Savings Impact of Community Care of North Carolina: A Review of the Evidence

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KEY POINTS FROM THIS BRIEF:

- Since 2011, five published evaluations, including a total of ten analytical approaches, have examined the savings impact of Community Care of North Carolina's managed care program for Medicaid and dual Medicaid-Medicare beneficiaries.
- Studies differed in time frame and beneficiary populations included, and employed a variety of methodological approaches, but each concluded substantial Medicaid or Medicare savings net of program costs.
- Annualized per-beneficiary net savings estimates ranged from $105 to $2290 across eligibility categories and across study-years.
- Of the three evaluations that considered the total enrolled population, each independently concluded a savings impact of approximately $3 for every $1 invested in CCNC.
- Substantial reductions in inpatient utilization and greater savings impact among beneficiaries with chronic conditions were additional findings common to every evaluation.

Background

Federal regulations provide state Medicaid programs with two options for managed care: (1) risk-based managed care organizations (MCOs); and (2) Primary Care Case Management (PCCM) programs. In North Carolina, the Division of Medical Assistance currently contracts with NC Community Care Networks, Inc. (NCCCN) to administer a statewide enhanced PCCM managed care program commonly known as Community Care of North Carolina (CCNC). CCNC's approach emphasizes establishing access to a primary care medical home for Medicaid enrollees, equipping those medical homes with the multidisciplinary support needed to assure comprehensive, coordinated, high-quality care; and developing community-based infrastructure to support better local systems of care. The model emphasizes "quality first" and anticipates that

savings will accrue through reductions in hospital utilization and other potentially preventable services (such as overuse of specialty care), as members receive improved access to primary care and appropriate care of acute and chronic conditions. Currently, over 1,800 participating physician practices serve as primary care medical homes for over 1.6 million Medicaid recipients through the CCNC program.

This data brief provides a review of available evidence regarding CCNC's impact on total healthcare spending for Medicaid or dual Medicaid-Medicare beneficiaries, net of program costs. Studies were included in this review if they: 1) examined the saving impact of the CCNC model as a whole, rather than isolating specific program components such as care management, 2) included a comparison group, 3) measured spending through direct examination of Medicaid or Medicare paid claims data, and 4) differentiated between CCNC-enrolled and non-enrolled Medicaid beneficiaries.

Five reports published between 2011 and 2016 meet these criteria, covering differing time periods and enrolled populations or sub-populations (Table 1). Because it is impossible to directly measure what costs "would have been" in the absence of CCNC, these studies have used a variety of analytic approaches to estimate cost savings attributable to CCNC enrollment, controlling for external factors that may also influence costs. Study methods are summarized in Table 2, followed by additional findings from each report.

Table 1

Author and Date of Publication	Study Population and Timeframe	Savings Estimate
Milliman, Inc. Analysis of Community Care of North Carolina Cost Savings, Prepared for the Division of Medical Assistance, NC DHHS. December 15, 2011 (Milliman)	Total Medicaid population, in 4 categories: • Aged, blind and disabled (ABD) Medicaid only • ABD dual eligible • Children age 20 and under (excluding ABD) • Adults (excluding ABD) SFY 2007-2010	Annual net savings grew from $8.73 PMPM in FY07 (total $103M) to $25.40 PMPM in FY10 (total $382M). (annualized $104.76 to $304.80)
Fillmore et al. Health Care Savings with the Patient-Centered Medical Home: Community Care of North Carolina's Experience. *Population Health Management* 2013;17:141-148 (Fillmore)	Non-elderly, non-dual Medicaid recipients with disabilities (n=169,676 individuals) January 2007-September 2011	Total net savings of $184M over 4.75 years, or 7.87% decrease in average PMPM cost. Annual savings estimates range from $190.91 PMPM to $63.74 PMPM. (Annualized $2290.92 to $764.88)
RTI International. Medicare Health Care Quality (MHCQ) Demonstration Evaluation North Carolina Community Care Networks Year 3 Final Report, Prepared for Centers for Medicare & Medicaid Services. January 2015 (RTI)	Dual eligibles (Medicare and Medicaid beneficiaries) residing in 7 rural NC demonstration counties. January 2009- December 2012	Medicare savings of $568 per beneficiary per year among dual eligibles enrolled in CCNC's medical home program.
North Carolina Community Care Networks, Inc. Clinical Program Analysis. Prepared for the Division of Medical Assistance, NC DHHS. May 2015 (NCCCN)	Non-elderly, non-dual Medicaid beneficiaries SFY 2014	NCCCN saves $3 for every $1 invested in the program – a net savings of $336,375,995 in SFY 2014.
State of NC Office of the State Auditor. Community Care of North Carolina. Financial Related Audit. Study conducted by Michael Chernew, PhD, of Harvard School of Government.	Non-elderly, non-dual Medicaid beneficiaries July 2003-December 2012	Net savings of $312 per beneficiary per year

Table 2: Overview of Study Methods

Study	Design and Control Methodology
Milliman 2011, Method 1	Cross-sectional comparison between NC Medicaid recipients who were and were not enrolled in CCNC, adjusted for differences in demographic characteristics and clinical risk. Risk adjustment used 3M Clinical Risk Groups with NC Medicaid-specific resource intensity weights; Milliman further validated this approach with independent risk assessment calculations using the Chronic Illness and Disability Payment System (CDPS).
Milliman 2011, Method 2	Identification of factors other than CCNC efforts that affected trends in Medicaid spending, and adjustment of observed cumulative trend in per-member costs from FY07 to FY10 by the estimated impact of each of these factors (e.g. program changes such as eligibility requirements, changes in health status and disease burden in a given eligibility category, changes in provider reimbursement rates), resulting in an adjusted observed trend. Observed trends were compared to Milliman's estimate of national average fee-for-service utilization trends, with Medicare trends as a benchmark for the ABD population and commercial trends as a benchmark for Children and Adults.
Milliman 2011, Method 3	Pre-post study design using longitudinal data, examining health costs in the 12 months before and after CCNC enrollment. For each newly enrolled member, propensity matching was used to identify a matching control with similar Clinical Risk Group assignment, age, gender, and eligibility category, who was either never CCNC enrolled or continuously CCNC enrolled over the 24 months.
Fillmore 2013, Method 1	Hierarchical regression mixed model including all CCNC disabled recipients within time period, comparing member experience in CCNC-enrolled vs. unenrolled months, accounting for regional differences as fixed effects and within physician group differences as random effects.
Fillmore 2013, Method 2	Pre-post, intervention/comparison group, difference-in-differences mixed model, which directly matched cohort samples of enrolled and unenrolled members on factors including pharmacy use, demographics, health status, and behavioral health history.
RTI 2015	Multivariate regression analyses to determine whether the intervention group cost growth rate was slower than the comparison group cost growth rate, while also controlling statistically for five other factors that may affect costs (HCC risk score, age, gender, Medicare eligibility status, and race) and for pre-base year trends in costs. Comparison group drawn from 78 counties in five states, with propensity score weighting to balance beneficiary characteristics between the intervention group and comparison group.
NCCCN 2015	Cross-sectional comparison of costs for CCNC-enrolled vs. unenrolled NC Medicaid beneficiaries, risk-standardized through stratified analysis within clinical risk groups and program eligibility categories
Chernew 2015, Method 1	County fixed effect model to analyze effects of CCNC based on changes in enrollment penetration within counties over time. Concurrent and prospective risk adjustment using Chronic Illness and Disability Payment System v 5.3, Medical and Prescription Drug Models; age; gender; disability status; chemical dependency; mental illness; and chronic conditions. Several additional sensitivity analyses were conducted.
Chernew 2015, Method 2	As above, but using person fixed effect model that compared CCNC enrollees to themselves before joining CCNC. (Model rejected due to failed diagnostic tests)
Chernew 2015, Method 3	As above, but using physician-fixed effect model to measure outcomes relative to percent of a physician's Medicaid patients enrolled in CCNC over time. (Model rejected due to failed diagnostic tests, attribution issues)

Milliman, 2011

The NC DHHS Division of Medical Assistance contracted with Milliman, Inc. to determine the Medicaid cost savings achieved by the CCNC networks during state fiscal years 2007 to 2010. Milliman used three separate methodological approaches to this question. In the primary method, they calculated observed costs per member for CCNC-enrolled vs. non-enrolled NC Medicaid recipients in each fiscal year within each major Medicaid eligibility category, adjusted those costs to remove the impact of case mix differences, and attributed the remaining cost differences to the managed care efforts of CCNC. CCNC management fees were included in the cost calculations, so that the differences reflect savings net of program costs. Milliman further confirmed the reasonableness of these savings estimates with the Milliman Health Cost Guidelines (HCGs) cost estimation tool, a widely used tool for actuarial estimates of managed care savings.

Table 3: Saving Estimates from Milliman

North Carolina Division of Medical Assistance
Estimated Cost Savings Calculated Using Method 1

Fiscal Year	Average Members per Month	PMPM Savings	Total Annual Savings	Percent Savings
FY07	983,356	$8.73	$103,000,000	1.9%
FY08	1,083,636	$15.69	$204,000,000	3.4%
FY09	1,176,778	$20.89	$295,000,000	4.6%
FY10	1,253,292	$25.40	$382,000,000	5.8%

Source: Milliman 2011, Table 1

Milliman's Method 2 examined year-to-year cost trends for all beneficiaries, concluding that utilization trends for all eligibility groups were lower than would be expected based on utilization trends in national Medicare and commercial benchmark populations. Method 3 separately examined before-and-after costs of individuals who became enrolled with CCNC during the study period, with results generally suggesting lower cost trends for these newly enrolled members compared to otherwise similar beneficiaries over a 24-month period.

Milliman 2011, Additional Findings

- Savings grew from FY07 to FY10.
- Children and adults were the largest contributors of cost savings, with costs 15% lower than non-CCNC Medicaid beneficiaries by FY10.
- Savings were positive for the non-dual ABD population only in FY10 (3.3% lower costs), consistent with the timing of CCNC's focus on this population. Costs tended to increase for ABD individuals during their first year of CCNC enrollment due to increased utilization of primary care and prescription drugs, but were lower compared to non-CCNC members in subsequent years.
- Reductions were mainly seen in hospital and ER costs.

Fillmore et al., 2014

In a peer-reviewed study published in the journal Population Health Management, Fillmore et al. evaluated the financial impact of CCNC management for non-elderly Medicaid recipients with disabilities from January 2007 through third quarter 2011, using two sophisticated, quasi-experimental analytical models. Annual per-member net savings estimates varied by method, but converged on the same conclusion that CCNC achieved substantial statistically significant savings in this population, with a 7.87% decrease in average PMPM cost. Savings impact was greatest among persons with multiple chronic conditions (annual per-member savings estimates ranged from $63.74 to $190.91 in the full non-elderly disabled population, and from $92.61 to $228.41 among those with multiple chronic conditions).The authors additionally examined healthcare utilization trends. Inpatient admission rates declined from 420 per thousand per year (PKPY) in 2007 to 384 PKPY in 2011 among enrolled members, while increasing from 396 PKPY to 552 PKPY among the unenrolled, despite the higher clinical risk profile (disease burden) of enrolled members. Emergency department visits were initially higher for the enrolled population, but steadily declined and became insignificantly different from the unenrolled population by 2011. Rates of non-acute physician visits were significantly higher for enrolled members compared non-enrolled in every year after 2007, consistent with the medical home model.

Fillmore 2014, Additional Findings

- Savings increased with length of time in program.
- Impact was greater in persons with multiple chronic conditions .
- Hospitalization and ED visit rates declined among enrolled members while increasing among non-enrolled, despite a higher disease burden among the enrolled.

RTI, 2015

The Medicare Healthcare Quality Demonstration (also referred to as the "646 Demonstration") provided an opportunity to analyze the Medicare savings impact of the CCNC model for dually eligible beneficiaries in 26 counties over three years of program participation (2009-2012), with an out-of-state control population. The evaluation was performed by RTI, International, commissioned by the Centers for Medicare and Medicaid Services. RTI examined CCNC savings impact using 3 methods of attributing beneficiaries to the demonstration: a) "one-touch' attribution, including all beneficiaries with at least one primary care visit with a participating provider; b) "plurality assignment", similar to methodology currently used in the Medicare Shared Savings Accountable Care Organization program, including only those beneficiaries who received a plurality of their primary care visits from a participating provider; and c) "CCNC enrollment", including only those beneficiaries who met the one-touch attribution criteria and were also enrolled in CCNC's Medicaid medical home program.

Table 4: Medicare Savings Impact of CCNC Management of Dual Eligibles, by Attribution Method

Attribution Method	N (member-quarters)	Annualized per capita savings
One-touch attribution	723,716	$189
Plurality touch attribution	643,110	$251
Enrollment in CCNC medical home	519,285	$568

Source: RTI International analysis of Medicare claims October 2007–December 2012

As shown in Table 4, estimates of annualized per capita savings effect varied by attribution method, from -$189 (one-touch attribution), to -$251 (plurality-touch attribution), to -$568 (CCNC enrollment). This amounts to a total net Medicare savings of $14.5 million per year for the 25,484 dual eligibles enrolled in CCNC's Medicaid medical home program in these 26 counties. Multivariate regression analysis was also conducted to evaluate the impact of the CCNC demonstration intervention on expenditures by beneficiary subgroups, and on expenditure by types of Medicare services.

RTI 2015, Additional Findings

- Cost savings impact increased over time.
- Significant savings effects were found for seven subgroups, including beneficiaries with diabetes, any of seven chronic diseases, vascular disease, end-stage renal disease (ESRD), positive inpatient spending, risk scores in the top 10%, and risk scores in the top 25%.
- Significant savings effects were found for five expenditure categories, including inpatient, outpatient total, Part B physician/supplier, and home health.
- Significant reductions in emergency department visits and hospitalizations, consistent with the savings achieved.

NCCCN, 2015

At the request of the NC DHHS Division of Medical Assistance, North Carolina Community Care Networks, Inc. (NCCCN) conducted an updated analysis of overall program savings for the more recent time period of SFY 2014 (July 2013-June 2015). In this analysis, CCNC estimated gross savings by calculating the difference in actual Medicaid costs for beneficiaries who were enrolled in CCNC versus those not enrolled. Beneficiaries who were dually enrolled with Medicare, and beneficiaries who received care in nursing homes during SFY 2014 were excluded from the analysis. All claims spending was included except for capitation fees paid to Behavioral Health Managed Care Organizations.

In order to accurately compare enrolled beneficiaries to the unenrolled while taking into account case mix differences, the two populations were stratified into 44 mutually exclusive Clinical Risk Groups (CRG) using 3M Health Information Systems methodology. This allows CCNC-enrolled beneficiaries to be compared directly to

unenrolled beneficiaries with similar clinical conditions and disease severity, taking into account all available information from claims (including demographics, diagnoses, medications, treatments, duration, and severity). The difference in CRG-adjusted spending between enrolled and unenrolled beneficiaries was multiplied by the number of member months for the enrolled population within each risk strata, within each program eligibility category (ABD and non-ABD), and subsequently summed to arrive at the risk-adjusted gross savings of $491 Million. Total savings net of program costs amounted to $336 Million, or a benefit:cost ratio of approximately 3:1. Results are summarized below in Table 5.

Table 5: Fiscal Year 2014 Medicaid Spending, with Unadjusted and Risk-Adjusted Spending Differences by CCNC Enrollment Status

Beneficiary Category	CCNC Enrollment	SFY 2014 Member Months	SFY2014 Total Spend	PMPM Spend	Unadjusted Difference, PMPM	Unadjusted Difference, Total	Risk-Adjusted Difference*
ABD	Enrolled	1,324,545	$1,167,855,050	$882	-$135	-$178,796,461	-$74,435,336
	Unenrolled	211,645	$215,177,332	$1,017			
Non-ABD	Enrolled	11,943,920	$1,733,682,924	$145	-$151	-$1,809,430,054	-$416,163,737
	Unenrolled	1,258,396	$373,297,812	$297			
Total Gross Savings Estimate						**-$1,988,226,515**	**-$490,599,073**
Total Program Costs (Management fees for NCCCN Central Office, 14 regional networks and 1,882 participating medical practices)							$154,223, 078
Net Program Savings Estimate							**-$336,375,995**

ABD = Aged/Blind/Disabled. PMPM= per member per month

Chernew, 2015

In July 2013, the NC General Assembly directed the Office of the State Auditor to "engage nationally recognized medical researchers to perform a scientifically valid study based upon actual data to determine whether the Community Care of North Carolina model saves money and improves health outcomes." Dr. Michael Chernew, renowned health economist from Harvard University, was commissioned for this work. Dr. Chernew's team explored three fixed effect modeling approaches, and concluded that the county fixed effect models provided the most reliable estimates of savings. The report concluded that savings averaged approximately $78 per

quarter per beneficiary, or $312 per member per year, after accounting for program costs. This represents a 9% overall savings for the Medicaid program, and amounts to a 3-to-1 return on investment for the State, with every dollar invested in the nonprofit CCNC program generating over $3 in savings.

Table 6: Office of the State Auditor Spending Results: Impact of CCNC

		$ per Quarter		Percentage of Spending	
	Means	C Risk	P Risk	C Risk	P Risk
Total	866.64	-77.98*	-81.62*	-9.0%	-9.4%
Inpatient	154.53	-27.25*	-27.26*	-17.6%	-17.6%
ER	6.45	1.45	1.43	22.5%	22.1%
Ambulatory	530.55	-32.67	-35.35	-6.2%	-6.7%
Pharmacy	143.16	-15.30	-16.19	-10.7%	-11.3%
Dental	38.50	-4.27	-4.30	-11.1%	-11.2%

Source: Chernew 2015, Table 2. All models include an intercept, age, disability status, risk score, county fixed effects and quarter fixed effects. These fixed effects control for time invariant traits at the county level. "P risk" models included prospective risk scores. "C risk" models included concurrent risk scores.
*Denotes significant at P<0.5

Chernew 2015, Additional Findings

- 9% savings overall.
- Decreased spending in almost all spending categories, with the largest reduction in inpatient services.
- 25% reduction in inpatient admissions.
- Reduction in readmissions, inpatient admissions for diabetes, and emergency department visits for asthma.
- No statistically significant effect on overall ED use.
- 20% increase in physician visits while spending on ambulatory services declined, reflecting a shift away from expensive services and sites of care.
- Meaningful savings in pharmacy spending despite increased medication use, driven by a shift to less expensive medications.

Conclusion

Multiple studies have shown substantial savings attributable to CCNC's approach to managed care for the NC Medicaid and dually eligible population. Collectively, this review of available evidence conclusively demonstrates the cost-effectiveness of the CCNC program from 2007-2014. More recent publications have confirmed a continued steady and substantial declines hospital utilization and Medicaid spending per capita.[6-8] These very favorable trends are unrelated to fluctuations in enrollment and state budgetary overruns that have contributed to a public misperception that spending for Medicaid beneficiaries has been escalating.[9]

The savings estimates summarized in this brief represent the overall impact of a multifaceted program, including: increasing patient access to primary and preventive care, supporting practices in clinical quality improvement and care coordination, facilitating linkages to community resources, and providing multidisciplinary care team management for selected individuals with complex care needs. Specific components of the CCNC model have been separately examined and reported elsewhere,[10-18] providing a substantial body of evidence of the effectiveness of the CCNC approach, and valuable lessons for the care of this population moving forward.

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