



Community Care  
*of North Carolina*

## **Recommendations for Transitions of Care in North Carolina**

FINAL REPORT

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## Executive Summary

Hospital discharge is a critical moment for care coordination interventions to improve outcomes for complex patients, yet many patients “fall through the cracks” during this period. Randomized controlled studies have demonstrated that readmission rates can be reduced through a number of transitional care interventions including coaching of patients and families in better self-management, reconciliation of medications following discharge, face-to-face visits with the patient in their home to assess the “on the ground” situation, and ensuring proper linkage back to their primary care medical home. These models have been further shown to be successful when implemented as part of a large-scale state-wide program. However, prior to the start of this project, very little was known about which of the many patients coming out of the hospital would benefit the most from different components of the transitional care model. **While considerable science has focused on refining our ability to predict which patients are most likely to be readmitted, there is a need to move beyond more accurate prediction of high cost patients, to more accurate prediction of impactable patients, and the resources that are mostly likely to match the particular problems they have or are about to encounter.**

A North Carolina Healthcare Quality Alliance (NCHQA) and Office of Rural Health and Community Care (ORH)-funded evaluation by Community Care of North Carolina (CCNC) has resulted in a series of new discoveries about transitional care, including:

- **High Risk Patients:** Patients with multiple chronic conditions (MCC) benefit the most from transitional care management as a whole, with a 20% reduction in readmission rates, and reduced likelihood of additional admissions during the course of the following year. Number needed to treat (NNT) is 6, but as low as 3 for the highest risk MCC patients, meaning that you only need to transition 6 high risk MCC patients to prevent one admission in the coming year.
- **Mental Health Comorbidity:** MCC patients with serious mental illness benefit from CCNC transitional care model as much as MCC patients without serious mental illness (even if they are already receiving intensive outpatient support such as from an assertive community treatment team)
- **Outpatient Follow-up:** MCC patients benefit from outpatient follow-up within 7 days of discharge. **However, current outpatient resources are mismatched:** for every patient getting a 7-day follow-up who doesn't need it, there is a patient who would have benefitted from 7-day follow-up who did not get it. Hospitals and practices would benefit from ensuring that the highest-risk MCC patients receive the timeliest follow-up appointments. CCNC-enrolled patients have much higher rates of outpatient follow-up than unenrolled Medicaid recipients, even if they are not receiving transitional care management
- **Home Visits:** Among the components of CCNC transitional care management, home visits appear to have the greatest impact on readmission rates for all MCC patients (~50% lower likelihood of a 30-day readmission, and ~25% lower likelihood of a 90-day readmission). Medication reconciliation in the home setting is likely a big part of the reason for the added effectiveness of a home visit. Within this group of patients with multiple chronic conditions, less adherent patients, and those with no history of chronic medication prescription fills, appear to benefit the most from a home visit.
- **Lower Risk Patients:** Patients with low baseline readmission risk (i.e., with one or no chronic medical conditions), who represent 38% of non-delivery Medicaid discharges, gain little benefit from transitional care management or timely outpatient follow-up.
- **Measuring Readmissions:** Most readmission measures (such as those used in the Medicare Shared Savings Program) currently calculate readmissions as a function of the number of discharges (i.e., “per admission”). However, measuring readmissions as a function of the entire population (i.e., “per beneficiary”) is a more accurate reflection of the performance from a population health perspective.

Based on the results of its analyses, CCNC recommends four priority steps to improve the quality and efficiency of transitional care in North Carolina:

- 1. Promote systems that identify patients with multiple chronic conditions (MCC) and provide robust care management support following hospital discharge.**
- 2. Promote systems that include home visits with medication reconciliation for MCC patients after discharge, with prioritization of patients at highest risk of readmission and those whose prescription fill history indicates no or little prior medication use for chronic disease care.**
- 3. Promote systems that ensure the highest risk MCC patients receive an outpatient follow-up visit to a health care provider within seven days of discharge.**
- 4. Promote measurement of readmission rates on a per beneficiary basis and not a per admission basis.**

Using the results of this evaluation, CCNC is preparing three manuscripts that it will submit for publication to peer-reviewed journals. Draft copies of the manuscripts, as of the time of this final report, are provided as Appendices A, B and C.

CCNC is working to apply the best practices identified through this evaluation to the patients it serves by making several revisions to its internal processes. These changes include revising the standardized plan and productivity measures for transitional care management and flagging patients who should receive priority for care management and outpatient follow up.

The NCHQA board has begun discussions about how the organization may disseminate these findings to other populations and payers in North Carolina.

## I. Significance

**Readmissions and the Patient Protection and Affordable Care Act.** One of the first nationwide payment initiatives established by the Patient Protection and Affordable Care Act (ACA) is the Hospital Readmissions Reduction Program. Starting in 2012, all hospitals in the U.S. that accept Medicare payment are being evaluated using 30 day readmission rates after an index admission for the primary diagnoses of heart attack, pneumonia or congestive heart failure.<sup>1</sup> Three additional conditions - COPD, hip replacement, and knee replacement - will be added by 2015. Poorly performing hospitals will receive cuts in Medicare reimbursement for all diagnostic related groupings at a rate of up to 1% the first year of unsatisfactory performance escalating to 3% by the third year of the program. Why would the most comprehensive healthcare bill enacted in 50 years place such major emphasis on a simple trip back to the hospital? Because readmissions are not only expensive, avoidable, and dangerous but are indicative of the most dysfunctional elements of our healthcare systems.

**Patients with Multiple Chronic Conditions.** This initial focus on six condition-specific discharge-readmission dyads, however, is likely to represent a very small fraction of overall opportunity. The vast majority of patients who experience hospital readmissions have multiple chronic conditions; indeed, 70% of Medicare beneficiaries readmitted to the hospital have six or more chronic conditions.<sup>2</sup> CCNC has found this to be true in the North Carolina Medicaid population as well. Our earlier research shows that Medicaid patients with MCC account for 74% of 30-day readmissions, but less than 10% of the discharges that led to readmission would have been targeted for intervention by hospitals strictly focusing on the initial ACA priority discharge diagnoses. MCC patients are incredibly diverse and complex, requiring coordination across multiple providers and settings, which adds to the challenge of managing the population as a whole. Performance measures related to hospital admissions and readmissions may be “missing the boat” when only considering the reason for the hospitalization, and may be a poor indicator of what exactly is potentially preventable, particularly where other conditions not directly related to the current inpatient visit may be driving propensity for readmission.

**Opportunity Beyond 30 Days.** The current emphasis on readmissions within the first 30 days after discharge may also be too narrow for the MCC population. We have shown that the NC Medicaid MCC population is admitted to the hospital at a rate of 519 admissions per 1000 members per year, and over half of those admissions occur within 90 days of a prior discharge.<sup>3</sup> MCC patients are chronically at risk for hospitalization, and logically may receive long-term benefit from attention to the issues that are commonly addressed in transitional care management interventions. In our own work examining the effectiveness of transitional care support for NC Medicaid recipients with MCC, we found that the impact of the intervention lasted far beyond the initial 30 days, altering the likelihood of subsequent hospitalizations over the subsequent year, with the greatest number of averted readmissions accruing in the post-30 day period. Similarly, in a recent evaluation of initiatives to improve care transitions for Medicare beneficiaries in 14 communities, Brock et al. reported declines in overall readmission and admission rates in the target population, despite no change in the rate of all-cause 30-day readmissions as a percentage of hospital discharges.<sup>4</sup>

**What is the True Opportunity?** As provider organizations anticipate taking on increasingly greater financial risk for failed hospital transitions, whether through financial penalties or through more broad-based accountable care arrangements with both public and private payers, they will need a more complete understanding of where readmission reduction opportunities exist and expected return on investment for deploying transitional care interventions. No consensus exists as to what proportion of hospital readmissions are “avoidable.” In a systematic review of the literature, the median proportion of readmissions deemed avoidable was 27.1%, but estimates based on a variety of methodologies ranged from 5% to 79%.<sup>5</sup> Recently, Joynt and coauthors reported that only a small percentage of spending among high-cost patients appear to be related to preventable hospital use, calling into question the degree to which care coordination interventions can be expected to influence hospital utilization and overall costs.<sup>6</sup> The opportunity to achieve savings, and to improve patient experience

and outcomes, depends not only upon the frequency of potentially avoidable readmissions, however, but upon the effectiveness of available interventions to decrease those readmissions.

**Transitional Care Interventions to Reduce Readmissions.** Evidence suggests that hospital discharge is a critical moment for care coordination interventions to improve outcomes for complex patients, yet many patients “fall through the cracks” during this period.<sup>7-9</sup> Randomized controlled studies have demonstrated that readmission rates can be reduced through coaching of patients and families in better self-management during the month following discharge,<sup>10</sup> through protocolized nurse-directed care over a 3-month period<sup>11</sup>, and through a reengineered discharge process.<sup>12</sup> The Hopkins Guided Care Model, and several disease specific programs, have additionally identified strategies that help frail and at risk patients achieve better outcomes and reduce hospital use.<sup>13-17</sup> Successful components of these programs include thorough patient and caregiver education about medications, warning signs of clinical worsening, and self-management skills. Care managers, who are usually skilled nurses or other highly trained personnel, have been effectively deployed to bridge transitions between settings. The effect of the care manager is enhanced by facilitating and assuring that key outpatient services actually arrive, by making an early home visit to assess the “on the ground” situation, and by providing some after-hours access to help patients cope with fear and uncertainty.<sup>18</sup>

**Benefits of Timely Outpatient Follow-up.** Various components of comprehensive medical home functionality may also have an impact, such as prompt receipt of the patient’s personal health record either electronically or through the patient, clear presentation of urgent contact options, and assiduous coordination with the care manager to avail the patient of the community services necessary to recover and attain the best quality of life possible.<sup>19-24</sup> Beyond the short term benefit of reduced admissions, the larger objective is to ensure that vulnerable patients, particularly the chronically ill, benefit from systems that maintain functional independence, enhance quality of life, and provide comfort without the trauma, expense, and displacement that unnecessary hospitalization so commonly entails.

**Targeting the Right Patients.** Positive financial return on investment for these kinds of care coordination interventions may be highly dependent on intelligent targeting of resources to patients most likely to benefit. In the Medicare Care Coordination Demonstration Project, only 4 of 11 programs were able to reduce hospitalizations for high risk patients. Successful programs featured timely, comprehensive transitional care after hospitalization, in-person contact between patients and care managers, substantial interaction between care managers and physicians, strong medication management, and patient education with emphasis on patient self-care.<sup>18, 25, 26</sup> One of these programs, after failing to reduce hospitalizations or costs through broad-based telephonic care management during the first year of the demonstration, achieved remarkable success after redesigning the initiative to focus on highest risk patients, medication reconciliation, and replacing telephonic care with in-person care management contact.<sup>26</sup> **While considerable science has focused on refining our ability to predict which patients are most likely to be readmitted, there is a need to move beyond more accurate prediction of high cost patients, to more accurate prediction of impactable patients, and the resources that are mostly likely to match the particular problems they have or are about to encounter.**

## II. Hospital Readmissions in the National Context

Reducing preventable hospital readmissions has become a priority among policy makers because this measure is viewed as an important indicator of quality of care, the burden to patients and costs to payers are high, and rates vary considerably across United States hospitals and states.<sup>27, 28, 29</sup> During 2008, the all-cause non-maternity care readmission rate among persons 45 to 64 years was 24.4 percent for Medicaid beneficiaries, 11.9 percent for privately insured persons, and 14.4 percent for uninsured persons.<sup>30</sup> The national rate for Medicare beneficiaries, aged 65 years and older, averaged 19.0 percent between 2007 and 2011.<sup>28, 30</sup> During 2010, almost one third of persons with a hospital admission for kidney transplant (29%), ileostomy and other enterostomy (29%), sickle cell disease (32%), and gangrene (32%) were readmitted within 30 days of discharge, based on

national estimates.<sup>31</sup> Among Medicare beneficiaries, the diagnoses with the highest 30-day readmissions during 2011 were congestive heart failure (134,500), septicemia (92,900), and pneumonia (88,800).<sup>27</sup> Rates have been shown to vary between hospitals, with readmission rates for heart failure ranging from 19.3 to 24.6 percent among case study hospitals with a national average of 24.7 percent in one study of almost 4,000 hospitals.<sup>29</sup> The annual cost of readmissions for Medicare patients has been estimated at \$26 billion, with \$17 billion being attributable to preventable readmissions.<sup>32</sup> Costs to Medicaid for readmissions among adult beneficiaries were estimated at \$7.8 billion in 2011.<sup>27</sup>

United States policy makers have embraced the Institute for Healthcare Improvement (IHI) Triple Aim as a major goal for health care delivery systems. This broad IHI framework, to improve the patient experience of care, improve the health of populations, and reduce per capital health care costs,<sup>33</sup> is being operationalized through a number of payment policies and performance improvement initiatives that are intended to improve care and lower costs. One policy approach is to provide incentives and/or disincentives to care providers or provider networks to reduce the occurrence of preventable hospital readmissions. An alternative strategy aimed at reducing readmissions is to implement transitional care programs to facilitate safe and effective transitions from the hospital to home and coordinate care with the primary care provider.<sup>3</sup>

Readmission prevention initiatives are being directed and/or implemented by the Centers for Medicare & Medicaid Services (CMS), state Medicaid programs, and stakeholders in the private sector. The Medicare Hospital Readmissions Reduction Program (HRRP) was established by Section 3025 of the Affordable Care Act through the addition of section 1886(q) to the Social Security Act.<sup>34, 35</sup> The HRRP requires CMS to financially penalize hospitals, as of October 1, 2012, if they have excessive readmission ratios for applicable conditions.<sup>34-36</sup> A readmission is defined by CMS as a Medicare patient who is readmitted to the same or another “subsection (d) hospital”, essentially an acute care hospital, within 30 days of discharge.<sup>35, 36</sup> Qualifying admissions in the first two years of HRRP were those of Medicare beneficiaries aged 65 years and older with diagnoses of acute myocardial infarction, heart failure, or pneumonia.<sup>34, 36</sup> The applicable conditions are to be expanded as of Fiscal Year 2015.<sup>35</sup> A second initiative, the Medicare Shared Savings Program for participating Accountable Care Organizations (ACOs), was established through Section 3022 of the Affordable Care Act by adding section 1899 to the Social Security Act.<sup>37, 38</sup> The Shared Savings Program aims to incentivize participating ACOs that serve Medicare Fee-For-Service patients to improve health system performance, meet quality standards, achieve savings, and meet or exceed an established Minimum Savings Rate.<sup>37, 39</sup> One of the 33 performance measures is a risk-standardized, all condition readmission measure, defined as the “risk-adjusted percentage of Accountable Care Organization (ACO) assigned beneficiaries who were hospitalized who were readmitted to a hospital within 30 days following discharge from the hospital for the index admission”.<sup>40</sup> Section 3026 of the ACA created a third initiative, the Community-based Care Transitions Program (CCTP), which aims to test models for improving the transition of care from inpatient to other care settings during 2011 through 2015.<sup>41</sup> Participating community-based organizations are eligible to receive compensation for the cost of care transition services for Medicare beneficiaries through an all-inclusive rate per discharge.<sup>41</sup> Two goals of the CCTP are to reduce readmission for high-risk patients, and to reduce costs of care.<sup>41</sup>

State Medicaid programs are actively engaged in efforts to reduce hospital readmissions. The Medicaid Medical Directors Learning Network, represented by medical directors from 48 state Medicaid programs, collaborate to conduct studies and discuss solutions to problems.<sup>42</sup> A group of 16 states are examining their readmission data, policies and practices with a goal of identifying successful practices for other states to implement. The Colorado Medicaid program developed a program under an Accountable Care Collaborative to reduce readmissions using regional organizations that provide care coordination and link patients to community-based resources that influence health status, such as housing, food, and transportation.<sup>42</sup> Similarly, the North Carolina Medicaid program implemented a population-based statewide transitional care program to improve care and reduce readmissions.<sup>3</sup> This initiative included community-based care management services,

comprehensive medication management, face-to-face self-management education for patients and their families, and timely follow-up and communication with a medical home.<sup>3</sup>

Stakeholders in the private sector are also developing strategies to reduce preventable readmissions because of the burden to employers and threat to patient health and safety.<sup>43</sup> The Northeast Business Group on Health developed four work groups, represented by employees of health systems, health plans, employers and other stakeholders, to explore the issues concerning preventable readmissions.<sup>43</sup> Discussions have centered on the need for standardized definitions and measurement related to readmissions, collaboration between health plans and health systems, collaboration between hospitals heavily reliant on public payers and those primarily reliant on private payments, and aligning reimbursement with performance, such as gain-sharing arrangements.<sup>43</sup> In Pennsylvania, a group of physicians, nurses, and other health professionals launched a Partnership for Patient Care initiative aimed at reducing hospital readmissions. The initiative is funded by a third party payer and group of hospitals.<sup>44</sup>

### **Community Care of North Carolina (CCNC) Transitions Program**

CCNC's program to improve transitions of care began in 2008 and now reaches Medicaid recipients statewide, including over 5,000 patients each month, involving more than 1,500 primary care practices and over 100 hospitals across 14 local Community Care networks. Core elements of CCNC's transitional care program include face-to-face visits to patients by care managers in the hospital and/or patient's home; facilitating timely follow-up with a patient's primary care provider or specialist after discharge; medication management; patient and family education; patient use of a "self-management notebook;" data support and information exchange between CCNC networks and hospitals; and collaborations with other organizations at the state and local level.

The CCNC approach to transitional care incorporates elements from the work of Eric Coleman, Mary Naylor, Guided Care, Project RED, Project BOOST, and others,<sup>10, 45-47</sup> while adding greater emphasis on closing the loop with the primary care medical home. Local processes are tailored to local circumstances, but each network's approach includes the following core components.

**Face-to-face patient encounters.** All CCNC networks have embedded care managers in large-volume hospitals to interact with the hospital team (including hospitalists, nursing and discharge planning staff, pharmacy, and palliative care teams), to begin planning for discharge as early as possible during the hospital stay. Care managers visit patients at the bedside when possible, to begin engagement with the patient and the family and to ensure that discharge instructions and medications are available.

**Medication management.** Medication management for patients receiving CCNC transitional care management services goes far beyond the traditional concept of simply documenting a comprehensive list of medications. Serious medication discrepancies are extremely prevalent for the high-risk Medicaid population after hospital discharge. Transitional care managers work closely with network clinical pharmacy staff to identify discrepancies between all available sources of fill data.

**Timely outpatient follow-up.** Care managers ensure that patients have a follow-up appointment with the primary care provider (PCP) medical home and/or specialist quickly after discharge, they assess for potential barriers to the patient's ability to attend the appointment, and they assist with scheduling or transportation as needed to facilitate completion of the appointment. Care managers also provide timely information to the PCP about the hospitalization, medication reconciliation, and social/environmental concerns and about the involvement of other services and providers (such as durable medical equipment or personal care, home health, and mental health services).



**Patient and family education.** Patients and their caregivers often receive an overwhelming amount of complex information at the time of hospital discharge, and they may not be able to fully comprehend or prioritize crucial information. CCNC care managers are able to distill the information and guide the patient's focus to the most immediate items to know. Care managers identify "red flags" for patients and families, which are signs, symptoms, or circumstances that could indicate a complication or exacerbation. This education includes not only what to watch for, but specifically what to do about it, including whom to call and what steps to take to prevent an adverse outcome or a return to the hospital. Care managers use motivational interviewing techniques, teach-back, and other evidence-based health coaching strategies to optimize outcomes.

**CCNC self-management notebook.** Patients are provided with a personalized CCNC self-management notebook to use as a personal health record, educational resource, and tracking system for disease self-management, such as the recording of daily weight for heart failure or glucose monitoring for diabetes. The notebook also serves as a communication tool to enhance continuity of care as the patient interacts with the PCP, specialty providers, and other health care services.

**Data support and information exchange.** Each CCNC network has an information-sharing relationship with virtually all hospitals that serve Medicaid patients in the region. Locally this may include CCNC care managers having direct access to the hospital medical record, as a fully incorporated member of the hospital care team, or it may consist of no more than a faxed census of Medicaid inpatients to the network office for manual review. Through a joint initiative of the North Carolina Department of Health and Human Services, CCNC, and the North Carolina Hospital Association - which was launched in the summer of 2010 - hospitals have been encouraged to facilitate CCNC transitional care efforts through the electronic exchange of real-time hospital admission, discharge, and transfer data for Medicaid recipients. By centrally receiving electronic notification of a patient's admission status, diagnosis, and provider information, the CCNC Informatics Center can more efficiently sort the information and alert the appropriate transitional care management team and PCP about the patient's admission. Risk indicators are linked to the real-time hospital alerts, to automate part of the screening process and to aid in triaging limited care management resources for the highest-risk patients.

### **Partnership with North Carolina Healthcare Quality Alliance and North Carolina Office of Rural Health and Community Care**

In 2012, CCNC partnered with NCHQA and ORH to collect and analyze detailed information from local CCNC networks about activities to manage care transitions, with the goals of identifying the most effective steps for reducing hospital readmissions and spreading these best practices throughout the state. Although CCNC's early evaluations demonstrated its transitional care program had a substantial impact on readmission rates, CCNC lacked detailed information on which elements of its program provided the most benefit for which groups of patients. CCNC's partnership with NCHQA and ORH allowed CCNC to build on and expand existing evaluations of its transitional care services. CCNC's experience, patient volume and data provided a unique opportunity to identify and spread the most effective transitional care activities within its networks, while NCHQA could provide the leadership and broad representation of health care stakeholders necessary to extend these best practices with other patients, providers and payers in the state.

At the beginning of the project, data available to CCNC to analyze care transitions were limited to what could be derived from claims data and care management records. CCNC did not have systematic information on a range of topics, including:

- Which networks have embedded care managers and where (hospital, emergency department, practices);
- Which hospitals and practices have embedded care managers or pharmacy supports;
- Unique activities at each network intended to improve transitions and reduce readmissions;

- Level of network partnership with local emergency departments;
- Level of network partnership with psychiatric inpatient units and/or local behavioral health providers;
- How care managers make use of CCNC Informatics Center reports to guide transitional care work;
- Professional qualifications of care managers;
- Other transitions initiatives (eg, Project RED, Novant pharmacy model) in place at hospitals and other CCNC partner organizations;
- Local operational data systems;
- Operational outcomes and improvement track record.

NCHQA and ORH initially funded the project for one year. At the conclusion of the first year, CCNC requested and was granted additional funding and a one-year extension to allow for further analysis and pursuit of ongoing funds from other sources. Over the course of the two-year project, NCHQA provided \$70,000 that was matched with Medicaid funding through ORH, for a total of \$140,000 in funding for the project.

### III. Methodology

The project as proposed had three phases:

- Data collection on interventions underway in CCNC’s local networks;
- Analysis of this data in combination with existing information to identify the most effective care transition practices; and
- Spread of the most successful interventions both within and beyond CCNC.

#### Data Collection

At the start of the grant period, CCNC hired a full-time program evaluation assistant to develop a survey tool to capture data on transitional care approaches in place at the local networks. CCNC sought input from representatives of the local networks as well as experts from its central office to identify the best survey format, and to develop the survey topics and specific questions. Draft surveys were then vetted with representatives of a small group of networks. The result of this process was a three-pronged survey that gathered detailed information from network staff about local activities at the three hubs of transitional care activities: CCNC care managers, primary care practices, and hospitals.

- **CCNC Transitional Care Staff Survey:** Information gathered in this portion of the survey included qualifications, training and experience of CCNC’s transitional care staff; interventions typically provided during a hospital visit with a patient; and details about the staff’s motivational interviewing skills.
- **Practice Survey:** Information gathered in this portion of the survey covered characteristics of each primary care practice in a network, including whether each practice was hospital owned, whether CCNC staff were able to attend provider appointments with patients, and how soon after a hospital discharge a patient could typically get a follow-up appointment at each practice. The staff person at the CCNC network who was most familiar with a particular practice completed the survey about that practice.
- **Hospital Survey:** Information gathered in this portion of the survey covered characteristics of each hospital in a network, including whether the hospital was affiliated with an academic institution and how quickly the hospital usually delivered the discharge summary to a patient’s primary care physician. The staff person at the CCNC network who was most familiar with a particular hospital completed the survey about that hospital.

The surveys were administered to staff at all 14 local CCNC networks between October 2012 and January 2013 and covered activities by transitional care staff, practices and hospitals between July 1, 2011 and June 30, 2012. Response rates to the survey were very high. We received responses for 530 out of 533 (99.4%) transitional care staff, 1,497 out of 1,587 (94.3%) CCNC practices, and 111 out of 111 (100%) NC hospitals. Complete survey questions and results are available in Appendix D.

### **Analysis Plan**

CCNC entered the survey data collected from the networks into CCNC’s existing evaluation database derived from Medicaid claims data and care management information. Using this new and existing data, CCNC developed and implemented statistical models to identify the transitional care activities most associated with reduced time to readmission and to tease out the effects of different interventions on different groups of patients. CCNC convened a stakeholder group to set priorities for the evaluation and help define the most important research questions. The stakeholder group consisted of clinical leadership from CCNC’s central office as well as representatives of local networks, including care managers, quality improvement staff and pharmacists. Further details on the methods and analyses used are provided in the manuscripts in Appendices A, B and C.

## **IV. Project Timeline**

<i>June 2012</i>	Contract with NCHQA begins; program evaluation assistant hired and begins work on survey development.
<i>June to September 2012</i>	Survey development and pilot testing
<i>June 2012 to present</i>	CCNC staff works with stakeholder group to develop survey, prioritize research questions
<i>October 2012 to January 2013</i>	Survey administered and results compiled
<i>January 2013 to May 2014</i>	Analysis of survey results in combination with existing CCNC claims data and care management records
<i>April 2013</i>	CCNC prepared and submitted an application for additional funding for transitions of care evaluations to the Patient Centered Outcomes Research Institute (PCORI) (application not funded)
<i>August 2013</i>	CCNC prepared and submitted an application for additional funding for transitions of care evaluations to the Agency for Healthcare Research and Quality (application not funded)
<i>April 2014 to June 2014</i>	Identification of best practices and development of manuscripts

Throughout the grant period, CCNC provided quarterly updates to the NCHQA board and received feedback from board members.

## V. Results

Highlights of survey responses include:

- Of the CCNC staff who conducted home visits to patients, 63% were registered nurses and 50% had worked for CCNC for between one and three years.
- Approximately 57% of respondents worked in a hospital setting prior to working for CCNC.
- Interventions most commonly provided at a care manager's hospital visit to a patient prior to discharge included offering an introduction to Community Care of North Carolina and beginning patient education (for example, about medication changes).
- Follow-up appointments at primary care practices were typically available less than 72 hours after discharge at 37% of practices and between 72 hours and 1 week after discharge at 45% of practices. At 2.3% of practices, follow-up appointments were not usually available until 2 weeks or more after discharge.
- Whether CCNC staff were able to attend patient appointments at a practice varied widely, with network staff reporting that 33% of practices almost always allowed CCNC staff to attend appointments, 28% occasionally allowed it, and 23% rarely or never allowed it.
- Approximately one-third of the practices were part of a hospital-owned system during this period.
- Whether a practice was owned or managed by the hospital affected the speed at which a discharge summary was delivered to a patient's primary care physician (PCP): When the practice was owned or managed by the hospital, 61% of hospitals delivered the discharge summary to a patient's PCP in less than 72 hours. Only 32% of hospitals delivered the discharge summary to the PCP within 72 hours in cases where the practice was not owned or managed by the hospital.
- CCNC staff had access to practice medical records (either on-site or remotely) at 76% of practices.
- Only one-quarter of the hospitals in the state were affiliated with an academic institution.
- CCNC staff only had access (eg, visiting patients, viewing charts) at 65% of the available psychiatric units in the state.
- Most hospitals in the state were providing electronic feeds of their real-time admissions, discharges and transfers to CCNC's Informatics Center during this period.

Subsequent analyses utilizing survey data, care team documentation in the CCNC Care Management Information System, and Medicaid claims resulted in a series of new discoveries about transitional care, the details of which are presented in Appendices A, B and C. The main findings include the following:

- **High Risk Patients:** Patients with multiple chronic conditions (MCC) benefit the most from transitional care management as a whole, with a 20% reduction in readmission rates, and reduced likelihood of additional admissions during the course of the following year. Number needed to treat (NNT) is 6, but as low as 3 for the highest risk MCC patients, meaning that you only need to transition 6 high risk MCC patients to prevent one admission in the coming year.
- **Mental Health Comorbidity:** MCC patients with serious mental illness benefit from CCNC transitional care model as much as MCC patients without serious mental illness (even if they are already receiving intensive outpatient support such as from an assertive community treatment team)
- **Outpatient Follow-up:** MCC patients benefit from outpatient follow-up within 7 days of discharge. **However, current outpatient resources are mismatched:** for every patient getting a 7-day follow-up

who doesn't need it, there is a patient who would have benefitted from 7-day follow-up who did not get it. Hospitals and practices would benefit from ensuring that the highest-risk MCC patients receive the timeliest follow-up appointments. CCNC-enrolled patients have much higher rates of outpatient follow-up than unenrolled Medicaid recipients, even if they are not receiving transitional care management

- **Home Visits:** Among the components of CCNC transitional care management, home visits appear to have the greatest impact on readmission rates for all MCC patients (~50% lower likelihood of a 30-day readmission, and ~25% lower likelihood of a 90-day readmission). Medication reconciliation in the home setting is likely a big part of the reason for the added effectiveness of a home visit. Within this group of patients with multiple chronic conditions, less adherent patients, and those with no history of chronic medication prescription fills, appear to benefit the most from a home visit.
- **Lower Risk Patients:** Patients with low baseline readmission risk (i.e., with one or no chronic medical conditions), who represent 38% of non-delivery Medicaid discharges, gain little benefit from transitional care management or timely outpatient follow-up.
- **Measuring Readmissions:** Most readmission measures (such as those used in the Medicare Shared Savings Program) currently calculate readmissions as a function of the number of discharges (i.e., "per admission"). However, measuring readmissions as a function of the entire population (i.e., "per beneficiary") is a more accurate reflection of the performance from a population health perspective.

CCNC has prepared three manuscripts that it will submit for publication to peer-reviewed journals. Summaries of each manuscript are below. Copies of the complete manuscripts are provided as Appendices A, B and C.

## 1. Effectiveness of Post-Discharge Home Visits Among Patients with Multiple Chronic Conditions

**Purpose:** Broadly speaking, transitional care management is significantly effective at reducing hospital readmissions among patients with multiple chronic conditions. However, some components of transitional care, such as home visits by a nurse care manager, are very expensive. Better information is needed on which patients benefit most from home visits in order to appropriately allocate limited resources.

**Methods:** We studied whether receiving a home visit after discharge resulted in a reduction in 90-day and 30-day readmission rates above and beyond other transitional care activities for non-dual CCNC enrolled Medicaid recipients with multiple chronic conditions (MCC). Using North Carolina Medicaid paid claims data for hospital discharges occurring between July 2010 and December 2012, and details on care management activities provided to Medicaid patients, we tested regression models that controlled for all known demographic and clinical characteristics and included interactions with receiving a home visit.

**Results:** The final study sample included a total of 35,338 discharges. All patient discharges included in this analysis received some form of intervention from a CCNC care manager. Of these, 21% (N=7,493) also received a home visit. Overall, home visits reduced readmission rates by almost half compared to those receiving less intensive forms of transitional care. The degree of benefit was associated with degree of medication adherence, with less adherent patients experiencing greater benefit from the home visit relative to more adherent patients with the same underlying clinical risk. The greatest impact was observed among multiple chronic condition patients not taking any chronic medications during the year prior to their hospitalization.

**Conclusions:** All MCC patients benefit from a home visit following discharge from the hospital. MCC patients who receive a home visit are, on average, half as likely to have a 30-day readmission, and one-fourth as likely to have a 90-day readmission, compared to those receiving

less intensive forms of transitional care. Poorly medication-adherent patients with multiple chronic conditions appear to experience the greatest benefit of a home visit.

## **2. Timeliness of Outpatient Follow-Up: an Evidence-Based Approach for Post-Discharge Resource Allocation**

**Purpose:** Conflicting guidelines exist for when discharged hospital patients should receive outpatient follow-up. Thirty days may be too long for some, while 7 days may be unnecessary for many. Guidance is needed to identify the ideal time to hospital follow-up for patients of varying complexity.

**Methods:** Using North Carolina Medicaid claims data for hospital discharged patients from April 2012 till March 2013, we constructed variables indicating whether patients received outpatient physician visits at successive post-discharge intervals, and whether these patients were readmitted during the following month. We constructed 8 clinical risk strata based on 3M Clinical Risk Groups (CRG) and determined expected readmission rates within each CRG. Our primary outcome was 30-day readmission rates. We applied survival modeling to identify groups who appear to benefit from outpatient follow-up within 3, 7, 14, 21 and 30 days post-discharge.

**Results:** The final study sample included 44,473 Medicaid recipients with 65,085 qualifying discharges. Sixty-four percent (N=41,634) of discharges were associated with an outpatient follow-up visit within 30 days. Patients in the highest risk strata experienced a meaningful reduction in 30-day readmission rates when receiving follow-up within 7 days of discharge. Patients in the lowest risk strata showed no meaningful impact on 30-day readmission rates when receiving follow-up within 30 days post discharge.

**Conclusions:** The majority of patients do not require follow-up with an outpatient provider earlier than 30 days post-discharge. Transitional care resources would be better allocated by focusing on ensuring that only the highest risk patients receive follow-up within 7 days.

## **3. Measuring Readmission Rates per Admission versus per Beneficiary**

This study aimed to compare admission and readmission measures among high risk Medicaid recipients with complex chronic medical conditions to assess the potential implications of using these measures for evaluating health systems performance and the effectiveness of transitional care programs. We aimed to answer the question, does the 30-day readmission rate per admission appropriately assess health systems performance and the effectiveness of care transition programs, or does an alternative metric or set of metrics better reflect the performance of health systems in caring for persons with complex health problems? In our study, while 30-day and 90-day readmission rates per admission for persons with multiple chronic conditions stayed relatively constant over a 60-month time period beginning January 2008, the readmission rates, and total admission rates, per Medicaid beneficiary declined during that same time period. These findings further confirm that the statewide transitional care program launched by Community Care of North Carolina (CCNC) in fall 2008 was temporally associated with reductions in overall hospital admission and readmission rates per 1,000 Medicaid beneficiaries with complex chronic medical conditions<sup>3</sup>. However, the successes observed in reducing hospitalizations overall were not reflected in the readmission rates per admission for this population.

These findings suggest that the readmission rates per admission provide an incomplete and biased picture of health system performance. The observed reduction in overall admission rates may have led to a change in the risk profile of beneficiaries being admitted over time. As evidence of this, we observed that the expected risk of a 30-day readmission among patients admitted to the hospital was 18.6% in 2008 and 19.2% in 2012 – a 3% relative increase in the risk of a readmission over time – or in other words, as the program successfully implemented an effective transitional care, those patients who do return to the hospital have greater clinical complexity, and hence, greater underlying risk of readmission (see Appendices B and E for more information on the methodology behind estimating underlying risk). As transitional care and community-based services were enhanced, lower risk beneficiaries may have achieved greater success with self-care or support services at home. If so, the denominator over time in the readmission rate per admission would tend to be over-represented by persons at higher risk for readmission. Yet, when the denominator was based on the broader population of Medicaid beneficiaries with multiple chronic conditions, the readmission rate declined, reflecting the overall decline in actual inpatient admission rates per beneficiary during the same time period.

Our findings demonstrate that the choice of a metric significantly affects the perceived effectiveness of the care transition program. If the 30-day readmission rate per admission is used to assess effectiveness, the transition program appears to be relatively ineffective because they are transitioning increasingly sicker patients over time; yet, when the 30-day readmission rate per beneficiary and overall admission rate per beneficiary are used, the program seems to be successful. This and other studies suggest that the 30-day readmission rate per admission may not reflect the overall effectiveness of a care transitions program and may unfairly penalize organizations or networks.

## **VI. Implementation at CCNC**

CCNC has already begun to evaluate its processes and make changes consistent with these findings. Specifically, we have identified areas of improvement with regard to outpatient follow-up, and modified our Informatics Center reports to aid in the making these improvements. In the manuscript titled, “Timeliness of Outpatient Follow-Up: an Evidence-Based Approach for Post-Discharge Resource Allocation (Appendix B),” we discovered that there was a specific high-risk group of patients who actually demonstrated benefit from outpatient follow-up as early as 7 days post discharge. When evaluating missed opportunities related to outpatient follow-up visits, we recognized a mismatch in resource allocation with the majority of patients who would have benefitted from a follow-up within 7 days not actually receiving an outpatient visit. As Figure 1 illustrates, there were 11,515 patients who would have benefitted from a 7-day follow-up who didn’t receive follow-up, while at the same time, there were 10,242 patients who likely didn’t need a 7-day follow-up who did get follow-up. This would suggest that there is room within the system to re-allocate follow-up appointments to give priority to the highest-risk patients.

**Figure 1. Opportunity Analysis for Improving Rates of Outpatient Follow-up After Hospital Discharge**

Opportunity Analysis for Patients Receiving 7-day Follow-up					
		Recommended Follow-up Period	Did the patient receive follow-up within 7 days of discharge?		Total
			NO	YES	
Risk Strata Grouping	0	30 days	16,082	10,242	26,324
	1	21 days	9,834	4,237	14,071
	2	14 days	9,099	4,151	13,250
	3	7 days	11,515	5,510	17,025
<b>Total</b>			46,530	24,140	70,670

Further analysis allowed us to pin-point specific areas of opportunity both at the practice and the hospital level. We identified hospital-practice dyads with high volumes of missed opportunities where focused quality improvement initiatives could be implemented related to outpatient follow-up rates. In one case, there were 240 high-risk discharges during the year from the same hospital to the same practice, with as many as 182 of those discharges (76%) not getting the needed follow-up within 7 days of discharge. This analysis allowed CCNC to identify high-yield opportunities where better connections could be made between the discharging hospital and the receiving practice.

To aid in the implementation of such quality improvement work, CCNC has already created enhancements to its existing Informatics Reports site by flagging for practices and networks those patients who should be prioritized for outpatient follow-up. Figure 2 is a screenshot of CCNC’s Admission/Discharge/Transfer report showing real-time information on patients currently in the hospital, along with recommendations for how to prioritize outpatient follow-up.



**Figure 2. Screenshot of CCNC’s ADT Report Incorporating Recommendations for Outpatient Follow-up**

Visit Type: Inpatient | Hospital: Alamance Regional Medical Center

Aged/Blind/Disabled: Yes, No, No Data | Dual: Dual, Non-Dual, No Data

Admission Date: 0-24 Hours, 24-48 Hours, 3-7 | Age: 0-4, 5-20, >=21, No Data

Discharge Status: Last 2 Days | Admission Diagnosis: All Other Visits

Transitional Care Priority: Yes, No | CCNC Priority: Yes, No

TC Priority Alert: Yes, No | LME Priority: Yes, No

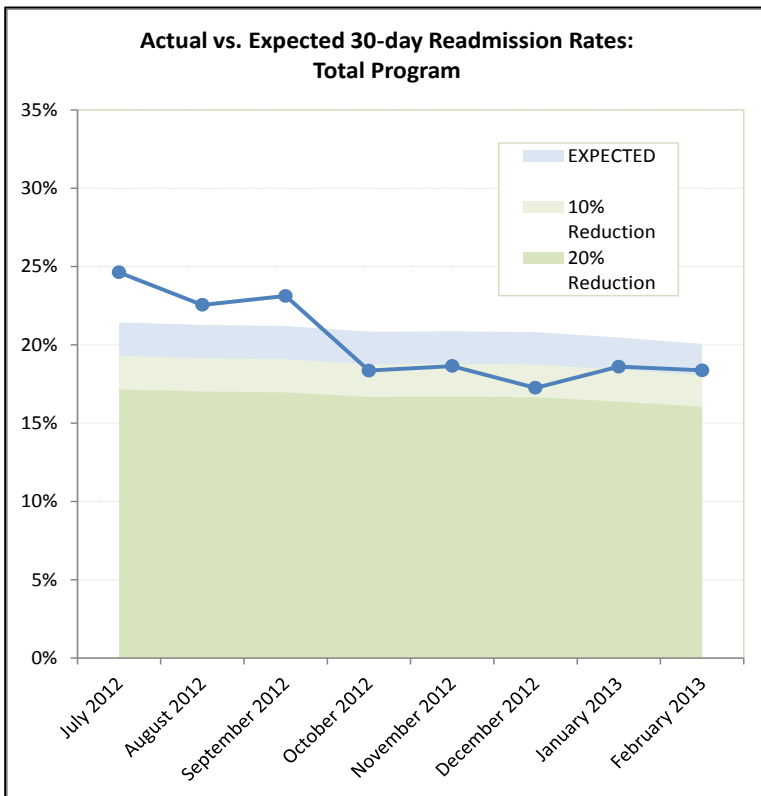
CPI Priority: Yes, No | Palliative Care Priority Indicator: Yes, No

Outpatient Follow-up Recommended Within (Inpatient Visits Only): 7 days, 14 days, 21 days, 30 c | Include CC4C records?: Yes

Include LME records?: Yes | Include PMH records?: Yes

1 of 2 ? | 100% | Find | Next | Select a format | Export

Base MID	Current MID	Hospital Patient ID	Name	Admit Date	Admit Time	Discharge Date	Discharge Time	Outpatient Follow-up Recommended Within (Inpatient Visits Only)	Outpatient Follow-up Due Date
				6-23-2014	00:00:00	6-23-2014	12:56:00	30 days	7-23-2014
				6-23-2014	07:30:00	6-23-2014	10:36:00	14 days	7-7-2014
				6-23-2014	12:30:00	6-23-2014	12:26:00	30 days	7-23-2014
				6-23-2014	09:40:00	6-23-2014	10:33:00	7 days	6-30-2014
				6-23-2014	12:58:00	6-23-2014	11:06:00	21 days	7-14-2014
				6-23-2014	07:45:00	6-23-2014	07:43:00	7 days	6-30-2014
				6-23-2014	13:00:00	6-23-2014	12:34:00	14 days	7-7-2014
				6-23-2014	09:45:00	6-23-2014	12:41:00	30 days	7-23-2014
				6-23-2014	14:00:00	6-23-2014	11:25:00	21 days	7-14-2014



**Figure 3. Actual Versus Expected Readmission Rates Among All CCNC Networks During the First 8 Months After the New Transitional Care (TC) Priority Flags Were Introduced.**

CCNC has also created run charts to monitor the effectiveness of its revised transitional care prioritizing. Figure 3 illustrates the performance across all CCNC Networks in terms of its actual readmission rates relative to what would have been expected based on the patient’s clinical risk (per the benchmark readmission rates detailed in Appendix E). The new priority flags were released in July 2012 but didn’t get incorporated into all of CCNC’s Informatics applications until October 2012, when we started observing an additional 10-20% reduction in actual readmission rates. Although this chart ends in February 2013, CCNC will continue to be able to monitor its own effectiveness once Medicaid claims feeds begin again.

## **VII. Recommendations to NCHQA**

Based on the results of its analyses, CCNC recommends four priority steps to improve the quality and efficiency of transitional care in North Carolina:

- 1. Promote systems that identify patients with multiple chronic conditions (MCC) and provide robust care management support following hospital discharge.**
- 2. Promote systems that include home visits with medication reconciliation for MCC patients after discharge, with prioritization of patients at highest risk of readmission and those whose prescription fill history indicates no or little prior medication use for chronic disease care.**
- 3. Promote systems that ensure the highest risk MCC patients receive an outpatient follow-up visit to a health care provider within seven days of discharge.**
- 4. Promote measurement of readmission rates on a per beneficiary basis and not a per admission basis.**

## **VIII. Future Work**

In addition to the implementation activities described above, CCNC has prepared three manuscripts that it will submit for publication to peer-reviewed journals. Copies of the complete manuscripts are provided as Appendices A, B and C. Some of these findings were also presented at the North Carolina Care Transitions Summit held in Durham, NC, on January 31, 2014.

The NCHQA board has begun discussions about how the organization may disseminate these findings to other populations and payers in North Carolina.

## IX. References

1. Centers for Medicare & Medicaid Services. FY 2012 IPPS Proposed Rule: details for CMS-1518-P: proposed changes to the hospital inpatient prospective payment systems for acute care hospitals and FY 2012 rates and to the long term care hospital PPS and FY 2012 rates. <http://www.cms.gov/acuteinpatientpps/ipp2012/itemdetail.asp?itemid=CMS1246629>. Accessed January 31, 2012.
2. Centers for Medicare and Medicaid Services. Chronic Conditions among Medicare Beneficiaries, Chart book: 2012 Edition Baltimore, MD. 2012
3. Jackson CT, Trygstad TK, DeWalt DA, DuBard CA. Transitional care cut hospital readmissions for North Carolina Medicaid patients with complex chronic conditions. *Health Aff (Millwood)*. 2013 Aug;32(8):1407-15.
4. Brock J, Mitchell J, Irby K, Stevens B, Archibald T, Goroski A, et al. (2013). Association between quality improvement for care transitions in communities and rehospitalizations among Medicare beneficiaries. *JAMA*. 2013;309(4):381-391.
5. van Walraven C, Jennings A, Forster AJ. A meta-analysis of hospital 30-day avoidable readmission rates. *J Eval Clin Pract* 2012 Dec;18(6):1211-8.
6. Joynt KE, Gawande AA, Orav EJ, Jha AK. Contribution of preventable acute care spending to total spending for high-cost Medicare patients. *JAMA* 2013 Jun 26;309(24):2572-8.
7. Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. *N Engl J Med* 2009;360:1418-1428
8. Gilmer T, Hamblin A. Hospital Readmissions among Medicaid Beneficiaries with Disabilities: Identifying Targets of Opportunity. Center for Health Care Strategies, Inc, December 2010 December 2010:1-10.
9. Grafft C, McDonald F, Ruud K, Liesinger J, Johnson M, Naessens JM. Effect of Hospital Follow-up Appointment on Clinical Event Outcomes and Mortality. *Arch Intern Med*. 2010;170(11):955-60.
10. Coleman EA, Parry C, Chalmers S, Min S-J. The care transitions intervention: results of a randomized controlled trial. *Arch Intern Med* 2006;166:1822-1828.
11. Naylor MD, Brooten D, Campbell R, Jacobsen BS, Mezey MD, Pauly MV, & Schwartz JS. Comprehensive discharge planning and home follow-up of hospitalized elders: a randomized clinical trial. *JAMA*. 1999;281:613-620.
12. Jack BW, Chetty VK, Anthony D, et al. A reengineered hospital discharge program to decrease rehospitalization: a randomized trial. *Ann Intern Med* 2009;150:178-187
13. Naylor MD, Brooten DA, Campbell RL, Maislin G, McCauley KM, & Schwartz JS. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc*. 2004;52:675-684.

14. Naylor MD, Bowles KH, McCauley KM, et al. High-value transitional care: translation of research into practice. *J Eval Clin Pract*. 2011 Mar 16. doi: 10.1111/j.1365- 2753.2011.01659.x. [Epub ahead of print]
15. Boulton C, Reider L, Leff B, Frick KD, Boyd CM, Wolff JL, Frey K, Karm L, Wegener ST, Mroz T, Scharfstein DO. "The Effect of Guided Care Teams on the Use of Health Services." *Arch Intern Med* 2011;171(5): 460-466.
16. Phillips CO, Wright SM, Kern DE, Singa RM, Shepperd S, Rubin HR. Comprehensive discharge planning with postdischarge support for older patients with congestive heart failure: a meta-analysis. *JAMA* 2004;291:1358-1367
17. Pushparajah S, McClellan R, Henry A, Kuitert LM. Use of a chronic disease management programme in COPD to reduce hospital readmissions. *Chron Respir Dis*. 2006;3:187-193.
18. Brown R, Peikes D, Peterson G, Schore J, Razafindrakoto C. Six features of Medicare Coordinated Care Demonstrations that cut hospital admissions of high risk patients. *Health Aff (Millwood)*. 2012;31:1156-1166.
19. Rosenberg C, Peele P, Keyser D, McAnallen S, Holder D. Results from a patient- centered medical home pilot at UPMC Health Plan hold lessons for a broader adoption of the model. *Health Aff (Millwood)*. 2012;31:2423-2431.
20. Auger K, Kahn R, Davis M, Beck A, Simmons J. Medical home quality and readmission risk for children hospitalized with asthma. *Pediatrics*. 2013;131:64-70.
21. Hernandez AF, Greiner MA, Fonarow GC, Hammill BG, Heidenreich PA, Yancy CW, Peterson ED, Curtis LH. Relationship between early physician follow-up and 30-day readmission among Medicare beneficiaries hospitalized for heart failure. *JAMA* 2010;303:1716-22.
22. Van Uden CJ, Winkens RA, Wesseling G, Fiolet HF, van Schayck OC, Crebolder HF. The impact of a primary care cooperative on the caseload of an emergency department. *J Gen Int Med* 2005;20:612-7.
23. Sharma G, Kuo YF, Freeman JL, Zhang DD, Goodwin JS. Outpatient Follow-up Visit and 30-Day Emergency Department Visit and Readmission in Patients Hospitalized for Chronic Obstructive Pulmonary Disease. *Arch Intern Med* 2010;170:1664-70.
24. Rizza P, Bianco A, Pavia M, Angelillo I. Preventable hospitalization and access to primary care in an area of Southern Italy. *BMC Health Serv Res*. 2007;7:134
25. Peikes D, Chen A, Schore J, Brown R. Effects of care coordination on hospitalization, quality of care, and health care expenditures among Medicare beneficiaries: 15 randomized trials. *JAMA*. 2009 Feb 11;301(6):603-18
26. Peikes D, Peterson G, Brown RS, Graff S, Lynch JP. How changes in Washington University's Medicare coordinated care demonstration pilot ultimately achieved savings. *Health Aff (Millwood)*. 2012 Jun;31(6):1216-26.
27. Hines, A., L., Barrett, M. L., Jiang, H. J., & Steiner C. A. (2014). Conditions with the largest number of adult hospital readmissions by payer, 2011.

28. Gerhardt, G., Yemane, A., Hickman, P., Oelschlaeger, A., Rollins, E. & Brennan, N. (2013). Data shows reduction in Medicare hospital readmission rates during 2012. *Medicare & Medicaid Research Review*, 3(2), E1-E12. Retrieved from [http://www.cms.gov/mmrr/Downloads/MMRR2013\\_003\\_02\\_b01.pdf](http://www.cms.gov/mmrr/Downloads/MMRR2013_003_02_b01.pdf)
29. Silow-Carroll, S., Edwards, J. N. & Lashbrook, A. (2011). Reducing hospital readmissions: lessons from top-performing hospitals. Synthesis report. Retrieved from [http://www.commonwealthfund.org/~media/Files/Publications/Case%20Study/2011/Apr/1473\\_SilowCarroll\\_readmissions\\_synthesis\\_web\\_version.pdf%5C](http://www.commonwealthfund.org/~media/Files/Publications/Case%20Study/2011/Apr/1473_SilowCarroll_readmissions_synthesis_web_version.pdf%5C)
30. Wier, L. M. (Thomson Reuters), Barrett, M. L. (M.L. Barrett), Steiner, C. (AHRQ), Jiang, H. J. (AHRQ). (2011). All-cause readmissions by payer and age, 2008. HCUP Statistical Brief #115. Agency for Healthcare Research and Quality, Rockville, MD. Retrieved from <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb115.pdf>
31. Healthcare Cost and Utilization Project. (n.d.). 30-day readmission rates to U.S. hospitals. H-CUP; Department of Health and Human Services; Agency for Healthcare Research and Quality. Retrieved from <http://www.hcup-us.ahrq.gov/reports/infographics/HCUP-hospital-readmission-infographic-final.pdf>
32. Robert Wood Johnson Foundation. (2013). The revolving door: A report on U.S. hospital readmissions. An analysis of Medicare data by the Dartmouth Atlas Project. Stories from patients and health care providers by Perry Udem Research & Communication Retrieved from <http://www.rwjf.org/content/dam/farm/reports/reports/2013/rwjf404178>
33. Institute for Healthcare Improvement. (2014). The IHI triple aim. Retrieved from <http://www.ihf.org/Engage/Initiatives/TripleAim/Pages/default.aspx>
34. Centers for Medicare and Medicaid Services. (2014a). Readmissions reduction program. Retrieved from <http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Readmissions-Reduction-Program.html>
35. Social Security Administration. (n.d.,a). Complication of the Social Security Laws. Payment to hospitals for inpatient hospital services. Section 1886. [42 U.S.C. 1395ww]. Retrieved from [http://www.ssa.gov/OP\\_Home/ssact/title18/1886.htm](http://www.ssa.gov/OP_Home/ssact/title18/1886.htm)
36. James, J. (2013). Medicare hospital readmissions reduction program. To improve care and lower costs, Medicare imposes a financial penalty on hospitals with excess readmissions. *Health Affairs Policy Brief*. doi: <http://dx.doi.org/10.5600/mmrr.003.02.b01>. Retrieved from [http://healthaffairs.org/healthpolicybriefs/brief\\_pdfs/healthpolicybrief\\_102.pdf](http://healthaffairs.org/healthpolicybriefs/brief_pdfs/healthpolicybrief_102.pdf)
37. Medicare Learning Network. (2014). Summary of final rule provisions for accountable care organizations under the Medicare Shared Savings Program. Department of Health and Human Services, Centers for Medicare & Medicaid Services. Retrieved from [http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/ACO\\_Summary\\_Factsheet\\_ICN907404.pdf](http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/ACO_Summary_Factsheet_ICN907404.pdf)
38. Social Security Administration. (n.d., b). Complication of the Social Security Laws. Shared savings program. Section 1899. [42 U.S.C. 1395jjj]. Retrieved from [http://www.ssa.gov/OP\\_Home/ssact/title18/1899.htm](http://www.ssa.gov/OP_Home/ssact/title18/1899.htm)

39. RTI International & Telligen. (2011). Accountable Care Organization 2012 program analysis. Quality performance standards narrative. Measure specifications. Final report. Prepared for Quality Measurement & Health Assessment Group, Office of Clinical Standards & Quality, Centers for Medicare & Medicaid Services. Retrieved from [http://www.cms.gov/medicare/medicare-fee-for-service-payment/sharedsavingsprogram/downloads/aco\\_qualitymeasures.pdf](http://www.cms.gov/medicare/medicare-fee-for-service-payment/sharedsavingsprogram/downloads/aco_qualitymeasures.pdf)
40. Centers for Medicare and Medicaid Services. (n.d.-a). ACO #8 – Risk standardized all condition readmission. Retrieved from <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/ACO-8.pdf>
41. Centers for Medicare & Medicaid Services. (n.d.-b). Community-based care transitions program. Retrieved from <http://innovation.cms.gov/initiatives/CCTP/index.html>
42. Agency for Healthcare Research and Quality. (2012). State Medicaid policy changes increasingly driven by evidence. Research Activities, 384. Retrieved from <http://www.ahrq.gov/news/newsletters/research-activities/aug12/0812RA1.html>
43. Nowicki, S., Zembroski, D., Pickering, L. & Nobel, J. (2012). Reducing preventable hospital readmissions: a multistakeholder perspective. A report on the NEBGH hospital readmission reduction project: an initiative of Northeast Business Group on Health's Solution & Innovations Center. Retrieved from [http://www.nebgh.org/publications/HospitalRedadmissionsReport\\_V2\\_SinglePages.pdf](http://www.nebgh.org/publications/HospitalRedadmissionsReport_V2_SinglePages.pdf)
44. Independence Blue Cross. (2010). Independence Blue Cross supports new project to reduce hospital readmissions. Press release. Retrieved from [http://www.ibx.com/company\\_info/news/press\\_releases/2010/05\\_26\\_IBC\\_supports\\_new\\_project.html](http://www.ibx.com/company_info/news/press_releases/2010/05_26_IBC_supports_new_project.html)
45. Project BOOST. Society of Hospital Medicine Web site. <http://www.hospitalmedicine.org/BOOST/>. Accessed December 5, 2011.
46. Naylor MD. Transitional care for older adults: a cost-effective model. LDI Issue Brief. 2004;9(6):1-4.
47. Wolff JL, Rand-Giovannetti E, Palmer S, et al. Caregiving and chronic care: the guided care program for families and friends. J Gerontol A Biol Sci Med Sci. 2009;64(7):785-791.