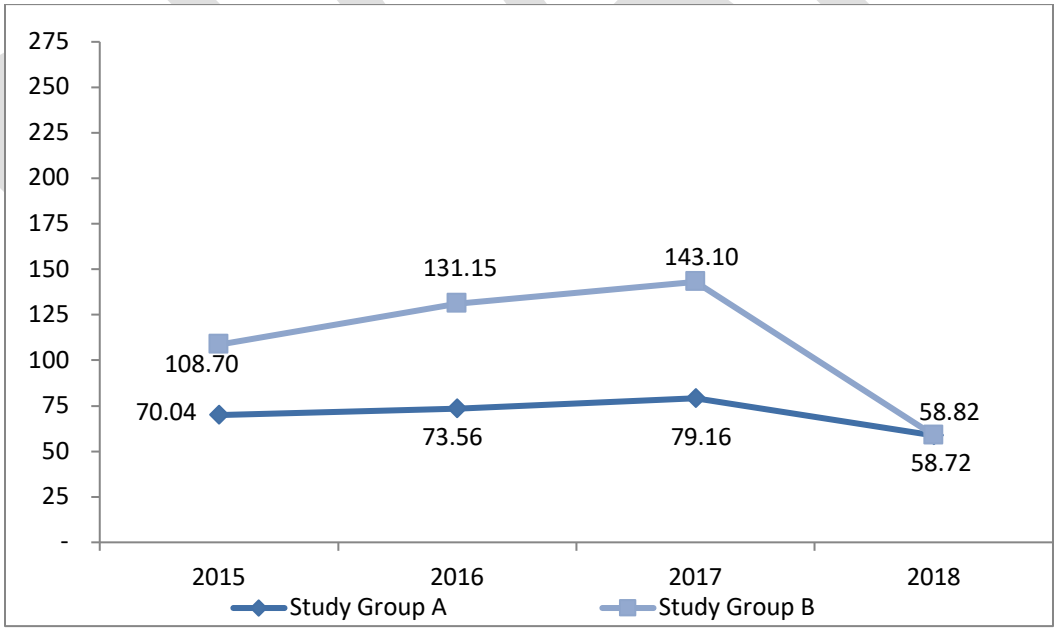
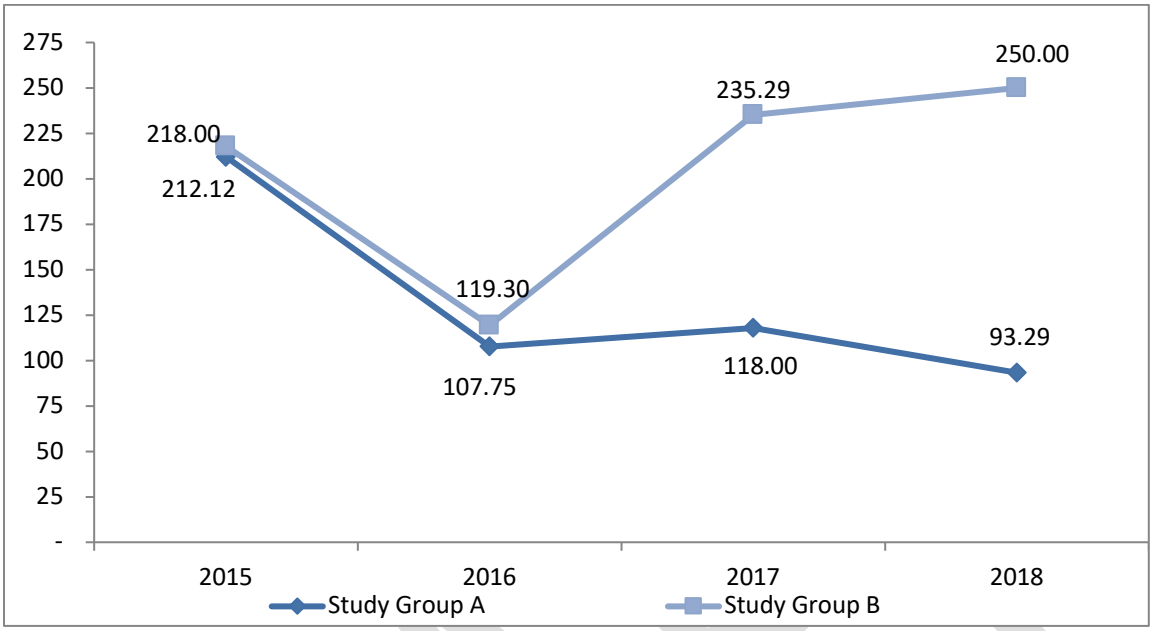


Exhibit 23: Longitudinal Study Adult* Population - ED Visits per 1,000



*Ages 20-64 years

Exhibit 24: Longitudinal Study Pediatric* Population- ED Visits per 1,000

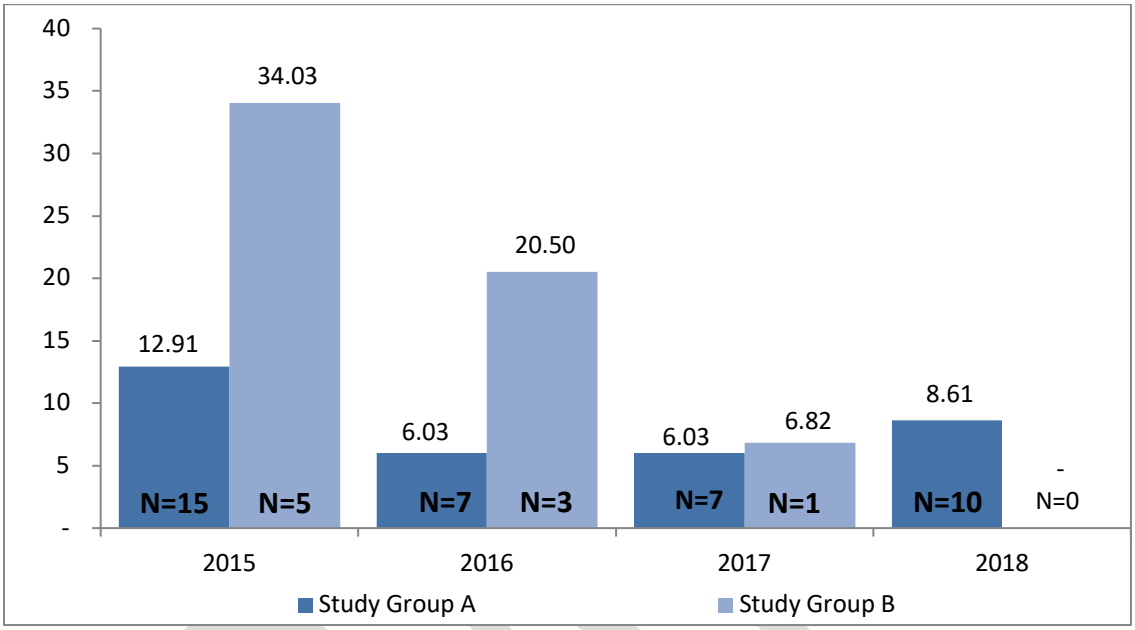


*Ages 5-19 years

Using claims data, CHNCT calculated the ED per 1,000 member rate for each longitudinal study group from CY 2015 through CY 2018. CHNCT's hypothesis was that members who were in Study Group A would exhibit lower ED rates than members who were in Study Group B. Exhibit 22 supports that hypothesis, showing that in all four years Study Group B visited the ED at a higher rate than Study Group A. Exhibit 23 examines the adult ED visits related to asthma per 1,000 members among the longitudinal study population. Compared to the other study groups, Study Group A shows lower rates of ED visits in each year of the study. There is a notable drop in ED visits related to asthma per 1,000 adult members in Study Group B in 2018, nearly reaching the rate for Study Group A. Exhibit 24 looks at the ED visits related to asthma per 1,000 members among the longitudinal study pediatric population. Overall, the asthma related ED visit per 1,000 member rate was higher in the pediatric population compared to the adult population. Within the pediatric longitudinal study population, ED visits related to asthma per 1,000 member rate closely aligned in CY 2015 and CY 2016 in both Study Groups. ED visits related to asthma decreased in Study Group A by over 57% percent from 2015 to 2018. The pediatric ED visits related to asthma in Study Group B increased over the same period by more than 17%.

Longitudinal Study Population - Inpatient (IP) Admissions

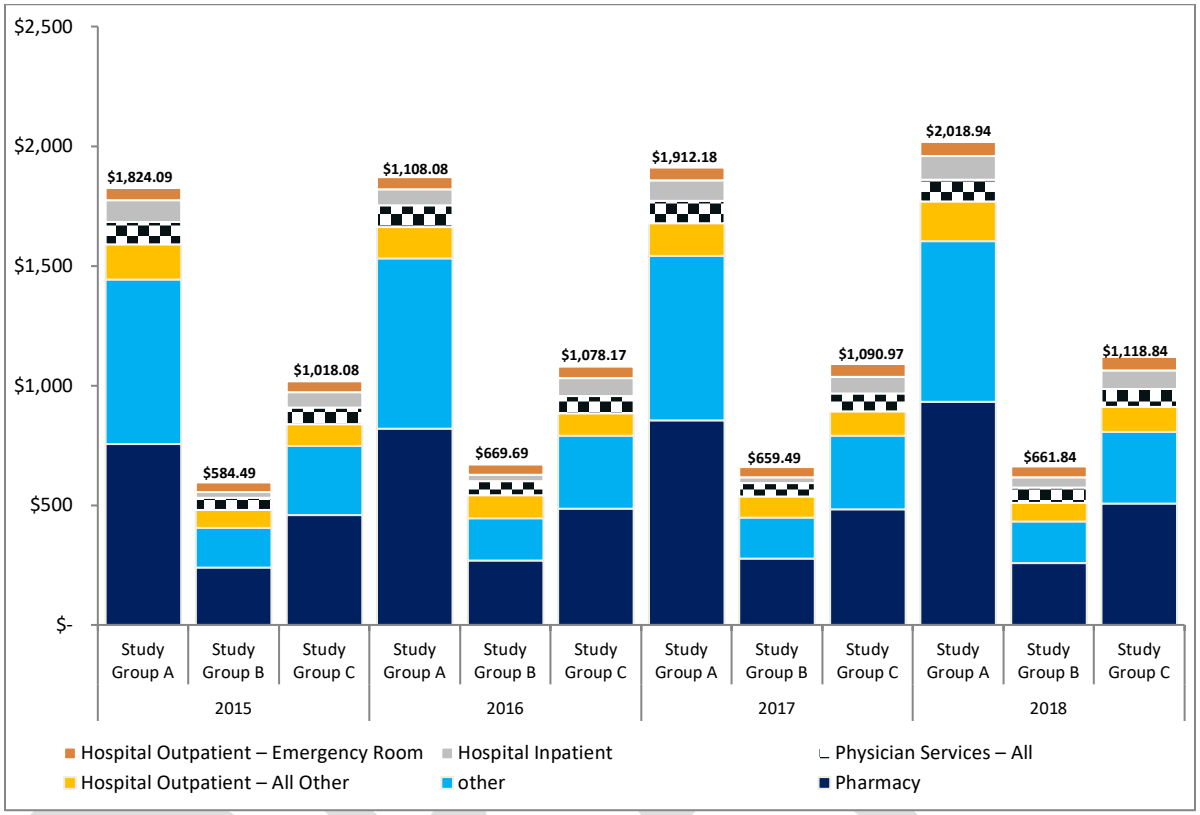
Exhibit 25: Longitudinal Study Total Population - IP Admissions per 1,000 Members



CHNCT measured the number of inpatient admissions related to asthma for each member in the study from CY 2015 through CY 2018. Inpatient admission exhibits related to asthma for the adult and pediatric population can be found in Appendix B. CHNCT's hypothesis was that members who were in Study Group A would exhibit a lower inpatient admission rate related to asthma per 1,000 members than Study Group B. Data supports the hypothesis in all years except 2018 where Study Group B showed no inpatient admissions related to asthma. The small number of asthma-related inpatient admissions in the longitudinal study population makes it difficult to draw any meaningful conclusions.

Longitudinal Study Population - Cost of Care Comparisons

Exhibit 26: Longitudinal Study Total Population – Total Cost of Care PMPM



The PMPM costs for each longitudinal study group are broken out by COE in Exhibit 26. CHNCT hypothesized that study Group A would demonstrate lower PMPM costs than the other two groups. Exhibit 26 shows that this hypothesis proved to be false. In each of the four years presented the PMPM rate for Study Group A was between $1,824.09 in 2015 and $2,018.94 in 2018, which is a 10.6% increase. The PMPM rate for Study Group A is more than 70% higher than Study Group C and more than 175% higher than Study Group B in all four years of the study. Pharmacy costs represented the largest category of service in all three study populations. In Study Group A, pharmacy costs represented 44% ($840.95) of all medical spending on average. In Study Group C, pharmacy costs represented 45% ($483.34) of medical spending on average. Medical spending on pharmacy PMPM was lowest in Study Group B, where it represented less than 41% ($261.60). Study Group C's PMPM costs were 66% higher than Study Group B on average. Additional data regarding the study population and category of expense can be found in Appendix B.

Table 27: Longitudinal Study Population: Average Risk Score by Year

Study Cohort	2015		2016		2017		2018	
	Pediatric	Adult	Pediatric	Adult	Pediatric	Adult	Pediatric	Adult
Study Group A	1.70	3.08	1.62	2.91	1.73	2.90	1.50	2.85
Study Group B	1.14	2.32	1.10	2.23	1.11	2.27	1.17	1.87
Study Group C	1.38	2.55	1.33	2.49	1.37	2.49	1.32	2.43
Grand Total	**1.43**	**2.71**	**1.38**	**2.62**	**1.43**	**2.61**	**1.35**	**2.55**

The average risk score was higher for both pediatrics and adults in Study Group A for all four years indicating that those members have a higher disease burden than the other two groups overall. The higher risk scores in Study Group A are associated with higher total costs. Risk scores in Study Group B were the lowest in both the adult and pediatric populations.

Table 28: Longitudinal Study Population: Chronic Condition Count by Year

Study Cohort	2015		2016		2017		2018	
	Pediatric	Adult	Pediatric	Adult	Pediatric	Adult	Pediatric	Adult
Study Group A	2.48	5.07	2.65	5.43	2.73	5.70	2.68	5.95
Study Group B	1.81	3.07	1.80	4.11	1.90	3.94	1.90	4.20
Study Group C	1.98	4.03	2.17	4.52	2.20	4.77	2.25	4.70
Grand Total	**2.07**	**4.34**	**2.25**	**4.80**	**2.29**	**5.04**	**2.32**	**5.08**

The average number of chronic conditions in the longitudinal study population increased in both the adult and pediatric populations over the course of this study. The average number of chronic conditions per member in the adult Study Group A was higher than the other two study groups in each year. Common comorbidities in the pediatric population include attention deficit disorder, obesity, depression, and acute respiratory tract infections. Comorbidities in the adult population include: hypertension, low back pain, obesity, anxiety, and depression. The prevalence of these comorbidities was more common in Group A than in the other two study groups.

Conclusion

This longitudinal study did not completely support the initial hypothesis. While those members with a PDC of above 75% had lower ED and IP admission rates, this did not result in a lower overall cost of care. The study demonstrated that patients who were most adherent to their asthma medication, those in Group A in both the MMA and Study populations, experienced higher overall costs. It appears that although members who were consistently prescribed controller medications demonstrated higher overall PMPM costs in nearly all COEs, ED and IP visits related to asthma are lower in these groups than in the comparison groups. These members also had a higher number of chronic conditions and a higher risk score, which may begin to explain the reason for the higher PDC for asthma medication. In other

words, members who had a high number of chronic conditions were more likely to display a higher PDC for asthma medication. This finding supports the need for interventions and supports for members with higher risk scores and multiple chronic conditions including asthma. CHNCT can also conclude that the pediatric population was less likely to achieve a PDC of 75% for their asthma controller medications than the adult population. This provides an opportunity to tailor asthma medication adherence strategies specific to the pediatric population.

Health inequities related to race/ethnicity were apparent when looking at data in the MMA measure. As we reviewed in the study, Black and Hispanic members were less likely to have a PDC above 75% for asthma controller medication. While improvements in coverage were seen in both the Black and Hispanic groups, increases in rates in the White group matched any gains, resulting in no narrowing of the gap. CHNCT is working toward closing the racial and ethnic disparities in health measures, including asthma. Efforts related to addressing social determinants of health will also assist in closing this gap.

The findings of this study are supported in the medical literature. A paper published in 2013 examined the relationship between the HEDIS® Medication Management for People with Asthma (MMA) measure and health outcomes related to asthma. The study included patients with persistent asthma classified as compliant or noncompliant with the MMA measure at the 75% and 50% threshold, respectively. Results showed that there was no clinically meaningful difference in asthma-related hospitalizations, emergency department visits or rescue inhaler dispensing as compared with those who were not adherent to their asthma medication regimen. Comparing groups of patients who were at 75% or greater, 50% to 74%, and less than 50% MMA compliant showed no meaningful difference in asthma outcomes between groups.[13] While this study's design was similar, the study's population was not a Medicaid population only. In addition, this study did not examine health outcomes associated with MMA-adherence over time.

[13] Crans Yoon A, Crawford W, Sheikh J, Nakahiro R, Gong A, Schatz M. 2015. The HEDIS Medication Management for People with Asthma Measure is Not Related to Improved Asthma Outcomes. J Allergy Clin Immunol Pract. 2015 Jul-Aug;3(4):547-52. doi: 10.1016/j.jaip.2015.02.002. Epub 2015 Mar 7. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/25758917

Appendix A - MMA Population Supplemental Information

Table A1 – ED Visits per 1,000 Members by MMA Group and Race/Ethnicity

Race / MMA Group	2015	2016	2017	2018
All Other	**209.41**	**187.39**	**182.37**	**184.70**
Group A	169.40	143.90	149.80	133.40
Group B	218.56	258.92	221.41	258.02
Asian	**67.96**	**82.70**	**98.12**	**65.43**
Group A	47.71	56.12	105.05	78.18
Group B	85.92	152.95	114.29	81.17
Black	**239.58**	**223.15**	**200.21**	**229.90**
Group A	225.80	208.85	175.93	181.24
Group B	268.48	245.04	233.08	302.52
Hispanic	**201.53**	**190.29**	**185.30**	**172.36**
Group A	169.00	163.79	172.95	143.88
Group B	224.19	223.24	201.68	211.87
White	**128.92**	**86.33**	**90.32**	**83.93**
Group A	103.84	66.69	77.12	66.65
Group B	145.49	129.14	118.63	112.91
Grand Total	**187.64**	**165.40**	**161.11**	**160.05**

Exhibit A2: Pediatric MMA Population – Inpatient Admissions per 1,000 Members

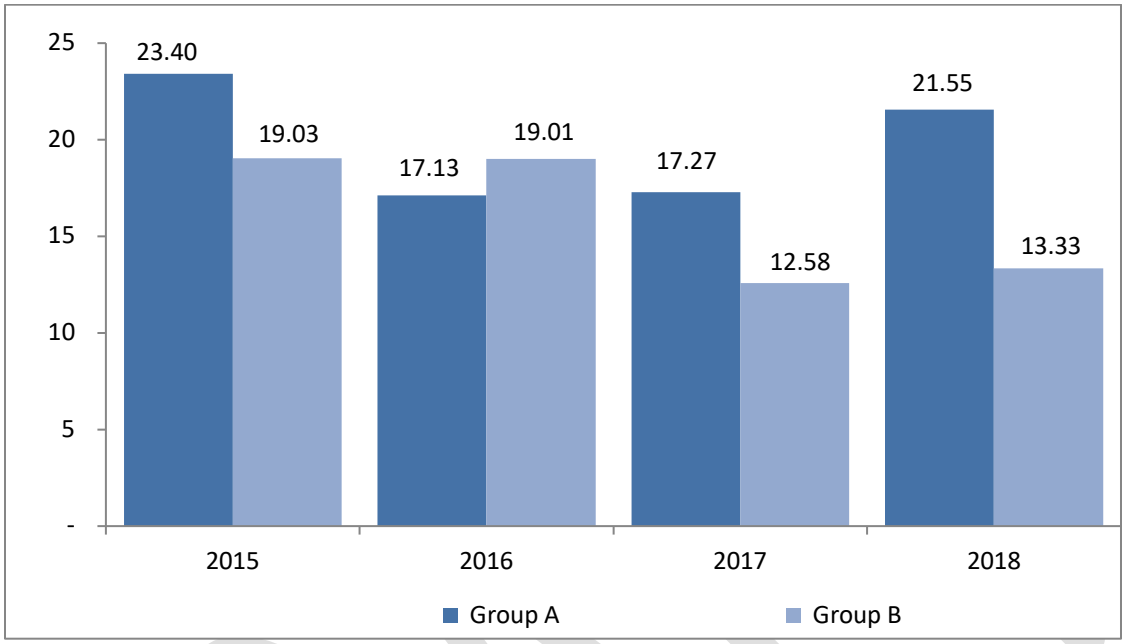


Exhibit A3: Adult MMA Population – Inpatient Admissions per 1,000 Members

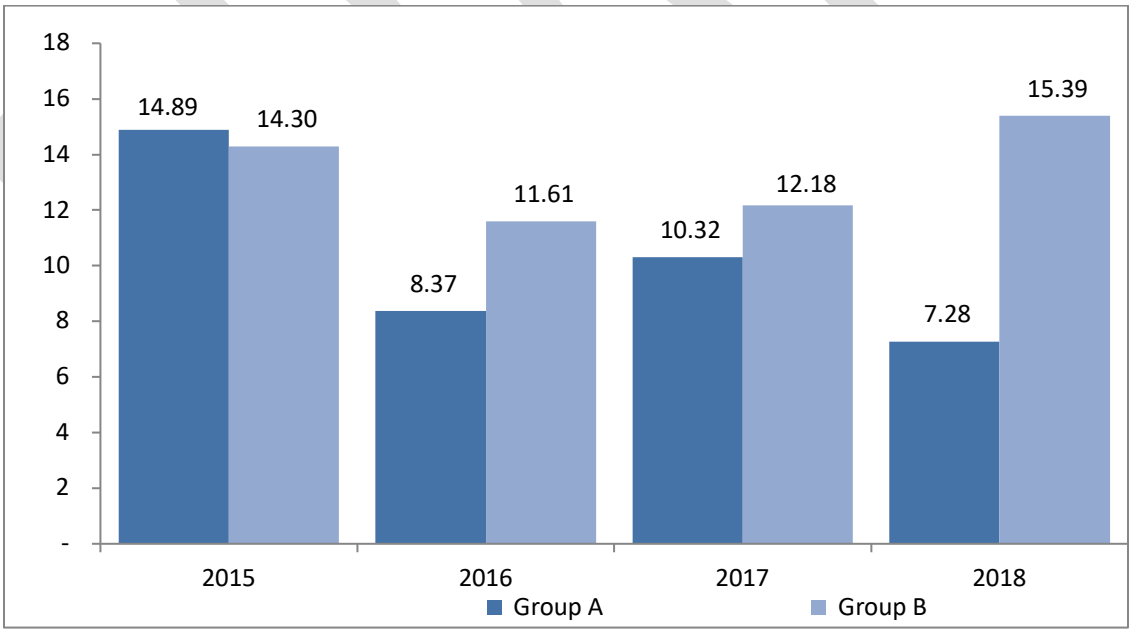


Table A4: Total MMA Population – PMPM Rates by COE, Group A

Category of Expense	2015	2016	2017	2018
Pharmacy	$ 608.25	$ 627.89	$ 597.38	$ 717.46
Other	$ 416.37	$ 407.20	$ 369.28	$ 395.09
Hospital Outpatient – All Other	$ 116.75	$ 110.93	$ 108.91	$ 128.28
Hospital Inpatient	$ 83.36	$ 80.19	$ 68.85	$ 80.88
Physician Services – All	$ 78.88	$ 86.56	$ 88.60	$ 91.39
Hospital Outpatient – ED	$ 48.43	$ 51.80	$ 54.74	$ 60.82
Total	**$ 1,352.05**	**$ 1,364.56**	**$ 1,287.76**	**$ 1,473.91**

Table A5: Total MMA Population – PMPM Rates by COE, Group B

Category of Expense	2015	2016	2017	2018
Pharmacy	$ 271.36	$ 234.06	$ 244.24	$ 275.40
Other	$ 216.70	$ 187.50	$ 180.27	$ 211.85
Hospital Outpatient – All Other	$ 71.51	$ 66.77	$ 63.56	$ 72.56
Hospital Inpatient	$ 69.76	$ 66.85	$ 103.33	$ 67.46
Physician Services – All	$ 56.73	$ 54.73	$ 58.89	$ 66.91
Hospital Outpatient – ED	$ 45.25	$ 44.70	$ 49.47	$ 60.03
Total	**$ 731.32**	**$ 654.62**	**$ 699.77**	**$ 754.22**

Table A6: Total MMA Population – PMPM Rates by COE, Group C

Category of Expense	2015	2016	2017	2018
Pharmacy	$ 383.81	$ 369.05	$ 375.94	$ 405.88
Other	$ 253.88	$ 266.39	$ 257.66	$ 232.83
Hospital Outpatient – All Other	$ 80.29	$ 93.25	$ 82.18	$ 80.26
Hospital Inpatient	$ 91.66	$ 72.29	$ 88.28	$ 69.82
Physician Services – All	$ 62.91	$ 69.64	$ 72.67	$ 72.60
Hospital Outpatient – ED	$ 45.75	$ 47.19	$ 54.40	$ 53.61
Total	**$ 918.30**	**$ 917.81**	**$ 931.13**	**$ 915.01**

Appendix B - Longitudinal Study Population Supplemental Information

Exhibit B1: Longitudinal Study Adult Population - IP Admissions per 1,000

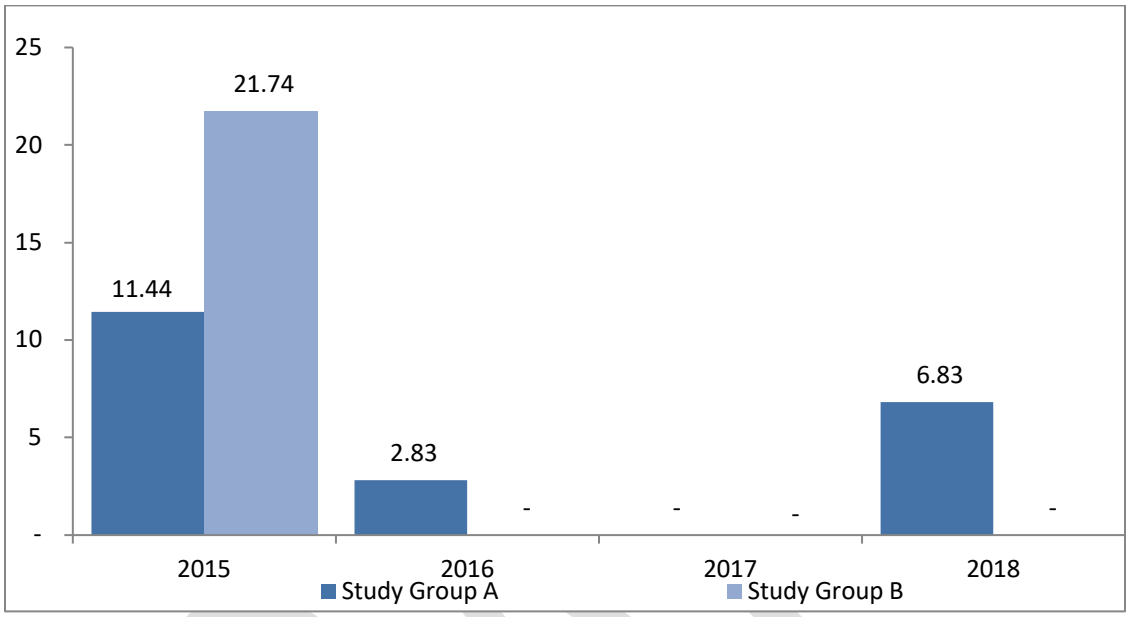


Exhibit B2: Longitudinal Study Pediatric Population - IP Admissions per 1,000

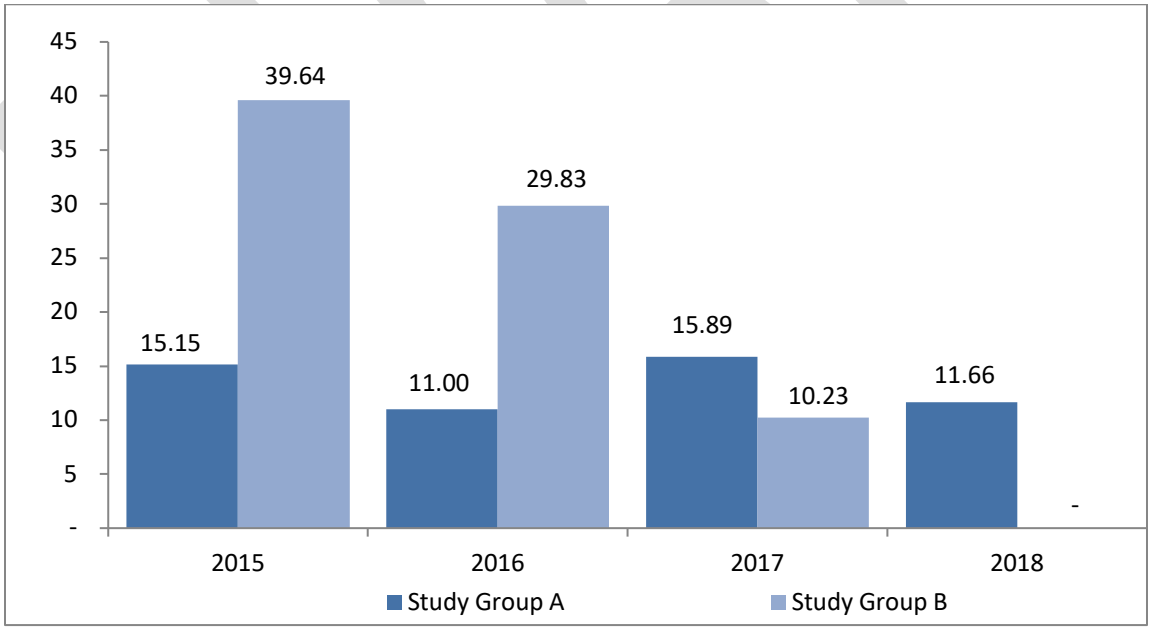


Table B3: Total Longitudinal Study Population – PMPM Rates by COE Study Group A

Category of Expense	2015	2016	2017	2018
Pharmacy	$ 756.10	$ 820.29	$ 855.07	$ 932.33
Other	$ 686.56	$ 709.98	$ 686.91	$ 670.47
Hospital Outpatient – All Other	$ 147.40	$ 131.11	$ 135.46	$ 165.24
Physician Services – All	$ 92.56	$ 90.64	$ 94.46	$ 91.41
Hospital Inpatient	$ 92.27	$ 69.23	$ 85.33	$ 99.76
Hospital Outpatient – ED	$ 49.18	$ 49.01	$ 54.96	$ 59.74
Total PMPM	**$ 1,824.09**	**$ 1,870.26**	**$ 1,912.18**	**$ 2,018.94**

Table B4: Total Longitudinal Study Population – PMPM Rates by COE Study Group B

Category of Expense	2015	2016	2017	2018
Pharmacy	$ 240.21	$ 269.93	$ 277.07	$ 259.18
Other	$ 165.07	$ 174.56	$ 171.68	$ 173.31
Hospital Outpatient – All Other	$ 74.03	$ 96.61	$ 88.24	$ 76.82
Physician Services – All	$ 51.90	$ 58.96	$ 56.24	$ 65.36
Hospital Inpatient	$ 23.64	$ 26.25	$ 24.31	$ 41.52
Hospital Outpatient – ED	$ 39.64	$ 43.39	$ 41.95	$ 45.65
Total PMPM	**$ 594.49**	**$ 669.69**	**$ 659.49**	**$ 661.84**

Table B5: Total Longitudinal Study Population – PMPM Rates by COE Study Group C

Category of Expense	2015	2016	2017	2018
Pharmacy	$ 458.07	$ 484.96	$ 484.37	$ 505.96
Other	$ 290.31	$ 304.70	$ 305.41	$ 300.64
Hospital Outpatient – All Other	$ 91.62	$ 94.32	$ 101.79	$ 104.40
Physician Services – All	$ 68.48	$ 72.53	$ 76.68	$ 74.18
Hospital Inpatient	$ 62.96	$ 74.29	$ 69.18	$ 76.79
Hospital Outpatient – ED	$ 46.64	$ 47.37	$ 53.52	$ 56.87
Total PMPM	**$ 1,018.08**	**$ 1,078.17**	**$ 1,090.97**	**$ 1,118.84**

HUSKY Health Program
Health Equity Longitudinal Study
Examining Primary Care Provider Attribution and Emergency Department Utilization

January 30, 2021

Contents

Introduction

The World Health Organization defines health equity as "the absence of avoidable, unfair, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically or geographically or by other means of stratification."[1] Unfortunately, many social barriers prevent individuals/groups from achieving their health potential. Health equity "requires removing obstacles to health such as poverty, discrimination, and their consequences, including powerlessness and lack of access to good jobs with fair pay, quality education and housing, safe environments, and health care."[2] In addition, The Center for Medicare and Medicaid Services (CMS) notes "health gaps occur among groups who have persistently experienced historical trauma, social disadvantage, or discrimination and who systematically experience worse health or greater health risks than more advantaged social groups."[3] Health inequity, or differences in the well-being of a population, are ubiquitous in the US and are more apparent in light of the COVID-19 pandemic. These differences, frequently the result of health inequities due to existing socio-economic, educational, and racial factors, act as drivers negatively impacting one's health status.[4] Race and ethnicity have also played a role in decisions regarding access to care and emergency department (ED) utilization. Additionally, social needs that go unaddressed are more likely to result in challenges with managing chronic conditions, increased "no show" visits, and higher ED utilization rates.[5]

Racial disparities exist in primary care utilization. Black/African Americans have historically used the ED as their primary source of care at higher rates than their white counterparts.[6] This preferential use of non-primary care sites for usual sources of care limits the access to potential benefits of primary care experiences. These benefits include improved quality of clinical care (care coordination and care continuity), a greater focus on prevention, early management of health problems, and reduction of unnecessary and potentially harmful specialist care.[7] The use of the ED for non-urgent conditions may also lead to needless or redundant testing and excessive healthcare costs.[8] As a result, the use of the ED as a usual source of care correlates with poorer health outcomes.[7] This creates a disadvantage for Black/African Americans and may further contribute to health inequities.

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[1] World Health Organization. Health topics: Health equity. 2020. Retrieved on 10/23/2020 from https://www.who.int/topics/health_equity/en/

[2] Robert Wood Johnson Foundation. Achieving Health Equity. May 1, 2017. Retrieved on 10/23/2020 from https://www.rwjf.org/en/library/research/2017/05/what-is-health-equity-.html

[3] Health Disparities. Health Information Technology. Medicaid.gov. Retrieved on 12/1/2020 from https://www.medicaid.gov/medicaid/data-systems/health-information-technology/health-disparities/index.html.

[4] Centers for Disease Control and Prevention (CDC). Coronavirus Disease 2019. Health Equity Considerations and Racial and Ethnic Minority Groups. Retrieved 12/8/2020 from https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/race-ethnicity.html

[5] Caitlin Thomas-Henkel and Meryl Schulman, C. f. (2017, October). *Screening for Social Determinants of Health in Populations with Complex Needs: Implementation Considerations*. Retrieved May 18, 2020, from CHCS Center for Health Care Strategies, Inc.: https://www.chcs.org/resource/screening-social-determinants-health-populations-complex-needs-implementation-considerations/

[6] Arnett MJ, Thorpe RJ Jr, Gaskin DJ, Bowie JV, LaVeist TA. Race, Medical Mistrust, and Segregation in Primary Care as Usual Source of Care: Findings from the Exploring Health Disparities in Integrated Communities Study. *J Urban Health*. 2016;93(3):456-467. doi:10.1007/s11524-016-0054-9

[7] Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q*. 2005;83(3):457-502. doi:10.1111/j.1468-0009.2005.00409.x

[8] Uscher-Pines, L., Pines, J., Kellermann, A., Gillen, E., & Mehrotra, A. (2013). Emergency department visits for non-urgent conditions: systematic literature review. *The American journal of managed care*, *19*(1), 47–59.

Up to one-third of all ED visits are estimated to be inappropriate or non-emergent.[9] Nationally in 2017, adult Medicaid recipients 18-64 years of age accounted for 32.6% of one or more ED visits, which was more than twice the rate for those privately insured (14.1%) and greater than those uninsured (19.1%).[10] According to the Centers for Disease Control and Prevention (CDC), the number of ED visits in 2017 across the United States was 138.9 million.[11] Racial distribution showed that for members aged 18-64 years, 17.9% were White/Caucasian Non-Hispanic, 25.3% were Black/African American Non-Hispanic, 17.7% were Hispanic, Asian Non-Hispanic had a rate of 11.7 and 26.9% were classified as American Indian or Alaska Native; White."[10] In 2016, the visit rates among the races were: "435 visits per 1,000 for Whites, 404 visits per 1,000 for Hispanics, and 804 visits per 1,000 for Black African Americans. The visit rate was 172 visits per 1,000 for persons of other races (i.e., Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaska native, and persons with more than one race)."[12] Notably, a majority of ED visits for non-urgent care are preventable with timely primary care, while a quarter of visits to the ED could have been more appropriately treated in the primary setting.[13,14]

Community Health Network of Connecticut, Inc. (CHNCT), the medical administrative services organization (ASO) for the State of Connecticut Department of Social Services, is committed to examining health inequities in the HUSKY Health membership. This Health Equity Longitudinal Study focuses on racial, ethnic and geographic disparities related to access to primary care, and the impact on ED utilization.

Using data from CHNCT's Medicaid data warehouse, CHNCT used the QlikView® tool to analyze overall ED visit data. This showed that in 2019, HUSKY Health members had 644.0 visits per 1,000 members overall. The Black/African American/Non-Hispanic population had 719.1 visits per 1,000 members; White/Caucasian Non-Hispanics had 494.0 visits per 1,000 members; Hispanics had 815.0 visits per 1,000 members, Asian Non-Hispanics had 298.4 per 1,000 members and All Other/Multiple Race/Unknown (includes native American, native American/Alaska, native Hawaiian/Pacific Islander, Other Race or Ethnicity, and Unknown) had 670.1 visits per 1,000 members.

[9] Rocovich, Courtney, and Trushnaa Patel. "Emergency department visits: Why adults choose the emergency room over a primary care physician visit during regular office hours?." *World journal of emergency medicine* vol. 3,2 (2012): 91-7. doi:10.5847/wjem.j.issn.1920-8642.2012.02.002. Retrieved on 11/11/2020 from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4129795/

[10] Centers for Disease Control and Prevention. 2017. Retrieved on 11/10/2020 from https://www.cdc.gov/nchs/data/hus/2018/036.pdf

[11] Centers for Disease Control and Prevention. 2017. National Hospital Ambulatory Medical are Survey: 2017 Emergency Department Summary tables. Retrieved on 11/11/2020 from https://www.cdc.gov/nchs/data/nhamcs/web_tables/2017_ed_web_tables-508.pdf

[12] American College of Emergency Physicians. ACEP Now, October 20, 2019. *The Latest Emergency Department Utilization Numbers Are In.* Retrieved on 11/19/2020 from https://www.acepnow.com/article/the-latest-emergency-department-utilization-numbers-are-in/

[13] Agarwal, P., Bias, T. K., Madhavan, S., Sambamoorthi, N., Frisbee, S., & Sambamoorthi, U. (2016). Factors Associated With Emergency Department Visits: A Multistate Analysis of Adult Fee-for-Service Medicaid Beneficiaries. *Health services research and managerial epidemiology*, *3*(3), 2333392816648549. https://doi.org/10.1177/2333392816648549

[14] Honigman LS, Wiler JL, Rooks S, Ginde AA. National Study of Non-urgent Emergency Department Visits and Associated Resource Utilization. *West J Emerg Med*. 2013;14(6):609-616. doi:10.5811/westjem.2013.5.16112

For the purposes of this study, examining primary care provider (PCP) attribution and ED utilization, *HEDIS®*[*] *MY 2015 - 2019 Ambulatory Care (AMB)* ED Visits (per 1,000 member months [MM] **) measure criteria was used to evaluate ED utilization within the HUSKY Health membership. The *HEDIS® MY 2015 - 2019 AMB* metric examines the utilization of ambulatory care in the ED and excludes ED visits for mental health or chemical dependent services. Other exclusions to this measure are discussed further in the study design.

Hypothesis

CHNCT hypothesized that members who are attributed to a PCP would use the ED as a source of care less often than those who are not attributed to a PCP.

Methods

Study Population

This is a retrospective study linking the results of the *HEDIS® MY 2015 - 2019 AMB* measure to HUSKY Health member attribution. The study population included 621,835 members attributed to a PCP and 200,048 unattributed members (69,801 of the unattributed members have no claims).

Data Sources and Study Design

The CHNCT data warehouse was the source of data used for this study. The *HEDIS® MY 2015 - 2019 AMB* measure specifications were then applied to the data and processed using our NCQA certified HEDIS® vendor's software.

For this measure, as with all HEDIS® measures, HUSKY A and B are combined into one rate. The measure rate is calculated by taking the sum of the numerator value (ED events), divided by the sum of member months. This value is then multiplied by 1,000. In the *HEDIS® MY 2015 - 2019 AMB* measure, each ED event is counted only once regardless of the intensity or duration. Multiple ED visits on one day are counted as one ED event. The HEDIS® specifications for this measure exclude members with any ED visit that resulted in an inpatient stay, and members with an ED visit where the principal diagnosis of a mental health condition or chemical dependency was provided, Members in hospice, and those enrolled in both Medicare and Medicaid, members with Third-Party Liability (TPL) coverage, and those enrolled in the HUSKY Limited Benefit program.

This analysis compared the *HEDIS® MY 2015 - 2019 AMB* rates for attributed and unattributed members focusing on differences in rates based on attribution, race/ethnicity, program, and geographic location. The

[*] HEDIS® is a registered trademark of the National Committee for Quality Assurance (NCQA). The HEDIS® Copyright Notice and Disclaimer appears at the end of this document.

** Please note that there are differences in the DSS and HEDIS methodology for calculating member months. In the DSS methodology, a member month is counted if a member is enrolled for any one day in the month. In the HEDIS methodology, a member month is counted if a member is enrolled on a specific, pre-determined day of the month. Any members whose enrollment ends before the specified date, or whose enrollment starts after the specified date would not be counted for that month.

race and ethnicity categorization used for this study was previously approved by DSS for purposes of an all ASO Health Equity Project and includes five race/ethnicity categories: White/Caucasian Non-Hispanic, Black/African American Non-Hispanic, Asian Non-Hispanic, Hispanic and All Other/Multiple Races/Unknown.

Members select their race classification upon registering for the HUSKY Health program. The member can select the race/ethnicity they feel best describes them or choose not to provide that information. In 2015 and 2016, the race designation defaulted to White/Caucasian Non-Hispanic if the member chose not to answer. This was corrected at the end of 2016, so race and ethnicity data prior to 2017 is inaccurate.

The statistical analysis model for determining the coefficient of determination (r^2) for the racial breakdown section is the proportion of the variance between two variables: the dependent variable and independent variables. For our purposes, *HEDIS® MY 2015 - 2019 AMB* measure rate is the independent, predictor variable, x, and percentage of each racial member month is the dependent, outcome variable, y. The simple linear regression is conducted to get the coefficient of determination for the best-fit and the square root of the r^2 become the correlation coefficient(r) which explain the degree of the linear relations between the two variables. The correlation coefficient normally ranges from -1 to 1. 1 implies the perfect positive correlation and vice versa. The p-value<0.05 is applied for the statistical significance of the simple linear regression.

CHNCT also conducted a retrospective cohort analysis to compare the ambulatory ED utilization behaviors of members who were included in the *HEDIS® MY 2015 - 2019 AMB* measure through all five years of the study and who may have had changes in attribution during the study. This analysis intended to determine if there was a change in ambulatory ED utilization based on differing attribution status throughout the study in each of the following cohorts:

- Members who were unattributed in MY 2015 – MY 2016 and then attributed in MY 2017 – MY 2019
- Members who were unattributed in MY 2015 – MY 2017 and then attributed in MY 2018 – MY 2019
- Members who were attributed all five years of the study
- Members with partial attribution (attributed for some, but not all the years of the study period)
- Members who were unattributed for the entire study period.

Additionally, CHNCT performed an analysis of three of the most prevalent chronic conditions, asthma, diabetes, and hypertension, of the members in the *HEDIS® MY 2015 - MY 2019 AMB* measure. The source of data was CareAnalyzer® MY 2015 to MY 2019 with a 6-month claims payment run-out period. The member should meet one of these three conditions within the measurement year in order to be identified with one of the specific chronic conditions:

1. The condition was identified from diagnosis information only.
2. The condition was identified from both diagnosis and pharmacy criteria, but minimum treatment criteria were not met.
3. The condition was identified according to specific treatment criteria, which include a minimum of two prescriptions within 120-days of each other (but on different dates of service) from an applicable chronic medication drug class AND a single inpatient diagnosis, a single emergency department diagnosis, or a minimum of two outpatient diagnoses.

Exceptions to this include:

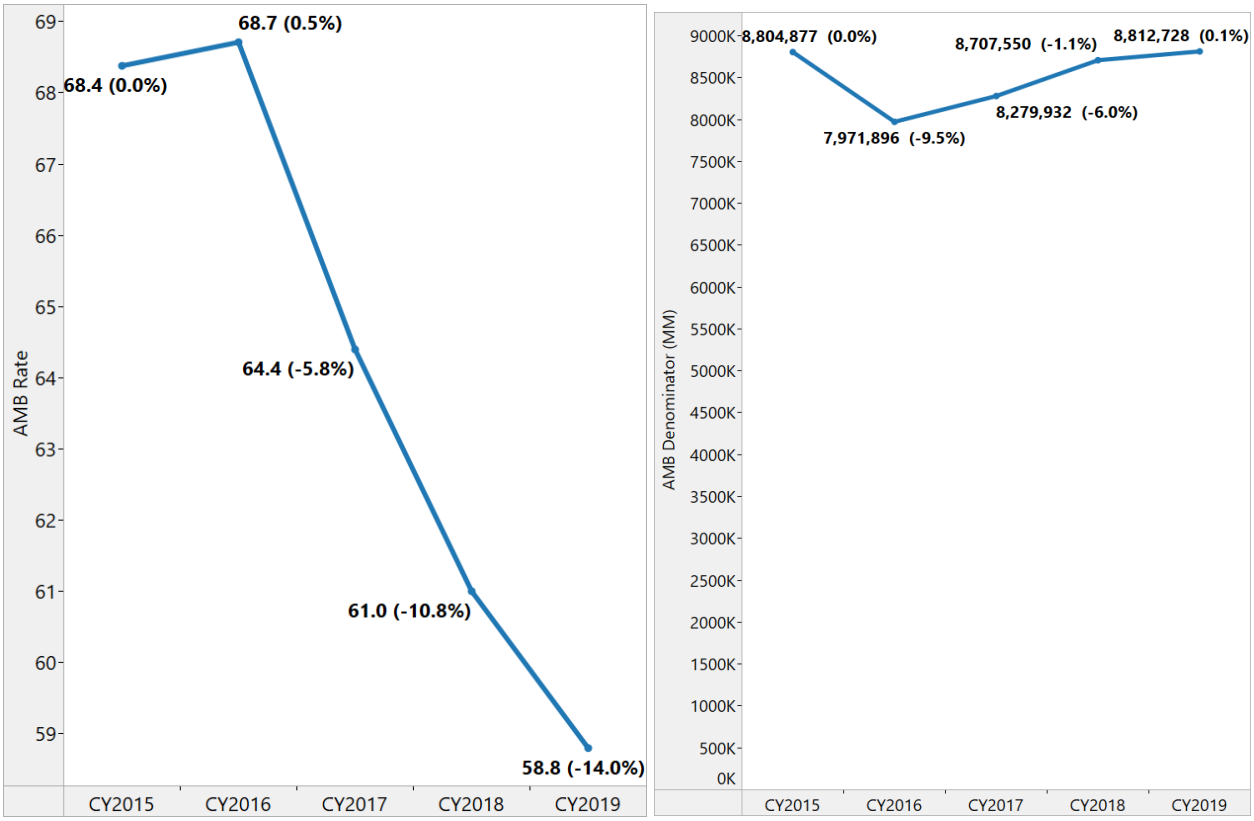
- For diabetes, patients may be identified as treated with a minimum of two prescriptions within 120-days of each other (but with different fill dates) in an applicable drug class; no diagnosis is required.
- For persistent asthma, there must be a minimum of two prescriptions within 120-days of each other (but with different fill dates) in an applicable drug class (other than Leukotriene Modifiers) plus any one of the following criteria:
    - An inpatient discharge with a principal diagnosis of asthma,
    - An ER visit with a principal diagnosis of asthma,
    - At least four outpatient visits with asthma listed as any diagnosis,
    - Two additional asthma medication prescribing events for a total of four asthma prescriptions in the reporting period.

Results

There were 844,445 HUSKY Health members meeting the criteria for the *HEDIS® MY 2019 AMB* measure. These members had 518,138 ED visits and were enrolled for 8,812,728 member months. Resulting in a statewide rate of 58.8 in MY 2019. The rate decreased by 14% statewide over the five years of the study.

Figure 1: CT Statewide *HEDIS® MY 2015 - 2019 AMB* Rate Change and Change in Denominator (MM)

Data Source: CHNCT Data Warehouse



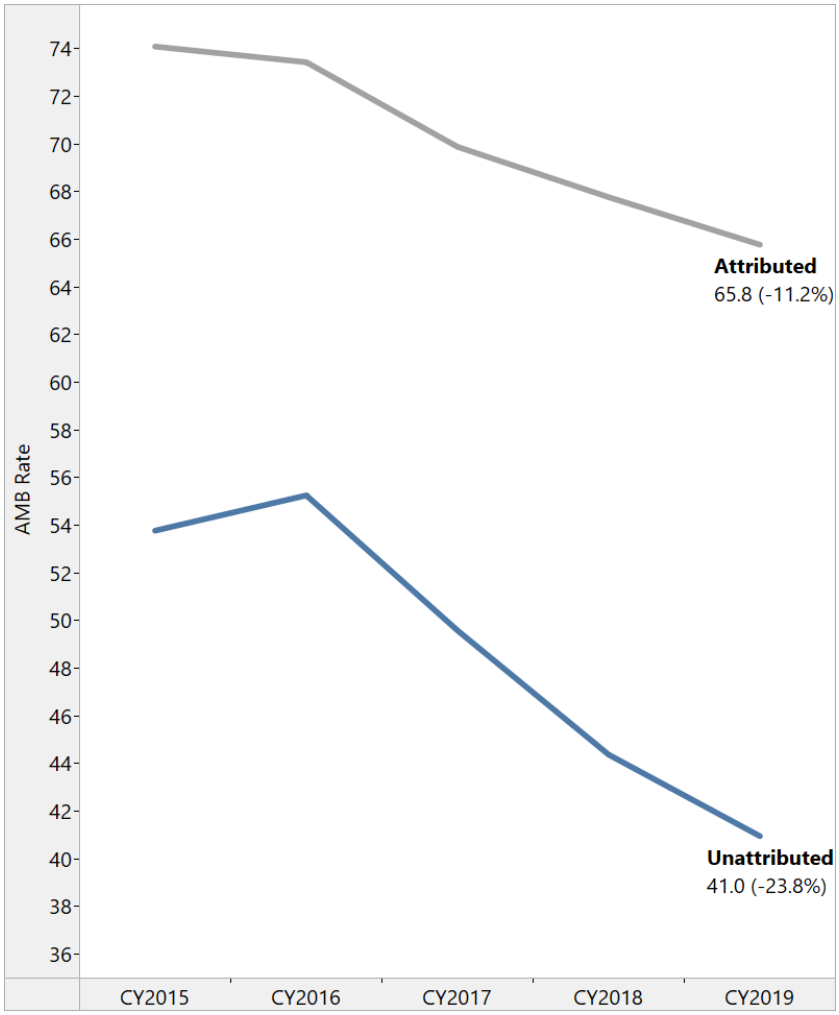
HEDIS® MY 2015 - 2019 AMB by Attribution

The study evaluates the *HEDIS® MY 2015 - 2019 AMB* rate for members attributed to a PCP and members unattributed to any practice.

Unlike what we expected with our hypothesis, members who were attributed to a PCP had a higher *HEDIS® MY 2015 - 2019 AMB* rate (65.8) and a lower rate of decrease (-11.2%) than unattributed members consistently across the five years of the study (Figure 2).

Figure 2: *HEDIS® MY 2015 - 2019 AMB* rate by Attributed or Unattributed Members

Data Source: CHNCT Data Warehouse

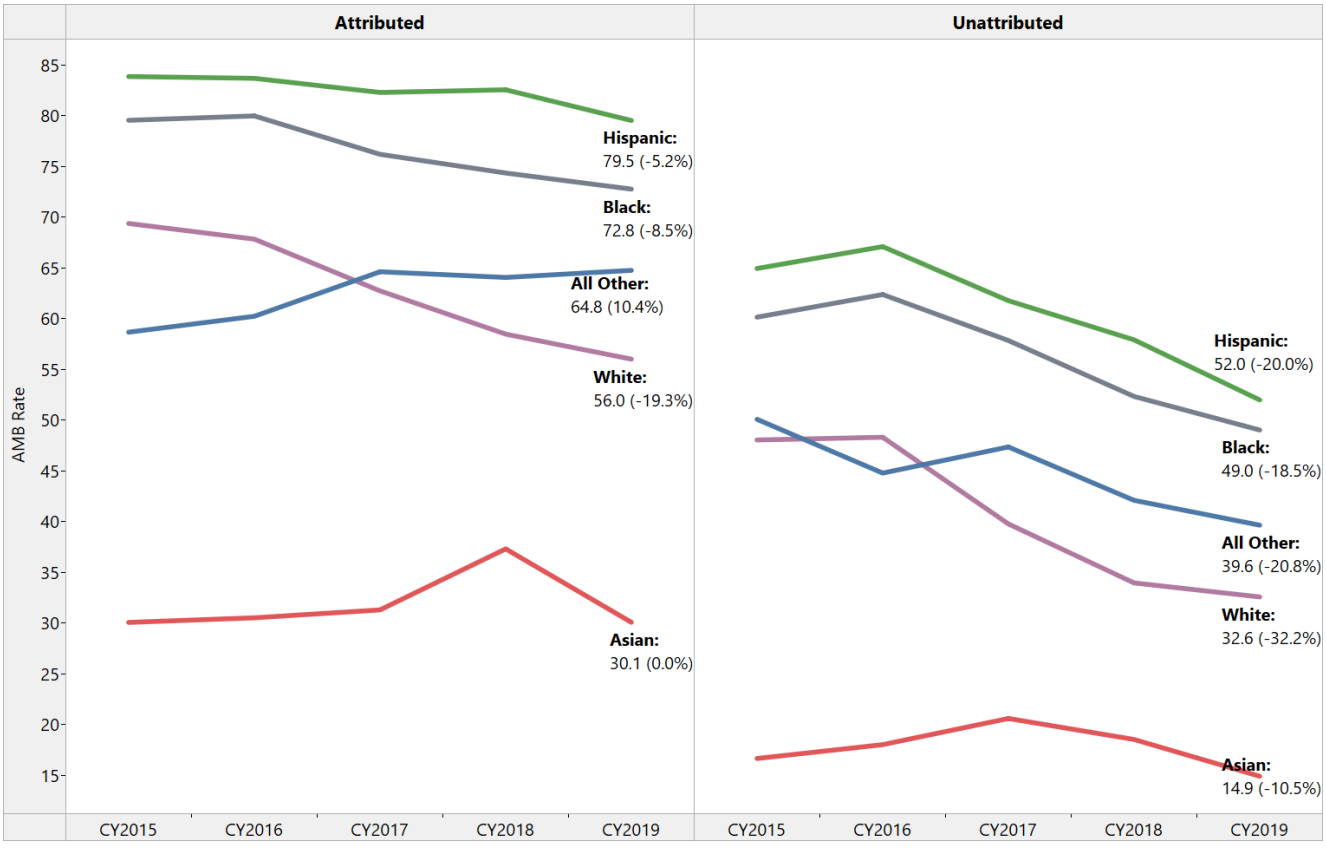


HEDIS® MY 2015 - 2019 AMB by Race

As shown in Figure 3, the racial disparity pattern was similar for both attributed and unattributed populations. Hispanics showed the highest *HEDIS® MY 2015 - 2019 AMB* rate in both attributed and unattributed PCP status and with the exception of Asian Non-Hispanics, the attributed group showed the slowest rate of decline. The findings on race and ethnicity are inconsistent with the national data for ED utilization, which indicates that the Black African American population had a higher rate of ED visits.[15] However, CT data shows the highest rate of ED utilization among Hispanics in both PCP attributed and unattributed groups. The rate of decline was greater for all races in the unattributed population compared to the attributed population, but the White/Caucasian Non-Hispanic race had the greatest decline in the rate for both populations. In the attributed population, the All Other/Multiple Races/Unknown is the only race that showed an increase in rate. The White/Caucasian Non-Hispanic rate declined and the All Other/Multiple Races/Unknown rate increased after MY 2017, which may be due to the inaccuracies of race and ethnicity data prior to 2017.

Figure 3: *HEDIS® MY 2015 - 2019 AMB* rate Change by Attribution Status and Race

Data Source: CHNCT Data Warehouse



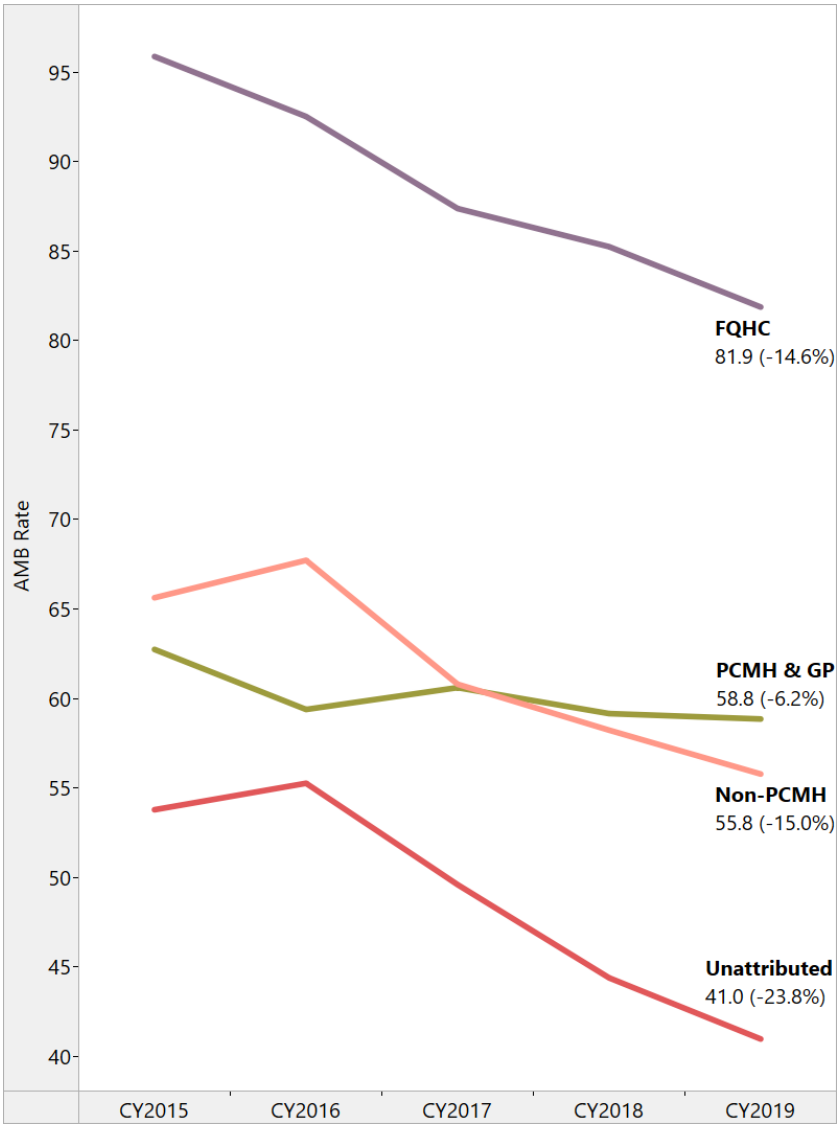
HEDIS® MY 2015 - 2019 AMB by Practice Setting

[15]Centers for Disease Control and Prevention. (2019, October 30). National Center for Health Statistics. Health, United States, 2018 - Data Finder. Retrieved January 21, 2021, from Centers for Disease Control and Prevention: https://www.cdc.gov/nchs/hus/contents2018.htm?search=Emergency_department_visits, (Centers for Disease Control and Prevention, 2019)

Members who were attributed to a PCP were attributed to either a Federally Qualified Health Center (FQHC), Person-Centered Medical Home (PCMH) and Glide Path practice (combined for this study), or a Non-PCMH practice. These practice setting groups were compared to all unattributed members. Members that were attributed to FQHCs had the highest *HEDIS® MY 2019 AMB* rate among the practice settings examined, at 81.9. This was followed by PCMH/GP practices, which had a *HEDIS® MY 2019 AMB* rate of 58.8%, and Non-PCMH practices at 55.8%, as shown in Figure 4.

Figure 4: *HEDIS® MY 2015- 2019 AMB* Rate by Practice Setting

Data Source: CHNCT Data Warehouse

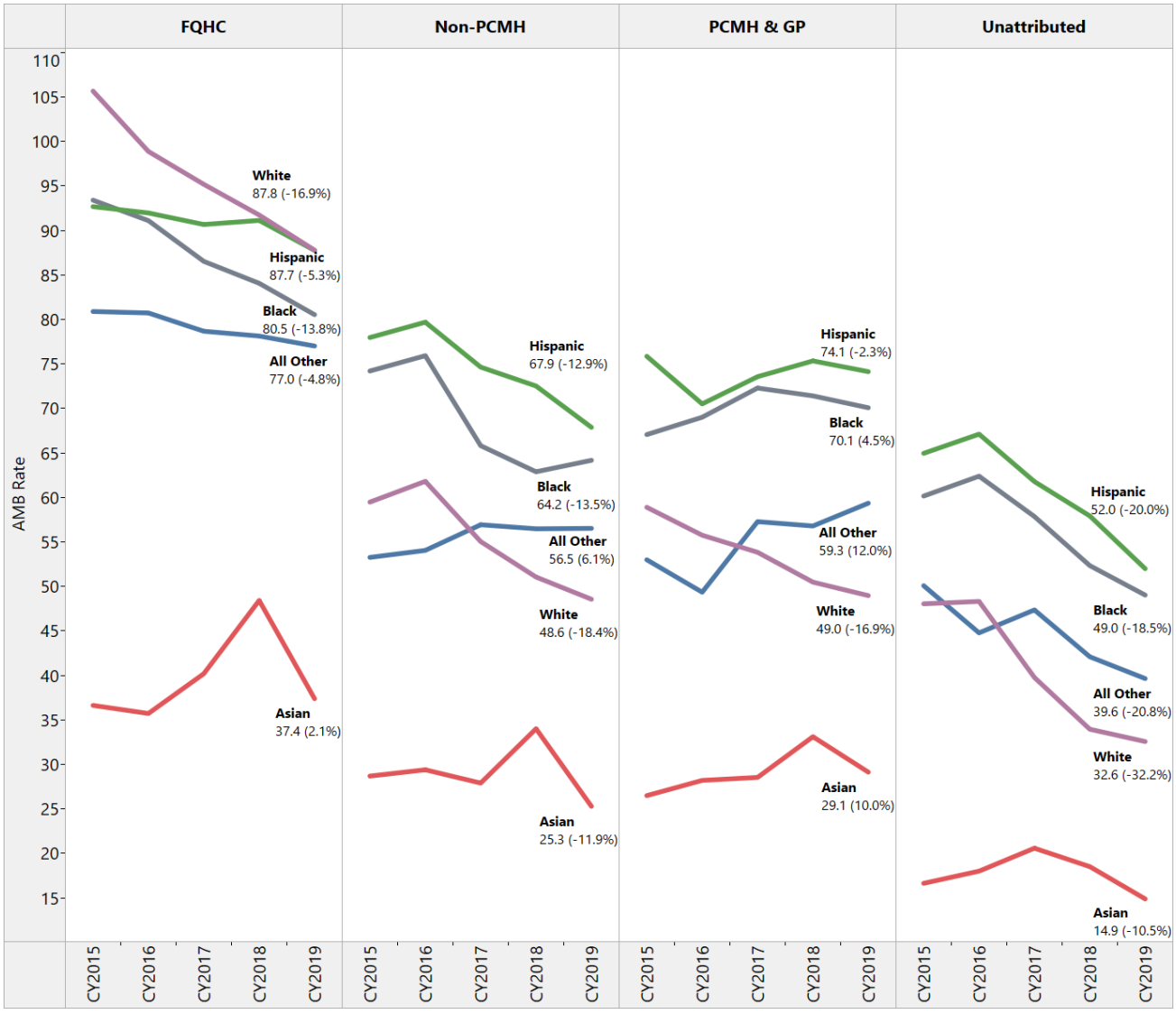


The *HEDIS® MY 2015 - 2019 AMB* rate reduction for the FQHC population was -14.6% since MY 2015, which is less than the Non-PCMH or unattributed groups. The FQHC and PCMH/ GP populations have the highest *HEDIS® MY 2019 AMB* rate and the slowest rate of decline over the five years of the study.

The unattributed population had both the lowest *HEDIS® MY 2019 AMB* rate (41.0) and the largest decrease over the five years of this study (23.8%). These findings do not support the hypothesis.

Figure 5: Racial Disparity by Practice Setting

Data Source: CHNCT Data Warehouse



The racial disparity pattern shown in Figure 5 is consistent with the trends with race seen in Figure 3, with the exception of the FQHC setting. The White/Caucasian Non-Hispanic race had the highest *HEDIS® MY 2015 - 2019 AMB* rate in the FQHC practice setting, while the Hispanic population had the highest *HEDIS® MY 2015 -*

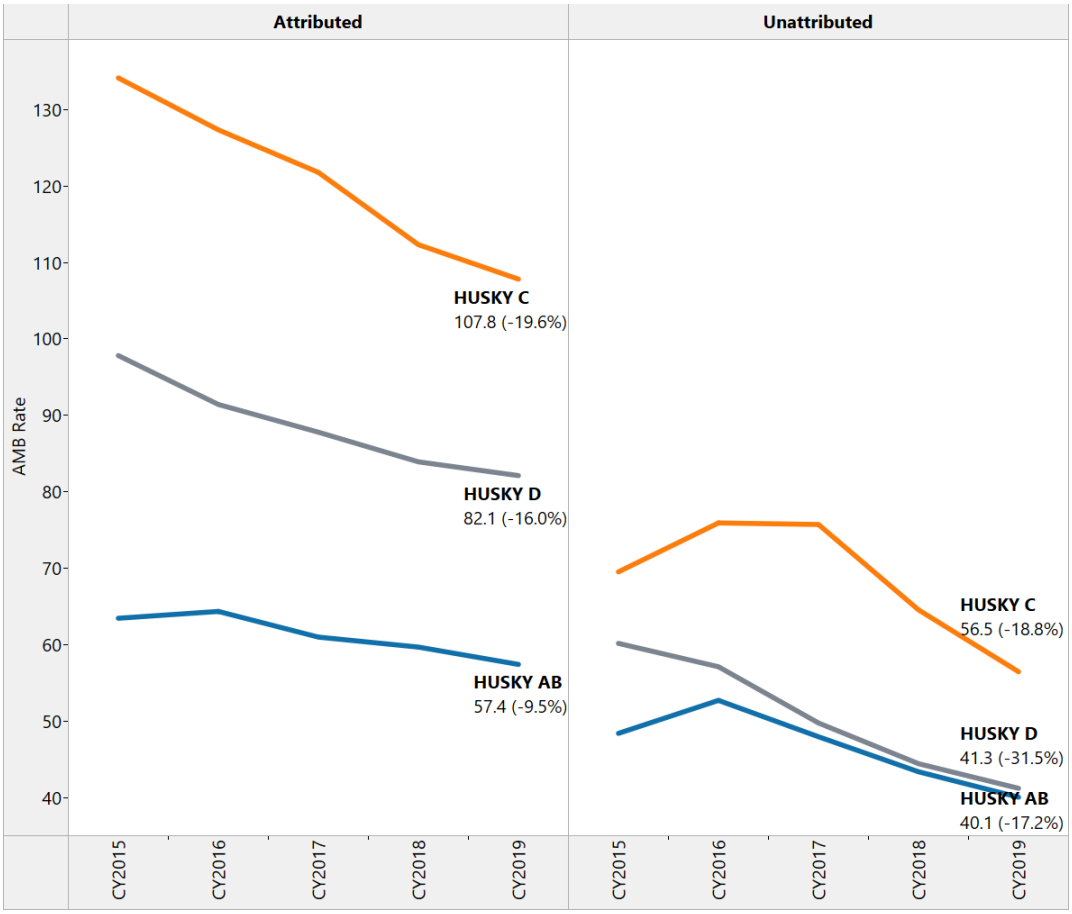
2019 AMB rates for the PCMH/GP practices, the Non-PCMH practices and the unattributed setting throughout the five years of this study.

HEDIS® MY 2015 - 2019 AMB by HUSKY Health Program

As we have seen in the previous Figures, the attributed population has higher *HEDIS® MY 2015 - 2019 AMB* rates than the unattributed (Figure 6). Throughout the five years of the study, HUSKY C has the highest *HEDIS® MY 2015 - 2019 AMB* rate, followed by HUSKY D, with HUSKY A/B coming in at the lowest regardless of attribution. All programs in the unattributed category have rates below the statewide average of 58.8. There was a decline in ED use across all races in all practice settings over the 5 years of the study, except for the All Other/Multiple race category in the PCMH&GP group.

Figure 6: *HEDIS® MY 2015 - 2019 AMB* Rate by Program

Data Source: CHNCT Data Warehouse

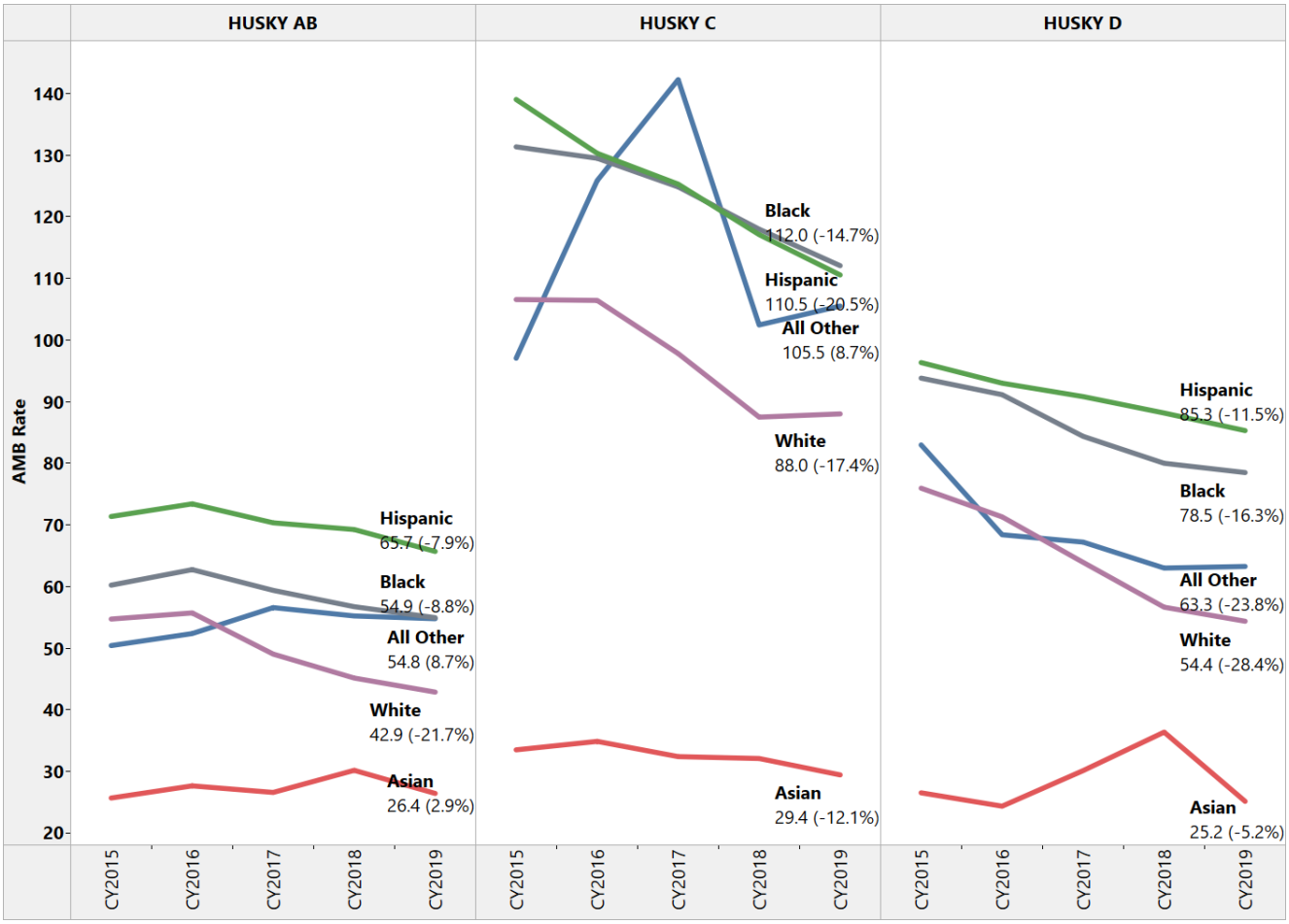


In Figure 7, the racial disparities by HUSKY Health program are consistent with what we have seen throughout this study. The Hispanic population has the highest *HEDIS® MY 2019 AMB* rate in HUSKY A/B and HUSKY D. For

HUSKY C, the Black/African American Non-Hispanic population had the highest rate in MY 2019, closely followed by the Hispanic population. There is an increase in the All Other/Multiple Race/Unknown rate for HUSKY C in MY 2017. This increase aligns with the revision to the race and ethnicity designations, as mentioned in the Study Population section of this document and is most likely an inaccurate representation of the true rates.

Figure 7: *HEDIS® MY 2015 - 2019 AMB* Rate - Racial Disparity by Program

Data Source: CHNCT Data Warehouse



HEDIS® MY 2015 - 2019 AMB Cohort Analysis

This analysis intended to determine if there was a change in ambulatory ED utilization based on differing attribution status throughout the study. A cohort analysis was performed to compare the ambulatory ED utilization behaviors of members who were included in the *HEDIS® MY 2015 - 2019 AMB* measure through all five years based on member attribution status during the study. Table 1 shows the member populations for the cohorts. Most members had a mixed attribution status from MY 2015 through MY 2019.

Table 1: *HEDIS® MY 2015 - 2019 AMB* Cohorts Included in All Five Years of the Study

Data Source: CHNCT Data Warehouse

COHORT MEMBERS	Unique Members
Cohort A: Members Unattributed MY 2015 – MY 2016, Attributed MY 2017 – MY 2019	10,447
Cohort B: Members Unattributed MY 2015 – MY 2017, Attributed MY 2018 – MY 2019	7,249
Cohort C: Members Attributed MY 2015 – MY 2019	220,667
Cohort D: Members, Mixed Attribution from MY 2015 – MY 2019	231,201
Cohort E: Members Unattributed MY 2015 – MY 2019	29,872
Grand Total	499,436

Table 2 shows the age breakout for each cohort in MY 2019. Of the members included in Cohort E, members unattributed throughout the study, had the largest percentage of members in the 21-44 age group, 69.16%. Of these, 56.3% were male versus 47.3% female. Annual screenings for men in their 20's, 30's and 40's only include an annual testicular exam, which may be self-administered, and screening for lipid disorders and prediabetes every 3 – 5 years depending on risk. An annual assessment of blood pressure, body mass index, and an eye exam is also recommended.[16] However, this group is traditionally difficult to engage in primary care, as they self-perceive to be healthy.[17]

Table 2: Age Breakout of Cohorts in *HEDIS® MY 2015 - 2019 AMB*

Data Source: CHNCT Data Warehouse

Cohort	Age 0-20	Age 21-44	Age 45-64	Age 65+
Cohort A	26.06%	50.27%	22.95%	0.71%
Cohort B	13.27%	63.19%	22.80%	0.73%
Cohort C	60.06%	18.32%	20.02%	1.60%
Cohort D	39.41%	42.00%	17.82%	0.78%
Cohort E	6.43%	69.16%	22.89%	1.52%

[16] https://www.hopkinsmedicine.org/health/wellness-and-prevention/mens-health-screenings

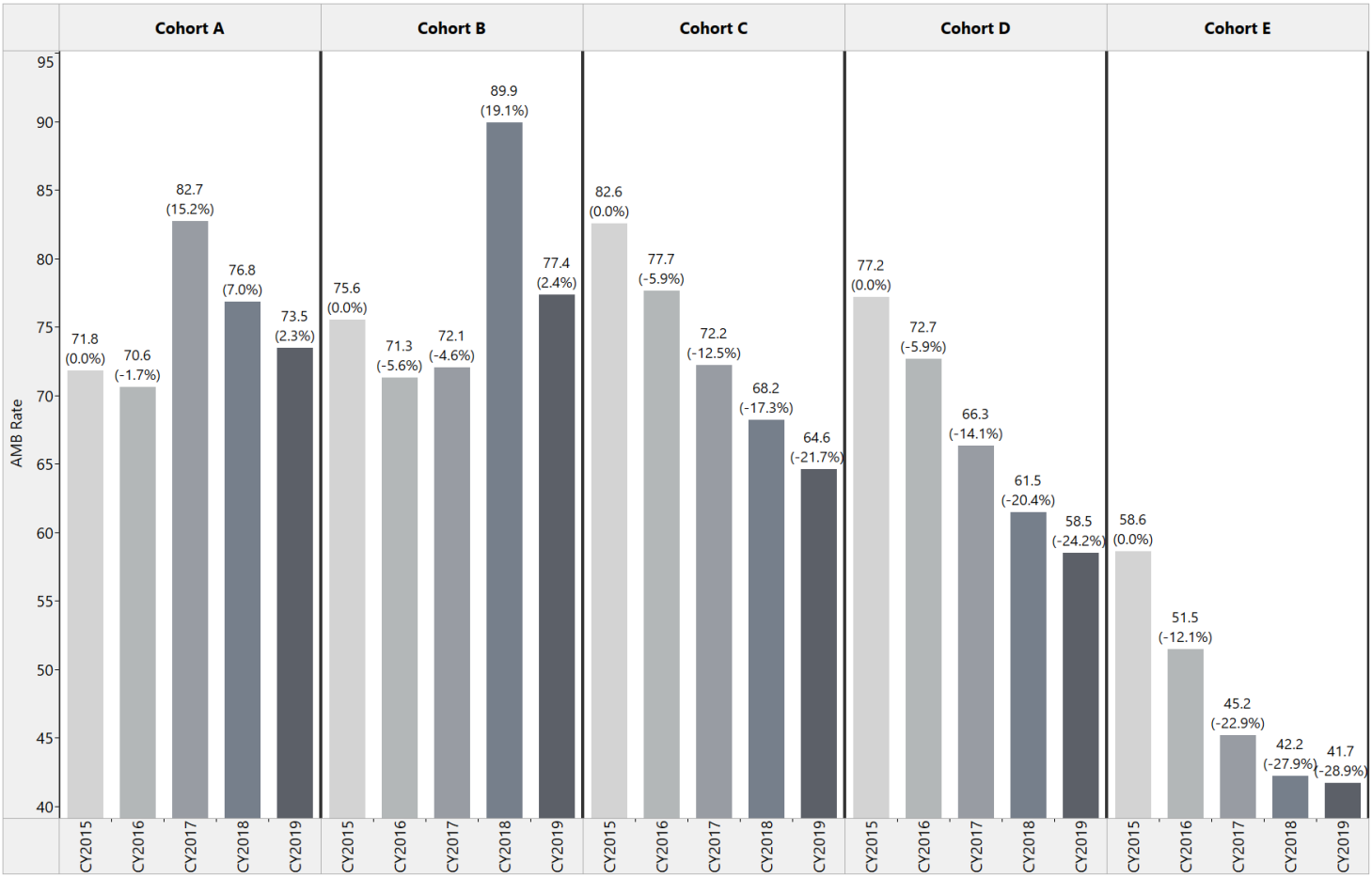
[17] http://med.stanford.edu/school/leadership/dean/precision-health-in-the-news/the-secret-to-getting-young-men-to-go-to-the-doctor.html

Figure 8 represents the *HEDIS® MY 2015 - 2019 AMB* rate for members Included in measure throughout the study period by cohort. Members who were unattributed and later became attributed (Cohorts A and B) resulted in *HEDIS® MY 2015 - 2019 AMB* increases in the first year post-attribution. In Cohort A, the rate jumped to 82.7; a 15.2% increase in the first year post-attribution. In Cohort B, the rate jumped to 89.9, reflecting an increase of 19.1% in the first year post-attribution. For both Cohorts A and B, while the rates dropped in the subsequent year(s) following attribution, the rate once attributed did not fall below the rate obtained while unattributed (Cohort A unattributed MY 2015 - 2016 and Cohort B unattributed MY 2015 – 2017).

Cohort C had a 21.7% decrease in the *HEDIS® MY 2015 - 2019 AMB* rate throughout the five years of the study; however, despite the decrease, the rate for this cohort in MY 2019 was still above the statewide average at 64.6. Cohort D, which had mixed attribution, showed a steady decline over five years, resulting in a MY 2019 rate of 58.5, just slightly below the statewide average. Cohort E, the group with members unattributed during the entire study, had the largest decline of 28.9% and the lowest *HEDIS® MY 2019 AMB* rate of 41.7. The results reveal that the *HEDIS® MY 2015 - 2019 AMB* rate decline does not appear to be tied to attribution status.

Figure 8: *HEDIS® MY 2015 - 2019 AMB* Members Included in Measure all Five Years of the Study by Cohort

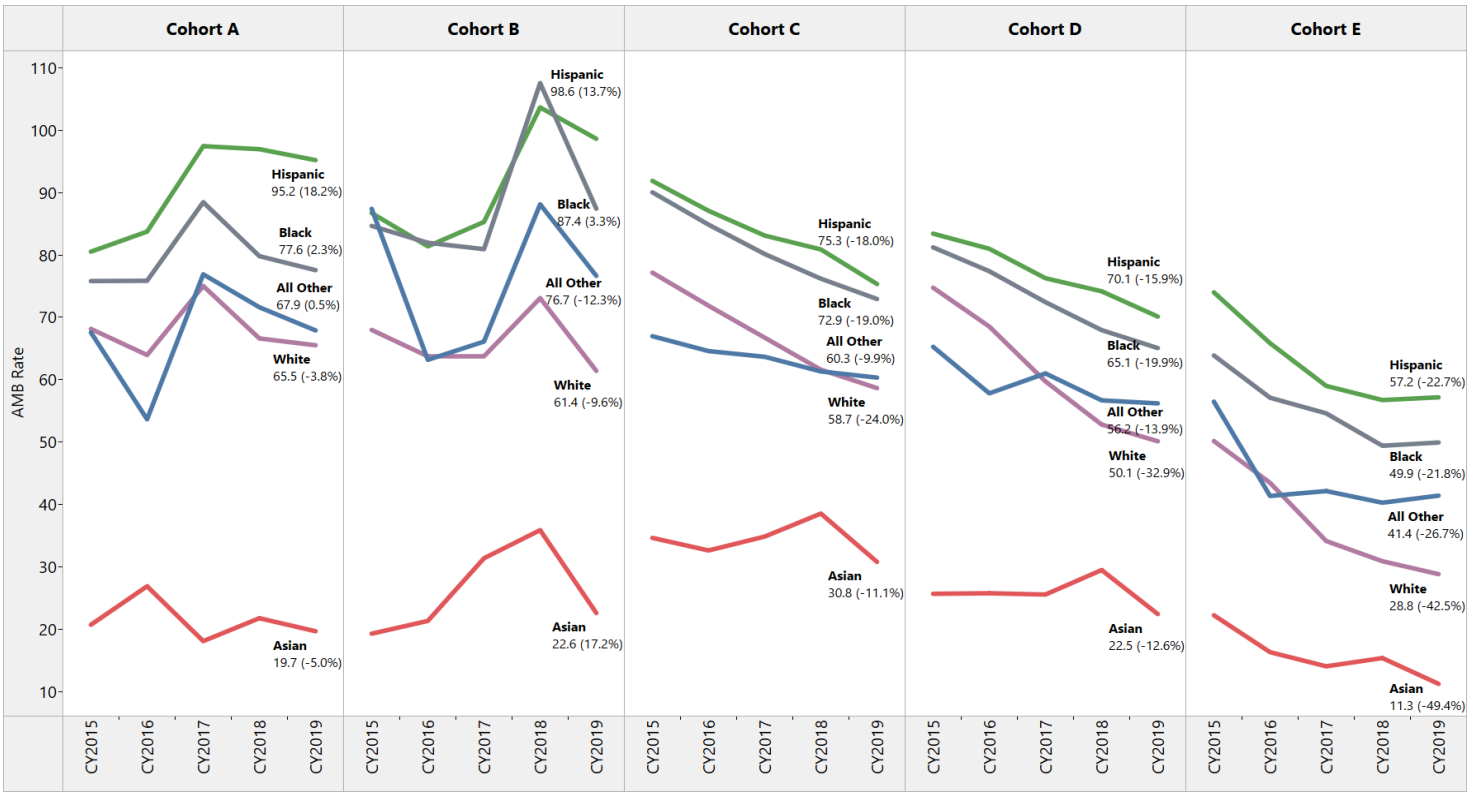
Data Source: CHNCT Data Warehouse



Evaluating each cohort by race in Figure 9 shows that regardless of attribution status, Hispanic members had the highest *HEDIS® MY 2019 AMB* rate. The rate for each race follows a similar pattern to the overall rate for each cohort. The rank order of each race is mostly stable across cohorts, with the Hispanic and Black/African American populations having the highest rates. This demonstrates a racial disparity across all cohorts. As seen in Figure 8, members in Cohort E who were unattributed throughout the 5 year time period had the lowest rate of ED utilization in MY 2019 regardless of race.

Figure 9: *HEDIS® MY 2015 - 2019 AMB* Rate by Cohort and Race

Data Source: CHNCT Data Warehouse



HEDIS® MY 2015 - 2019 AMB by Geographical Location Analysis

CHNCT has broken down the rates by city to evaluate for geographical patterns. Table 3 lists the *HEDIS® MY 2019 AMB* rate in the top 15 cities based on total MMs. In all 15 cities, the *HEDIS® MY 2019 AMB* rate is higher in the attributed population than the unattributed population; and with the exception of three cities (Danbury, Norwalk, and West Haven), the rate for the attributed population in each city is higher than the statewide rate.

Table 3: *HEDIS® MY 2019 AMB* rates by Top 15 Cities by Denominator

Data Source: CHNCT Data Warehouse

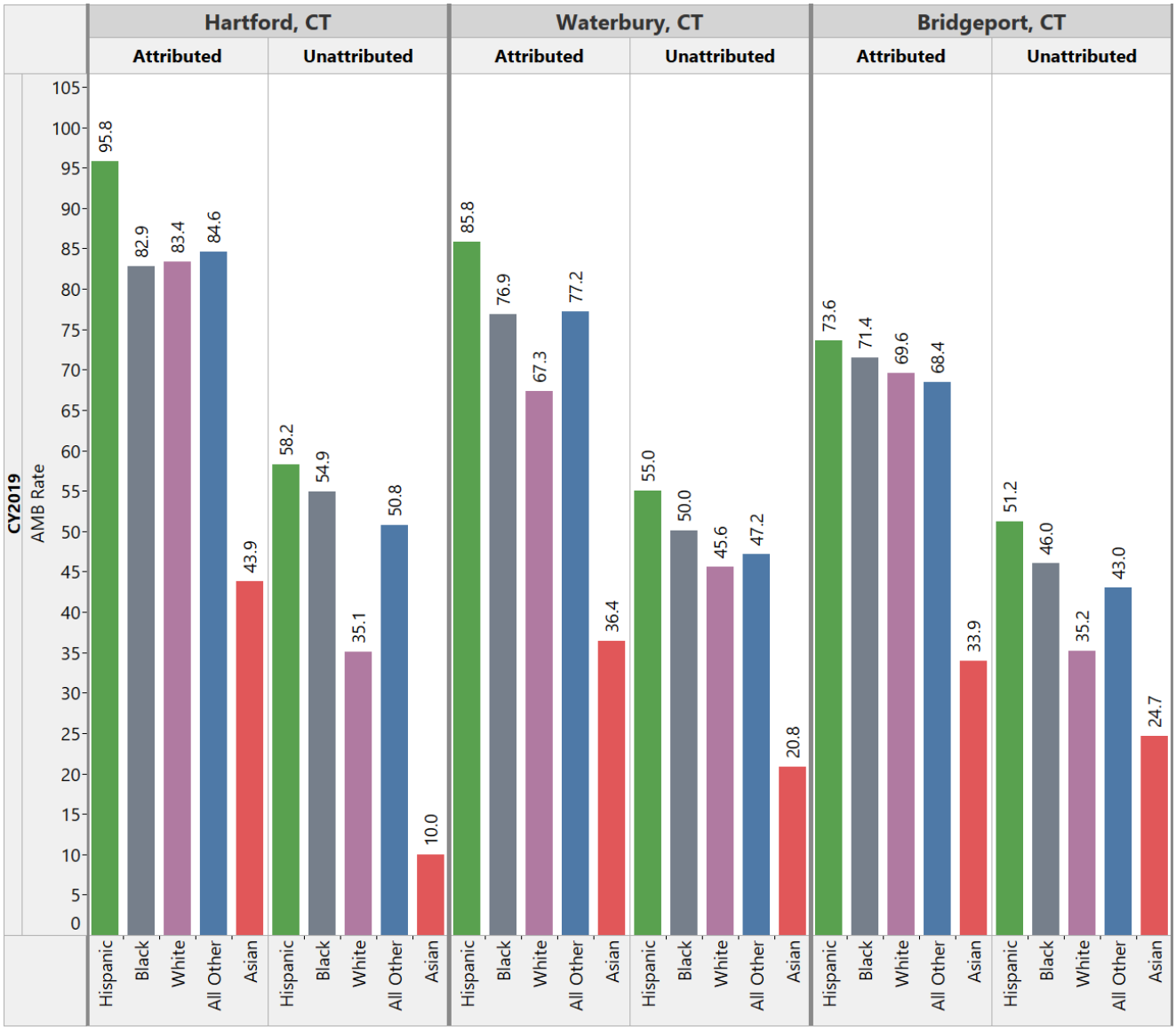
City	Attributed			Unattributed		
	Unique Member	Denominator (MM)	AMB Rate	Unique Member	Denominator (MM)	AMB Rate
Hartford, CT	45,274	497,690	88	23,720	235,871	54
Bridgeport, CT	47,474	515,752	70	21,631	206,079	45
Waterbury, CT	40,432	442,682	78	20,061	196,067	50
New Haven, CT	38,931	428,597	80	17,942	176,473	46
New Britain, CT	24,496	268,377	94	11,419	111,687	62
Stamford, CT	21,297	230,762	69	8,078	71,731	46
Meriden, CT	16,717	182,695	73	6,056	57,450	41
Danbury, CT	16,762	181,875	54	5,768	51,701	30
East Hartford, CT	14,208	155,343	65	5,572	52,912	41
Norwalk, CT	15,808	172,105	50	5,435	48,071	26
Manchester, CT	11,645	128,197	62	5,191	49,656	42
Bristol, CT	12,212	133,918	72	4,756	45,336	42
West Haven, CT	13,053	142,877	55	4,671	44,023	31
Norwich, CT	9,101	99,003	79	4,492	42,880	50
Stratford, CT	8,796	95,799	47	3,644	33,759	32

Figure 10 represents attributed and unattributed members by race for the top three cities with the largest denominators in MY 2019: Hartford, Waterbury, and Bridgeport. The rank order for the races in the attributed population are consistent in all three cities. The patterns are very similar; Hispanics had the highest rate, and Asian Non-Hispanics had the lowest rate. The Black/African American Non-Hispanics, All Other/Multiple Race/Unknown, and White/Caucasian Non-Hispanic had similar rates for both Hartford and Bridgeport; but in Waterbury, the White/Caucasian Non-Hispanic was much lower.

For the unattributed population, Hispanics had the highest rates, and Asian Non-Hispanic had the lowest rate just as for the attributed group, in all three cities. The ranking of the three remaining races were Black/African American Non-Hispanic, then All Other/Multiple Races/Unknown followed by White/Caucasian Non-Hispanic.

Figure 10: Three CT Cities with the Highest *HEDIS® MY 2019 AMB* Rate by Race

Data Source: CHNCT Data Warehouse



For each racial demographic, CHNCT examined the linear relationship between the *HEDIS® MY 2015 -2019 AMB ED visit* rate and the density of each population within Connecticut cities. The scatter plots in Appendix I were constructed by plotting the *HEDIS® MY 2015 -2019 AMB ED visit* rate for the city on the Y-axis and the percentage of each racial demographic residing in the city (measured by member months) on the X-axis.

Hispanics show a significant positive linear relationship with a correlation of 0.33 in MY 2016. The correlation progressively increases in strength, reaching 0.67 in MY 2019 (Table 4). This analysis indicates that Connecticut cities with denser Hispanic populations yield higher *HEDIS® MY 2015 -2019 AMB ED visit* rates. This trend becomes stronger as the years progress within the Hispanic population; however, similar relationships were

not observed in the Black/African American/Non-Hispanic and All Other/Multiple Races/Unknown races categories.

The White/Caucasian Non-Hispanic race shows a significant but weak negative relationship between the *HEDIS® MY 2015 – 2019 AMB* rate and the population density. This may be the result of some cities having a population of 100% White/Caucasian Non-Hispanic members as measured by member months.

Table 4: Correlation of *HEDIS® MY 2015 -2019 AMB* rate and Percent of Denominator by Race in Cities

Data Source: CHNCT Data Warehouse

	MY 2015	MY 2016	MY 2017	MY 2018	MY 2019
Hispanic Correlation (r)	0.24	*0.33	*0.5	*0.59	*0.67
Black Correlation	-0.42	-0.43	-0.37	-0.37	-0.30
White Correlation	*-0.36	*-0.32	*-0.23	-0.16	*-0.27
All Other Correlation	-1.00	-0.39	-0.26	*-0.40	-0.26

** indicates statistical significance*

A recent study published in the Annals of Emergency Medicine showed that there was a statistically significant reduction in the likelihood of ED visits for low-acuity conditions for those living within one mile of an open urgent care center.[18] CHNCT analyzed the average mileage to an urgent care facility in the top four zip codes based on member months. Results in Table 5 showed that these cities had some of the highest ED rates even though there were urgent care facilities within 1¼ miles.[19] Therefore, CT data does not show a decrease in ED use due in part to the proximity to an urgent care center.

Table 5: Top Cities Based on MM with Average Miles to an Urgent Care (UC) Facility

Data Source: CHNCT Data Warehouse

Zip Code	City	Member Months	% ED Use	Avg. Miles to UC
06051	New Britain	236,179	40.8%	1.11
06106	Hartford	269,408	37.3%	0.76
06511	New Haven	248,512	35.2%	0.75
06902	Stamford	236,512	34.3%	1.00

[18] Weineck R. et al., 2010. Some Hospital Emergency Department Visits Could Be Handed by Alternative Care. RAND Retrieved 1/7/2021 at https://pubmed.ncbi.nlm.nih.gov/31515180/

[19] This analysis includes all HUSKY Health members and all 2019 ED visits.

HEDIS® MY 2015 - 2019 AMB Analysis by Chronic Condition

The sickest 5% of the population consumes 50% of healthcare spending. Many of the sickest patients have multiple chronic conditions, and disease management programs through the PCP can increase the quality of patient care.[20] CHNCT performed an analysis of the top chronic conditions for the members in the *HEDIS® MY 2015 - 2019 AMB* measure. The conditions identified were asthma, diabetes, and hypertension. Table 6 shows the number of members included in the *HEDIS® MY 2015 - 2019 AMB* measure with their chronic condition status. Data showed that there were 190,557 (22.5%) members with one or more of those top three chronic conditions. The majority of those members (86.5%) are attributed to a PCP.

Table 6 shows the distribution of member attribution within the *HEDIS® MY 2019 AMB* members. The distribution of member attribution is relatively equal across the selected chronic conditions.

Table 6: PCP attribution within each condition group in MY 2019

Data Source: CareAnalyzer®

Chronic Condition	Attributed	Unattributed
Asthma	95,101 (87.4%)	13,660 (12.6%)
Diabetes	40,981 (87.9%)	5,644 (12.1%)
Hypertension	78,075 (87.0%)	11,699 (13.0%)

Table 7 below shows the number of unique *HEDIS® MY 2015 - 2019 AMB* members who had each condition during the measurement year. One member can have multiple chronic conditions.

Table 7: Number of Unique Members with Each Chronic Condition

Data Source: CareAnalyzer®

Chronic Condition	MY 2015	MY 2016	MY 2017	MY 2018	MY 2019
Asthma	100,960 (11.59%)	100,283 (12.77%)	105,398 (12.90%)	126,660 (15.18%)	108,761 (12.88%)
Diabetes	42,676 (4.90%)	42,435 (5.40%)	44,539 (5.45%)	45,490 (5.45%)	46,625 (5.52%)
Hypertension	82,674 (9.49%)	82,193 (10.47%)	84,419 (10.33%)	87,588 (10.50%)	89,774 (10.63%)

[20] Pearl, R., and Madvig, P. 2020. Managing the Most Expensive Patients. Harvard Business Review, January-February 2020. Retrieved on 1/18/2021 from https://hbr.org/2020/01/managing-the-most-expensive-patients

Table 8: HUSKY Health Members Eligible for *HEDIS® MY 2019 AMB* Measure

Data Source: CareAnalyzer®

	Total	Attributed		Unattributed	
		#	%	#	%
Members with no chronic conditions	653,888	416,753	63.7	237,135	36.3
Members with 1 or more chronic conditions	190,557	164,754	86.5	25,803	13.5

The data from this chronic condition analysis supports an alternative hypothesis. This indicate that members with one or more chronic conditions are more likely to be attributed to a PCP and the increase in ED use by the attributed populations may be due to having an underlying chronic condition. Conversely, the unattributed population are younger with less comorbid conditions, and therefore have lower ED utilization, and engage in primary care less frequently.

Limitations

There are some limitations to this study. A change in methodology on how members can determine their race upon enrolling in HUSKY Health prior to 2017 was a limitation to the data regarding race and ethnicity. In addition, the data showed that in MY 2019, the race of 31.0% of members was unknown due to members declining to answer. Membership attribution is an imperfect representation for primary care utilization since it does not always convey information as to where the members' usual source of care takes place. This is a limitation to the study's ability to apply some of the findings in the practice setting. Another limitation to this study is that the reasons for visiting the ED were not evaluated for medical appropriateness to determine those that would have been better addressed in an outpatient primary care practice setting. According to the CDC, the most common reasons for visiting an ED are abdominal pain, chest pain and fever.[21]

Discussion

CHNCT conducted a review of the *HEDIS® MY 2015 -2019 AMB* performance data with a focus on the differences in rates among members who were attributed to a PCP and those who were not. The results were further examined to evaluate differences based on race and ethnicity, program, and geographic location.

Our hypothesis was that members who are attributed to a PCP would use the ED as a usual source of care less often than those who are not attributed to a PCP. Nearly 75% of HUSKY Health members are attributed to a PCP, and the remaining 25% are unattributed. The results of this study provided valuable, although unexpected data. The findings did not support the hypothesis. The *HEDIS® MY 2019 AMB* rate for attributed members is 65.8, and for unattributed members the rate is 41.0. Members who were unattributed had the

[21] Centers for Disease Control and Prevention (CDC). National Hospital Care Survey. Emergency Departments. Retrieved on 1/21/2021 from https://www.cdc.gov/nchs/data/nhcs/ED_Factsheet.pdf

lowest *HEDIS® MY 2015 - 2019 AMB* rate. However, the study identified racial and geographic disparities that will guide future interventions to address health equity.

From a demographic perspective, the majority of members in the *HEDIS® MY 2019 AMB* measure were All Other/Multiple Races/Unknown. Members who are White/Caucasian Non-Hispanic were the second most common race, followed by Hispanics and Black African American/Non-Hispanics. Asian Non-Hispanics made up 2.8% of the *HEDIS® MY 2019 AMB* population. On average, HUSKY Health members in the measure were enrolled for 10.44 months in MY 2019. There was little variation in this statistic among the five race/ethnicity groups.

The results by race identified that the HUSKY Health Hispanic population had the highest *HEDIS® MY 2015 - 2019 AMB* rate across Connecticut and was notable in the three cities with the largest denominators for both attributed and unattributed members. Studies have shown that some Hispanic members may wait until the last minute to obtain care until the illness is such that it requires a visit to the ED.[22]

The race with the second-highest *HEDIS® MY 2015 - 2019 AMB* rate was the Black/African American Non-Hispanic population, followed by the White/Caucasian Non-Hispanic population. The White/Caucasian Non-Hispanic rate declined and the All Other/Multiple Races/Unknown rate increased after MY 2017 due to the inaccuracies of race and ethnicity data prior to 2017.

Nationally, the Black/African American Non-Hispanic population has the highest ED utilization per 1,000 people, followed by the White/Caucasian Non-Hispanic population and then the All Other population, with the Hispanic population having the lowest rate of ED utilization per 1,000 people.[23]

State of Connecticut Office of Health Strategy (OHS) data on ED utilization shows that overall, utilization has decreased 4.39% from FY 2015 through FY 2019. The payer mix has remained constant over the five-year period, and in FY 2019, Medicaid was the payer for most of the visits (48.0%). In FY 2019, the majority of ED visits were by White Non-Hispanic patients. Racial breakdown for FY 2019 ED use showed that White Non-Hispanics accounted for 54.0% of the visits, Hispanics had 24.9% of the visits, Black Non-Hispanics had 16.4% of the visits, and "Other" had 4.7%. Less than 1% was noted to be unknown.[24]

The racial distribution of the *HEDIS® MY 2015 - 2019 AMB* rate showed that Hispanic members had the highest rate, followed by Black/African American Non-Hispanic members, All Other/Multiple Races/Unknown members, White Non-Hispanic members and lastly Asian Non-Hispanic members. The State of Connecticut OHS data had White Non-Hispanics as the highest utilizers, followed by Hispanic patients, and then Black

[22] Centers for Disease Control and Prevention (CDC). Office of the Associate Director for Communication. Cultural Insights: Communicating with Hispanics/Latinos. Retrieved 12/21/2020 from https://www.cdc.gov/healthcommunication/pdf/audience/audienceinsight_culturalinsights.pdf

[23] American College of Emergency Physicians. ACEP Now, October 20, 2019. *The Latest Emergency Department Utilization Numbers Are In.* Retrieved on 11/19/2020 from https://www.acepnow.com/article/the-latest-emergency-department-utilization-numbers-are-in/

[24] Connecticut Office of Health Strategy. 020. Statewide Health Care Facilities and Services Plan—2020 Supplement. Hartford, CT: Connecticut Office of Health Strategy. FY (Fiscal Year) refers to Federal Fiscal Year (FFY), which runs from October 1 through September 30 each year. Retrieved on 1/26/2021 from https://portal.ct.gov/-/media/OHS/HSP/Facilities-and-Services-Plan-2020.pdf

patients.[25] The HUSKY Health member results differ from the State of Connecticut results as well as the national results; but this may be due to differences in how the data were obtained.

This study reviewed *HEDIS® MY 2015 - 2019 AMB* utilization by geographic location and found that Hispanic members who live in Hartford, Waterbury or Bridgeport have the highest rates.

Data showed that the FQHC population had the highest *HEDIS® MY 2019 AMB* rate at 81.9, followed by PCMH/GP practices at 58.8, and non-PCMH practices at 55.8. An intervention directly targeting members attributed to FQHCs should be considered.

The CHNCT Community Practice Transformation Specialists (CPTS) have been working with the FQHCs to reduce ED utilization. The CPTS team reviewed identified members from these practices with high ED utilization with the clinical team at each facility. They reviewed their last visits, diagnosis, reasons for the ED visits, number of missed appointments, and behavioral health referrals, or lack thereof. Results from these reviews showed that patient non-compliance and missed appointments significantly contributed to the loss of continuity and gaps in care. One FQHC identified that every member on their high ED utilizer list had either a suspected behavioral health diagnosis or a defined behavioral health diagnosis. Identified barriers included the fact that transportation could be an issue and calling an ambulance is easier, limited staff working during extended hours may make it harder for some members to get an appointment, and the limited number of behavioral health providers available may cause a member to seek treatment at an ED instead.

The HUSKY C population attributed to a PCP had the highest *HEDIS® MY 2019 AMB* rate at 107.8, followed by HUSKY D at 82.1 and HUSKY A/B at 57.4. While the unattributed population had the programs in the same order, the rates were much lower. HUSKY C had the highest rate in the unattributed population (56.5). Further analysis would be required to understand the drivers of ED use in this population. HUSKY D (41.3) and HUSKY A/B (40.1) rates were very close, and both had a five-year decline in rate; however, HUSKY D had a much greater decline (31.5%) as compared to HUSKY A/B (17.2%).

CHNCT reviewed cohort data for members who were included in the *HEDIS® MY 2015 - 2019 AMB* denominator for the entire study. Results indicated that Cohort C, members who were attributed to a PCP for the entire five-year study period, had a steady decrease in ED utilization by 21.7%.; the rate started at 82.6 in 2015 to 64.6 in 2019, which is still above the statewide average of 58.8. Cohorts A and B, members who were unattributed at the beginning of the study and who then became attributed, showed a sharp increase in ED utilization in the year immediately following attribution. This was followed by a steady decrease in utilization ending with a rate that was still above the statewide average. Cohort D, members with mixed attribution (those who fluctuated between being attributed and unattributed) showed a steady decline and ended MY 2019 just slightly below the statewide average. Cohort E, members who were unattributed the entire study, had the lowest *HEDIS® MY 2015 - 2019 AMB* rates throughout the study.

The state's geographic areas that showed the highest *HEDIS® MY 2019 AMB* rates in the attributed population were in cities where a hospital is located. The top five cities based on denominator are New Britain, Hartford,

[25] Connecticut Office of Health Strategy. 020. Statewide Health Care Facilities and Services Plan—2020 Supplement. Hartford, CT: Connecticut Office of Health Strategy. FY (Fiscal Year) refers to Federal Fiscal Year (FFY), which runs from October 1 through September 30 each year. Retrieved on 1/26/2021 from https://portal.ct.gov/-/media/OHS/HSP/Facilities-and-Services-Plan-2020.pdf

New Haven, Norwich and Waterbury. For the unattributed population, New Britain was the only city with a rate higher than the statewide average.

CHNCT performed an additional analysis on ED utilization throughout the state, including all members and all MY 2019 ED visits and found that in cities with the largest member months continued to have high ED utilization regardless of the fact that there were urgent care facilities within 1 ¼ miles. This may be due in part to the proximity of a hospital. It may benefit the membership in these cities to implement a geo-targeting campaign directed at obtaining a PCP and/or utilizing PCP or urgent care services prior to visiting the ED for non-emergent care.

CHNCT performed an analysis of the top chronic conditions for the members in the *HEDIS® MY 2015 - 2019 AMB* measure. The three most prevalent conditions were asthma, diabetes and hypertension. Members with one or more of these chronic conditions have an attribution rate of 87% or higher. Results showed that members with one or more chronic conditions are more likely to be attributed to a PCP and that the increase in ED use may be due to the underlying chronic condition.

Conclusion

The review of HEDIS® *Ambulatory Care - ED Utilization visits per 1,000* data from MY 2015 through MY 2019 revealed disparities among race and ethnic groups, geographic location, and practice settings. This study's results did not support the hypothesis that unattributed members would visit the ED more frequently than those attributed to a PCP. Members attributed to an FQHC used the ED as a place for non-emergent care more often than other practice settings. Hispanic populations throughout the state frequented the ED more often than other racial/ethnic groups. This information is consistent with what was identified previously when this evaluation was performed solely on MY 2017 data.

Future studies can be focused on the impact of chronic conditions on ED utilization, such as asthma/COPD, diabetes, and cardiovascular disease in relation to social determinants of health, as these can affect access to primary care and can lead to preventable ED visits among these members.[26] Next steps could also include identifying the HUSKY C Hispanic members with a chronic condition in the top three cities (Hartford, Waterbury and Bridgeport) and develop a targeted intervention aimed at reducing ambulatory ED use.

A recent study comparing ED utilization between Medicaid and commercial insurance cited several factors contributing to increased ED utilization by Medicaid members. The study found that if Medicaid members were seen by busy or PCPs who were not able to address all of their needs, the members might be more likely to visit the ED for conditions better treated with the primary care physician. In addition, Medicaid members may have habituated to frequent ED use as the ED setting may be better equipped to address all health care needs at one time with no appointment. In addition, outpatient providers can easily delay or postpone treatment to certain patients, but ED providers are mandated to provide care to all patients regardless of their insurance status. Results of this study suggest that effective interventions to reduce ED visits among Medicaid members could include case management, addressing social determinants of health and access to urgent

[26] Health, Sara (2019). Primary Care Access Key to Reduce Chronic Illness ED Utilization. Retrieved on 12/23/2020 from https://patientengagementhit.com/news/primary-care-access-key-to-reduce-chronic-illness-ed-utilization

care.[27] CHNCT, by continuing to offer case management to members who use the ED most frequently, addressing social determinants of health, and informing members of the availability of urgent care, continues to take effective steps to help reduce health inequities within the HUSKY Health population and help all members achieve health equity. In 2021, CHNCT will analyze the use of telehealth services and its impact on utilization. Telehealth services have been shown to potentially reduce health inequity among underprivileged people; and members with chronic diseases can benefit from the preventive health components and follow-up care provided during telehealth visits.[28] CHNCT has also established an employee representative Health Equity Committee that works with leadership, and our established organization-wide committees, such as Clinical Effectiveness and Member and Provider Engagement Committees, external stakeholders, such Member and Provider Advisory Work Group, to identify and address reasons that result in health inequities. These include factors such as implicit bias in the healthcare delivery system, mistrust of the system, etc. CHNCT will also collaborate with culturally-focused community based organizations to help mitigate these factors. We will also work with provider organizations such as the Connecticut Hospital Association, and state agencies, such as the Department of Children and Families, the Department of Mental Health and Addiction Services, Department of Corrections to support these goals. Analysis of other measures of health outcomes for racial and ethnic disparities will be conducted as part of the all ASO Health Equity project, currently underway.

[27] Kim, Hyunjee et al. "Comparing Emergency Department Use Among Medicaid and Commercial Patients Using All-Payer All-Claims Data." *Population health management* vol. 20,4 (2017): 271-277. doi:10.1089/pop.2016.0075. Retrieved 12/22/2020 from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5564052/

[28] Ayabakan, Sezgin and Bardhan, Indranil and Zheng, Eric, Impact of Telehealth Use on Healthcare Utilization: A Quasi-experimental Study of Maryland Patients (October 9, 2020). Available at SSRN: https://ssrn.com/abstract=3707829 or http://dx.doi.org/10.2139/ssrn.3707829

Appendix I

CHNCT conducted an analysis on the relationship between the *HEDIS® MY 2015 - 2019 AMB* rate as compared to the percentage of the member months by race.

Table 9: Correlation of *HEDIS® MY 2015 - 2019 AMB* rate and Percentage of Denominator by Race in Cities

	MY 2015	MY 2016	MY 2017	MY 2018	MY 2019
Hispanic Correlation (r)	0.24	*0.33	*0.5	*0.59	*0.67
Black Correlation	-0.42	-0.43	-0.37	-0.37	-0.30
White Correlation	*-0.36	*-0.32	*-0.23	-0.16	*-0.27
All Other Correlation	-1.00	-0.39	-0.26	*-0.40	-0.26

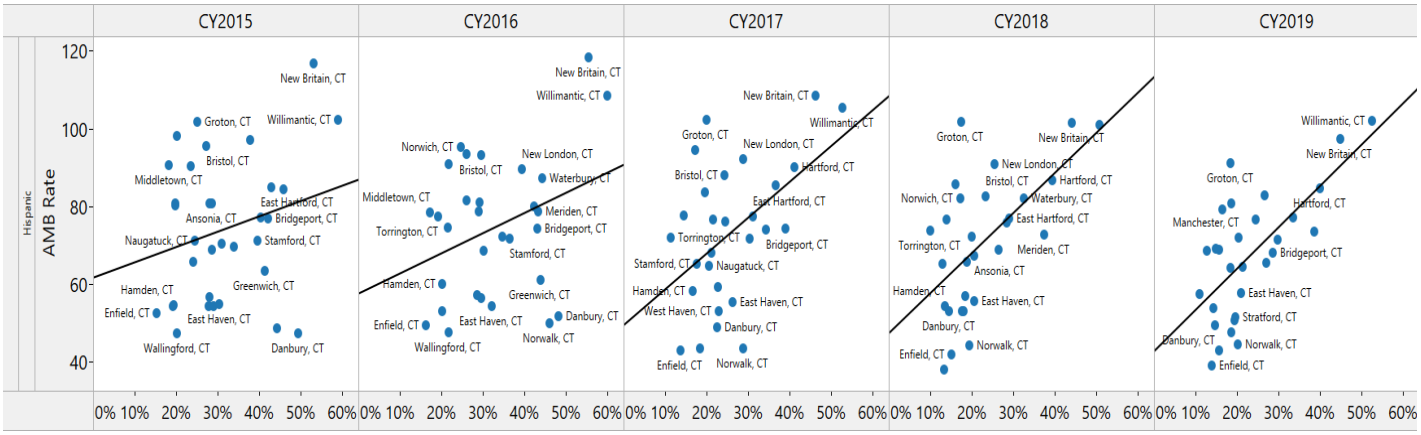
** indicates the statistical significance*
Data from CareAnalyzer®

In the following scatter plots, each dot represents a Connecticut city with a denominator over 10,000 MM.

Hispanic

Since the Hispanic population had the highest *HEDIS® MY 2015 - 2019 AMB* rate compared to other races, we conducted an analysis on the relationship between the *HEDIS® MY 2015 - 2019 AMB* rate as compared to the percentage of Hispanic member months in each city (Figure 11).

Figure 11: Relationship of *HEDIS® MY 2015 - 2019 AMB* Rate by Percentage of Hispanics in Each City



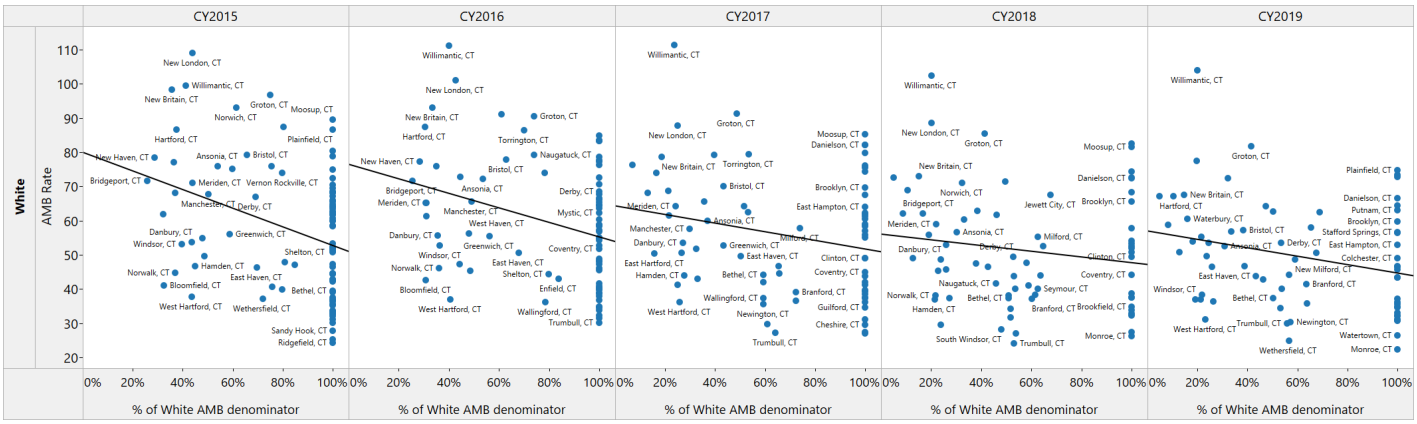
Data from CHNCT Data Warehouse

This Figure shows that the percentage of Hispanic member months and *HEDIS® MY 2015 - 2019 AMB* rate is strongly correlated, and the correlation grew stronger over the five years of the study. It supports other results from this study showing that the Hispanic population has a stronger tendency to use the ED as their usual source of care.

For the Hispanic population, the linear relationship gets stronger throughout the study years. The correlation in MY 2016 through MY 2019 is statistically significant and shows that there is a strong relationship in the cities with the highest Hispanic MM and higher *HEDIS® MY 2015 -2019 AMB* rates.

White/Caucasian Non-Hispanic

Figure 12: Relationship of *HEDIS® MY 2015 - 2019 AMB* Rate by Percentage of White/Caucasian Non-Hispanics in Each City

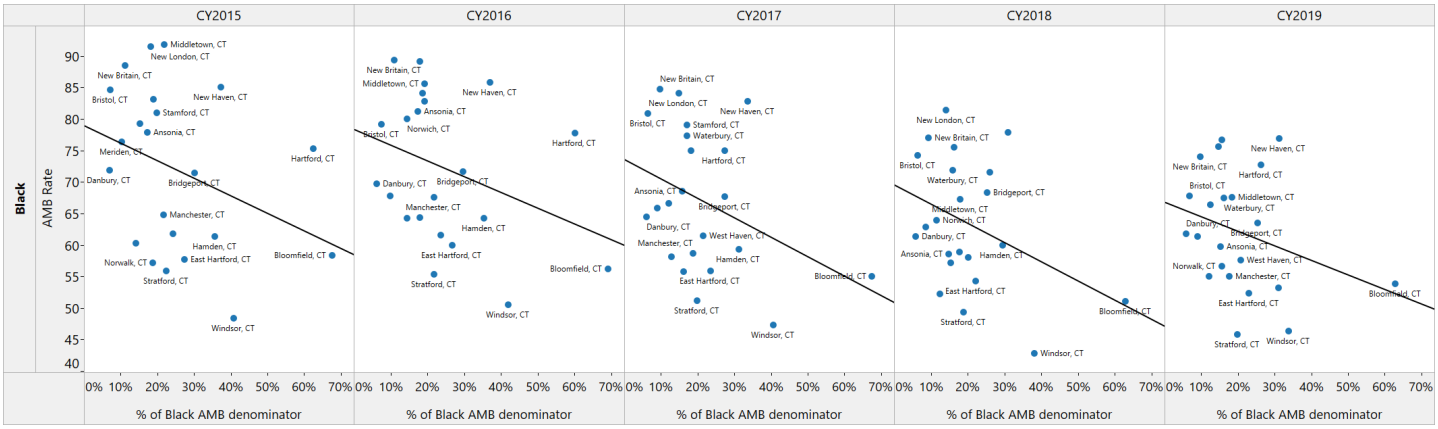


Data from CHNCT Data Warehouse

The White/Caucasian Non-Hispanic population has statistically significant correlation between *HEDIS® MY 2015 -2019 AMB* rate and percent of MM for all years of the study with the exception of MY 2018. The correlation in this population is driven by those cities with 100% White/Caucasian Non-Hispanic population.

Black/African American Non-Hispanic

Figure 13: Relationship of *HEDIS® MY 2015 - 2019 AMB* Rate by Percentage of Black/African American Non-Hispanics in Each City

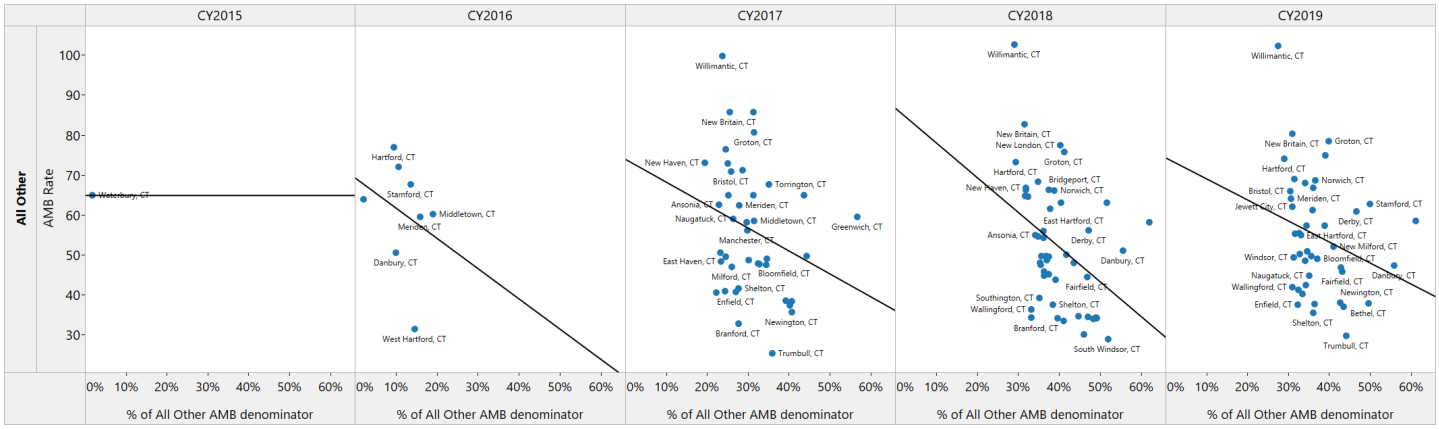


Data from CHNCT Data Warehouse

Although there was no statistical significance in the correlation for the Black/African American/Non-Hispanic population, a trend line can still be drawn. This graphic does not indicate that the cities with higher Black/African American/Non-Hispanic population have a lower rate. All Other/Mixed Race/Unknown

All Other/Mixed Race/Unknown

Figure 14: Relationship of *HEDIS® MY 2015 - 2019 AMB* Rate by Percentage of All Other/Mixed Race/Unknown in Each City



Data from CHNCT Data Warehouse

There are very few dots in the MY 2015 and MY 2016 due to the DSS race categorization issue. The results showed no statistical significance in the correlation for the All Other/Multiple Races/Unknown races.

Appendix II

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Glossary

Term	Description	Definition
Administrative		Methodology used to produce measure rates using claims data only.
ASO	Administrative Services Organization	An organization providing utilization management, benefit information, member and provider services, intensive care management services, centralized data management and reporting, quality management and improvement in a managed fee for service platform with the risk assumed by the Department of Social Services.

Term	Description	Definition
Attribution		A methodology used to link a member to a primary care provider based on specific claims data.
CareAnalyzer®		CareAnalyzer® is a tool that combines elements of patient risk, care opportunities, and provider performance. CareAnalyzer® is available to primary care practices to assist with identifying gaps in care and high-risk members.
CHNCT	Community Health Network of CT, Inc.	CHNCT, Inc. is contracted with the CT Department of Social Services as the medical ASO for the HUSKY Health program.
COEFFICIENT OF DETERMINATION (r^2)		In statistics, the coefficient of determination, denoted R^2 or r^2 and pronounced "R squared", is the proportion of the variance in the dependent variable that is predictable from the independent variable(s).
COHORT ANALYSIS		Cohort analysis is a type of behavioral analytics that breaks the data in a data set into related groups before analysis. These groups, or cohorts, usually share common characteristics or experiences within a defined time-span.
CMS	Centers for Medicare and Medicaid Services	CMS is a federal agency that administers the Medicare program and works in partnership with state governments to administer Medicaid, the Children's Health Insurance Program, and health insurance portability standards.
CPT	Current Procedural Methodology	The most recent edition of a listing, published by the American Medical Association, of descriptive terms and identifying codes for reporting medical services performed by providers.
CPTS	Community Practice Transformation Specialist	CHNCT staff that works with primary care practices that qualify for the DSS PCMH program to obtain their NCQA PCMH recognition or TJC PCMH certification. The team assists DSS PCMH program participants in their use of available resources to manage HUSKY Health members. They also support practices in maintaining and benefiting from their DSS PCMH participation.
DATA WAREHOUSE		A large store of data accumulated from a wide range of sources within a company and used to guide management decisions.
DSS	Department of Social Services	Connecticut's DSS is a multifaceted health and human service agency that administers a broad range of programs and services for over 1,000,000 Connecticut residents.
FQHC	Federally Qualified Health Center	FQHCs are community-based healthcare providers that receive funding from the Federal Health Resources and Services Administration (HRSA) Health Center Program to provide primary care and other services in underserved areas.

Term	Description	Definition
Glide Path		The DSS' PCMH Glide Path option provides financial (for private practices and hospital clinics only) and technical assistance (for all practice settings) to practices working toward PCMH recognition.
HEDIS®	Healthcare Effectiveness Data and Information Set	HEDIS® is a comprehensive set of standardized performance measures designed to provide purchasers and consumers with the information they need for reliable comparison of health plan performance. HEDIS® measures relate to many significant public health issues, such as cancer, heart disease, smoking, asthma, and diabetes. Special Needs Plans (SNPs) can use HEDIS® performance data to identify opportunities for improvement, monitor the success of quality improvement initiatives, track improvement, and provide a set of measurement standards that allow comparison with other plans. Data allow identification of performance gaps and establishment of realistic targets for improvement.
HUSKY Health	HUSKY A, B, C, D and limited benefit programs	HUSKY Health includes the following programs: 1) HUSKY A – Low-income children, parents, relative caregivers; 2) HUSKY B – Children's Health Insurance Program; 3) HUSKY C – Aged/Blind/Disabled; 4) HUSKY D – Low-income adults; and 5) Limited Benefit Program – Covers Tuberculosis and Family Planning.
Hybrid		Methodology used to produce measure rates using both claims data and chart review.
ICM	Intensive Care Management	Intensive Care Management (ICM) is a voluntary, person-centered program developed to support HUSKY Health members in reaching their health goals through education and access to quality healthcare. The program concentrates on enhancing the health and quality of life for HUSKY Health members identified as having the greatest need in managing complex co-morbid health conditions and/or behavioral health conditions.

Term	Description	Definition
Member Month		A member month (MM) is counted if a member is enrolled on a specific, pre-determined day of the month. Any member whose enrollment ends before the specified date, or whose enrollment starts after the specified date, would not be counted for that month.
National HEDIS® Medicaid Averages		A benchmark Medicaid rate provided by NCQA for HEDIS® measures. The data is compiled from health plans that report their data publically combined with plans that only allow their data to be used in aggregate.
NCQA	National Committee for Quality Assurance (NCQA)	A not-for-profit organization that develops and defines quality and performance measures for managed care, thereby providing an external standard of accountability.
P-VALUE		In null hypothesis significance testing, the p-value is the probability of obtaining test results at least as extreme as the results actually observed, under the assumption that the null hypothesis is correct.
PCMH	Person-Centered Medical Home	A Person-Centered Medical Home is a healthcare setting that facilitates partnerships between individual patients, and their personal providers, and when appropriate, the patient's family. Care is facilitated by registries, information technology, health information exchange and other means to assure that patients get the indicated care when and where they need and want it in a culturally and linguistically appropriate manner. The provider is required to provide this coordination and is encouraged to improve practice infrastructure in order to qualify as a medical home.
PCP	Primary Care Provider	A PCP is a provider who is both the first contact for a person with an undiagnosed health concern as well as continuing care of varied medical conditions, not limited by cause, organ system, or diagnosis.
PMPM	Per Member Per Month	Refers to the ratio of some service or cost divided into the number of members in a particular group on a monthly basis. For example, if a 10,000 member HMO in one month's time spends $20,000 on cardiovascular surgery, the cost on a PMPM basis would be $20,000 divided by 10,000 equaling $2 per member per month.

Term	Description	Definition
TPL	Third Party Liability	Third Party Liability (TPL) refers to the legal obligation of third parties (e.g., certain individuals, entities, insurers, or programs) to pay part or all of the expenditures for medical assistance furnished under a Medicaid state plan.