

**Insights for Partnerships between Community-based Organizations and Healthcare
Delivery Systems: Perspective from an Evaluation of the Western Pennsylvania
Community-based Care Transitions Program**

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Abstract

Improving transitions of care and reducing avoidable readmissions continues to be important in improving quality, safety, and overall costs of care. These goals are relevant as Pennsylvania implements Community HealthChoices, a Managed Long-Term Services and Supports program. Pennsylvania was the 24th state to implement a MLTSS model nationally. This paper summarizes the local and national context for coordinating care, while highlighting some of the pressing issues of the current environment including an aging population, increased caregiver demand and burden, challenges related to social determinants of health and the importance of care coordination and transitional care. The context and challenges summarized have public health significance locally and nationally.

A literature review highlights the distinctions between transitional care and care coordination, the public health significance of hospital readmissions, challenges during transitions of care, practices with mixed or unfavorable results, and a summary of evidence-based interventions. We conducted a mixed methods evaluation of a Community-based Care Transitions Program in Western Pennsylvania using the Care Transitions Intervention. The collaboration was part of a Medicare demonstration known as the Community-based Care Transitions Program that funded 101 communities nationally. The Western Pennsylvania community included Area Agencies on Aging as the community-based organizations and six acute care hospitals in a predominantly rural region serving Medicare beneficiaries at highest risk of readmission.

Multiple linear regression analysis was used to explore the extent to which dose of the care transitions intervention influenced outcome patient activation as measured by the Patient Activation Assessment and the Patient Activation Measure while accounting for baseline activation, hospital, age and gender. Intervention dose was significantly associated with increase in PAM, $F(9,1732) = 157.62$, $p < .0001$, adjusted $R^2 = .447$ and with increase in PAA, $F(9,1337) = 88.82$, $p < .0001$, adjusted $R^2 = .315$. A cost effectiveness analysis estimated a savings of \$3,926 per readmission avoided. and a finding of overall cost effectiveness of the program assuming intervention costs are below \$600 and a 5% absolute reduction in readmissions. While this does not establish causality nor prove cost effectiveness, these are promising findings for additional research and translation to other communities seeking similar results.

Keywords: care transitions, cost effectiveness, readmissions, patient activation, CCTP

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Preface

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1.0 Introduction: Context for Coordination of Care and Care Transitions in Pennsylvania

1.1 MLTSS and the Role of Care Coordination

Pennsylvania is nearing the end of the 3rd and final zone in a 3-year phased implementation of Community-Health Choices, a managed long-term service and supports model for managing physical health and long-term services and supports for Pennsylvanian's who are older adults or adults with disabilities. ¹

Before discussing MLTSS in greater detail it may be helpful to provide a concise summary of Medicare and Medicaid. Medicare is a federally regulated and administered health insurance program that pays the costs of hospital, physician, outpatient, limited skilled home care and medically necessary durable medical equipment and medical supplies. Because Medicare enrollment is federally mandated and regulated, enrollment, benefits and coverage options tend to be consistent. Qualifying beneficiaries are individuals age 65 or older or individuals with a disability that completed the process to qualify for Social Security Income benefits.

Medicaid is a federally regulated but state funded and administered health insurance program that pays the costs of physical health and long-term services and supports. As a result, there is a great deal of variation in Medicaid programs by state.

A recent MLTSS report indicated that number of states funding MLTSS doubled from 2012 to 2015 and then doubled again to a total of 41 in 2017. The number of states that are operating multiple MLTSS programs also doubled. Similarly, enrollment and Medicaid spending more than doubled within the same time-period. State goals for MLTSS programs were to improve participant outcomes and quality of care, increase access to HCBS, improve care coordination, improve efficiency, and increase participant choice. Enrollment was almost a 50/50 split between voluntary and default enrollment.

In 2019 states used various Medicaid managed care authorities to implement MLTSS programs based upon features relative to state needs. In 2012 the distribution by authorities was fairly even. For example: 19 states or 46% used 1115 waiver demonstrations, 11 or 27% used 1915 (b) authority, 6 or 15% used 1915 (c) and 5 or 12% used 1932 waivers.²

The population dually eligible for Medicare and Medicaid is largely low-income older adults or adults with disabilities. On average this population tends to have more chronic conditions, less access to care, lower health literacy, lower levels of activation and self-management, higher rates of disability and higher costs than other beneficiary groups.³

MLTSS is one of many strategies to better integrate and coordinate care for high-risk populations. While far less integrated a model than Accountable Care Organizations or Financial Alignment Demonstrations, MLTSS does take an important step towards integrating the coordination of physical health, behavioral health and long-term services and supports. These are areas of health that have traditionally been coordinated and delivered in silos.

Approximately 1 in every 5 Medicare beneficiaries are dually eligible for Medicare and Medicaid.⁴ These individuals tend to have a higher incidence of poverty, poor health and chronic illness or disability.³ For example, 50% of dually eligible beneficiaries have incomes below the poverty line, 60% have multiple chronic conditions, 66% are over age 65 and 33% have a disability. Dual eligible beneficiaries comprise a much larger portion of costs than of enrollment.⁵ Among dual eligible populations, 10% of Medicaid beneficiaries account for 60% of Medicaid costs with the majority of these costs attributed to institutional care.

An estimated 5-12% of all nursing facility residents are estimated to be suitable for home-based care assuming appropriate services could be secured and implemented at home. These are also individuals that tend to be impacted by health disparities and may have lower knowledge, skills and confidence in managing their healthcare.⁵ Integrating care coordination for individuals dually eligible for Medicare and

Medicaid is expected to improve health outcomes, improve the experience of care and improve the cost effectiveness of care.⁶

1.2 1MLTSS Structure and Key Elements

Managed Long-Term Services and Supports (MLTSS) is a delivery and finance system for long term services and supports (LTSS) operated by Medicaid managed care organizations (capitated health plans) and administrated by states. MLTSS includes both home and community-based services (HCBS) and facility-based care.⁷ MLTSS has experienced a rapid growth trajectory. Fifteen years ago, there were 4 states with Medicaid managed care programs. In 2018, the National Association for State Units on Aging and Disabilities identified 25 such programs. A Kaiser Family Foundation Brief reports 31 states having Medicaid managed care programs in 2019.

Medicaid managed care is the largest method of managing and financing health care services for individuals with low income and for those requiring long term services and supports.⁸ Medicaid is the third largest mandatory spending category at approximately 9% of the federal budget outpaced only by social security and Medicare.⁹ In 2015 approximately 80% of all Medicaid participants were enrolled in managed care programs and the growth continues to be rapid.⁸ In budgetary terms as recently as April of 2019, Medicaid managed care was 49% of federal spending with 45.8% of spending in managed care.⁹

While states administer and directly fund Medicaid insurance programs, the federal government through the Centers for Medicare and Medicaid Services provides guidance and expectations to the states to ensure current standards are met.⁷ States in turn receive federal match funds to offset the costs of providing health care for target populations while meeting federal requirements and expectations. State budgets have a unique Medicaid impact such that Medicaid is on average 26.5% of state spending and

14.2% of state funding, largely due to the federal match. The impact of the federal Medicaid matching rate (FMAP) is such that for every \$1 spent on health care and LTSS, states may receive between \$1 to \$2.85 from the federal government.¹⁰ FMAP rates range between 50-74% with national average of 57%.

The Affordable Care Act provision for Medicaid Expansion funded Medicaid growth by providing a federal match payment (FMAP) of 100% during the expansion years of 2014 through 2016 and continues to provide a significant enhanced FMAP rate to states beyond implementation. The net result of these provisions was that the federal government provided 100% of the costs of care for Medicaid expansion for 3 years and then continue to pay \$9 for every \$1 paid by states for ongoing coverage for the Medicaid expansion population.¹⁰

In addition to funding, CMS provides guidance to the states which includes 10 key elements that must be addressed by new, expanded or revised MLTSS programs.⁷ These are relevant to understanding the MLTSS landscape and state implementation and expansion of MLTSS programs. These elements include:

1. Sufficient planning to inform design with stakeholder input and safeguards
2. Structure for regular stakeholder engagement and input before, during and after implementation
3. Implementation compliant with the Americans' with Disabilities Act and Olmstead v. L.C. decision which includes the delivery of MLTSS in the most integrated setting offering participants optimal opportunity for active community and workforce participation.
4. Payment methods that hold contracted entities accountable through financial penalties and reward performance through incentives and pay for performance mechanisms.
5. Conflict-free and user-friendly support for participants including education, assistance with enrollment and disenrollment, service provision and advocacy.

6. Person-centered processes across the board and specifically in the areas of needs assessment, service planning, policies, and procedures. CMS expects states to encourage participant directed approaches such as self-direction where the participant leads their care plan development and participant directed option where the participant can become a common law employer and directly hire and manage their direct care worker for personal care services.
7. Provision of integrated care models including physical health, behavioral health and long-term services and supports.
8. Adequate qualified provider networks to provide access to all of the care and services included within the scope of the MLTSS contract. CMS recognizes the transition from fee for service to managed care and encourages states to incorporate existing LTSS providers in the provider network to the extent possible and help these providers to be prepared which may include information technology, systems and/or operational support.
9. Participant safeguards and protections must be provided to ensure the health, welfare of participants is protected which includes formal development and implementation of participant rights and responsibilities, critical incident management systems, policies and procedures to prevent abuse, neglect and exploitation and include processes for receiving and managing complaints, grievances and appeals.
10. Implementation of a comprehensive quality management and quality improvement strategy which includes quality of life and public access to the approach and performance results.

While there is much more detail around these 10 key elements this summary provides insight into the rationale behind state implementation efforts.

1.3 Long Term Services and Supports Definition

Long-term services and supports (LTSS) are critical services to older adults and adults with disabilities who require assistance to perform the essential activities of daily living (ADLs) or instrumental activities of daily living (IADLs).¹¹ ADLs include the ability to eat, bath, dress, toilet, transfer positions, and maintain continence of bowel and bladder. IADLs include housekeeping, shopping, preparing meals, taking medication, traveling, using the telephone, and managing personal finances.¹² Determining a participant's ability to perform ADLs and IADLs generally includes assessing the level of assistance required to perform these tasks.

LTSS services are needed by a broad range of individuals who require assistance with self-care due to physical, cognitive, or mental conditions. The goal of LTSS is to support individuals in carrying out ADLs and IADLs necessary to maintain health and well-being. These services may include any age group although the majority are over 65.¹³ LTSS includes services and supports that are provided in a variety of settings including an individual's home, personal care home, assisted living/residential care facilities, mental health facilities, intermediate care facilities and nursing homes.¹⁴ LTSS services may be paid for out of pocket, by private insurance and within some Medicaid plans. When the payor is Medicaid, covered benefits and services depend upon the authority (1915 or 1115) and service definitions proposed by states and approved by CMS. Common services include personal assistance services, supported employment, non-medical transportation, personal emergency response systems, durable medical equipment, medical supplies, home delivered meals and incontinence supplies.

1.4 Population Needs and Growing Demand

Older adults are the most frequent users of LTSS due to the loss of ADL and IADL independence that comes with advanced age. Individuals with disabilities are the second highest users of LTSS. Older adults and adults with disabilities comprise two-thirds of all Medicaid spending on LTSS services.⁹

The Assistant Secretary of Health Planning and Evaluation at the US Department of Health and Human Services summarizes trends and projects utilization and costs based on population growth, characteristics and expected demand. Demand for LTSS is expected to increase dramatically from 2014 to 2040. Projections indicate an 19% overall population increase during this time-period to an estimated 380 million people. Older adults create the greatest demand for LTSS services and demand is anticipated to increase by 72.9% from 48 to 82 million individuals.¹⁵

In addition to an aging population, experts anticipate an increase in the drivers of LTSS utilization. Alzheimer's related dementia is expected to be a significant driver of LTSS demand. Overall longevity and increased prevalence of chronic conditions including multiple chronic conditions is also expected to increase need for long term services and supports.¹⁵ The other driver for LTSS is the anticipated increase in significant disability from these and other conditions.

Additionally, there are multiple demographic changes among the population that are expected to affect both supply and demand. For example, changing family structures and gender roles may mean less caregivers available for informal (unpaid) caregiver roles given that women have historically provided the majority of caregiving. Other demographic changes that will impact supply and demand for LTSS service include a doubling of the proportion of racial and ethnic minorities from 2010 to 2050. These trends are both drivers for increased demand for LTSS service and an increased need for cultural competency among service providers and delivery systems.¹⁵

It is important to note that utilization patterns in LTSS shifted in 2013 when HCBS utilization as a percent of overall spending exceeded institutional care spending. Prior to this year there had been a long-term institutional bias. Several policy changes contributed to this change including growth in 1915 (c) Waivers, improved reporting, and stabilized nursing facility spending.¹⁵

1.5 Social Determinants of Health & Public Health Significance

Social determinants of health have been recognized for decades however disparities and inequities persist. MLTSS programs have substantial opportunity to address social determinants of health directly and in partnership with other thought leaders, systems and care providers. The World Health Organization includes in their constitutional a definition of health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.¹⁶ The WHO expresses commitment to additional principles within their constitution which includes:

“...enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition; the extension to all peoples of the benefits of medical, psychological and related knowledge is essential to the fullest attainment of health; and a belief that governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures.”¹⁷

Many researchers have called for action to address social determinants of health. Marmot identified a 48-year variation in life expectancy across countries and 20-year variance within countries and argued

that reducing these inequities and meeting basic human needs is a moral obligation and an issue of social justice.¹⁷ Additionally, there are estimates suggesting that approximately 40% of deaths are caused by behavior patterns that could be prevented and merit increasing resources and efforts focused on prevention and health promotion.¹⁷ Very little progress has been made in reducing disparities in health status by socioeconomic status and race/ethnicity. One of the challenges is the need for organizations to measure not only gains in health achievements but to also measure reductions in disparities as part of evaluation efforts.

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The social conditions that have the greatest impact on health include neighborhood living conditions, opportunities for learning and capacity for development, employment and community development, social norms and customs, social cohesion and civic engagement, and access to health promotion, disease prevention and health care.¹⁹ The US Task Force identified 200 specific community-based interventions while acknowledging that few of them have been evaluated. The Community Guide lists many of these interventions by category.²⁰ These and others may be opportunities for managed care organizations and community partners to improve health and reduce health disparities.

1.6 Opportunities to Leverage Socioecological Model & Health Impact Pyramid

The socio-ecological model describes multiple levels to influence health behavior from individuals at the center to policies that impact health at the broadest context to the communities, organizations and relationships that support each individual. Research demonstrates that efforts targeted at multiple levels are most influential.²¹ Done well, care coordination within MLTSS has the potential for influential engagement at the individual level with a person-centered approach. This process includes needs assessment and coordination of efforts while leveraging strengths and addressing unmet needs for additional socialization or interpersonal support and increasing access to organizations and communities that support

health and well-being. Additionally, care coordination which includes variations on the theme in the form of service coordination and care management, would ideally include coordinating transitions of care using evidence-based practices along with physical health, behavioral and long-term services and supports.²²

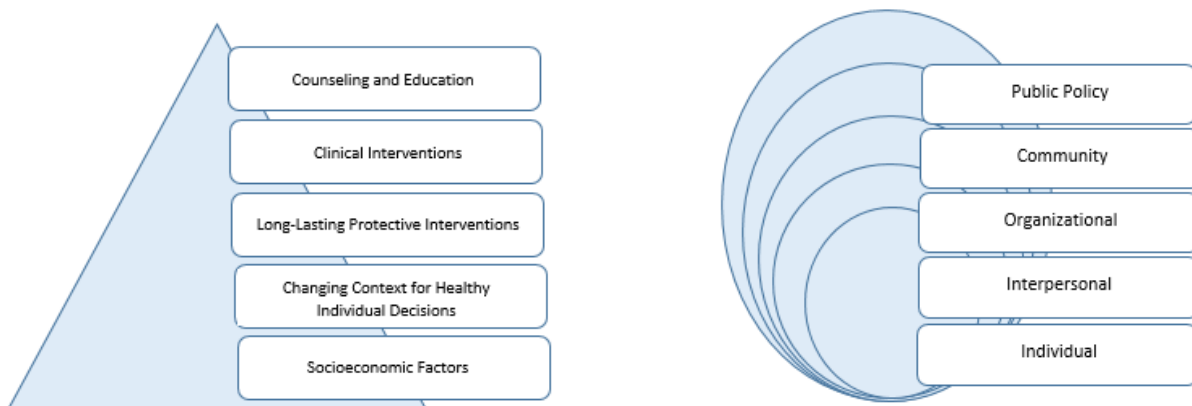


Figure 1: Health Impact Pyramid & Socio-Ecological Model

The Health Impact Pyramid is a framework that describes types of public health interventions that can make the greatest impact on health.²³ For example, socioeconomic based interventions will make the largest impact whereas counseling and education by comparison are estimated to have a smaller degree of impact.

The Community Guide illustrates interventions that target various levels of the health impact pyramid and depending on the details of the interventions, some may engage multiple socio-ecological model levels which could increase the impact of the intervention. For example by improving linkages to health plan benefits and community and social supports, socioeconomic risk factors are expected to be reduced and positive health impact realized. It is important to note that interventions delivered at the bottom level of the pyramid affect a larger population at a potentially a lower unit cost. The distinction between the two models is that the social ecological model describes potential levels of intervention that influence and support individuals health behavior within a concentricly broader context whereas the health impact

model demonstrates the size of public impact by type of intervention.

These are distinct but complementary models.

The MLTSS population has complex characteristics of advanced age, poverty, incidence of chronic conditions and functional limitations including disability, lower rates of advanced education, lower health literacy, greater barriers to care and disparities in health outcomes. Additionally, a significant portion of the state is considered rural. Older adults in these communities may experience challenges with access to care, transportation, personal assistance service providers, a limited choice of providers and limited community resources given the lower population density.

1.7 Caregiver Demand and Caregiver Burden

Caregivers have an essential and irreplaceable role in long term services and supports. Informal caregivers were estimated to provide three-quarters of the total caregiving needs which would be valued at \$450 billion dollars of caregiving at an average market rate of \$12.51 per hour.²⁴ Based on a 2015 survey; the average caregiver is 49 years old although 1 in 10 caregivers are over 75. Sixty percent of caregivers are female and 28% of caregivers also have dependents under the age of 18. 60% are employed at an average of 34.7 hours per week. A reported 25% of caregivers have been caregiving for 4 years and 50% of caregivers expect to be caregiving for the next 5 years.²⁴

The average volume of care provided per week is 24.4 hours, 25% of respondents provided more than 40 hours of care and 7% provided greater than 44 hours per week. Caregivers that provide care for more than 20 hours per week are 4 times more likely to be caring for a spouse and 2 times more likely to be caregiving for more than 10 years.²⁵ The survey summarized the types of support provided by family caregivers demonstrating the “new normal” of medically complex caregiving that has become the norm for many caregivers:²⁵

- i. 78% helped with managing medications including injections and intravenous therapies
- ii. 43% helped with assistive devices such as canes and walkers for mobility
- iii. 41% helped with preparing food
- iv. 35% helped by providing wound care such as ostomies, pressure sores ointments and wound related prescription drugs or bandages
- v. 32% helped with meters and monitors such as testing blood sugar, oxygen, blood pressure, test kits and telehealth
- vi. 25% helps with incontinence such as enemas, equipment, and supplies
- vii. 21% helped with operating durable medical equipment such as lifts, beds, and chairs
- viii. 14% helped by operating medical equipment such as ventilators, dialysis, tub feeding and suctioning

Caregivers reported impact on their own health and well-being because of their caregiving role. For example, among caregivers who provided up to 20 hours per week of care 34% reported experiencing physical strain and 22% reported experiencing emotional stress. However, among those in higher (>20 hours per week) categories of caregiving, 32% reported physical strain and 46% reported emotional stress. Those who shared they had “no choice” but provide care experienced significantly higher levels of emotional stress at 53%. On average 18% of family caregivers reported experiencing financial stress and that rate climbed to 31% among caregivers providing care more than 20 hours per week.²⁵

When asked what kind of support would be helpful: 84% indicated information, 25% indicated access to affordable services, 49% indicated more inclusion/involvement by hospital staff, 30% suggested a tax credit and 30% selected being reimbursed for some of their care hours. Caregivers were also asked about the services that they had used. 34% indicated that they used home modifications, 28% financial assistance, 23% used transportation services and 15% used respite.

There have been some significant improvements in recent years. The caregiving surveys, and champion organizations and caregiver advocacy groups have certainly been catalysts in this progress. Given the growth of aging populations, incidence of disability, concurrent declining volumes of caregivers and a general shortage in health care professionals our long-term care system would do well build off existing survey research and identify opportunities to innovate and implement cost effective strategies to mitigate caregiver burden and enhance caregiver experience of care.²⁵

A comparison of costs of care, in the absence of an unpaid caregiver, illustrates the impact to an individual, family or payor budget. The 2019 estimated average annual cost of care in Pennsylvania for adult day care 5 days per week at 8 hours per day is 17,485; annual cost for an Assisted Living Facility private one bed-room is \$46,950, annual cost for a Nursing Facility semi-private room is \$116,800; annual cost for Personal Care Service at home 8 hours per day (40 hours per week) is \$47,840; annual cost Personal Care Service at home 24-hour per day (168 hours per week) is \$200,928.²⁶ Twenty-four hour care at home is approximately two times the cost of nursing facility care.

One of the ways that MLTSS programs and providers can support caregivers is by supporting The Care Act and promoting caregiver inclusion. For example, with the implementation of The Care Act, hospitals are required to ask all admitted patients if they wish to identify a caregiver who helps with their care at home. The hospital must then include the family caregivers name in the patient record if the patient elects this option. The hospital is also required to offer family caregivers instructions on care tasks and keep them informed of the discharge date.²⁷

Additionally, given that 84% of caregivers surveyed indicated a need for information, MLTSS managed care organizations can also increase awareness and referrals to community resources and awareness and access to high-quality trainings such as the evidence based *No Longer Alone* instructional videos and tip sheets.²⁸ These resources have the potential to provide low to no cost support services and the instructional videos teach caregivers how to perform frequently needed tasks including those that are

more complex and relevant to the caregiving tasks performed today. A variety of topics are available in the categories of special diet, managing incontinence, wound care, mobility, and managing medications.²⁸

Another potentially important caregiver policy development is the approval of the RAISE Act in January of 2018. RAISE stands for “Recognize, Assist, Include, Support, and Engage”.²⁹ The law established a Family Caregiving Advisory Council with defined membership that will partner with the federal Administration for Community Living (ACL) to create a Family Caregiving Strategy with recommended actions for federal, state and local governments, communities and providers to recognize and support family caregivers. The law defines family caregivers as an adult family member or other individual who has a significant relationship with and provides a broad range of assistance to an individual with a chronic or other health condition, disability, or functional limitation.

The strategy should include recommend actions that promote greater adoption of participant and family centered care in health and LTSS settings and includes both the participant and the family caregiver at the center of care teams. The scope of the RAISE Act includes development of a Family Caregiving Strategy that promotes greater adoption of participant and family centered care in health and LTSS settings. Recommendations should include both the participant and the family caregiver at the center of assessments, person and family caregiver centered care teams and service plans.

Importantly the RAISE Act explicitly states that assessments are inclusive of care transitions and care coordination. The scope should also include information, education and training supports, referral and care coordination including hospice care, palliative care and advance planning. The scope of recommendations will also include respite options, financial security, workplace issues and delivering services based on performance, mission and purpose while eliminating redundancies.

The Secretary is responsible to disseminate an initial and annual report reflecting new developments, challenges, opportunities, solutions and a review of progress and recommended actions for improvement and implementation. The initial report is to include an inventory and assessment of all

federally funded efforts to support family caregivers and the results, opportunities to eliminate redundancy and ensure needs of family caregivers are addressed. It will also include identification of challenges and an evaluation of family caregiving impacts to Medicare, Medicaid and other federal programs.³⁰

The law does not authorize or mandate funding therefore, the John A. Hartford Foundation (JAHF) provided a \$2.5 million dollar grant to the National Academy for State Health Policy (NASHP) to fund related efforts including creation of the RAISE Family Caregiver Resource and Dissemination Center. In 2020 JAHF and NASHP will launch listening sessions across the country to solicit stakeholder input.³¹

1.8 Conclusion

The goal of the introduction was to illustrate the growing demand for long term services and supports, including the state and community-based structure and context for managing care. I also summarized some of the most pressing issues of the current environment including an aging population, increased caregiver demand and caregiver burden, challenges related to social determinants of health attempted to underscore the importance of coordination of care.

In subsequent sections we will examine a review of literature and current knowledge base regarding core coordination and transitions in care. I will highlight the distinctions between transitional care and care coordination, the public health significance of hospital readmissions, common challenges during transitions of care, practices with mixed or unfavorable results, and a summary of evidence-based programs, practices and interventions. The review concludes with a discussion of common themes and future directions.

Section 4.1 presents a mixed methods evaluation of a Community-based Care Transitions Program in Western Pennsylvania that examined the impact of the Care Transitions Intervention on patient activation and self-management. Survey data included the Care Transitions Measure, five items from within the HCAHPS, the Patient Activation and self-Management assessment and Coleman's Patient Activation

Assessment. The collaboration was part of a Medicare demonstration known as the Community-based Care Transitions Program that funded 101 similar communities nationally. The Western Pennsylvania community included Area Agencies on Aging as the community-based organizations and six acute care hospitals in a predominantly rural region serving Medicare beneficiaries at highest risk of readmission.

The evaluation identified significant increases in patient activation and patient activation and self-management while controlling for baseline differences across six acute care hospitals. Prior studies found that patients with higher levels of patient activation and self-management have better health outcomes. This finding was consistent with a national evaluation report which identified statistically significant reductions in 30-day readmissions among Medicare participants served within this community.

Section 4.2 presents a cost effectiveness analysis demonstrating a savings of \$3,926 per readmission avoided and overall cost effectiveness of the program assuming intervention costs are below \$600. While this does not establish causality nor prove cost effectiveness, these are promising findings for additional research and translation to other communities seeking to implement similar interventions and partnerships to achieve meaningful results with at risk populations.

The dissertation concludes by summarizing core themes and opportunities for community-based organizations and health care delivery system partnerships. Recommendations include integrating evidence based transitional care interventions within standard care coordination. Improving transitions of care and reducing avoidable readmissions continues to be important in improving quality, safety, and overall costs care.

2.0 Background: Transitions of Care from Hospital to Home and Hospital to Short Term Stay at Skilled Nursing Facility on the Journey Home

2.1 Introduction

Transitional care has been the subject of significant attention including research, policy, and quality improvement for the past twenty years. In 2005, the Institute of Medicine identified transitional care as one of the top three areas of improvement.³² Transitional care consists of the efforts needed to ensure coordination and continuity of health care as patients transfer between care settings or between levels of care within the same setting.³³ The focus of this paper is the current knowledge base and best practice in transitions of care between hospital, home and short term stay in skilled nursing facilities as part of the journey from hospital to home.

2.2 Methods

A literature review was conducted to summarize the current state of science in transitions of care from hospital to home and hospital to short-term stay at skilled nursing facility on the journey home. The purpose was to summarize the current knowledge base and identify trends and gaps in the literature.

A search was conducted of PubMed MEDLINE with search terms “Care Transitions”, “Transitional Care” or “Transitions of Care” or “Patient Activation” AND 30-day hospital readmissions with publication dates between 1/1/1990 to 11/1/2020. The search also included a review of the lists of references in key articles and addition of relevant items. Figure 3 describes the search strategy.

The review was conducting by reviewing all the abstracts and removing papers that were out of scope or not relevant to the purpose for the review. Articles were then read and summarized based on level of evidence, publication year, key findings, population, study design, setting and journal.

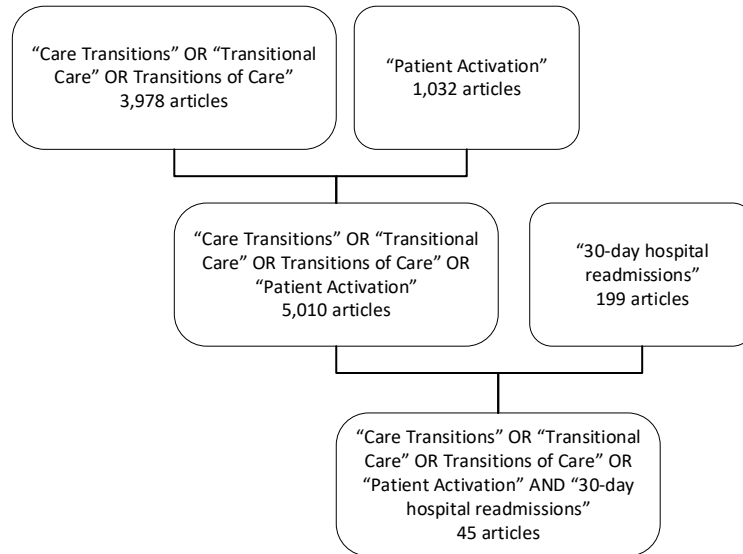


Figure 2: Literature Review Search Strategy

Additional articles were reviewed based on a review of the list of references. Themes were aggregated and the key insights were summarized in the discussion.

2.3 Analysis

Among 45 articles reviewed, 12 were removed: 1 was purely an opinion piece without a supporting review of the literature,³⁴ 1 was a single payor health system lacking generalizability,³⁵ 2 were registered protocols for clinical trials for which results are not yet published,^{36, 37} and 8 were considered out of scope due to specificity of the transitions intervention to a specific medication, procedure or diagnosis.^{38, 39, 40, 41, 42, 43, 44}

The core 45 articles analyzed from the search strategy, review and analysis procedure, are summarized due to length in the appendix. All articles including those identified in the lists of references from the original 45 articles, were grouped by thematic area based on unique insights added to the literature review. Key themes including contributing articles were summarized in the discussion section.

2.4 Results

Table 1: Literature Review Themes

Thematic Area	Publications
Significance of Hospitalizations and Readmissions	48, 51-56, 61,62,65-76
Debate on Hospitalizations as a Measure of Quality of Transitional Care	77-83
Common Challenges during Transitions of Care	44-50, 57-60, 63, 64, 98-100
Previously Promising Practices with Mixed or Unfavorable Results	105-109
Evidence Based Practices, Programs and Interventions	110-123

2.5 Discussion

Optimal coordination of care across settings is important in a complex and fragmented health system where patients with multiple family members and often many independent health practitioners are responsible for planning and executing care activities. Done well care coordination can optimize outcomes through communication, ensuring appropriate follow-up care, protocols to reduce risk of error or omission and reducing duplication of effort, expertise, and expense.⁴⁵

Care coordination requires integration of efforts between care providers to facilitate appropriate delivery of health care services.⁴⁶ Much has been written regarding the gaps and opportunities in coordinating care across providers. Primary care physicians are often considered the central coordinator of a participant's care and yet studies have shown that physicians are often not notified when patients visit emergency rooms. Frequently specialists post discharge have not received test results or medical records in time for scheduled follow-up appointments.⁴⁷ Similarly, while specialists frequently do not receive

supporting information with a referral, it is also common that referring physicians do not receive status updates from specialists after their consultation.⁴⁸

For these and similar reasons, health care reform policy and practice changes include a greater focus on improving coordination of care especially across transition settings. A Medicare Coordinated Care Demonstration project with 15 selected sites tested models for coordination of care from 2002 to 2005. At the time, 50% of Medicare participants had been treated 5 or more chronic conditions and accounted for 75% of Medicare expenditures with a majority of expense attributed to hospitalizations and readmissions.⁴⁹

The evaluation concluded that care coordination programs without strong transitional care components are unlikely to improve quality and yield savings. Examples of subsequent models tested by Medicare includes patient centered medical homes, payment models to support care coordination within primary care, and Community-based Care Transitions demonstration projects.^{50,51} A study of a statewide transitional care program in North Carolina demonstrated that individuals receiving transitional care were 20% less likely to experience a readmission.⁵⁰

2.5.1 Significance of Hospitalizations and Readmissions

The United States has the highest health care costs in the world while ranking 22nd among 23 developed countries on outcomes.⁵² Hospitalizations account for a third of United States health care costs.^{53, 54} The Medicare Payment Advisory Committee indicated that 20% of Medicare hospitalizations result in a readmission and that 12% of these are avoidable.⁵⁵ Heart failure, pneumonia, and chronic obstructive pulmonary disease were the most prevalent among the range of chronic conditions that accounted for 79% of Medicare fee-for-service patient readmissions.⁵⁶ Among patients discharged for medical conditions and experienced a readmission, over 50% did not have a physician follow-up appointment billed to Medicare between the time of discharge and the readmission.⁵⁷

An analysis of Medicare claims found that older adults were seen by a median of 2 primary care physicians and five additional specialists across four practices in a year. Additionally, one-third of participants changed PCPs from one year to the next.⁵⁸ It has also been observed that American adults receive only approximately 55% of recommended care.⁵⁹ This is especially true for women, minorities, economically-disadvantaged, and the uninsured.⁶⁰ The Patient Protection and Affordable Care Act included goals to reduce avoidable readmissions and included changing payment models to increasingly value based structures to support improving quality and reducing avoidable readmissions such as Hospital Readmission Reduction Program and Community-based Care Transitions Program.⁶¹

Individuals that are dually eligible for Medicare and Medicaid have a high rate of potentially avoidable hospitalizations and readmissions.^{62, 63} Many researchers have demonstrated the increased risk of adverse events in handoffs between health care providers^{64,65} This is concerning since patient safety is a paramount consideration in health care. The Institute of Medicine published two seminal reports on patient safety, *To Err is Human* and *Crossing the Quality Chasm*. The first identified that adverse events (injuries resulting from medical management) occur in 2.9-3.7% of hospitalizations. These errors can be errors of planning or errors of execution.⁶⁶ Relevant examples of these two types of errors include discharge planning and executing transitions of care. Of course, not all errors result in patient harm. That said among adverse events, preventable are those that could be avoided and ameliorable are errors that could be reduced in severity.⁶⁷ Adverse events following transitions in care include medication discrepancies, gaps in communications and avoidable readmissions.

Patients that discharge from hospitals may have a 20% rate of adverse events within 3-weeks of discharge, three-fourths of which are likely avoidable.^{67, 68} Additionally, among patients discharged, 40% leave without final test results and studies have found that on average 9% of these results require follow-up action.⁶⁹ More than half of patients discharged experience at least one medication discrepancy.⁷⁰ Two thirds of post-discharge adverse events were related to medication related issues.⁷¹ Other studies found

that between 14-45% of patients left the hospital with a medication related issue.⁷² Approximately 19% of Medicare patients readmit to the hospital within 30-days of discharge costing >\$15 billion dollars annually.

Referral and discharge of Medicare participants to post-acute care facilities increased from 37.4% in 1986 to 46% in 1999 and 30-day readmission rates from nursing facilities increased by 50% between 2000-2004.^{73,74} Post-acute care facilities were noted to have a 22% readmission rate.⁷⁵ Nursing facility residents present on average twice annually to emergency departments, often with normal vital signs and no diagnostic tests suggesting premature presentation to the acute care setting especially given the vulnerability of this population to risk of complication. Between 30-67% of hospitalizations from nursing facilities could be prevented with targeted interventions.⁷⁶ Additionally, it is noteworthy that irrespective of setting, readmissions tend to be more costly than index admissions.⁷⁷

2.5.2 Debate on Hospital Readmissions as a Measure of Quality in Transitions of Care

Hospital readmission rates have received considerable attention as a measure of quality of care and an opportunity to improve planning and care coordination especially during times of transition. There is some debate regarding the appropriateness of readmissions as a quality measure, as opposed to being a measure of access to care. The concern is that analyzing administrative data related to hospital readmission rates may be better suited to demonstrating disease progression as opposed to quality of care. Kangovi recommended using prospective studies or retrospective chart review of readmitted patients as a preferred method of evaluating quality of care opportunities relative to readmission rates.⁷⁷

Other researchers argue that readmission rates are not a quality measure but rather a measure of access to care. Kangovi and Grande stressed that inpatient care is more accessible to those with greater socioeconomic barriers than outpatient care.⁷⁸ Researchers indicated that health care users with Medicaid benefits have barriers to timely outpatient care and therefore demonstrate higher emergency department use

for non-emergent conditions.⁷⁹ Although, Weinberger and colleagues found that increased access to primary care post hospitalization resulted in increased readmissions as opposed to an expected reduction.⁸⁰ Kagovi and Grande cited literature that demonstrated the uninsured have lower rates of inpatient admission following emergency department utilization they did not reference evidence for Medicaid participants.^{81, 82}

A literature review of hospital readmissions found 9-48% to be avoidable with 12-75% of readmissions avoidable through improved patient education, pre-discharge assessment and post discharge care.⁸³ Another study found 5-79% of readmissions to be avoidable.⁸⁴ Most preventable readmissions occur within 30 days of discharge and identified that 45.7% occur within 5-days.^{85,86} Conclusions regarding avoidable readmissions vary based on data source as demonstrated by a finding of 12% avoidable based on clinical data whereas 59% were deemed avoidable based upon administrative data. The author concluded that the current evidence regarding the proportion of readmissions that can be classified as avoidable needs improvement.⁸⁷

Specific recommendations include further examination of adverse events, data source, need for peer-review process, inclusion of at least 3 reviewers, stating explicit criteria for differentiating avoidable vs. unavoidable readmissions, examining large volumes of readmissions, including teaching vs. community hospitals, and use of structural modeling methods like latent class model to consider probability that the readmission was avoidable based on the criteria and reviewers.⁸⁷

While acknowledging this debate in the literature, 30-day readmission rate is widely used as quality measure to assess process and short-term outcomes of acute care. Additionally, there is a large body of evidence demonstrating practices and interventions that are effective at reducing preventable hospitalizations and readmissions. A systematic review and meta-analysis found that interventions with the highest effect size consistently used strategies that assessed and supported the patient's context and capacity for self-care.⁸⁸

Multiple transitional care interventions include mechanisms to increase patient activation. Patient activation and self-management refers to participants believing that their role is important, having knowledge about their conditions, confidence in their ability to communicate and collaborate with healthcare providers as needed and taking action to manage their care.⁸⁴ Patients that are engaged and active in their care experience better health outcomes and cost savings.^{90,91,92} A recent systematic review and meta-analysis examined 42 randomized control trials of interventions found to reduce or prevent 30-day readmissions using a model that examines intervention effectiveness by increasing patient capacity to carry out burdensome self-care.¹⁰⁹

2.5.3 Common Challenges during Transitions of Care

Among older adult hospitalizations, 85% of patients discharged home to self-care receive help from family or friends who are often ill-prepared or insufficiently supported for this critical role.⁹⁴ This is particularly concerning given that recent caregiver survey results suggest that family caregivers are responsible to complete complex tasks. Specifically, 78% manage medications, 53% perform care coordination activities and 46% completed medical/nursing tasks.^{95,96}

Readmission variability across hospitals is also reflective of the needs of the community with incidence of mental illness and social determinants such as poverty and social support often identified among root causes.⁹⁷ Patients and family caregivers often report feeling unprepared to self-manage their care after discharge, they are unable to recall their discharge instructions, they experience barriers and challenges in scheduling follow-up care and have care needs that go unmet post discharge. Approximately half of patients readmitted within 30-days did not have follow-up with their physician. Patients often indicate that transportation and competing priorities are a barrier to follow-up care.⁹⁷

Additional qualitative studies report that patients experience gaps in information transfer between care providers, conflicting advice, and have difficulty reaching providers when they have questions or experience problems or possible red flags.^{98,99,100,101} Additionally between 15-45% of patients were found to have experienced medication related issues post discharge.^{102, 103, 104} Although other researchers found that clinically significant medication errors are rare.¹⁰⁵

2.5.4 Previously Promising Practices with Mixed or Unfavorable Results

A few practices were observed to have mixed or unfavorable results. For example, a common practice across transitional care interventions is telephone follow-up calls. A systematic review found that most studies that examined telephone follow-up had low methodological quality and did not demonstrate statistically significant results from telephone follow-up by a hospital based professional.¹⁰⁶ Similarly, nurse care manager scheduling of follow-up appointments for patients in the absence of other interventions to support transitions in care did not demonstrate significant impact on unplanned hospitalizations, 30-day readmissions or emergency department use.¹⁰⁷

Multiple RCTs testing telemonitoring interventions found that these methods alone did not significantly reduce readmissions nor emergency department utilization.^{108, 109} Medication reconciliation alone likely does not reduce avoidable readmissions but is an important part of interventions to improve care transitions.¹¹⁰ Additionally there is mixed evidence for pharmacist assisted transition of care programs with many not demonstrating an impact on reducing avoidable readmissions.

2.5.5 Evidence-based Programs, Practice, and Interventions

A variety of evidence-based interventions have been developed to increase the quality of transitions in care and reduce the risk of adverse events such as unplanned hospitalizations or decline in health status.

Many of these interventions include the use of a care transition coach, coordinator or navigator. Practices to improve transitions of care have included structural or system interventions and patient level interventions. Structural interventions are those that focus on the structure or process of care whereas patient level interventions are those that focus on patient education, discharge planning and health coaching.¹¹¹ A recent systematic review and meta-analysis concluded that interventions to improve post-discharge outcomes and reduce 30-day readmissions are effective, but the most effective efforts are complex interventions that support patient and caregiver capacity to self-manage.¹¹²

Parry and Coleman define health coaching in transitional care as coaching that supports the patient to gain knowledge, skills, tools and confidence to better coordinate and manage their conditions to achieve their personal health goals. The key differentiator with transition coaching is practicing participant engagement and skill transfer in coordinating care and self-managing their conditions.¹¹³

The process and content of transition coaching occur in parallel and are mutually reinforcing. The following summaries illustrate well-established transitional care programs, practices and interventions with randomized control trials or evaluation results.¹¹⁴ These interventions are among the most widely used in addition to having the most established evidence base.¹¹⁵

2.5.5.1 Care Transitions Intervention (CTI)

The care transitions intervention engages participants and their caregivers to be active managers of their transition and their health conditions. The intervention begins at the hospital and includes a hospital visit, a home visit within 72-hours of discharge, 3-follow-up phone calls within 21-days of discharge. The intervention includes four conceptual areas of effort, specifically, medication self-management, follow-up with a primary care physician or specialist, knowledge of red-flags or signs and symptoms that a condition is worsening and what to do next and includes the use of a patient-centered health record. The intervention is focused on skill transfer and is delivered through transition coaching and the use of the patient-centered

health record and completes within 30-days of discharge. Readmission rates were reduced by 27-36% at 30-days, ED visits reduced by 16%.^{116, 117, 118}

2.5.5.2 Transitional Care

The transitional care program is delivered by a masters prepared advanced practice nurse (APRN) and begins with a screening to identify patients who would most benefit. Screening includes 5 or more chronic conditions, a recent fall, deficits in at least 2 ADLs, diagnosis of dementia or cognitive impairment, history of mental or emotional health problems or hospitalization within the past 30-days or two hospitalizations within the past 6-months.

The average intervention is 2-months in duration and begins with the APRN interviewing the patient, family caregivers and working with the clinical care team. The APRN conducts a comprehensive assessment, attends appointments, develops and carries out a care plan. The APRN works with the patient and the family caregiver to provide education and promote self-management which begins with patient goals and considers unique learning styles and preferences. The care plan includes patient goals, medication management, diet, exercise, and follow-up care. Contact is frequent beginning with daily at the hospital, weekly throughout the first month, includes accompanying the participant to physician's visits and ensuring early identification of risks and how to manage symptoms.^{119, 120}

2.5.5.3 Reengineered Discharge (Project RED)

There are 12 principal themes of the Reengineered Discharge. These include (1) explicit delineation of roles and responsibilities, (2) not waiting for discharge to begin planning, (3) initiating patient education during and throughout the hospital stay, (4) reliable bi-directional communication from PCP to hospital to PCP, (5) complete discharge summary readiness at time of discharge, (6) comprehensive scope of written discharge plan to specific guidelines, (7) provide the patient a copy at the time of discharge, (8) accessible discharge plan to the patients communication needs and literacy, (9) reinforcing the discharge plan post

discharge for high risk patients, (10) admission information that is organized, complete and transmitted timely to the PCP, (11) case management staff available after hours, (12) applying quality improvement to the discharge process including benchmarking, measurement and continuous improvement.^{121, 122}

2.5.5.4 INTERACT (Interventions to Reduce Acute Care Transfers)

Interact is a quality improvement program for nursing facilities to identify, evaluate and manage changes in condition for nursing home residents. The program requires support from the senior clinical and operational leadership team and use of quality improvement tools. The INTERACT strategies include (1) adopting principles of quality improvement, (2) early identification and evaluation of changes in condition, (3) management of common changes when safe and feasible without hospital transfer, (4) improved advance care planning, and (5) improved communication and documentation. The INTERACT standard toolkit includes quality improvement tools such as: root cause analysis, a quality improvement worksheet to trend data for education and process improvements, and the use of quality dashboards.

The toolkit also includes communication tools such as “STOP and WATCH” to identify and communicate changes in condition, “SBAR Communication Form and Progress Note” to evaluate the change in condition and prepare for communication. SBAR stands for situation, background, assessment, and recommendation and is used in many health care settings. The communication tools include checklists for “nursing home to hospital transfer” and “hospital to post-acute transfer”. These documents ensure that critical information needed by the care team is provided. The Toolkit also includes a “Medication reconciliation worksheet”. The intervention provides change of condition cards and care paths, communication guides and advance care planning tools. The program has demonstrated 24% reductions in all cause hospitalizations.^{123, 124}

2.6 Conclusion

There are several limitations to this review. First it was limited to PUBMED/MEDLINE/OVID and this may bias results by not including studies that could be identified by other search engines. Additionally, the rigor of the review was practical in addressing specific research questions. This is not an exhaustive review of the literature nor is it a systematic review. I included all types of literature resulting from the search strategy and removed items not applicable or that were purely opinion or that I judged to be biased.

That said this review yielded a range of articles and journals, resulting in 6 core themes, and included 4 well known studies. In addition to the existing well-established interventions to improve transitions in care and reduce avoidable readmissions, this review included emerging models identified in the literature review that had mixed results such as pharmacist and emergency medical technician assisted transitions of care, a translated CTI at the Mayo Clinic Care Transitions program, and a model for older adults called SWIFT. A recent example of innovations that have demonstrated promising results are some of the recent Accountable Care Organization models that are delivering target results and exploring the mechanisms that are leading to lower readmissions with shorter lead time.

2.6.1 Emerging Models

Recent studies in Medicare participants that discharge from Accountable Care Organization (ACO) vs. non-ACO affiliated hospitals to nursing facilities found relative reductions in readmissions between 14.1 to 17.4%. This effect was stronger within the first 3-days of discharge with relative reductions between 14.3-19.1%. The authors concluded that ACO affiliated partners experienced greater reductions in readmissions and reduced readmission rates faster than non-ACO affiliated partners.¹²⁵ Another recent study found lower relative admission rates, readmission rates, death rates, per discharge SNF spending and lower SNF length of stay for Medicare patients across ACO participating hospitals and SNFs.¹²⁶ Ongoing

research to understand the mechanisms that improve outcomes across ACO providers is an important direction for future research and evaluation.

2.6.2 Common Themes & Best Practices Across Interventions

The best practices across interventions include: the use of teach back method to educate patients and caregivers;¹²⁷ following best-practice guidelines for discharge planning and participant centered discharge plans;^{128, 129} patient goal setting;¹³⁰ coordination of post-discharge care and services, complete and timely discharge summaries and confirmation of PCP receipt.¹³¹ Studies have also found that including the family caregiver increases completion of interventions to reduce avoidable readmissions.¹³²

2.6.3 Future Directions

Given increased life expectancy, aging population trends, prevalence of chronic disease burden, health care reform needs and caregiver capacity constraints, efforts to improve transitions of care and increase participant and caregiver engagement and ability to self-manage in order to prevent avoidable hospitalizations and avoidable readmissions appears well-placed.¹³³

The literature reflects a need to standardize criteria that defines avoidable readmissions and to continue efforts to develop and improve readmission prediction models so that complex interventions that are more resource intensive can be directed to the populations that would most benefit.¹³⁴

The need to develop and improve readmission risk prediction models was a theme from this literature review. Additional efforts improve ability to effectively target populations at highest risk of readmission before discharge has the potential to lead to better outcomes and cost savings by delivering resource intensive evidence-based interventions to the population that would most benefit.¹³⁵

While there is considerable interest in health information exchange recent studies have not yet found significant impact to readmission reduction efforts.¹³⁶ A systematic review concluded that while there is promise for the future at present there is not sufficient integration of health information exchange into readmission initiatives to achieve a significant impact.¹³⁷

3.0 Methods

This dissertation includes 3 distinct manuscripts. One paper is a literature review which comprises the background section. The remaining two papers are presented within the results section. The first is an evaluation of the Western Pennsylvania Community-based Care Transitions Program. The second is a Cost Effectiveness Analysis of the Western Pennsylvania Community-based Care Transitions Program. The current methods section therefore, represents a summary of the evaluation and cost effectiveness papers as an integrated methods section with the limitation that I did not duplicate the figures and tables out of consideration to length. Integrated discussion and conclusions sections are presented as well.

3.1 Design

A retrospective cohort observational design was used for the program evaluation. The evaluation was mixed methods using both survey data and program intervention data.

3.2 Research Aims

The research aims for the mixed methods evaluation were to: 1) identify characteristics of who participated in the program, 2) explore how who participated may have affected the outcomes, and 3) determine if the intervention increased patient activation and self-management.

The research aims for the cost effectiveness evaluation were to: 1) identify if the Care Transitions Intervention was more cost effective than standard care, 2) identify the incremental cost savings of a readmission avoided.

3.3 Participants

Participants were Medicare fee-for-service beneficiaries admitted to one of the six partnering acute care hospitals between February 1, 2012 and December 1, 2016 and met one or more of the following inclusion criteria: a high readmission risk diagnosis such as chronic obstructive pulmonary disease, acute myocardial infarction, chronic heart failure, diabetes, pneumonia, total hip or total knee replacement, multiple (>2) medications, readmission history, psychosocial risk, or a case management referral. Participants were deemed ineligible if they had an active substance abuse, serious mental illness, or were deemed “un-coachable” for cognitive or psychosocial reasons. The Centers for Medicare and Medicaid Services (CMS) also had a billing rule that they could not be billed more than once in 180-days therefore this was included in the exclusion criteria. Additionally, participants had to be residing at home in the community or have a short term stay at skilled nursing facility on the journey home. Nursing facility residents were not eligible for the intervention. The inclusion criteria were obtained from prior effectiveness and efficacy studies demonstrating intervention success with this population. Due to the catchment areas of the six partnering hospitals, participants were assumed to be residing within the geographically contiguous 129 zip-codes served by the six acute care hospitals.

The community-based organization and demonstration project lead applicant was the Southwest Pennsylvania Area Agency on Aging in Charleroi, PA. Partnering Hospitals included the Monongahela Valley Hospital, the Washington Hospital, Canonsburg Hospital, and Excelsa Health System Frick, Latrobe,

and Westmoreland hospitals. Hospital profiles reflective of the time of the program are included in Table 2.

3.4 Procedures

3.4.1 Intervention Description

The Care Transitions Intervention includes a hospital visit, a home visit and three follow-up phone calls. The intervention transitions with the participant from hospital to home with a focus on increasing patient activation in 4 areas of (1) medication review and reconciliation, (2) physician follow-up, (3) recognizing red flags and knowing what follow-up action should be taken in response and (4) communication between providers aided by the use of a personal health record. The Transitions Coach offers the intervention at the hospital and continues the coaching role with the goal of skills transfer throughout the steps of the intervention.

3.4.2 Data Sources

While WPA CCTP was awarded in February 2012, implemented in May 2012 and completed January 2017, the evaluation examined data from the last 2-years of the demonstration project since this is the time that data was reliably and consistently collected within the Medisoft's Harmony for Care Transitions HIPAA HITECH compliant cloud-based information system. During the first two-years of the program, data was collected within spreadsheets on shared drives with secure access across sites. This process resulted in occasional version control issues and accidental deletions and as a result was at risk of unknown missing data and therefore not used for the purposes of evaluation.

3.4.3 Data Collection Methods

Data were collected by care transitions coaches who entered required data into a HIPAA compliant cloud- based information system using tablet computers. Data collection began at the hospital at the time that participants chose to participate upon being offered the program as one of their Medicare benefits. Care Transitions Coaches continued to enter all required program data throughout the 30-day intervention. Data collection consisted of WPA CCTP program information and survey data.

The community had license agreements with Insignia for the use of the Patient Activation Measure and completed trainings with Insignia Health and used their software application. Additionally, all coaches were employed by the Area Agency on Aging and were trained and received certificates of completion as Transitions Coaches by the Coleman Care Transitions team.

WPA CCTP Program information included participant name, Medicare ID, date of birth, gender, hospital admission date, program acceptance date, hospital discharge date, home visit date, phone call 1 date, phone call 2 date, phone call 3 date, readmission date, intervention status, intervention status reason code. Data entry at each stage of the intervention is documented in the process and data flow in the appendix to the evaluation.

Surveys were conducted at the home visit and at the last interaction with the participant thereby allowing a pre-test and a post-test. Surveys included the Care Transitions Measure-3, a three item instrument that measures participant readiness for discharge; the HCAHPS-5, a five item instrument that measured participant readiness for discharge at the hospital, the Patient Activation Assessment, a 10 item instrument to measure the level of activation of the patient at the beginning and the end of the intervention; and finally, the Patient Activation and Self-Management survey, a 13 item assessment to measure activation and self-management at the beginning and end of the intervention. The Care Transitions Measure and the Hospital Consumer Assessment of Healthcare Providers and Services were pre-test only whereas the Patient

Activation Assessment and Patient Activation and Self-Management assessments were used at pre-test and post-test. Tables 3-6 include details on the questions and response options for all assessments.

3.5 Analysis

3.5.1 Program Evaluation Analysis

One-way analysis of variance was used to test equivalence of mean age as a continuous variable across hospitals. Pearson's Chi-Square test for dichotomous variables was used to test equivalence of gender across hospitals. Similarly, X^2 was used to test categorical variables of HCAHPS levels, dose and completion reason. ANOVA was used to test equivalence of means across hospitals for PAA at 4-levels, CTM-3, PAA pre-post and PAM pre-post. Additionally, to explore potential selection bias, comparisons were made on baseline characteristics of age and gender and a comparison by dose group. Multiple linear regression analysis was used to explore the size and significance of contributions to outcome activation by baseline and dose.

3.5.2 Cost Effectiveness Analysis

This study compares standard care with providing an evidence-based care transitions service at discharge for a Medicare population in Southwestern Pennsylvania. Patients assessed to be at high risk of readmissions were offered a care transitions intervention.

Assumptions include a readmission rate among Care Transitions Intervention served participants of 13.05% and the readmission rate among those that did not receive the intervention (standard care) is 21.20%. Willingness to pay was based on the average cost of a readmission was of \$13,800 based on

HCUPS estimate for the time of the study.¹⁹⁶ Finally, we assume the cost of the Care Transitions Intervention is \$320 based on cost to implement based on geography and program design

A description of the variables and distributions are provided in tables. All assumptions were based on actual performance within the WPA CCTP program.

4.0 Results

4.1 Program Evaluation Results

Demographic data collection was limited to age and gender. Among participants that chose to participate in CCTP, the mean age of participants was 74.5 years and 56 percent were female. Characteristics of age and gender did not meaningfully differ by hospital.

Based on HCAHPS survey data, 62.16% indicated yes to “during this hospital stay, were you given any medicine that you had not taken before.” 7% indicated usually to “before giving you any new medicine how often did hospital staff tell you what the medicine was for”. Another 44.19% indicated always. Among participants that received new medicine, 4.98% indicated usually to “how often did hospital staff describe side effects in a way you could understand”. Another 15.23% indicated always. When asked “During this hospital stay, did doctors, nurses, or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?”, 86.2% indicated yes. And finally, in response to “During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?”, 81.45% indicated yes. Response trends varied by hospital and the distinctions were statistically significant at $p < .001$.

Based on survey data from the care transitions measure, 56.73% of participants indicated they agree that “hospital staff took my preferences and those of my family or caregiver into account in deciding what my health care needs would be when I left the hospital”. Another 36.12% indicated they strongly agree. 57.36% of respondents indicated that “when I left the hospital, I had a good understanding of the things I was responsible for in managing my health”. Another 37.72% indicated that they strongly agree. 50.54% of respondents indicated that “When I left the hospital, I clearly understood the purpose for taking each of

my medications.” Another 42.36% indicated that they strongly agree. Mean differences between hospitals were statistically significant at $p < .001$.

Continued participation rates were not the same across hospitals among participants that chose to participate in CCTP and completed the survey. All participants accepted at the hospital and had a hospital coaching visit. A high rate, between 94-99% of participants, engaged in a home visit whereas phone call participation declined over time. Additionally, some hospitals had much lower rates of continued participation in follow-up phone calls and experienced different readmission rates. Notably, hospitals 2 and 3 had lower rates of phone call follow-up for all 3 phone calls.

Participant completion rates were between 79% at a large rural hospital to 100% at a small rural hospital. The primary reasons for non-completion from highest to lowest selected responses were readmission during the intervention at 3.9% or 17 readmissions at the large rural hospital, 8 unable to reach, 4 refusals (3 participants and 1 caregiver). 194 records were missing a reason code.

Multiple linear regression was used to explore the extent to which baseline differences in patient activation (PAA) and patient activation and self-management (PAM) influenced change in outcome PAA and PAM while accounting for differences by hospital, age, gender and dose. Regression weights suggest that a one unit increase in baseline activation will cause a .358- unit increase in outcome activation. Age and gender did not have a significant influence on PAA outcomes, $F(8,1738) = 92.24$, $p < .0001$, adjusted $R^2 = .2948$. Similarly, PAM regression weights suggest that a one unit increase in baseline PAM will cause a .7-unit increase in outcome activation. Age and gender did not have a significant influence on PAM outcomes, $F(8,1733) = 169.90$, $p < .0001$, adjusted $R^2 = .4370$

We identified significant differences in baseline PAA and PAM between both low dose and high dose groups based on t-tests. PAA, $p < .001$; PAM, $p < .014$. Differences in age and gender were not significant. Regression models were used for additional insight on the impact of baseline activation and dose of intervention to outcome PAA and outcome PAM.

Subsequent multiple regression models were used to explore the outcome of PAA and PAM baseline, hospital, age, gender and dose. A single unit of dose was counted for each encounter post discharge including home visit and up to 3 follow-up phone calls since all participants receive the hospital visit when they accepted the program. Results suggests that baseline PAA, baseline PAM and dose of intervention have a significant influence on PAA and PAM outcomes. PAA: $F(9,1737)=88.82$, $p<.0001$, adjusted $R^2=.3116$. Specifically, one unit increase in PAA1 estimates a .352 unit increase in PAA2. Similarly, one additional intervention encounter such as a home visit or follow-up phone call is expected to increase PAA outcomes (intervention competency) by .243. Age and gender did not contribute significantly to outcomes on intervention competency (PAA2).

The same approach was used to explore the outcome of patient activation and self-management based on PAM baseline, hospital, age, gender and dose. A single unit of dose was counted for each encounter post discharge including home visit and up to 3 follow-up phone calls since all participants receive the hospital visit when they were offered the program. The second multiple regression model suggests that baseline PAM and dose have a significant influence on PAM outcome $F(9,1732)=157.62$, $p<.0001$, adjusted $R^2=.4474$. Specifically, one unit increase in PAM1 estimates a .691 unit increase in PAM2. Similarly, one additional intervention encounter such as a home visit or follow-up phone call is expected to increase PAM outcome score by 1.873. Age was significant such that a one-year increase in age is associated with a reduction of .058 in PAM2. Gender did not contribute significantly to PAM2.

4.2 Cost Effectiveness Analysis Results

A cost effectiveness analysis was conducted based on the assumption of 21.20% baseline readmission rates, 13.05% CCTP served readmission rates and intervention costs of \$320 per participant

served with the Care Transitions Intervention. The perspective on the cost effectiveness is from the payor perspective.

The cost effectiveness acceptability curve illustrates uncertainty around the estimate and suggests the probability that the intervention will be cost effective. Specifically, the acceptability curve illustrates that under conditions where willingness to pay to avoid a hospitalization is $\geq \$6,500$, then 100% of the model iterations favor the intervention. A two-way sensitivity analysis models the absolute CTI related reduction in readmission rate on the y-axis and intervention cost on the x-axis. Given a willingness to pay of \$13,800 (the average cost of a readmission), The sensitivity analysis suggests that the Care Transitions Intervention is favored over standard care as long as the CTI-related decrease in absolute readmission is $\geq 5\%$ and the cost of the intervention remains less than \$600

4.3 Evaluation of the Western Pennsylvania Community-based Care Transitions Program

4.3.1 Introduction

Transitional care has been the subject of significant attention including research, policy, and quality improvement for the past twenty years. In 2005, the Institute of Medicine identified Transitional Care as one of the top three areas of improvement.¹³⁸ Transitional care consists of the efforts needed to ensure coordination and continuity of health care as patients transfer between care settings or between levels of care within the same setting.¹³⁹

A prior Medicare demonstration evaluation that focused on care coordination concluded that programs without strong transitional care components are unlikely to improve quality and yield savings.¹⁴⁰ Examples of subsequent models tested by Medicare include patient centered medical homes, payment

models to support care coordination within primary care, policy that reinforces the centrality of primary care as the first point of care with responsibility for continuity and coordination of care over time and settings and recently, Community-based Care Transitions demonstration projects.^{141, 142}

A study of a statewide transitional care program in North Carolina demonstrated that individuals receiving transitional care were 20% less likely to experience a readmission.¹⁴¹ The rate of 30-day readmissions is widely used as quality measure to assess process and short-term outcomes of acute care. Hospitalizations account for a third of United States health care costs.¹⁴³ There is a large body of evidence demonstrating practices and interventions that are effective at reducing preventable hospitalizations and readmissions. Interventions with highest effect size consistently used strategies that assessed and supported the patient's unique context and capacity for self-care.¹⁴⁴

Patient activation and self-management refers to participants believing that their role is important, having knowledge about their conditions, confidence in their ability to communicate and collaborate with healthcare providers as needed and taking action to manage their care.¹⁴⁵ Patients that are engaged and active in their care experience better health outcomes and cost savings.^{146, 147, 148} A recent systematic review and meta-analysis examined 42 randomized control trials of interventions found to reduce or prevent 30-day readmissions using a model that examines intervention effectiveness by increasing patient capacity to carry out burdensome self-care.¹⁴⁹

Section 3026 of the Patient Protection and Affordable Care Act included goals to reduce avoidable readmissions through structural interventions like changing payment models to progressively more value-based models. The act also included patient and caregiver interventions to improve quality, access to care and reduce avoidable readmissions.¹⁵⁰

4.3.2 Background

4.3.2.1 Community-based Care Transitions Demonstration Project & QIO 9-10th SOW

The Community-based Care Transitions Program was awarded in February of 2012 and began implementation in May 2012 as a Centers for Medicare & Medicaid Services (CMS) demonstration project.¹⁵¹ The program was authorized by the Affordable Care Act with the goals of reducing avoidable readmissions, improving transitions in care and demonstrating savings to Medicare. The Western Pennsylvania Community-based Care Transitions Program (WPA CCTP) was one of 101 nationally awarded communities.^{152, 153}

The community had prior experience partnering with acute care hospitals as part of the Quality Insights Organization (QIO) 9th Scope of Work under contract with CMS. This project was a 2-year pilot including two community-based organizations in partnership with 4 of what would become 6 acute care hospitals under the subsequent CCTP program award. In this pilot effort the partners implemented the Care Transitions Intervention and demonstrated reductions in 30-day readmissions.¹⁵⁴ The success of this work led to QIOs 10th Scope of Work in which QIOs supported the formation of CCTP communities and also supported the communities with reports, statistical analysis and quality improvement support during the CCTP implementation.¹⁵⁵

4.3.3 Methods

4.3.3.1 Evaluation Scope, Design and Setting

WPA CCTP partners include the SWPA Area Agency on Aging as the lead applicant and community-based organization in partnership with 6 acute care hospitals in Washington, Fayette, Greene, Latrobe, and Westmoreland counties. The acute care hospital partners include Monongahela Valley Hospital, Allegheny Health Network Canonsburg Hospital, The Washington Hospital and Excelsa Health

System's Frick, Latrobe, and Westmoreland Hospitals.¹⁵⁶ The QIO conducted an analysis of discharges within the community to ensure 80% power to detect a 2% reduction in 30-day readmissions.¹⁵⁷

The WPA CCTP community conducted root cause analysis as part of program planning and development and identified 3 primary drivers of 30-day readmissions. Community leaders then selected an intervention strategy best suited to the communities' unique needs. The root causes identified included low patient activation and self-management, lack of standard and known processes, and inadequate transfer of information between care settings. The partners reviewed a range of evidence-based programs and practices and selected the Care Transitions Intervention which is an evidence based coaching model developed by Eric Coleman. The Care Transitions Intervention focuses on empowering patients to self-manage in four primary areas of focus: (1) medication self-management, (2) patient centered health record, (3) follow-up care and (4) recognizing signs that a health condition may be worsening.

The Western Pennsylvania Community-based Care Transitions leadership team sought an outcomes and cost effectiveness evaluation. Approximately mid-way through the implementation while serving a target 3,500 Medicare patients annually, the leadership team was seeking to determine if the desired outcomes of increased participant activation and self-management and reducing avoidable readmissions were being achieved. To this end the community scoped a mixed methods evaluation in partnership with the University of Pittsburgh Graduate School of Public Health.

The selected mixed methods evaluation design is a retrospective cohort study using survey and intervention data. The 3 aims of the evaluation are to: 1) identify characteristics of who participated in the program 2) understand how variation in who participated affected the outcome, and 3) determine if dose of the intervention influenced the outcome. A logic model for the program is included within the appendix to the evaluation.

The CCTP first annual report which examined preliminary progress among the first 14 communities including WPA CCTP did not find significant results. The final evaluation reported that the WPA CCTP

community achieved a program to date readmission rate among CCTP served of 13.05% compared to the Medicare fee-for-service baseline community all-cause readmission rate of 21.20%. This evaluation however did not examine changes in patient activation or patient activation and self-management. Therefore, the current evaluation seeks to evaluate impact on activation and to conduct a cost effectiveness evaluation.

A cost effectiveness evaluation will examine the overall cost effectiveness of the care transitions intervention relative to standard care. The cost effectiveness evaluation questions are: (1) what is the incremental cost effectiveness of a readmission avoided, (2) is the intervention cost effective, (3) within what range of intervention cost does the program continue to be cost effective.

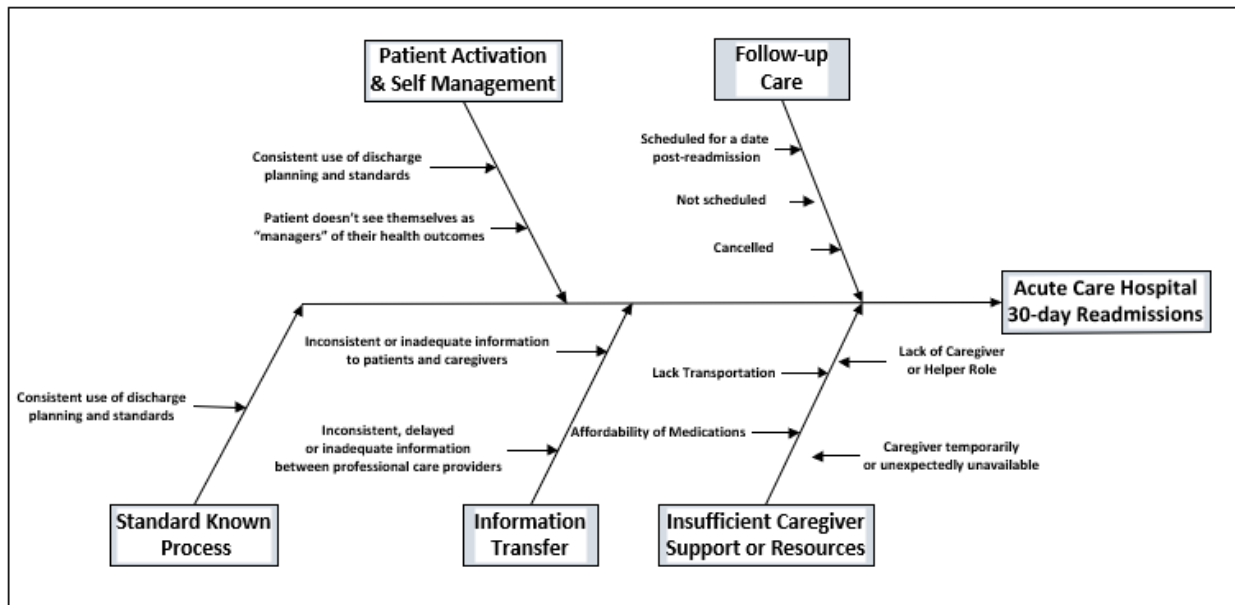


Figure 3: Root Cause Analysis

The CMS project officer was consulted and approved the evaluation on the basis that, as a quality improvement project in ordinary operations, this initiative was not classified as research on human subjects and therefore CMS did not seek review by an institutional review board. The University of Pittsburgh Institutional Review board reviewed the design and exempted the evaluation with the similar conclusions.

4.3.3.2 Participants & Community Partners

The community served approximately 3,500 Medicare fee-for-service beneficiaries annually from May 2012 through January 2017. The program targeted patients at high risk of readmission using exclusion and inclusion criteria as noted in Figure 4. The target population resides within the geographically contiguous catchment area of the 6 acute care hospitals and the Area Agency on Aging and includes 129 zip codes within a primarily rural area. Hospital profiles are included

in Table 2.

Inclusion Criteria (any 1 or >)	Exclusion Criteria (any 1 or >)
High Risk Diagnosis COPD, AMI, CHF, DIABETIS, PNEU, TH/N Multiple Medications (>2) Readmission History Psychosocial Risk Case Management Referral	Substance Abuse Serious Mental Illness Uncoachable Served within past 180-days

Figure 4: Participant Inclusion and Exclusion Criteria

Table 2: Hospital Profiles

Hospital 1	Hospital 2	Hospital 3	Hospital 4	Hospital 5	Hospital 6
Canonsburg, PA	Mt. Pleasant, PA	Latrobe, PA	Greensburg, PA	Monongahela, PA	Washington, PA
Type of Facility: Short Term Acute Care	Type of Facility: Short Term Acute Care	Type of Facility: Short Term Acute Care	Type of Facility: Short Term Acute Care	Type of Facility: Short Term Acute Care	Type of Facility: Short Term Acute Care
Total Staffed Beds: 104	Total Staffed Beds: 102	Total Staffed Beds: 128	Total Staffed Beds: 359	Total Staffed Beds: 183	Total Staffed Beds: 243
Total Discharges: 3,818	Total Discharges: 3,530	Total Discharges: 8,337	Total Discharges: 20,755	Total Discharges: 7,753	Total Discharges: 12,949
Total Inpatient Days: 19,234	Total Inpatient Days: 15,558	Total Inpatient Days: 33,039	Total Inpatient Days: 99,331	Total Inpatient Days: 47,447	Total Inpatient Days: 66,131

4.3.3.3 Program and Intervention Description

The program’s primary objective was to improve the quality of transitions of care and decrease avoidable readmissions using an evidence-based intervention. The community selected the Care Transitions Intervention based on root cause analysis and a review of related evidence-based interventions. Secondly the community-based organization transition coaches were knowledgeable on available community and social supports and provided information and counseling with assistance to help patients and caregivers to access these services. Patient or caregiver need of community and social supports was determined based on informal questions and discussion during CCTP program encounters. The community-based organization was not the direct provider of these services merely a source of information and referral given their core mission as an Area Agency on Aging.

The Care Transitions Intervention includes a hospital visit, a home visit and three follow-up phone calls. The intervention transitions with the participant from hospital to home with a focus on increasing patient activation in 4 evidence-based areas of (1) medication review and reconciliation, (2) physician follow-up, (3) recognizing red flags and knowing what follow-up action should be taken in response and (4) communication between providers through the use of a personal health record.¹⁵⁶

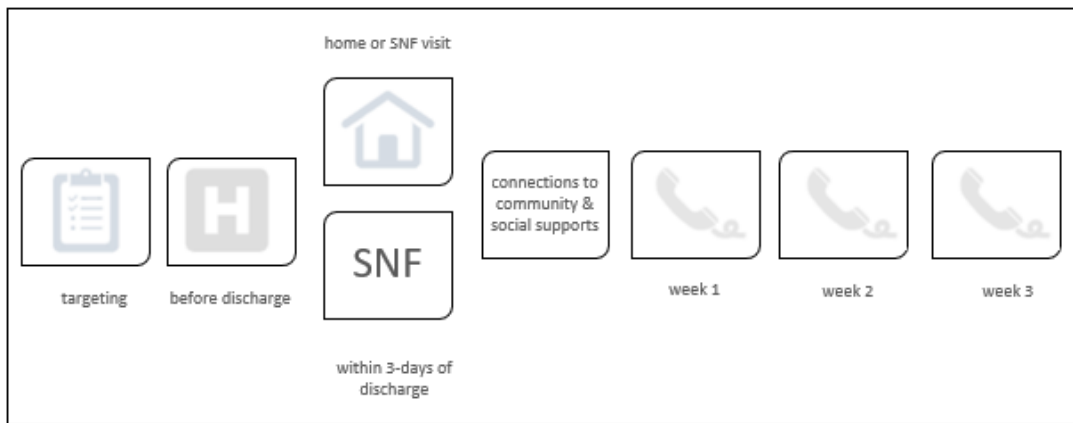


Figure 5: Intervention Activities

The intervention is based on 4 pillars which are the conceptual areas with corresponding activities. These include: (1) assistance with medication self-management by reviewing medications, reconciling with pre-discharge and discharge medication lists, ensuring a system is in place and used for managing medications; (2) the use of a personal health record that is used and maintained by the participant and shared across care-settings to remind the participant of goals, questions for the doctor, medications, and to generally support in transferring information across providers; (3) arranging for and preparing for timely follow-up with primary care physicians and specialists; and (4) noting red flags or signs and symptoms that a condition may be worsening and what action to take as a result.¹⁵⁷

The intervention is conducted over a 30-day period with the 1st visit at the hospital at least 24-hours prior to discharge, a home or SNF visit within 24-72 hours of hospital discharge, and 3 follow-up

phone calls. The first call occurs within 2 days of the first home visit. The second call occurs approximately 7 days after the first call and the third and final coach call occurs approximately 14 later.

The timing of the calls is a general guideline and should truly take place when it is most meaningful to the patient. For example, a well-timed call could be the day before a doctor’s appointment to confirm transportation and coach the patient to bring their PHR, medication list and questions to the appointment. The coach empowers the participant with tools and support to promote improved knowledge and self-management of their condition. The Care Transitions Intervention has demonstrated success in reducing readmission rates at 30, 60, and 90-days post discharge.¹⁵⁷

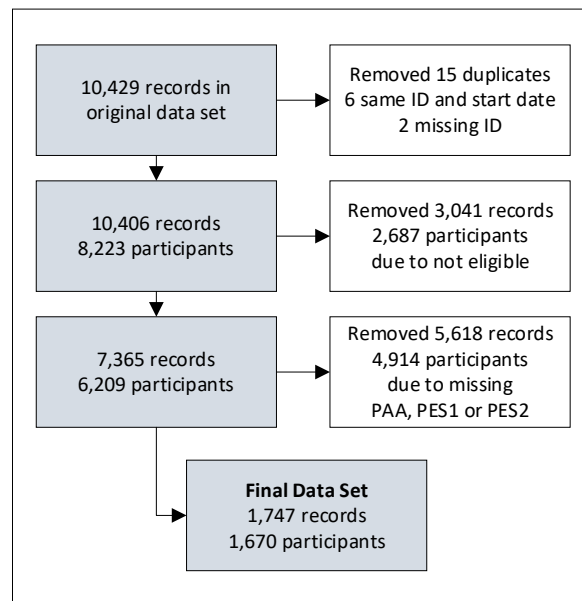


Figure 6: Patient Flow

4.3.3.4 Data Collection

Data Sources

While WPA CCTP operated was awarded in February 2012, implemented in May 2012 and completed January 2017, the evaluation examined data from the last 2-years of the demonstration project since this is the time that data was reliably and consistently collected within the Mediware’s Harmony for

Care Transitions HIPAA HITECH compliant cloud-based information system. During the first two-years of the program, data was collected within spreadsheets on shared drives with secure access across sites. This process resulted in occasional version control issues and accidental deletions and as a result was at risk of unknown missing data.

Data Collection Methods

Data was collected by care transitions coaches who entered required data into a HIPAA compliant cloud-based information system using tablet computers. Data collection began at the hospital when participants chose to participate when offered the program as one of their Medicare benefits. Care Transitions Coaches continued to enter all required program data throughout the 30-day intervention. Data collection consisted of WPA CCTP program information and survey data.

WPA CCTP Program information included participant name, Medicare ID, date of birth, gender, hospital admission date, program acceptance date, hospital discharge date, home visit date, phone call 1 date, phone call 2 date, phone call 3 date, readmission date, intervention status, intervention status reason code. Data entry at each stage of the intervention is documented in the process and data flow in the appendix to the evaluation.

Surveys were conducted at the home visit and at the last interaction with the participant thereby allowing a pre-test and a post-test. Surveys included the Care Transitions Measure-3, a three item instrument that measures participant readiness for discharge; the HCAHPS-5, a five item instrument that measured participant readiness for discharge at the hospital, the Patient Activation Assessment, a 10 item instrument to measure the level of activation of the patient at the beginning and the end of the intervention; and finally, the Patient Activation and Self-Management survey, a 13-item assessment to measure activation and self-management at the beginning and end of the intervention.

4.3.3.5 Survey Instruments

Care Transitions Measure

The Care Transitions Measure was developed as a measure of patient perspective on readiness for hospital discharge.¹⁵⁸ Response options are on a 5 item Likert scale with choices of: strongly disagree, disagree, agree, strongly agree, don't know/don't remember/not applicable.

Table 3: Care Transitions Measure 3-Items

	Care Transitions Measure Question
Q1	The hospital staff took my preferences and those of my family or caregiver into account in deciding what my health care needs would be when I left the hospital.
Q2	When I left the hospital, I had a good understanding of the things I was responsible for in managing my health.
Q3	When I left the hospital, I clearly understood the purpose for taking each of my medications.

Hospital Consumer Assessment of Healthcare Providers and Services (HCAHPS)

The HCAHPS survey is a standardized instrument implemented in 2006 to measure patient's experience of hospital provided care. The survey is a standardized and implemented nationally to allow for comparable data across hospitals, incentivize continuous improvement in quality of care and enhance accountability through transparent results available to the public. The survey includes 27 items, 18 of which substantively assess communication with doctors and nurses, responsiveness of staff, cleanliness and noise-level, pain management, medication communication, discharge information, hospital rating and recommendation.¹⁵⁹ The CCTP program included the following 5 items from the HCAHPS which related to the patient's readiness for transition.¹⁶⁰

Table 4: Patient Experience Survey 1 HCAHPS Questions

Subset of HCAHPS Questions Included in CCTP Patient Experience Survey Pre-Test	
Q1	During this hospital stay, were you given any medicine that you had not taken before: Yes, No If No, skip to Q4.
Q2	Before giving you any new medicine, how often did hospital staff tell you what the medicine was for? Would you say never, sometimes, usually, or always?
Q3	Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand? Would you say never, sometimes, usually, or always?
Q4	During this hospital stay, did doctors, nurses, or other hospital staff talk with you about whether you would have the help you needed when you left the hospital? Yes, No.
Q5	During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital? Yes, No.

Patient Activation Assessment

The Patient Activation Assessment (PAA) was developed by Eric Coleman to provide Care Transitions Coaches with a means to track progress in skill transfer to intervention participants. The assessment was conducted initially at the home visit as a baseline assessment and then at the end of the intervention. The PAA aligned with the four pillars of the intervention, specifically, medication management, red flags, medical care follow-up and use of a personal health record.¹⁶¹

Table 5: Patient Activation Assessment

Patient Activation Assessment	
P1	<p>Medication Management</p> <ul style="list-style-type: none"> a. Demonstrates effective and reliable method of medication management b. For each medication, the patient understands the purpose, when and how to take and possible side effects c. Demonstrates ability to accurately update medication list d. Agrees to share medication list with PCP and/or specialist
P2	<p>Red Flags</p> <ul style="list-style-type: none"> a. Demonstrates understanding of red flags, or warning signs that condition may be worsening b. Can articulate how to respond to red flags
P3	<p>Medical Care Follow-up</p> <ul style="list-style-type: none"> a. Can schedule and attend a follow-up appointment(s) b. Writes a list of questions for PCP and/or specialist and brings to appointment
P4	<p>Personal Health Record</p> <ul style="list-style-type: none"> a. Understands the purpose of the PHR and the importance of updating the PHR b. Agrees to ring PHR to every health care encounter

Patient Activation Measure

The Patient Activation Measure was developed by Dr. Judith Hibbard to assess knowledge skills and confidence to actively self-manage their health. This measure provides important insights so that health

care providers can allocate resources most effectively, tailor support to specific levels of activation and measure impact. Response options are on a 5 item Likert scale with choices of: strongly disagree, disagree, agree, strongly agree, or not applicable.¹⁶²

Table 6: Patient Activation Measure

	Patient Activation Measure
Q1	When all is said and done, I am the person who is responsible for taking care of my health.
Q2	Taking an active role in my own health care is the most important thing that affects my health.
Q3	I am confident I can help prevent or reduce problems associated with my health.
Q4	I know what each of my prescribed medications do.
Q5	I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.
Q6	I am confident that I can tell a doctor concerns I have even when he or she does not ask.
Q7	I am confident that I can follow through on medical treatments I may need to do at home.
Q8	I understand my health problems and what causes them.
Q9	I know what treatments are available for my health problems.
Q10	I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising.
Q11	I know how to prevent problems with my health.
Q12	I am confident that I can figure out solutions when new problems arise with my health.
Q13	I am confident that I can maintain lifestyle changes, like eating right and exercising, even during times of stress.

4.3.3.6 Study Variables

Independent variables were hospitals and patient characteristics which include gender, age, intervention dose, baseline CTM-3 and HCAHPS scores. Gender and age were treated as constants given the brief intervention period. The primary dependent variables were patient activation (intervention

competency) as measured by PAA and patient activation and self-management as measured by Patient Activation Measure. Both were continuous data.

Dose effect was analyzed to determine what influence more intervention completion had on the outcomes of 30-day readmission or change in patient action (PAA) or patient activation and self-management (PAM). While all participants had a hospital visit, participation in a home visit and three follow-up phone calls varied by participants. The home visit is the “biggest dose” of intervention with the follow-up phone calls as opportunities to reinforce, practice and further support engagement and skill transfer. It seems feasible that five coaching sessions would increase activation and reduce avoidable readmissions to a greater degree than fewer sessions would.

Table 7: Study Variables

DV/IV	Variable Name	Data Type	Levels
DV	PAM Score	Continuous	0-100
DV	PAA Score	Continuous	0-10
IV	Hospital	Categorical	H1, H2, H3, H4, H5, H6
IV	Dose	Categorical	1-5
IV	Age	Continuous	0-100
IV	Gender	Categorical	Female, Male
IV	CTM-3 Questions	Continuous	1-100
IV	HCAHPS Questions	Categorical	Never/Sometimes Usually/Always
IV	PAA Questions	Categorical	1-10
IV	PAM Questions	Categorical	1-13

4.3.4 Analysis

One-way analysis of variance was used to test equivalence of mean age as a continuous variable across hospitals. Pearson's Chi-Square test for dichotomous variables was used to test equivalence of gender across hospitals. Similarly, X^2 was used to test categorical variables of HCAHPS levels, dose and completion reason. ANOVA was used to test equivalence of means across hospitals for PAA at 4-levels, CTM-3, PAA pre-post and PAM pre-post. Additionally, to explore potential selection bias, comparisons were made on baseline characteristics of age and gender and a comparison by dose group. Regression was used to explore the size and significance of contributions to outcome activation by baseline and dose.

Multiple linear regression tests were used first to explore impact of baseline on outcome activation as measured by the Patient Activation Assessment (PAA) which assessed competency in the intervention and Patient Activation and Self-Management (PAM). Age and Gender were included in these models to assess impact of these baseline characteristics as well. A second set of multiple linear regression models were used for PAA and PAM to include dose of intervention. Since all participants receive the hospital visit, 1 unit of dose is counted for each encounter post discharge including home visit and up to 3 follow-up phone calls. Stata 16.1 was used for all analysis.

4.3.5 Results

4.3.5.1 Patient Characteristics

Demographic data collection was limited to age and gender. Among participants that chose to participate in CCTP, the mean age of participants was 74.5 years and 56 percent were female. characteristics of age and gender did not meaningfully differ by hospital.

Aim 1: Identify characteristics of who participated in the program.

Table 8: Patient Characteristics by Hospital

Patient Characteristics	H1 (CH)	H2 (FH)	H3 (LH)	H4 (WH)	H5 (MVH)	H6 (TWH)	Total	p-value
	N=124	N=81	N=261	N=296	N=438	N=547	N=1,747	
Mean Age (SD)	75.0 (11.5)	74.9 (12.8)	73.8 (12.1)	74.9 (10.5)	74.9 (12.7)	74.1 (11.4)	74.5 (11.77)	0.7144
Female (n) (%)	73 (58.9%)	46 (56.8%)	136 (52.1%)	163 (55.1%)	268 (61.2%)	297 (54.3%)	983 (56.27%)	0.184

Note: χ^2 test, * indicates statistically significant at alpha <.05

Among participants that chose to participate in CCTP, the mean age of participants was 74.5 years and 56.27% were female. Characteristics of age and gender did not significantly differ by hospital.

Table 9: Patient Responses on HCAHPS

HCAHPS	Hospital 1 (CH)	Hospital 2 (FH)	Hospital 3 (LH)	Hospital 4 (WH)	Hospital 5 (MVH)	Hospital 6 (TWH)	p-value
	N=124	N=81	N=261	N=296	N=438	N=547	
Q1: New Meds Yes n (%)	78 (62.9%)	49 (60.5%)	158 (60.5%)	189 (63.9%)	267 (61.0%)	345 (63.1%)	0.042*
Q2 Med Purpose Never/Sometimes	6 (4.8%)	15 (18.5%)	36 (13.8%)	28 (9.5%)	38 (8.7%)	43 (7.9%)	0.001*
Usually/Always	72 (47.8%)	33(40.7%)	114 (42.6%)	157 (53.1%)	228 (52%)	296 (54.1%)	0.001*
Missing	46 (37.1%)	33 (40.7%)	111 (42.5%)	111 (37.5%)	172 (39.3%)	208 (38.0%)	0.001*
Q3 FA03 Explained possible side- effects Never/Sometimes	50 (40.4%)	33 (40.8%)	128 (41.8%)	99 (33.4%)	183 (41.8%)	239 (43.7%)	0.001*
Usually/Always	27 (21.8%)	14 (17.3%)	44 (16.9%)	85 (28.7%)	83 (18.9%)	100 (18.3%)	0.001*
Missing	47 (37.9%)	34 (42.0%)	108 (41.4%)	112 (37.8%)	172 (39.3%)	208 (38.0%)	0.001*
Q4 FA04 Yes Have Support Needed n%	98 (79.0%)	61 (75.3%)	222 (85.1%)	266 (89.9%)	396 (90.4%)	463 (84.6%)	0.001*
Q5 FA05 Red Flags	89 (71.8%)	60 (74.1%)	206 (78.9%)	248 (83.8%)	416 (95.0%)	404 (73.9%)	0.001*

Note: X^2 test, * indicates statistically significant at alpha <.05. Patient perspective differed across

hospitals on the 5 HCAHPS questions.

Based on HCAHPS survey data, 63% indicated yes, they were given new medicine that they had not taken before. Approximately 51% or slightly more than half indicated usually/always that hospital staff told them what the medicine was for, 9.5% indicated never/sometimes and 39% did not respond. Among participants that received new medicine, 40.81% indicated never/sometimes to “how often did hospital staff describe side effects in a way you could understand”, 20.21% indicated usually/always and 39% did not respond. When asked “During this hospital stay, did doctors, nurses, or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?” 86.2% indicated yes. And finally, in response to “During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?” 81.45% indicated yes. Response trends varied by hospital and the differences between hospitals were statistically significant at $p < .001$.

While many patients indicated that they had the help they needed at home and received information on signs and symptoms to watch out for before discharge, it seems important to note that 63% received new medication and only about half indicated that they understood what the medicine was for, and over 40% indicated that side-effects were not explained to them before discharge.

Table 10: Analysis of Patient Responses on CTM-3

CTM-3	H1 (CH)	H2 (FH)	H3 (LH)	H4 (WH)	H5 (MVH)	H6 (TWH)	P-value
	N=124	N=81	N=261	N=296	N=438	N=547	
0-100 score	78.5 (16.2)	70.0 (15.7)	77.5 (17.6)	78.5 (15.8)	79.1 (16.1)	77.9 (16.6)	0.001*
missing	1	1	1	1	1	3	

Note: ANOVA test for total score and subscales of PAA.

Mean responses were not the same across hospitals on CTM questions among participants that chose to participate in CCTP and completed the survey. While differences are statistically significant the absolute differences are small and likely not meaningful.

Table 11: Intervention Dose

Intervention	H1 (CH)	H2 (FH)	H3 (LH)	H4 (WH)	H5 (MVH)	H6 (TWH)	p-value
Total Dose							
# Accepted at Hospital Visit	N=124	N=81	N=261	N=296	N=438	N=547	
# Home Visit	123 (99.2%)	78 (96.3%)	247 (94.6%)	288 (97.3%)	431 (98.4%)	535 (97.8%)	0.034*
# Phone Call 1	113 (91.1%)	58 (71.6%)	180 (69.0%)	260 (87.8%)	381 (87.0%)	495 (90.5%)	0.001*
# Phone Call 2	85 (68.6%)	30 (37.0%)	111 (42.5%)	169 (57.1%)	262 (59.8%)	372 (68.0%)	0.001*
# Phone Call 3	34 (27.4%)	10 (12.4%)	31 (11.9%)	78 (26.4%)	75 (17.1%)	163 (29.8%)	0.000*

Note: χ^2 test, * indicates statistically significant at $\alpha < .05$

Continued participation rates were not the same across hospitals among participants that chose to participate in CCTP and completed the survey. All participants that accepted the program when offered the opportunity as a benefit at the hospital had a hospital coaching visit. A high rate, between 94-99% of participants, engaged in a home visit whereas phone call participation declined over time. Additionally, some hospitals had much lower rates of continued participation in follow-up phone calls and experienced different readmission rates. Notably, hospitals 2 and 3 had lower rates of phone call follow-up for all 3 phone calls.

Table 12: Intervention Dose by Group (High vs. Low)

Dose Comparison	H1 (CH)	H2 (FH)	H3 (LH)	H4 (WH)	H5 (MVH)	H6 (TWH)	p-value
	N=124	N=81	N=261	N=296	N=438	N=547	
Low Dose HV+PC1	39(31.5%)	52(64.2%)	153(58.6%)	129(43.6%)	182(41.6%)	180(32.9%)	0.000*
High Dose HV+PC2/P3	85(68.6%)	29(35.8%)	108(41.4%)	167(56.4%)	256(58.5%)	367(67.1%)	0.000*

Note: χ^2 test, * indicates statistically significant at alpha <.05

Participant dose was compared by hospital while grouping participants into high vs. low groups such that high consists of a home visit and 2-3 follow-up phone calls whereas low dose consists of a home visit and 1 follow-up phone call. This resulted in 42% of participants in low dose and 58% of participants in high dose. Group means varied significantly across hospitals with $p < .001$.

Table 13: Intervention Completion Status by Reason

Status & Reason Codes	Hospital 1 (CH)	Hospital 2 (FH)	Hospital 3 (LH)	Hospital 4 (WH)	Hospital 5 (MVH)	Hospital 6 (TWH)	p-value
	N=124	N=81	N=261	N=296	N=438	N=547	
Missing	17 (13.7%)	0 (0.0%)	7 (2.7%)	5 (1.7%)	75 (17.1%)	90 (16.5%)	0.000*
Partial-CG Refused	0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.000*
Partial-PT Refused	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (0.6%)	0.000*
Partial-Readmit	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	17 (3.9%)	3 (0.6%)	0.000*
Partial-UTR	0 (0.0%)	0 (0.0%)	4 (1.5%)	2 (0.7%)	0 (0.0%)	2 (0.4%)	0.000*
Successful Complete	107 (86.3%)	81 (100%)	249 (95.4%)	288 (97.3%)	346 (79.0%)	449 (82.1%)	0.000*

X^2 test, * indicates statistically significant at alpha <.05; Note: UTR unable to reach, CG caregiver,

PT patient;

Ideally participants would complete the full intervention which includes a hospital visit, a home visit and three follow-up phone calls. Participants were considered partially complete if they withdrew, were lost to follow-up, unable to reach or readmitted and aged out of the intervention based on the 30-day duration. Participant completion rates were between 79% at a large rural hospital to 100% at a small rural hospital. The primary reasons for non-completion from highest to lowest selected responses were readmission during the intervention at 3.9% or 17 readmissions at the large rural hospital, 8 unable to reach, 4 refusals (3 participants and 1 caregiver). 194 records did not indicate a reason. The intervention and data entry process flow are noted in the appendix and all care transitions coaches were trained to this process.

4.3.5.2 Patient Activation Assessment & Dose Effect

Aim 2: How did who participated affect the outcome?

Table 14: Patient Activation Assessment Pre-Test by Hospital

PAA Pre-Test	Hospital 1 (CH)	Hospital 2 (FH)	Hospital 3 (LH)	Hospital 4 (WH)	Hospital 5 (MVH)	Hospital 6 (TWH)	P-Value
	N=124	N=81	N=261	N=296	N=438	N=547	
Medication Management	2.1 (1.5)	2.3 (1.8)	2.8 (1.5)	2.4 (1.7)	2.7 (1.3)	2.3 (1.5)	0.001*
PHR	1.8 (0.5)	1.6 (0.8)	1.6 (0.8)	1.1 (1.0)	1.7 (0.6)	1.7 (0.6)	0.001*
Medical Care Follow-up	0.6 (0.7)	1.1 (0.8)	1.3 (0.8)	0.7 (0.8)	0.6 (0.8)	0.6 (0.7)	0.001*
Red Flags	0.5 (0.8)	0.6 (0.9)	0.9 (0.9)	0.3 (0.6)	0.2 (0.6)	0.5 (0.8)	0.001*
Total Score	5.0 (2.2)	5.5 (3.3)	6.6 (3.2)	4.4 (2.7)	5.3 (2.1)	5.2 (2.4)	0.001*

Note: ANOVA test for total score and subscales of PAA. Patient activation assessment pre-test scores differed significantly across hospitals, $F(5,1741) = 21.06, p < .0001$.

Table 15: Patient Activation Assessment Post-Test by Hospital

PAA Post-Test	Hospital 1 (CH)	Hospital 2 (FH)	Hospital 3 (LH)	Hospital 4 (WH)	Hospital 5 (MVH)	Hospital 6 (TWH)	P-Value
n (%)	N=124	N=81	N=261	N=296	N=438	N=547	
Medication Management	3.5 (0.8)	3.4 (0.7)	3.6 (0.8)	3.5 (0.8)	3.8 (0.5)	3.5 (1.0)	0.001*
PHR	2.0 (0.2)	2.0 (0.2)	2.0 (0.3)	2.0 (0.2)	2.0 (0.3)	2.0 (0.2)	0.794
Medical Care Follow-up	1.5 (0.5)	1.5 (0.6)	1.6 (0.5)	1.6 (0.6)	1.7 (0.5)	1.4 (0.6)	0.001*
Red Flags	1.5 (0.7)	1.3 (0.6)	1.4 (0.6)	1.5 (0.6)	1.7 (0.5)	1.5 (0.7)	0.001*
Total Score	8.5 (1.8)	8.1 (1.8)	8.5 (1.7)	8.5 (1.8)	9.2 (1.4)	8.4 (2.0)	0.001*

Note: ANOVA test for total score and subscales of PAA.

Patient activation assessment post-test scores differed significantly across hospitals, $F(5,1741)=12.61, p<.0001$.

Multiple linear regression was used to explore the extent to which baseline differences in patient activation influenced change in patient activation outcomes while accounting for differences by hospital, age and gender. Baseline PAA scores significantly increased outcome PAA scores. Regression weights suggest that a one unit increase in baseline activation will cause a .358- unit increase in outcome activation. Age and gender did not have a significant influence on PAA outcomes, $F(8,1738) =92.24, p<.0001$, adjusted $R^2 = .2948$.

Table 16: Baseline PAA on Outcome PAA given Hospital, Age and Gender

Variance Explained				
	R	R Square	Adjusted R Square	Std. Error of the Estimate
	0.545893763	0.2980	0.2948	1.5056

ANOVA Results					
	SS	DF	MS	F	p
Regression	1672.80798	8	209.100997	92.24	<0.0001*
Residual	3939.76901	1738	2.266841		
Total	5612.57699	1746	3.214534		

Regression Coefficients					
Independent Variable	b	Std. Error	95% CI		p
Intercept	6.489483	0.2709056	5.9581480	7.0208180	<0.001*
PAA1 (pre-test)	0.357997	0.0141567	0.3302309	0.385763	<0.001*
Hospital 1 (ref)					
Hospital 2	-0.5279713	0.2152345	-0.9501171	-0.1058254	0.014*
Hospital 3	-0.4975707	0.1658951	-0.8229457	-0.1721956	0.003*
Hospital 4	0.2205108	0.1612957	-0.0958433	0.5368648	0.172
Hospital 5	0.5939481	0.1532242	0.2934250	0.8944712	<0.001*
Hospital 6	-0.1545185	0.1498338	-0.4483920	0.1393550	0.303
Age	0.0021367	0.0031086	-0.0039602	0.0082336	0.492
Female	0.0759893	0.0735363	-0.0682396	0.2202183	0.302

Aim 2: How did who participated affect the outcome?

Table 17: Patient Activation Measure (PAM) Pre-Test by Hospital

PAM Pre-Test	Hospital 1 (CH)	Hospital 2 (FH)	Hospital 3 (LH)	Hospital 4 (WH)	Hospital 5 (MVH)	Hospital 6 (TWH)	P-Value
n (%)	N=124	N=81	N=261	N=296	N=438	N=547	
Total Score	65.4 (16.0)	62.3 (12.0)	67.0 (13.4)	68.0 (14.8)	69.3 (17.3)	66.6 (17.0)	0.003*
# More active patients	91 (73.4%)	61 (75.3%)	220 (84.3%)	257 (86.8%)	369 (84.3%)	414 (75.7%)	0.001*
missing	0	0	1	0	2	1	

Note: ANOVA test for total score and X^2 for more active (3rd & 4th quartiles) as category of PAM.

Patient activation measure pre-test scores differed significantly across hospitals, $F(5,1741)=3.70$, $p=.0025$.

Table 18: Patient Activation Measure (PAM) Post-Test by Hospital

PAM Post-Test	Hospital 1 (CH)	Hospital 2 (FH)	Hospital 3 (LH)	Hospital 4 (WH)	Hospital 5 (MVH)	Hospital 6 (TWH)	P-Value
	N=124	N=81	N=261	N=296	N=438	N=547	
Total Score	70.8 (18.1)	63.6 (12.8)	70.3 (14.1)	75.4 (16.6)	73.7 (18.6)	71.1 (18.2)	<0.001*
# More active patients	100 (80.7%)	68 (84.0%)	235 (90.0%)	278 (94.0%)	393 (89.7%)	452 (82.6%)	<0.001*
missing	0	0	0	0	1	0	

Note: ANOVA test for total score and X^2 for more active (3rd & 4th quartiles) as category of PAM.

Patient activation measure post-test scores differed significantly across hospitals, $F(5,1741)=7.95$, $p<.0001$.

Multiple linear regression was used to explore the extent to which baseline PAM influenced outcome PAM while accounting for differences by hospital, age and gender. Analysis confirmed that baseline PAM scores significantly increased outcome PAM scores. Regression weights suggest that a one unit increase in baseline PAM will cause a .7-unit increase in outcome activation. Age and gender did not have a significant influence on PAM outcomes, $F(8,1733) = 169.90$, $p < .0001$, adjusted $R^2 = .4370$.

Aim 3: Did the dose of intervention affect participant outcomes?

Table 19: Summary of Age, Female and PAM Baseline by Dose Group

	High Dose n=1012	Low Dose N=735	p-value
Age (M,SD)	74.5	74.5 (11.75)	0.9108 t-test
Female (n,%)	565 (55.83%)	418 (56.87%)	0.665 χ^2
PAM Baseline (M,SD)	68.35 (17.22)	65.87(14.14)	<0.014* t-test

The table above indicates significant differences in baseline PAM between both low dose and high dose groups based on t-tests. PAM, $p < .014$. Differences in age and gender were not significant. Regression models were used for additional insight on the impact of baseline activation and dose of intervention to outcome activation.

An additional multiple regression was used to explore the outcome of patient activation and self-management based on PAM baseline, hospital, age, gender and dose. A single unit of dose was counted for each encounter post discharge including home visit and up to 3 follow-up phone calls since all participants receive the hospital visit when they were offered the program. The second multiple regression model suggests that baseline PAM and dose have a significant influence on PAM outcome $F(9,1732) = 157.62$, $p < .0001$, adjusted $R^2 = .4474$. Specifically, one unit increase in PAM1 estimates a .691 unit increase in PAM2. Similarly, one additional intervention encounter such as a home visit or follow-up phone call is

expected to increase PAM outcome score by 1.873. Age was significant such that a one-year increase in age is associated with a reduction of .058 in PAM2. Gender did not contribute significantly to PAM2.

Table 20: Baseline PAM on Outcome PAM given Hospital, Age and Gender

Variance Explained				
	R	R Square	Adjusted R Square	Std. Error of the Estimate
	0.663023378	0.4396	0.4370	13.063

ANOVA Results					
	SS	DF	MS	F	p
Regression	231919.422	8	28989.927700	169.9	<0.001*
Residual	295707.702	1733	170.633412		
Total	527627.124	1741	303.059807		

Regression Coefficients					
Independent Variable	b	Std. Error	95% CI		p
Intercept	28.779550	2.718022	23.448600	34.110500	<0.001*
PAM1 (pre-test)	0.701544	0.019672	0.662961	0.740126	<0.001*
Hospital 1 (ref)					
Hospital 2	-0.5087949	1.867250	-8.750249	-1.425650	0.006*
Hospital 3	-0.6091170	1.142682	-4.407593	1.189358	0.260
Hospital 4	2.7428470	1.398470	-0.000020	5.485713	0.050
Hospital 5	0.0845025	1.332199	-2.528385	2.697390	0.949
Hospital 6	-0.5220073	1.300125	-3.071986	2.027971	0.688
Age	-0.0567328	0.026937	-0.109565	-0.003900	0.035*
Female	0.7064456	0.638964	-0.546776	1.959667	0.269

Table 21: Baseline PAM on Outcome PAM given Hospital, Age, Gender & Dose

Variance Explained					
	R	R Square	Adjusted R Square	Std. Error of the Estimate	
	0.6710	0.4503	0.4474	12.941	
ANOVA Results					
	SS	DF	MS	F	p
Regression	237573.09300	9	26397.010400	157.62	<0.0001
Residual	290054.03100	1732	167.467685		
Total	527627.12400	1741	303.059807		
Regression Coefficients					
Independent Variable	b	Std. Err.	95% CI		p
Intercept	24.12223	2.809463	18.611940	29.632530	<0.001
PAM1 (pre-test)	0.6910466	0.0195717	0.652660	0.729433	<0.001
Hospital 1 (ref)					
Hospital 2	-3.8264250	1.862545	-7.479499	-0.173350	0.040
Hospital 3	-0.3318612	1.430516	-3.137582	2.473859	0.817
Hospital 4	3.085874	1.386694	0.366103	5.805645	0.026
Hospital 5	0.5694297	1.32242	-2.024278	3.163137	0.667
Hospital 6	-0.5064788	1.28801	-3.032698	2.019741	0.694
Age	-0.057562	0.0266864	-0.109903	-0.005221	0.031
Female	0.7800059	0.6331354	-0.461784	2.021796	0.218
Dose	1.873211	0.322394	1.240889	2.505534	<0.001

4.3.6 Discussion

Overall, participation was strong across sites. As described in a site summary in a previous evaluation, this was a community with well formed partnerships, standardized and integrated business process, well defined roles and responsibilities. There were differences at baseline as evidenced by significant variation in Care Transitions Measure (CTM) mean scores, Hospital Consumer Assessment of Health (HCAHPS) scores before the intervention. That said there was also a clear interaction effect with

dose and significant increases in two unique scales of patient activation and patient activation and self-management.

While this evaluation was not able to examine impact on 30-day readmission rates due to limitations in the data collection, a national CCTP final evaluation did examine site specific and overall program impact for 101 communities nationally. The Community-based Care Transitions Program was the focus of two prior national evaluations meaning including all 101 communities. The first in year one which was considered the first annual report and the final in 2017 after the demonstration project completed. WPA CCTP was “site 10” in these evaluations meaning the 10th community to be awarded funding in a competitive national process. In the first 5 months of operations, the WPA CCTP (CBO 010) demonstrated a very modest -1.0% difference in differences readmissions according to the First Annual Report by Mathematica.¹⁶³

WPA CCTP was among the 44 that were extended based on enrollment and readmission reduction performance. WPA CCTP was also among the 26 with the most favorable results. The final evaluation noted that among the WPA CCTP participants 30-day readmissions rates were 12.51% lower than matched comparisons ($p < 0.10$) and overall Medicare Part A and B expense were \$2,016,601 lower than matched comparisons ($p < 0.10$).¹⁶⁴ The national evaluation concluded that there was not sufficient evidence among the 101 communities combined to attribute significant reductions beyond national trends

We acknowledge that recent studies have raised concern regarding the predictive ability of the Care Transitions Measure regarding hospital readmission.^{165, 166, 167, 168} This does not impact the current evaluation as we used the CTM as a measure of patient perspective on readiness for discharge and was not used to evaluate the extent to which it predicted readmissions.

Hibbard et al. developed the Patient Activation and Self-Management measure based upon findings demonstrating that patients who are more engaged and better able to self-manage in the areas of: symptoms and health issues, health maintenance activities, treatment and diagnostic decisions, provider selection

based on performance and quality ratings, and navigating the health care system, also tend to have better health outcomes.¹⁶⁹

Baseline levels of patient activation and self-management significantly differed by hospital at $p < .001$. However irrespective of baseline differences in PAA and PAM, hospital, age and gender, gains in patient activation and self-management were significantly increased by dose of the care transitions intervention, $p < .001$. The Patient Activation Assessment demonstrated a trend of increases in patient activation after controlling for differences by hospital in baseline activation levels, and participants demonstrated higher levels of competency in the important areas of medication management, follow-up care, use of a personal health record and awareness of signs and systems that their condition may be worsening and what action to take as a result.

4.3.7 Conclusion

The evaluation was limited due to the scope of data collection conducted by the community-based organization and program lead. The evaluation would have yielded additional insights if we had the foresight to request and collect additional demographic, clinical and claims data. A lesson learned is the conventional wisdom to begin with evaluation in mind at the planning stage of the program. In hindsight Quality Insights Organization was obtaining and analyzing data that we could have secured access to. Including evaluation and dissemination preparation into readiness and implementation plans is a key insight for similar partnerships in the future.

None the less, the intervention was impactful with significant gains in patient activation and patient activation and self-management based on both baseline activation and dose of the Care Transitions Intervention. The findings of the current evaluation make a meaningful contribution to the literature. No doubt the background and experience working together in past scopes of work contributed to the maturity of the community and the depth of partnership. Some of the partners had the opportunity to work together

in a quality improvement initiative with the QIO 9th Scope of work, QIO 10th Scope of Work, and the Community-based Care Transitions Program. Some of the CCTP communities went on to participant in later Accountable Care Communities.^{170, 171, 172} Each of these initiatives have contributed to progressive partnerships between community-based organizations and organized health care delivery systems to assess and compliment the delivery of services that address social risk factors and needs along with traditional health care needs and services.¹⁷³ The 9th scope of work tested innovative models of community based organization and acute care hospital and skilled nursing facility partnerships in improving transitions of care, the 10th scope of work supported formation of 101 such communities nationally and provided structural support and early partnerships opportunities between these entities. CCTP as authorized by the Affordable Care Act carried out a broadscale demonstration project to reduce readmissions and improve outcomes for Medicare beneficiaries by leveraging transitional care interventions as an enhancement to standard care coordination.

Subsequent payment models and demonstration projects will continue to advance more value-based payment structures and efforts to assess social determinants of health, social and health care partnerships and efforts to reduce avoidable readmissions and continuously improve quality, outcomes and costs of care.

4.4 Cost Effectiveness Analysis of the Western Pennsylvania Community-based Care Transitions Program

4.4.1 Introduction

Hospital readmissions continue to be an important measure of quality of care internationally and within United States health care reform efforts. It is estimated that 1 in 5 Medicare patients have a

readmission within 30-days of discharge from an acute care hospitalization.¹⁷⁵ This analysis suggested that 30-day readmissions for Medicare patients alone resulted in \$44 billion dollars of direct health care costs. While the estimates of avoidable readmissions range from 4-79% the average rate of avoidable readmissions in a systematic review was found to be 27%.¹⁷⁶

The Community-based Care Transitions Program began implementation in May 2012 as a Centers for Medicare & Medicaid Services (CMS) demonstration project.¹⁷⁸ The program is part of the Affordable Care Act with the goals of reducing avoidable readmissions, improving transitions in care and demonstrating savings to Medicare. The Western Pennsylvania Community-based Care Transitions Program (WPA CCTP) is one of 102 nationally awarded communities.

4.4.2 Background

WPA CCTP partners include the SWPA Area Agency on Aging as the lead applicant and community-based organization in partnership with 6 acute care hospitals in Washington, Fayette, Greene and Westmoreland counties. The acute care hospital partners include Monongahela Valley Hospital, Allegheny Health Network Canonsburg Hospital, The Washington Hospital and Excelsa Health System's Frick, Latrobe, and Westmoreland Hospitals.

As a result of root cause analysis, this community identified 3 primary drivers of 30-day readmissions and selected an intervention strategy best suited to the communities' unique needs. The root causes identified included low patient activation and self-management, lack of standard and known processes, and inadequate transfer of information between care settings. The partners selected the Care Transitions Intervention which is an evidence based coaching model developed by Eric Coleman to empower patients to self-manage in four primary areas of focus: (1) medication self-management, (2) patient centered health record, (3) follow-up care and (4) recognizing signs that a health condition may be

worsening.¹⁷⁹ In the final year of program operations, the Western Pennsylvania Community-based Care Transitions leadership team sought an outcomes and cost effectiveness evaluation.

4.4.3 Program and Intervention Description

The Care Transitions Intervention demonstrated both efficacy and effectiveness in engaging older adults and their caregivers to actively engage with a health coach, establish a health-related goal, use a personal health record, engage in medication review, follow-up with physicians and recognize signs that suggest a condition is worsening and how to respond.^{175, 176} The goal of the CTI is to improve the quality of transitions in care by supporting individuals and their caregivers to take a more active role in their transition from hospital to home. A Care Transitions Coach can be a clinical or a non-clinical role such as a social worker, community health worker or trained peer coach. The coach helps participants to have the knowledge, skills, and confidence to achieve their health-related goals.¹⁸⁵

The intervention begins in the hospital and the duration is 30-days post discharge. The intervention engages the participant and caregiver with a personal health record and a hospital visit, home visit and 3 follow-up phone calls within 30-days post discharge. The intervention is also tested on populations whose transition from hospital to home includes rehabilitative care at a short-term skilled nursing facility. In these settings the participant receives a weekly visit by the transitional coach at the SNF to monitor status, prepare for discharge and to arrange for the post-discharge home visit.¹⁸¹

The personal health record is an opportunity for the participant to document their health-related goals and a tool for communication across providers. It also provokes the participant and caregiver to complete a pre- and post-hospitalization medication review knowing the purpose and schedule of medications and having a system in place to effectively manage their medications. The PHR lists the participant's primary and specialist physicians, documents their follow-up visits post discharge, provides a

space for participants to note questions for the doctor and the PHR notes “red flags” which are signs and symptoms for the participant to recognize that a condition is worsening and how to respond.

The intervention consists of a hospital visit, a home visit within 1-3 days of discharge and 3 follow-up phone calls. During the home visit the care transitions coach engages the participant and caregiver to complete a medication review and document the list in the PHR. They will then note any questions and schedule any follow-up care to occur within 2 weeks of hospital discharge. The coaches’ role is support, coaching and knowledge transfer. The coaches’ role is to ensure that the participant and caregiver are in the “driver’s seat”. The assumption is that the coach is temporary and that the participant and caregiver have an important active role in the coordination of care.¹⁷⁹

The CTI has demonstrated significant reductions in 30, 60 and 90-day readmissions. Additional benefits of the intervention are overall low cost to implement, participant and caregiver engagement, increased follow-up care and the opportunity to identify medication discrepancies early.¹⁷⁹

4.4.4 Methods

This study compares standard care with providing an evidence-based care transitions service at discharge for a Medicare population in Southwestern Pennsylvania. Patients assessed to be at high risk of readmissions were offered a care transitions intervention as a Medicare benefit.

Assumptions include the mean readmission rate among WPA CCTP participants of 13.05% and the mean all-cause readmission rate across all discharges at 21.20%.¹⁸¹ Willingness to pay was based on the assumption that the average cost of a readmission was \$13,800 given an HCUPS estimate for the time of the study.¹⁹⁵ Finally, we assume the cost of the Care Transitions Intervention is \$320.

A description of the variables is provided in Table 24 and distributions used in Table 25. All assumptions were based on estimated cost per intervention and readmission rates reported in the national evaluation report specific to the WPA CCTP community.¹⁸¹

Table 22: Cost Effectiveness Analysis Variables

Name	Root Definition	Description
cCTI	Dist_cCTI	Cost Intervention
cSC	0	Cost Standard Care
pReadmit_CTI	pReadmit_SC-pSaved_with_CTI	Probability of Readmission with CTI
pReadmit_SC	0.2120	Probability of Readmission with SC
pSaved_with_CTI	dist_Saved	Probability of Readmission Avoided with CTI

A decision tree was used to model discharge support at the decision node with the option of the Care Transitions Intervention or No Care Transitions Intervention for standard care. Variables were defined for costs and probabilities allocating a cost of \$320 to the intervention and zero additional cost to standard care meaning no intervention. Savings were modeled using a gamma distribution and readmission probabilities using a beta distribution.

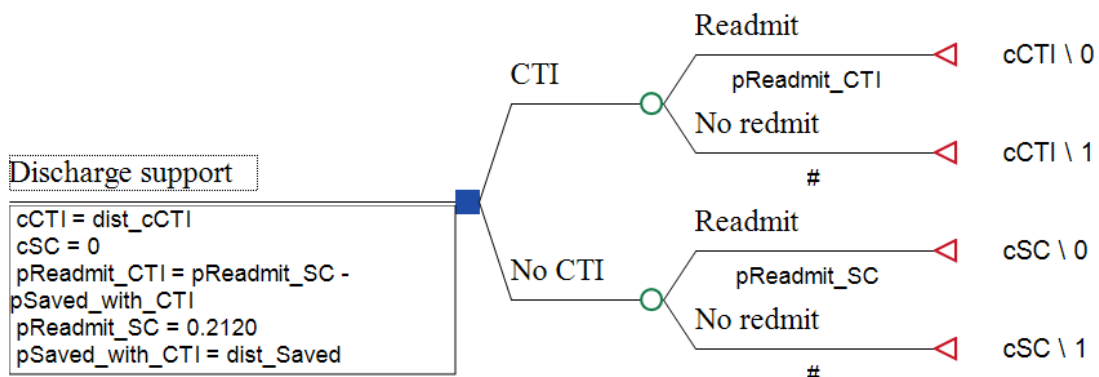


Figure 7: Decision Tree

Table 23: Model Distributions

Index	Distribution Type	Sampling Range	Distribution Name
1	Gamma	EV	dist_cCTI
2	Beta	EV	Dist_Saved

4.4.5 Analysis

Analysis was conducted using TreeAge Pro Healthcare 2020 software. Sensitivity analysis was performed based on stated assumptions and distributions. Cost effectiveness rankings were performed, and the decision tree was rolled back. Figure 9 illustrates the cost effectiveness acceptability curve.

The rolled back decision tree from left to right demonstrates the expected values at each node. Payoff values and weighting are demonstrated at the terminal nodes indicated by red triangles. The Care Transition Intervention values include \$320 for incremental intervention costs, and a probability of a readmission of 13.05% or conversely, a 0.87, or 87% probability of avoiding a readmission as demonstrated in the figure. Similarly, No CTI or standard care has zero incremental cost and a probability of readmission of 21.2% or conversely a 79% probability of avoiding readmission. Table 26 depicts the incremental cost effectiveness ratio of \$3,926 per hospitalization avoided, which is less than \$13,800 as the average cost of a readmission, therefore favoring the intervention.

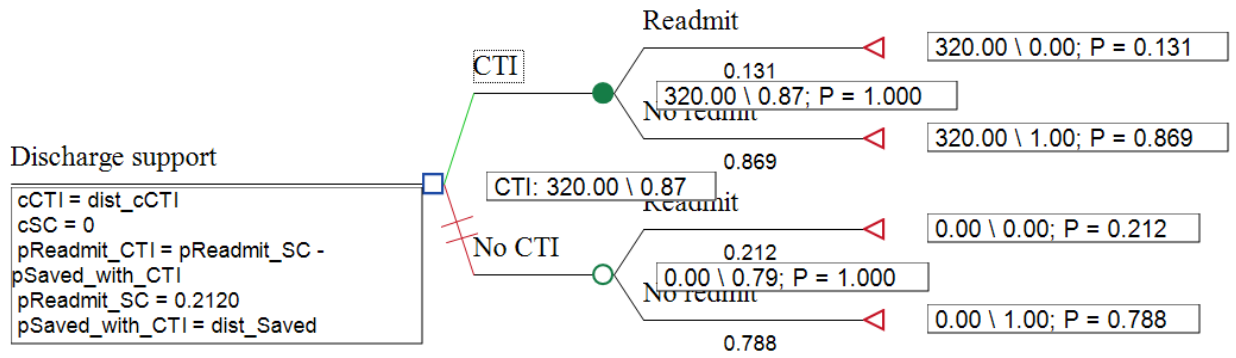


Figure 8: Rolled Back Decision Tree

Table 24: Cost Effectiveness Rankings

Strategy	Cost	Incremental Cost	Incremental Effectiveness	Incremental Effectiveness	ICER
No CTI	0		0.79		
CTI	320	320	0.87	0.08	3926

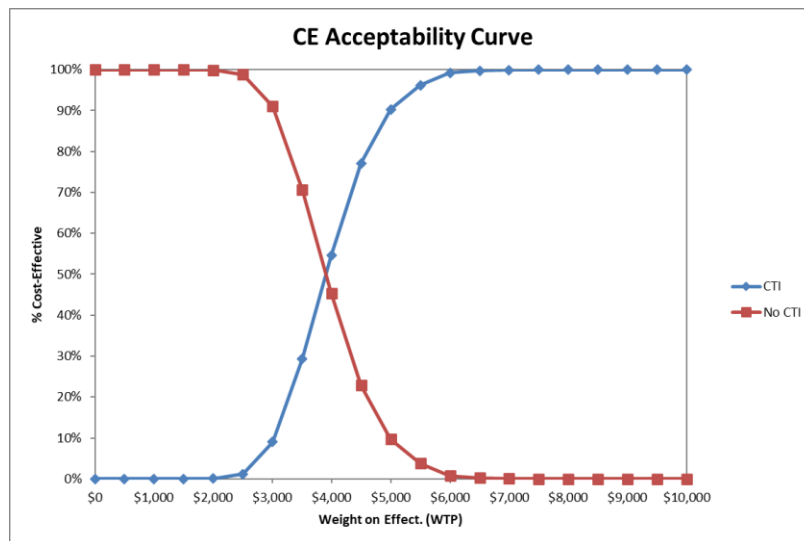


Figure 9: Cost Effectiveness Acceptability Curve

The cost effectiveness acceptability curve illustrates uncertainty around the estimate and suggests the probability that the intervention will be cost effective. If willingness to pay to avoid a hospitalization is $\geq \$6,500$, then 100% of the model iterations favor the intervention.

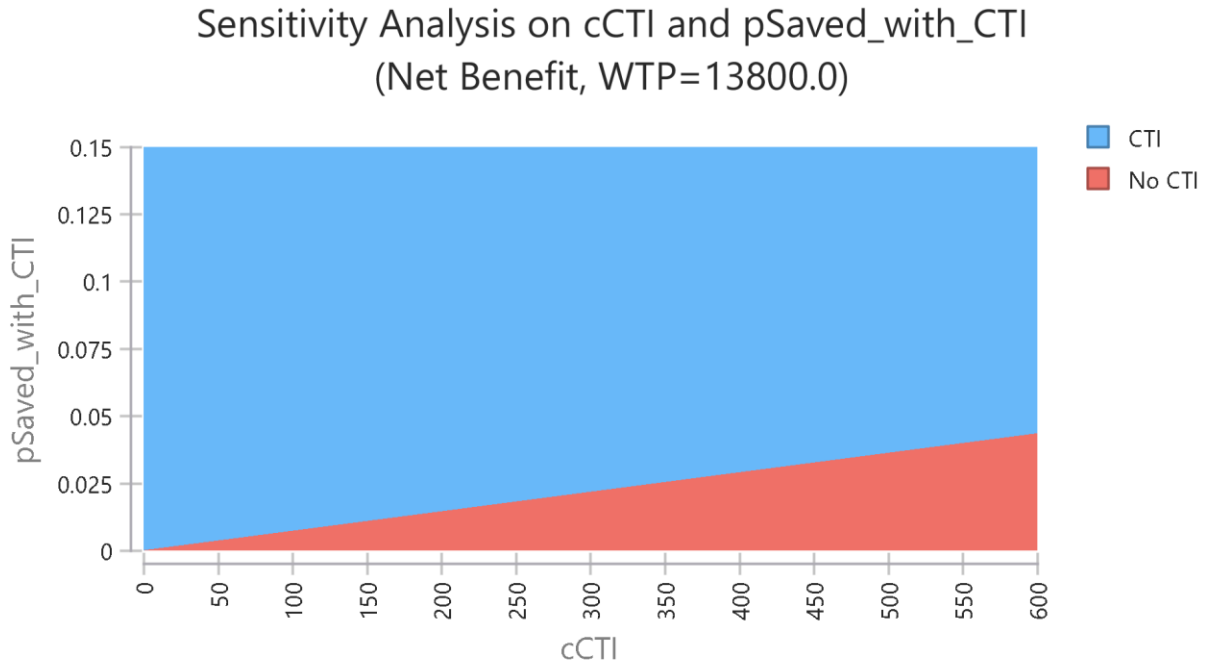


Figure 10: Sensitivity Analysis of Absolute Readmission Reduction Rate & Cost

4.4.6 Results

A cost effectiveness analysis was conducted based on the assumption of 21.20% baseline readmission rates, 13.05% CCTP served readmission rates and intervention costs of \$320 per participant served with the Care Transitions Intervention. The perspective on the cost effectiveness is from the payor perspective.

A two-way sensitivity analysis models the absolute CTI related reduction in readmission rate on the y-axis and intervention cost on the x-axis. Given a willingness to pay of \$13,800 (the average cost of a readmission), the sensitivity analysis suggests that the Care Transitions Intervention is favored over

standard care as long as the CTI-related decrease in absolute readmission is $\geq 5\%$ and the cost of the intervention remains less than \$600.

4.4.7 Discussion

We anticipate that cost effectiveness is most vulnerable to changes in readmission rates and the cost of the intervention. The incremental cost-effectiveness ratio suggests a cost savings of \$3,926 per readmission avoided. Based on readmission rate assumptions for standard care and the Care Transitions Intervention, the intervention will continue to be cost effective when costs are less than \$600 and there is at least a 5% absolute reduction in readmission rate among participants receiving the intervention. This analysis suggests that payor sponsorship of the intervention is more cost effective than standard care within this range of assumptions.

4.4.8 Conclusion

This project builds on existing research that demonstrates the effectiveness of evidence-based care transitions interventions and the importance of targeting high risk patients. The unique contribution of this analysis is to examine the incremental cost effectiveness of the intervention relative to standard care. Medicare demonstration projects make significant investments of public dollars to test new models, improve health, improve healthcare, and effectively manage costs. Cost effectiveness analysis and sensitivity analysis are useful tools inform decision makers involved in program planning, implementation, and evaluation.

5.0 Discussion

Program participation was strong across sites. One of the communities' strengths going into the evaluation was well formed partnerships, standardized and integrated business process, and well-defined roles and responsibilities. The evaluation confirmed that participants differed at baseline as evidenced by significant variation in baseline assessments Care Transitions Measure (CTM), Hospital Consumer Assessment of Health (HCAHPS), Patient Activation Assessment (intervention competency) and Patient Activation Measure.

The Community-based Care Transitions Program was the focus of two prior evaluations, the first in year one which was considered the first annual report and the final in 2017 after the demonstration project completed. WPA CCTP was "site 10" in these evaluations meaning the 10th community to be awarded funding in a competitive national process. In the first 5 months of operations, the WPA CCTP (CBO 010) demonstrated a -1.0% difference in differences readmissions according to the First Annual Report by Mathematica.¹⁶³ The community was among the 44 that were extended given strong enrollment and readmission reduction trends. The community was also among the 26 with the most favorable results. The final evaluation noted that among the WPA CCTP participants 30-day readmissions rates were 12.51% lower than matched comparisons ($p < 0.10$) and overall Medicare Part A and B expense were \$2,016,601 lower than matched comparisons ($p < .10$).¹⁸¹

We acknowledge that some recent studies have raised concern regarding the predictive ability of the Care Transitions Measure regarding hospital readmissions.^{165, 166, 167, 168} We do not believe these concerns are relevant to the current evaluation as we used the CTM as a measure of patient perspective on readiness for discharge and did not evaluate the extent to which it predicted readmissions. We found that among participants completing the CTM at hospital, 93% of patients indicated agreement that hospital staff took their preferences into account. 95% of patients indicated agreement that when they left the hospital,

they had a good understanding of the things they were responsible for in managing their health. 93% of patients indicated agreement that when they left the hospital, they clearly understood the purpose of taking each of their medications

Hibbard et al. developed the Patient Activation and Self-Management measure based upon findings demonstrating that patients who are better able to self-manage symptoms and health issues, engage in health maintenance activities, engage in treatment and diagnostic decisions, select and partner with providers based on performance and quality ratings and navigate the health care system tend to have better health outcomes.¹⁶⁹

The current evaluation focused on impact of the intervention on patient activation (intervention competency) and patient activation and self-management. Intervention dose was significantly associated with increase in PAM, $F(9,1732) = 157.62$, $p < .0001$, adjusted $R^2 = .447$ and with increase in PAA, $F(9,1337) = 88.82$, $p < .0001$, adjusted $R^2 = .315$. This amounts to a 2.5% increase in PAA and a 1.8% increase in PAM for each dose or encounter of the intervention which is both significant and makes a meaningful difference.

We anticipate that cost effectiveness is most vulnerable to changes in readmission rates and the cost of the intervention. The incremental cost-effectiveness ratio suggests an overall cost savings of \$3,926 per readmission avoided. Based on readmission rate assumptions for standard care and the Care Transitions Intervention, the intervention will continue to be cost effective as long as, costs are less than \$600 and absolute reductions in readmission risk are $\geq 5\%$ among the intervention group.

6.0 Conclusion

6.1 Evolving Role of CBOs particularly AAAs, CILS & ADRCs

The Older American's Act (OAA) was originally authorized in 1965 along with Medicare and Medicaid.¹⁸⁸ The purpose of the Older American's act is to support a wide range of social services and programs to improve the lives of all older Americans (60 years or older) by helping them to have adequate income in retirement, the best possible physical and mental health, opportunity for employment and a system of long term services and supports.¹⁸⁹ The OAA established the federal Administration on Aging as the lead agency for older adult advocacy, planning, policy development and administration of OAA activities. These activities were organized through the establishment of planning and service areas by 56 State Units on Aging, 622 local Area Agencies on Aging and 250 tribal and Native Hawaiian organizations.

In 2003, Aging and Disability Resource Centers were established as a “no wrong door” entry points to services which supported eligible participants in access to information, referral, and services. The ADRCs grew nationally from 12 in in 2013 to 525 across 53 states and territories in 2019. ADRCs partner with State Units on Aging, Centers for Independent Living, Area Agencies on Aging, state Medicaid agencies and local Veteran's Administration Offices.

Today the Older Americans Act continues to target older adults with the greatest economic and social needs with a focus on minorities, low-income, frail, and rural based individuals. The 2019 funding allocation was \$2.09 billion distributed to states and requires a modest state funding match based on the service allocation.¹⁹⁰ The most common services provided are congregate meals, home delivered meals, family caregiver support programs, adult day care, personal care, care management, transportation, ombudsman, employment, elder abuse, chronic disease self-management, Alzheimer's support programs and other services to support older adults to remain safely in their homes and communities.¹⁹¹

In 2012, the Administration on Community Living (ACL) replaced the Administration on Aging again better align aging and disability resources and services. ACL administers and supports Aging and Disability programs and networks. Aging and Disability Networks include ADRCs, Americans with Disabilities Act National Network, Area Agencies on Aging, Assistive Technology, Centers for Independent Living, Protection and Advocacy Systems, Senior Centers and Supportive Services for Older Adults, State Councils on Developmental Disabilities, State Units on Aging, University Centers for Excellence in Development Disabilities.¹⁹²

The Independent Living Network includes 56 Statewide Independent Living Councils, 403 Centers for Independent Living and 330 branch offices. The National Center for Independent Living defines Independent Living as a program, a movement, and a culture. Independent Living philosophy emphasizes self-determination and control recognizing that individuals with disabilities are the best experts of their needs, have valuable perspective and deserve equal opportunity and independence.¹⁹³

Independent Living program funding is authorized by the Rehabilitation Act of 1973. The purpose of the program is to “promote a philosophy of independent living including a philosophy of participant control, peer support, self-help, self-determination, equal access, and individual and system advocacy, in order to maximize the leadership, empowerment, independence, and productivity of individuals with disabilities, and the integration and full inclusion of individuals with disabilities into the mainstream of American society.”^{194, 195}

The Independent Living model sees disability as a social construct that contributes to purposeful physical, programmatic and attitudinal barriers for people whose physical, intellectual and mental attributes vary from social norms. It is with this philosophy and culture that Centers for Independent Living as community-based non-profit organizations are designed and operated by people with disabilities. The organizations have a strict philosophy of participant control meaning that individuals with disabilities govern and staff the organization. The Centers provide peer support, information and referral, advocacy, skills training and transition services.¹⁹⁵⁻¹⁹⁶

Independent Living focuses on principles of access to participant-directed services, choice in services and providers, appeal rights and ombudsperson protections, LTSS including personal assistance service and durable medical equipment, roles for advocates in coordination of services, and funding that adequately supports providers, gives incentives for LTSS, penalizes institutionalization and does not cut services for short term savings.¹⁹⁶

The Administration of Community Living engages independent evaluators to assess the evidence base for the impact of ACL and OAA programs. Evaluation results are publicly available for Ombudsman, Chronic Disease Self-Management programs, Adult Protective Services and nutrition programs, among others. Nutrition programs for example, demonstrated improved nutritional status, well-being, food security and lower likelihood of admission to hospital and nursing homes.^{197, 198}

With the rapid growth of MLTSS programs nationally, ACL funded an Aging and Disability Resource Institute and later an MLTSS Institute and competitively awarded Business Acumen Technical Assistance Projects to statewide partnerships of Area Agencies on Aging and Centers for Independent Living.¹⁹⁹ The goal was to prepare statewide networks of aging and disability community-based organizations to enhance the technical skills and business acumen necessary to effectively partner with managed care organizations. Advancing States formerly known as the National Association of State Units on Aging currently maintains an HCBS clearinghouse website with resources from these projects for HCBS providers ongoing use and runs an HCBS MLTSS Center with training, technical assistance and consulting services for community-based organizations.^{200, 201}

Clearly these safety net organizations are evolving with the national trends as evidenced by national participation by these organizations in the Community-based Care Transitions Program, various business acumen and technical assistance projects to advance partnerships with MLTSS and health care delivery systems, pursuit of NCQA Case Management for LTSS and participation in the more recent Accountable Care Communities demonstration project. There is much opportunity for community-based organizations to leverage historical strengths while evolving with the changing demands of today's environment.

6.2 Critical Components of Care Coordination in Current Practice

6.2.1 Person Centered Care Coordination

In the influential work, *Crossing the Quality Chasm: A New Health System for the 21st Century*, Donabedian identified 6 essential pillars to improve the quality of health care. Specifically, Donabedian on behalf of the Institute of Medicine stated that Healthcare should be safe, effective, efficient, timely, patient centered and equitable.”

Patient-centered care was defined as “providing care that is respectful of and responsive to individual patient preferences, needs and values and ensuring that patient values guide all clinical decisions.”²⁰² Twenty years later these continue to be critical aims for care coordination and quality.

Nursing facilities were the first health care environment to require person centered care as part of quality reform efforts. The law required NF residents to receive “service sufficient to attain and maintain his or her highest practicable physical, mental, and psychosocial well-being”.²⁰³ Other researchers indicate that person-centered care has become the gold-standard for domestic and international healthcare and a transition from patient centered to person centered language acknowledges a holistic and autonomous view of the person as opposed to the person as a receiver of health care services.²⁰⁴

Kogan et. al. identified that while person centered care approaches have been translated to a number of settings there is a paucity of literature to guide the field in home and community-based services. Additionally, instruments that evaluate person centeredness are limited and mostly developed and tested outside of the United States health care system which may limit generalizability. They conducted qualitative interviews of experts in the field of aging and health and confirmed the lack of a single definition and concluded that there was much variability in the interpretation of what person-centered care means in home

and community-based services and outpatient medical settings and variation in how community-based organizations that participated implemented person-centered care.²⁰⁵

Kogan et. al. in a systematic review identified six domains across the literature that seemed to best characterize person centered care. Their work informed a subsequent American Geriatric Society expert panel that was established to formally define person centered care and standardize the essential elements of a person-centered care to inform future practice. The authors noted that while person centered care had been applied in various contexts there is an increased demand in outpatient home and community-based services. The six domains identified included: holistic or person-centered care, respect and value, choice, dignity and self-determination and purposeful living.²⁰⁶

The Scan Foundation along with the American Geriatric Society and the University of Southern California collaborated to form an expert panel to establish a common definition and standards for person centered care. They conducted a literature review which included an environmental scan and consideration of gray literature and best practice. As a result, the team defined person centered care to mean individual's values and preferences are elicited and once expressed, guide all aspects of their health care, supporting their realistic health and life goals. Person centered care is achieved through a dynamic relationship among individuals, others who are important to them and all relevant providers. The collaboration informs decision making to the extent that the individual desires.²⁰⁷

Essential elements of person-centered care include:

- a. Individualized, goal-oriented care plan based on person's preferences and thorough medical, functional and social assessment which collectively informs care planning.
- b. Reassessment and review/revision of person's goals and care plan to address any change in goals or medical, functional, psychological or social functioning.
- c. Interdisciplinary team with person as integral member of the team.
- d. A lead point of contact

- e. Active coordination among all care team members
- f. Communication and information sharing
- g. Education and training for person, the care team and providers
- h. Performance measures, monitoring and continuous improvement taking into consideration person and caregiver feedback.

Section 2402(a) of the Patient Protection and Affordable Care Act includes standards for person centered care planning and self-direction in HCBS. The guidance reviews the scope of HCBS, a definition and overview of person-centered care planning, a review of the person-centered care planning process and expectations regarding the elements and implementation of the plan. The guidelines include self-directed models which include structure and process for eligible participants to become a common law employer. In this model participants have the opportunity to directly plan, budget and control their own care planning process and HCBS services. Self-directed programs may vary by state.²⁰⁸

Person centered care coordination is central to many older adult programs and often includes goals to increase access to needed services and supports while containing public and private costs. Care coordination usually includes comprehensive needs assessment, identification of service needs, access and coordination of services, engagement of informal and community supports and ongoing monitoring. The Partnership for Patients and Affordable Care Act included a number of provisions explicitly designed to promote coordinated care, including Independence at Home Demonstration Program, Community First Choice Option, Money Follows the Person Rebalancing Demonstration and Community-Based Care Transitions Program.

6.2.2 Transitional Care Coordination

Clearly there is significant opportunity to improve transitions of care as discussed throughout the preceding sections. We also reviewed a variety of evidence-based interventions that have increased the

quality of transitions in care and reduced the risk of adverse events such as unplanned hospitalizations or decline in health status. Many of these interventions reviewed included the use of a transition coach, coordinator, or navigator.

The Community-based Care Transitions Program led to the formation of 101 communities nationally that created partnerships between community-based organizations, acute care hospitals and downstream partners such as skilled nursing facilities and home health agencies. Among the group of 26 CCTP communities that demonstrated statistically significant reductions in readmissions, 73% of communities selected the Care Transitions Intervention. An evaluation report and community profiles suggested that this model was selected due to the evidence base, relevance to root causes of readmissions within their community, scalability, and cost effectiveness.²¹² One of the advantages of this model is the ability to train Care Transitions Coaches with backgrounds as nurses, advance practice nurses or social workers.

The Care Transitions Intervention engages participants and their caregivers to be active managers of their transition and their health conditions. The intervention begins at the hospital and includes a hospital visit, a home visit within 72-hours of discharge, 3-follow-up phone calls within 21-days of discharge. The intervention includes four conceptual areas of effort, specifically, medication self-management, follow-up with a primary care physician or specialist, knowledge of red-flags or signs and symptoms that a condition is worsening and what to do next and includes the use of a patient-centered health record. The intervention is focused on skill transfer and is delivered through transition coaching and the use of the patient-centered health record and completes within 30-days of discharge. Readmission rates were reduced by 27-36% at 30-days, ED visits reduced by 16%.²¹³⁻²¹⁹

6.3 Additional Opportunities for Community-based Organizations

The evaluation of The Western PA Community-based Care Transitions Program is an example of a rewarding partnership between community-based organizations, hospital, post-acute care providers and a third-party payor. Evaluation results suggest that similar partnerships would be favorable to participants, providers and payors. An ideal translation of this approach could involve integrating evidence-based transition of care interventions within participant centered-care coordination. This approach would be conducive to value-based payment structures that reward outcomes. Additionally, this approach has the potential to be aligned with participant centered practice, improve quality of care, reduce avoidable readmissions and increase participant engagement while being cost effective.

Appendix A: Literature Review Analysis Framework

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
SR & MA	Community pharmacist involvement in TOC was associated with a non-significant reduction in readmissions	N/A	N/A	Pharmacist TOC	39	Systematic Review & Meta-Analysis	Lussier ME	J Am Pharm Assoc	2020
RCT	Patients that participated in CTI had lower readmissions than controls. OR 0.61 95% CI .42-.88	MFSS Patients AMI, CHF, PULM	Rhode Island	Care Transitions Intervention	257	RCT	Voss R	Arch Intern Med	2011
RCT	access to patient portal did not increase patient activation but it did lead to increased looking up of health	426 patients	New York, Academic medical center	Inpatient portal intervention	426	RCT	Masterson	J Am Med Assoc	2019

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
	information online and was associated with lower readmission rates.								
PR	Examined cost effectiveness of MCCT program, did not find statistically different cost of care for intervention vs. matched control	363 patients at risk of readmission, 365 controls	Mayo Clinic Rochester, Minnesota	365 MCCT Participants	363	Retrospective Cohort Secondary Data	Hanson GJ	J Am Geriatr Soc	2018
PR	Patients transported home from hospital by ambulance have a higher readmission rates than those transported by other means	207 patients 162 controls	New York, tertiary-academic referral center	index discharge ambulance transport	207	Retrospective Cohort Study	Munjal KG	J Emerg Med	2020
PR	lower odds of readmission	708 patients' cardiovascular discharges	Buffalo, NY	Community Pharmacy TOC	708	Cross-Sectional	Shaver A	J Am Pharm Assoc	2019

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
PR	Continuum of Care Network with pharmacist intervention demonstrated significant reductions in readmissions	162 HF discharges from community hospital	San Diego, CA	Continuum of Care Pharma led intervention	162	Retrospective Cohort Study	Truong JT	SAGE Open Med	2015
PR	CCTP program resulted in significant reduction in readmissions; no reduction in PAM	Medicare CCTP	New Haven, CT	CTI & TCM	832	Retrospective Case Control	Wilcox D	Prof Case Manag	2018
PR	C-TraC participants 54% less likely to be readmitted w/I 30-days	299 veterans discharging from VA hospital	Boston, MA	C-TraC	299	Prospective Cohort Study	Reese RL	J Am Geriatr Soc	2019
PR	1 in 5 discharges to SNF resulted in 30-day readmission. CHF, renal failure, UTI, PNUE, COPD were the most common index and	3,254 patients discharged from 350-bed community hospital	SE Florida	frequency and diagnosis associated with 7 & 30-day readmissions from SNF	584	Retrospective Case Review	Ouslander JG	J Am Med Dir Assoc	2011

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
	readmission diagnosis.								
PR	No statistically significant impact on readmissions. 78.34% of 314 charts had a med discrepancy	314 charts reviewed	Pittsburgh, PA	Med. Therapy Mgmt.	314	Prospective Cohort Study	Miller DE	Hosp Pharm	2016
PR	Patients with low/med adherence had significantly higher readmission rates than patients with high adherence (p.005)	385 inpatients	Cedars-Sinai Med Center LA	Medication Adherence	385	Retrospective Case Control	Rosen OZ	Patient Prefer Adherence	2017
PR	Qualitative analysis on 17 high utilizers found trends in social support, social determinants, substance, depression/BH, chronic conditions, Medicaid	17 readmitted patients	Academic Medical Center in Michigan	N/A	17	Descriptive Case Studies	Gallagher NA	Am J Manag Care	2017

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
PR	No significant reduction in readmissions observed from the intervention	507 patients discharging from large academic medical center	Philadelphia, PA	Pharmacist assisted interprofessional discharge visit	507	Observational Study	Smith JN	J Eval Clin Pract	2020
PR	No significant difference in readmissions as a result of pharmacist follow-up phone calls	62 general medical patients	1 ACHs in UK	Pharmacist follow-up phone calls within 14-days of discharge	62	Prospective Cohort	Yang S	BMC Health Serv Res	2017
PR	readmissions rates were lower to same hospital but not to other hospitals	555 patients at higher risk based on BOOST Risk Assessment	263 bed hospital in Midwest	Pharmacist led Care Transitions Intervention	555	Retrospective Case Control	Feldmann JD	J Am Pharm Assoc	2018
PR	No significant difference in readmissions as a result of intervention; study did not achieve targeted power	28 intervention 73 control diabetes patients with med risk	Baltimore Medical Center	Pharmacist Med. Therapy Mgmt.	101	Prospective Cohort	Shaya FT	J Med Econ	2015
PR	Pharmacist intervention associated with reduction in readmission	SNF patients	San Diego, CA	Pharmacist Transition of Care Intervention	116	Retrospective Case Control	Amin PB	J Pharm Pract	2020

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
	but not statistically significant								
PR	Pharmacist assisted TOC intervention pre-discharge and post-discharge clinical visit and phone call associated with lower readmission rates.	23 COPD and HF patients discharging to home	urban academic teaching hospital	Pharmacist Transition of Care Intervention	23	Retrospective Case Review	O'Reilly EA	J Am Pharm Assoc	2020
PR	Root cause analysis on readmitted patients after STAR intervention; categorized readmissions as preventable, possibly preventable, not preventable; among preventable decisions related to care and medication management	SNF patients that readmitted post-STAR intervention	Boca Raton, FL	Root cause analysis on readmissions after STAR	37	Secondary Data Analysis	Ouslander JG	J Am Geriatr Soc	2020

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
	were the trending causes								
PR	Characteristics among patients that opted out of SWIFT RCT included 30x increased odds of cancer diagnosis and 6x odds of 30-day readmission were found.	30 out of 90 that opted out	Pasadena, CA	Secondary data analysis	30	Secondary Data Analysis	Coulourides Kogan A	Am J Manag Care	2017
PR	STAR program did not significantly reduce readmissions nor ED visits	202 patients that enrolled in STAR	Boca Raton, FL	Safe Transitions for At Risk (STAR)	202	Quasi experimental	Huckfeldt PJ	J Am Geriatr Soc	2019
PR	PCP TC service based on CPT codes for PCP transitional care coordination did not results in reductions in readmissions	Patients within PCP group	Florida	Transitional Care Management	1702	Retrospective Case Control	Farford B	J Am Board Fam Med	2019

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
PR	Home health visits within a week of SNF discharge is associated with lower readmission rates	Older adults discharging after ≥ 3 -day LOS to SNF	Indianapolis, IN	Use of home health within 1 week of SNF discharge	1543	Secondary data analysis	Carnahan JL	J Am Med Dir Assoc	2017
PR	Relative risk reduction of 36.8% however not significant due to lack of power small sample	Patients at mod/high risk of readmission	Concord, NC	Pharmacist Transitional Care Management	76	Prospective Cohort Study	Cole J	Pharmacy (Basel)	2019
PR	Interprofessional TOC intervention on 30-day readmissions and ED visits; not significant on readmissions nor ED visits based on intent to treat		Academic Medical Center	Interprofessional Transition of Care		Retrospective Case Control	Otsuka S	J Interprof Care	2019
PR	Derived and validated HOSPITAL model to predict potentially avoidable	eligible discharges	Academic Medical Center in Boston	Model Development & Validation	2,398	Retrospective Case Control	Donzé J	JAMA Intern Med	2013

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
	readmissions using administrative and clinical data available prior to discharge								
QI	HF disease management education program associated with significant reduction in readmissions compared to standard education	HF patients	large private hospital in FLA.	HF disease management education	106	Retrospective Case Control	Clarkson JN	J Healthc Qual	2017
RV	Perspective paper comparing 3 interventions (CTI, TCM, MCCT) and transitional care readmission reduction trends	N/A	N/A	N/A	N/A	Literature Review	Takahashi PY	Mayo Clin Proc	2020
QI	Pharmacist inclusion in CTI enhanced effect of		NC	Pharmacist assisted CTI	583	Retrospective Cohort	Cavanaugh J	Pharmacy (Basel)	2020

Level of Evidence	Key Finding	Population	Setting	Intervention	Sample Size	Design	First Author	Journal	Year
QI	decreased readmissions Significant reductions in HF readmissions with TOC Pharma, ACP and Paramedic home visits		New Hanover Medical Center	Unique collaboration between Pharma, ACP and Paramedics	89	Quality Improvement	Boykin A	Am J Health Syst Pharm	2018
RV	Hospital Readmission Reduction Program Perspective paper				N/A		Pсотka MA	JACC Heart Fail	2020
QI	Compared readmission rates by HHA across CCTP community with favorable results based on QI efforts	hospital discharges	Harlingen, Texas		19783	Quality Improvement	Markley J	Home Health Nurse	2012

Situation	Inputs	Outputs		Outcomes		
		Activities	Participants	Short	Medium	Long
<p>Readmission rates broadly adopted as quality indicator</p> <p>High prevalence of readmissions in partnering acute care hospitals</p> <p>1-3% penalties on hospitals total Medicare revenue based on "excessive" readmission rates incentivizes hospitals to take actions to reduce avoidable readmissions</p> <p>CMS through ACA Section 3026 funded Community-based Care Transitions Program from 2012-2017 as a demonstration project to reduce avoidable readmissions and improve transitions in care</p> <p>Project required hospitals partnering with community-based organizations to deploy evidence-based interventions based on root cause analysis</p> <p>Funding guaranteed for 2-years then renewable annually based on performance through January 2017</p>	<p>6 Acute Care Hospitals EHS Frick Hospital EHS Latrobe Hospital EHS Westmoreland Hospital Monongahela Valley Hospital AHN Canonsburg Hospital The Washington Hospital</p> <p>Acute Care Hospital Dedicated Resources shared workspace for coaches Parking for coaches EMR access for coaches Monthly leadership team meeting participation Program oversight & within organization reporting</p> <p>SWPA Area Agency on Aging Dedicated Resources 12 FTE Coaches Coach Certification and Training .5 FTE Coach Supervisor .5 FTE Regional Project Director .05 FTE Executive Director & Long Term Services Director Oversight (Sponsor Role) Information System Tablet Computers & Aircards (coaches) 1 Laptop & 12 Desktops Mileage Reimbursement Office space & supplies</p> <p>Other Community Partners 16 Skilled Nursing Facilities</p> <p>CMS Provided Resources Quarterly Learning Sessions Monthly Project Officer Calls Monthly All-Team Webinars Monthly Coach Calls National CCTP Faculty Leads Monthly Regional Team Calls</p>	<p>Staff & Train Recruit, train and maintain a staff of 12 FTE coaches (5 days initial training, 1 hr. monthly continuing educ.)</p> <p>Targeting & Recruitment Hospital-based Coaches target and recruit patients into the program conducting daily census review, EMR verification, hospital visits, risk assessments & data entry (recruit enough to retain 296 per month)</p> <p>Care Transitions Intervention Field-based coaches conduct home visits and follow-up phone calls using Care Transitions Intervention™ 4 Pillar methodology</p> <p>Needs Assessment & Early Linkages to Services Hospital and field coaches provide "Options Counseling" on available community and social supports and provide information, referral and assistance to support participants in accessing benefits and services</p> <p>Data Collection All coaches conduct data entry using tablets and cloud based information system</p> <p>Root Cause Analysis Readmission RCA conducted at participating hospitals to inform CQI efforts</p> <p>Monthly Staff & Leadership Team Meetings</p>	<p>Target Population MFFS Beneficiaries having acute care hospitalization at partnering hospital</p> <p>Recruitment Target Volume >296 patients per month will be recruited into the program</p> <p>Inclusion Criteria ≥ 1 high readmission rate diagnosis (AMI, CHF, PNEU, Diabetes, COPD) ≥1 chronic conditions ≥ 2 medications Discharging home, home with home health or short term stay at SNF on journey home</p> <p>Exclusion Criteria Served within 180 days Discharging to LTAC Known active substance abuse issues</p>	<p>At least 80% of those retained to a home visit will complete the Care Transitions Intervention with 2-3 follow-up phone calls within 30-days of hospital discharge.</p> <p>Increase patient activation among those served (any positive % change is acceptable although bigger is better)</p> <p>Provide options counseling to target range of 20-60% of participants based on expressed or observed needs</p> <p>>25% of patients served will follow-up with a physician within 7-days of hospital discharge</p> <p>>45 % of patients served will follow-up with a physician within 14-days of hospital discharge</p> <p>< 16.5% 30-day all cause readmission rate among CCTP served</p>	<p>≥ 10% of CCTP served will OBTAIN new community or social service benefits</p> <p>Achieve > 90% patient satisfaction with CCTP service</p> <p>Decrease self-assessed caregiver burden for ≥ 10% of patients served whose record indicates caregiver participation in CCTP</p> <p>Increase patient activation (any positive % change is good, bigger is better) based on Patient Activation Measure</p> <p>Increase patient activation by ≥ 20% based on Coleman Patient Activation Assessment</p> <p>≥10% decrease in 60-day all cause readmission rate among CCTP served compared to baseline</p> <p>≥5% decrease in 90-day all cause readmission rate among CCTP served</p> <p>Achieve program renewals annually through the end of the funding period</p>	<p>Program will achieve ≥ 20% decrease in 30-day readmissions among patients served relative to 2011 baseline MFFS readmission rate prior to program start</p> <p>≥ 20% increase in hospital rate of 7-day physician follow-up at relative to 2011 baseline rate</p> <p>≥ 20% increase in hospital rate of 14-day physician follow-up at relative to 2011 baseline rate</p> <p>Demonstrate savings to Medicare (any positive return on investment is acceptable no specific target was set by CMS)</p> <p>Sustain the program through additional payor contracts beyond the CMS funding period (beyond year 4 of program)</p> <p>Use lessons learned from the CCTP experience to inform future business opportunities and strengthen organizational capacity to operate increasingly in integrated delivery systems and accountable healthcare partnerships</p>

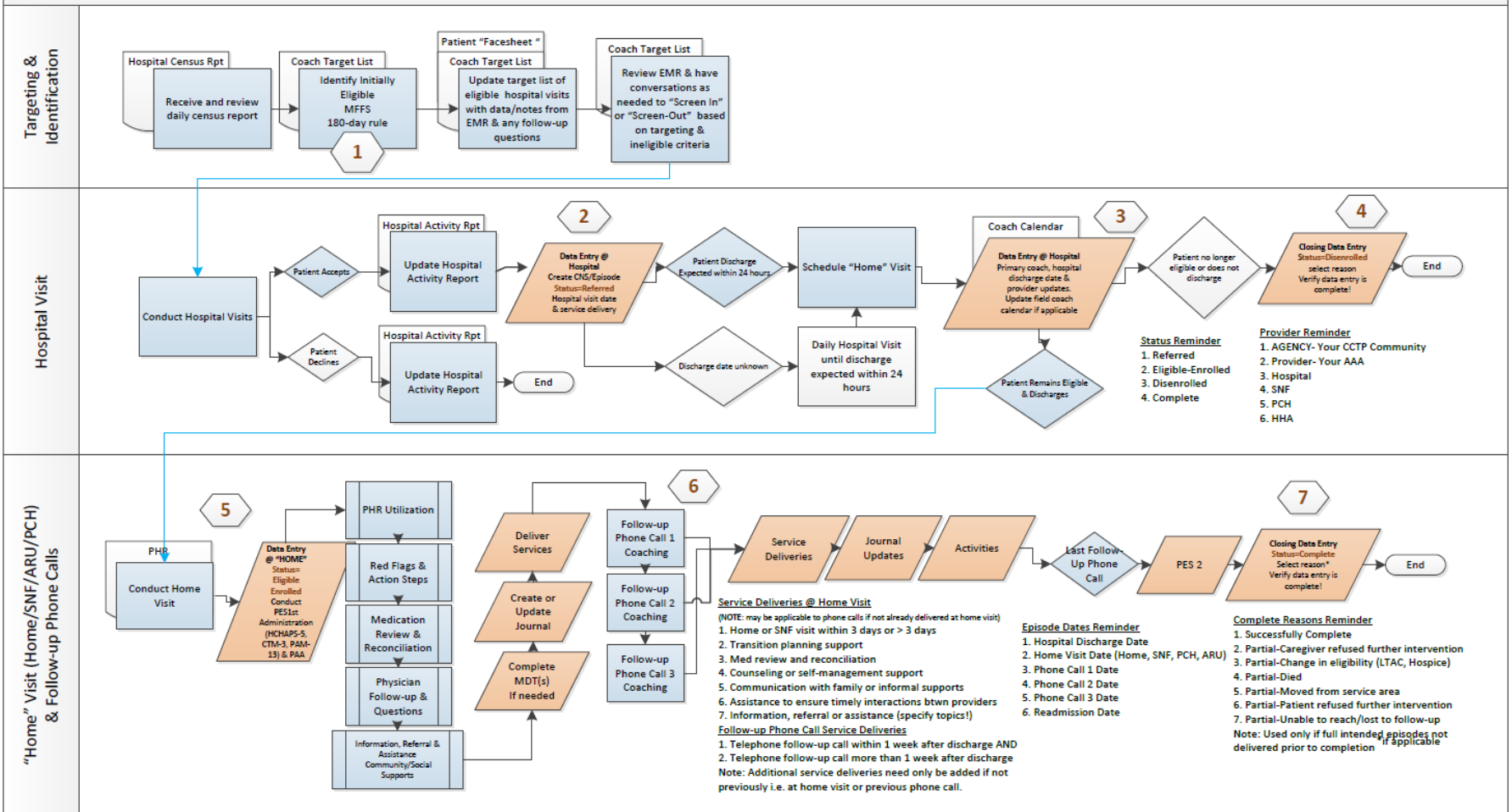
Appendix Figure 1a: WPA CCTP Program Logic Model

Situation	Inputs	Outputs		Outcomes		
		Activites		Short	Medium	Long
		<p>Coaches will be certified as a result of CTI training (1.5 days after 3 month probation when locally available)</p> <p>296 patients per month will be retained to a home visit (CH 21, MVH 43, TWH 70, FH 15, LH 36, WH 96)</p> <p>At least 75% of home visits occur within 3 days of hospital discharge</p> <p>Coaches will conduct up to 3 follow-up phone calls per patient retained to a home visit at approximately 2-days from home visit, 7 days from 1st phone call, 7 days from 2nd phone call</p> <p>Assessments will be conducted on the following schedule: Risk Assessment at hospital Patient Activation Assessment -Pre-test at home visit -Post-test at last phone call CTM-3 at home visit HCAHPS-5 at home visit Patient Activation Measure -Pre-test at home visit -Post-test at last phone call</p>				
Theoretical Assumptions & Key Constructs				External Factors		
<ul style="list-style-type: none"> • 4-79% of readmissions are potentially avoidable • Communities that implement high fidelity Care Transitions Interventions will be able to increase patient activation and reduce 30-day readmissions by at least 20% • Social determinants of health go beyond hospital's traditional sphere of influence and increase the likelihood of patients to readmit • Community-based organizations will be able to increase patients awareness of and access to community and social services • Increasing access to community and social services will improve patients ability to follow their care plans and reduce barriers to care thereby reducing avoidable readmissions 				<ul style="list-style-type: none"> • Funding will continue to be available for the demonstration project • Hospital partners will remain committed to the collaboration • Community based-organization will remain committed to the collaboration • Competing initiative or priorities will not interfere with program operations 		

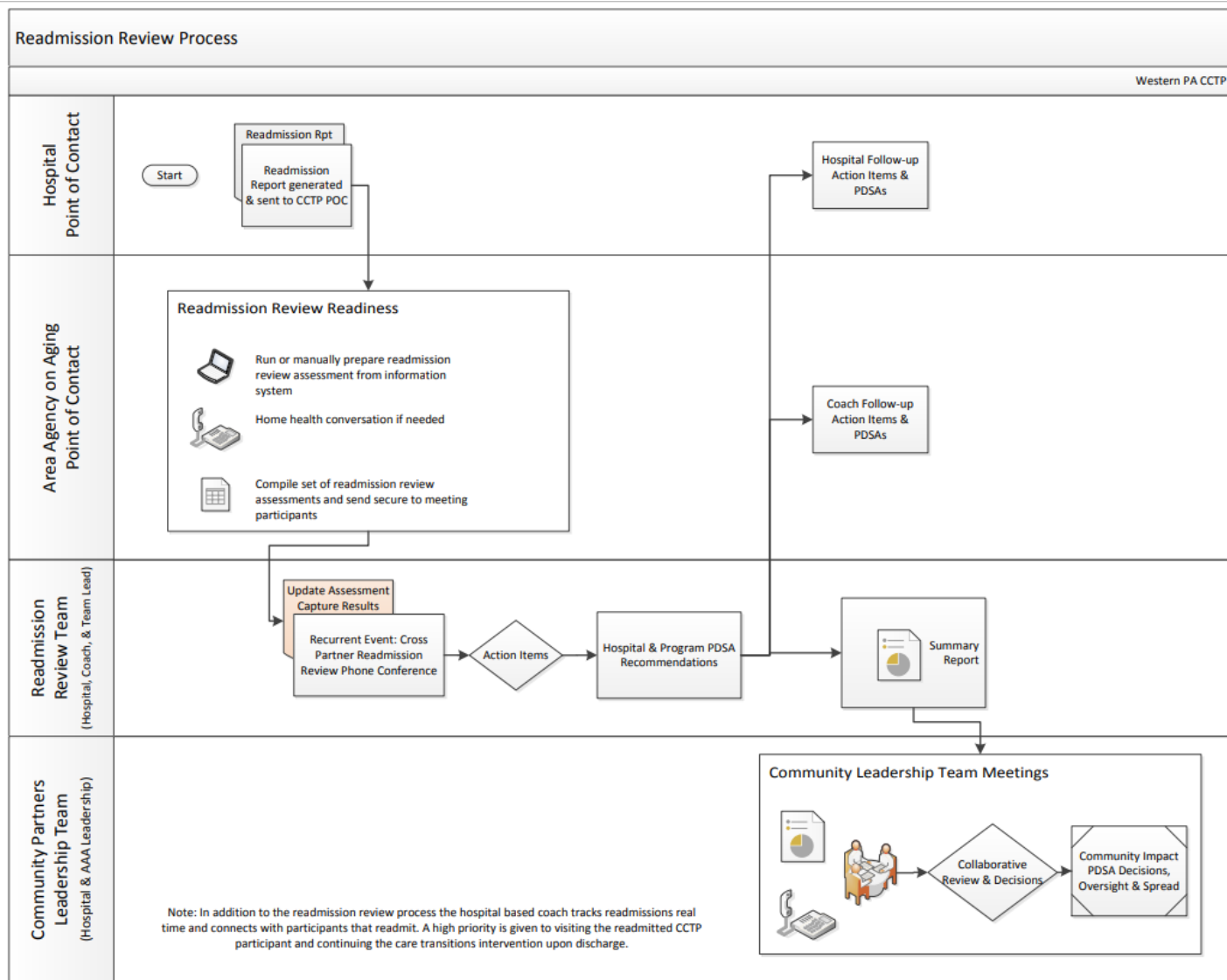
Appendix Figure 1b: WPA CCTP Program Logic Model

Community-based Care Transitions Program Process Map

Standard Intervention



Appendix Figure 2: WPA CCTP Process Flow & Data Entry



Appendix Figure 3: WPA CCTP Readmission Review Process Flow

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