

**The Contribution of Managed Long-Term Services and Supports to Aging in Place:
An Evaluation of the Use of Attendant Care Services to Avoid Nursing Facility Admissions**

by

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Abstract

More than 13 million individuals in the US use long-term-services and supports (LTSS) to help them with daily activities they cannot perform by themselves, and Medicaid is the primary payer. Recently, Medicaid Managed Long Term Services and Supports (MLTSS) programs have spread, and enrollment reached 1.8 million in 2017. In MLTSS programs, participants are eligible for benefits that include home and community-based services (HCBS), such as personal/attendant care services. These services can enable older adults to continue living in their homes, maintaining their independence and community participation. This dissertation investigated (1) the effectiveness of attendant care (AC) services to avoid long-term institutionalization of older adults, when provided as part of an MLTSS program; and (2) whether the dosage and type of attendant care influence the results of AC. Using enrollment and claims data of 491 community-dwelling older adults enrolled in an MLTSS program for at least six months, multivariate logistic regression was used to test the association between long-stay nursing facility (LSNF) admissions (≥ 90 days) and the use of AC services. Findings confirmed the hypothesis that those receiving AC services are less likely to have LSNF admissions. Participants with attendant care had at least 75 percent lower odds of an LSNF admission than those who did not receive AC services. As the dosage increases, the odds of LSNF decreased, with those

receiving 5h/day or more of AC services being 81 percent less likely of having an LSNF admission than those with no AC. In addition, participants who used only self-directed AC services (where care recipients choose and hire their care providers) were 93 percent less likely to have an LSNF admission than those receiving no AC services, and 23.5 percent less likely to have this outcome than those who received only agency AC services. These preliminary findings give a basis for policy and program discussions about MLTSS resources allocation, as they demonstrated the public health importance of attendant care services in the context of increasing demand for LTSS and older adults' desire to age in place.

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Preface

My first work experience with aging was as a volunteer for a community-based organization in Brazil, which mobilizes and trains individuals to visit older adults in low-income neighborhoods all over the country. Through this work, more than 20,000 community volunteers visit almost 170,000 older adults every month, assessing their needs, helping them adopt healthy habits, and connecting them to their peers and community resources. In the first semester of 2015, I worked with this organization, facilitating the development of an outcome map that would help them better visualize their goals for the short, medium, and long term. In the many meetings I had with them, I learned about the complexities of promoting healthy aging, especially in underserved communities, and about the innumerable factors that affect healthy aging at the individual, family, community and policy levels. A few months later I started my PhD in Public Health and decided to direct my research to the field of aging, and the required support for older adults to age with quality and dignity in their homes and communities.

I found at the University of Pittsburgh's Behavioral and Community Health program an opportunity to expand my horizons, drawing upon almost 20 years working with social and health programs in Brazil. I came to develop new skills and knowledge in applied research and evaluation in order to help organizations have a greater impact on their programs and services. Gateway Health gave me the opportunity to realize this wish and work on a dissertation that combines three areas of great interest for me: aging, community health, and evaluation.

As I finish my doctoral journey, I want to acknowledge those who gave me strength, support, and inspiration throughout these almost four years.

First and foremost, my greatest treasure: Rogerio, Beatriz, and Gustavo. Despite the enormous revolution this doctorate brought to their lives, and the challenging experience of learning the language and adjusting to a different culture, they have thoroughly and unhesitatingly supported me in my studies. Together we celebrated every victory, and by holding each other's hands, we faced challenges and hardships and shared learnings. This is our dissertation, as I would not have concluded the program or this paper without their love, patience, and continuous encouragement.

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I leave the doctoral program as a better person and professional. I now see many new possibilities to work for a more equitable and healthier world. And this is due to the amazing professors and colleagues with whom I have had the chance to learn. I want to thank Dr. Jeanette

Trauth for welcoming me in the program, and for conversations that helped me feel that I belonged here and that my ideas were valued.

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I also want to thank the Gateway Health team for welcoming me first as an intern and then as Health Services Researcher. I especially want to thank Jeanine Kilgore, Luis Fernando Arbelaes, and Lynne Marshal, who so generously shared their knowledge and time to help me conclude this dissertation.

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1.0 Introduction and Public Health Relevance

More than 13 million individuals in the United States use long-term services and supports (LTSS) to help them with daily activities they cannot perform by themselves. Medicaid is the primary payer for LTSS for this vulnerable population, providing payment for these services for almost five million beneficiaries. Before 2004, these services were delivered through a fee-for-service payment system, in which providers are reimbursed for each service given to those enrolled in Medicaid. However, due to increasing demand for services and the need to control cost, a model of care has been increasingly prominent: Managed Long-Term Services and Supports (MLTSS) (Soper & Phillip, 2017).

Managed long-term services and supports is the delivery of LTSS through capitated Medicaid managed care programs for Medicaid beneficiaries and also for those with Medicare and Medicaid benefits. Operated under federal Medicaid managed care authorities, MLTSS programs are the result of an agreement between state Medicaid agencies and contractors, generally health plans. These contractors receive capitated payments (e.g., a per-member-per-month premium) to provide long-term services and supports for Medicaid beneficiaries with functional limitations or chronic illnesses, allowing them to live in their preferred settings (Saucier, Kasten, Burwell, & Gold, 2012; U.S. Centers for Medicare and Medicaid Services, 2017c).

In the recent years, MLTSS programs have significantly increased in the United States, and the number of states adopting this model grew 200 percent in the last 13 years (Adams, Gebru, & Kimmel, 2017; Lewis, Eiken, Amos, & Saucier, 2018). Enrollment in this type of program

doubled from 2012 to 2017, when the total MLTSS program enrollment reached 1.8 million, and most of the states with MLTSS programs have used them to serve older adults and people with physical disabilities (Lewis et al., 2018).

Important demographic changes happening in the United States point to increasing need of LTSS in the near future, intensifying the pressure on state and federal policymakers to find more cost-effective ways to provide LTSS at both the institutional and community-based settings (Anthony et al., 2017; Reaves & Musumeci, 2015; Thach & Wiener, 2018). Each day, about 10,000 Americans reach the age of 65 (Olivari et al., 2018), and the population aged 65 and older is expected to grow from 48 million in 2014 to 83 million people by 2040 (Thach & Wiener, 2018). Also, the number of people aged 85 or older, who are four times more likely to need LTSS than those aged 65 to 84, is expected to increase 224 percent between 2012 and 2050 (Houser, Fox-Grage, & Ujvari, 2012; Reaves & Musumeci, 2015).

Furthermore, positive changes in health behaviors (e.g., declines in smoking, motor vehicle deaths, and heavy alcohol consumption) have resulted in increased life expectancy, while risk behaviors (e.g., low physical activity, poor nutrition, and substance abuse) have resulted in an increased prevalence of chronic health conditions (Thach & Wiener, 2018). The combined effect of age, greater life expectancy, and increasing prevalence of chronic conditions produces a progressively older and sicker population, which is expected to largely increase the demand for, utilization of, and expenditures for LTSS (Roberts, 2018; Thach & Wiener, 2018).

Research has shown that older adults highly value community living, and most Americans desire to live as long as possible in their “familiar surroundings” – their own homes and communities – a process that is called “aging in place” (Tang & Lee, 2011). Aging in place has

been defined by the Centers for Disease Control and Prevention (2009) as “the ability to live in one’s own home and community safely, independently, and comfortably, regardless of age, income, or ability level.” It is considered an enabler for older people to keep their independence, autonomy, and social connections with family and friends (Wiles, Leibing, Guberman, Reeve, & Allen, 2011). Home and community-based services (HCBS) can help older adults and people with disabilities to remain in their own homes or communities by assisting them with basic activities of daily living (ADLs) they cannot perform by themselves (Chen & Thompson, 2010; Ewen, Washington, Emerson, Carswell, & Smith, 2017).

The MLTSS model is a strategy that is increasingly being adopted to expand HCBS, promote community inclusion, ensure quality care, and increase efficiency (U.S. Centers for Medicare and Medicaid Services, n.d.-d). Some states have been successful in increasing access to HCBS with their MLTSS programs (Libersky et al., 2018), and, as of July 2016, 23 states were using managed care to deliver some or all HCBS to their beneficiaries (National Quality Forum, 2016).

Personal care services, which receive different names across the country (e.g., personal attendant services, personal assistance services, and attendant care services) (Peebles & Bohl, 2014), are an important component of Medicaid’s MLTSS programs, as stated by the Director of Health Care at the United States Government Accountability Office (GAO). These services can enable disabled and aged people, with limited ability to care for themselves, to continue living in their homes, maintaining their independence and community participation (Iritani, 2017).

Notwithstanding the recognition that HCBS is changing the healthcare landscape in the United States and the presumption that HCBS provides higher quality care than nursing homes,

there is a lack of research on the relationship between HCBS services and outcomes, which is necessary to assess their quality (AcademyHealth, 2015; Wysocki et al., 2015). It has also been pointed out that the evidence for the cost-effectiveness of HCBS in comparison to nursing facility care is inconclusive (Blackburn, Locher, & Kilgore, 2016; Wysocki et al., 2015).

The shift from a fee-for-service system to managed LTSS has not only shed light on the need for more research and evaluation of HCBS (Lipson, 2018) but has also created a better environment for this to happen. The focus on person-centered care, which is one of the foundations of MLTSS, has been stated as an opportunity to improve quality measurement in HCBS (AcademyHealth, 2015). In addition, one of the premises of the MLTSS model is to turn managed-care organizations (MCOs) into a good new source of data about LTSS quality, outcomes, and costs (Kaiser Commission on Medicaid and the Uninsured, 2011).

This dissertation investigates the effectiveness of attendant care services delivered in the context of MLTSS, and the contribution of these services to avoid institutionalization of older adults, allowing them to age in place. It is organized into the following sections:

- Pathways to Managed Long-Term Services and Supports in the United States, which presents some of the milestones in the history of healthcare policy that created the foundation for MLTSS.
- Overview of MLTSS, describing the model, its growth in the country, its funding mechanisms, its contribution to a more coordinated and value-based care system, and how it has been implemented in the state of Delaware.
- Need and Opportunity to Evaluate HCBS Provided under MLTSS Programs, which summarizes the promise of MLTSS, the existing types of evaluation studies, the

issues with performance and quality evaluation in MLTSS, and the opportunity for better evaluations of HCBS.

- Evaluation Study, describing the utilization-focused evaluation approach and the purpose, scope, and methods used in this study.
- Results, presenting the main findings of descriptive, bivariate, and multivariate logistic regression analyses.
- Discussion, summarizing and interpreting the study results according to existing literature, and also presenting strengths and limitations of this research.
- Conclusion, with some key messages based on study findings, and recommendations for practice and future research.

2.0 Pathways to Managed Long-Term Services and Supports in the United States

Managed Long-term Services and Supports (MLTSS) is a model of care that resulted from important health reforms and policies implemented in the country over past decades. Understanding the pathways that helped the development of MLTSS is the first step to understanding its promise and value.

2.1 Healthcare for Vulnerable Populations

It was in the early 20th century that the idea of creating a national health insurance system in the United States began to be discussed, with Theodore Roosevelt including this idea in his political platform when running for president in 1912 (Anderson, 2016). Nevertheless, it was only on July 30, 1965, that President Lyndon B. Johnson established the creation of the two main government programs that provide healthcare for vulnerable populations: Medicare and Medicaid (U.S. Centers for Medicare and Medicaid Services, 2015).

Despite having the same creation date, Medicare and Medicaid are distinct programs and have different characteristics, requirements, service delivery, and funding mechanisms. Table 1 summarizes the main characteristics of each program.

Table 1: Comparative Summary of Medicare and Medicaid

Program	MEDICARE	MEDICAID
Brief description	National health insurance program for the elderly, created to help them with their hospital, medical, and other health costs. It is available to most people at age 65 or older.	A “needs-based entitlement program” designed to help states meet the costs of healthcare for low-income and medically needy populations. It is the largest public health insurance program in the United States and the largest payer of healthcare in every state.
Management and funding	Run by the federal government and funded with resources from the Medicare Trust Fund, tax revenues, and beneficiary premiums, the Medicare program currently consists of four different and complementary parts: • <u>Part A</u>: also called hospital insurance, covers inpatient care in hospitals and nursing facilities, hospice care, and some home health services. • <u>Part B</u>: also called medical insurance, covers medical services, outpatient care, preventive care, home health services, and durable medical equipment prescribed by doctors for home use. • <u>Part C</u>: also called Medicare Advantage, it is provided by health plans. It includes all Part A and Part B services and sometimes prescription drug coverage and other additional benefits. • <u>Part D</u>: also called the Prescription Drug Benefit; it is an outpatient prescription drug coverage provided by health plans.	Considered “a cooperative venture funded by Federal and State governments,” Medicaid is designed by the state governments under broad federal guidelines. Upon approval by the Centers for Medicare and Medicaid Services (CMS), Medicaid state plans receive matching funds from the federal government.
Eligibility	Individuals must have a qualifying work history (i.e., have worked for at least ten years in Medicare-qualifying employment), regardless of income, and (1) be 65 or older, or (2) be under age 65 and have been receiving Social Security Disability Insurance for more than 2 years, or (3) have end-stage renal disease (ESRD) or amyotrophic lateral sclerosis (ALS).	Individuals must meet financial eligibility (i.e., have low income or high medical expenses) and non-financial eligibility: (1) be American citizens or have immigration status, and (2) be a resident of the state where Medicaid coverage is provided). Individuals must have income and assets below a certain threshold. States have the

Table 1 Continued

		autonomy to cover beyond the threshold mandated by the federal government.
Statistics	By 2015, 50 years after it was launched, Medicare covered more than 55 million people in the country (84% aged 65 and older, 16% under age 65 and permanently disabled).	Roughly one in five Americans are covered by the Medicaid program, a total of almost 81 million people.

Note: Data from (Adams et al., 2017; Grabowski, 2007; O'Keeffe et al., 2010; Reaves & Musumeci, 2015; Shugarman, Bern, & Foster, 2015; U.S. Centers for Medicare and Medicaid Services, 2016, 2017a, n.d.-b).

2.1.1 Medicaid Waiver Authorities

Under broad federal guidelines regarding eligibility, service provision, program administration, and provider compensation, states have great flexibility to design their programs. States can also restructure their Medicaid programs by requesting approval to make changes to the traditional model through waivers or State Plan Amendments (U.S. Centers for Medicare and Medicaid Services, 2012b). While Plan Amendments allow states to propose changes to specific components to their Medicaid program related to eligibility, benefits, covered services, and provider payment models, waivers allow states to improve and develop program objectives that are not included in the federal law.

Under a Medicaid waiver, states can improve their programs, conduct demonstration projects, extend coverage to other population groups or geographic areas, offer alternative benefits, and provide special services to a subset of their beneficiaries. The legal authority for Medicaid waivers can be found within specific sections of the Social Security Act and the Affordable Care Act (e.g., Social Security Act Sections 1115, 1915, and 1932). Each authority has

specific requirements and offers states different flexibilities and limitations (Adams et al., 2017; Anthony et al., 2017).

The Section 1115 waiver has been considered the broadest type of Medicaid waiver, as it provides greater flexibility for states to launch experimental, pilot, or demonstration projects that are considered likely to promote the goals of Medicaid. Under an 1115 waiver, states can propose demonstration projects that aim to transform delivery systems, improve health outcomes, strengthen Medicaid coverage, and increase beneficiaries' access to services (U.S. Centers for Medicare and Medicaid Services, n.d.-f). In order to be approved, states' 1115 waiver proposals must be budget neutral, which means that they cannot cost the federal government more than the funding the state would have received without the waiver (Anthony et al., 2017; Musumeci, Rudowitz, Hinton, Antonisse, & Hall, 2018; National Association of Community Health Centers, n.d.). By February 1, 2018, 35 states had projects approved under Section 1115 (43 waivers total), and 22 states had 23 pending 1115 waivers (Musumeci et al., 2018).

2.2 Long-Term Care in the United States

The characteristics of long-term care in the United States and how it relates to Medicare and Medicaid bring important insights into the context and trends that led to the development of MLTSS. Long-term care (LTC) is defined as “a continuum of medical and social services designed to support the needs of people living with chronic health problems that affect their ability to perform everyday activities” (McCall, 2001, p. 3). It encompasses a broad range of health and health-related services, personal care, social and supportive services (such as transportation and

housing) needed by individuals of all ages with functional limitations caused by long-term conditions, disabilities, and frailty. These services can be provided for several weeks, months, or years, at community settings (people's homes, adult day care centers, or assisted-living residences) or institutions (nursing skilled facilities, intermediate care facilities for individuals with developmental disabilities, or mental health facilities), and by paid and unpaid providers (i.e., informal caregivers) (Anthony et al., 2017; O'Keeffe et al., 2010; Reaves & Musumeci, 2015; C. Woodcock, Stockwell, Tripp, & Miligan, 2011).

As of 2015, more than 12 million Americans were using long-term care services and supports (LTSS)¹ to meet their personal care needs and live with quality and independence at community and institutional settings. Of those, about 10 million lived in the community, and about half are aged 65 and older (Kaye & Harrington, 2015).

While everyone is at risk of needing LTSS, not everyone will, in fact, need them. Nevertheless, with the number of elderly Americans expected to more than double in the next 40 years (Reaves & Musumeci, 2015), it is estimated that the number of people who need LTSS will increase by almost 70 percent in the next 20 years, especially among those over age 85 (O'Keeffe et al., 2010; Reinhard et al., 2017; U.S. Centers for Medicare and Medicaid Services, 2017c).

¹ It has been noted by authors that long-term care systems and services have been called by different names depending on the population groups they serve and the states where they are provided (O'Keeffe et al., 2010). More recently, the term "long-term services and supports (LTSS)" has been increasingly used in the country, and therefore it will be the terminology mostly adopted in in this paper.

2.2.1 Funding for LTSS

Informal caregivers, such as family members, partners, friends, and neighbors, are the primary providers of long-term services and supports in the United States. This unpaid care ranges from helping with instrumental daily activities (IADLs) to more intensive care, such as helping with ADLs,² medication management or wound care (Anthony et al., 2017; Reaves & Musumeci, 2015). Reports from 2015 show that about 43.5 million adults provided unpaid care to a child or an adult in the last 12 months, and the services provided by informal caregivers in 2013 had an economic value of \$470 billion (Family Caregiver Alliance, 2016; National Alliance for Caregiving & AARP Public Policy Institute, 2015; Reinhard, Feinberg, Choula, & Houser, 2015). Notwithstanding this invaluable support voluntarily offered by family and friends, as a person's daily care needs become more comprehensive, paid LTSS provided by physicians or nurses, and by para-professionals (i.e., nurse aids or personal attendants), may be needed, complementing or in place of family caregiver support. These LTSS costs, however, often exceed what people can afford given their other personal and family expenses, especially for low-income families (Reaves & Musumeci, 2015).

² Activities of daily living (ADLs) are daily basic activities related to personal care and that are necessary for independent living at home or in the community. They include bathing or showering, dressing, eating, using the toilet, and transferring (getting in and out of bed or a chair, and walking from one place to another). Instrumental activities of daily living (IADLs) are activities related to independent living but that do not need to be performed daily. They include basic communication skills (e.g., using telephone, Internet, or email), meal preparation, transportation (by driving oneself, arranging rides, or using public transportation), managing medications, shopping for groceries or personal items, performing housework (e.g., laundry and cleaning dishes), and managing personal finances. Functional limitations are measured by the number of ADLs and IADLs a person is able to perform without assistance and are used as eligibility criteria for participation in assistance programs (American Elder Care Research Organization, 2016; U.S. Centers for Medicare and Medicaid Services, 2008).

It is estimated that 27 percent of people in the United States who are turning 65 will spend at least \$100,000 on LTSS, and about 15 percent will spend over \$250,000 (Miller, 2016). Some people can afford the initial LTSS expenses, but over time the costs tend to become prohibitive (Anthony et al., 2017). In this context, a common alternative for many individuals in need of ongoing LTSS has been to pay for their own care until most of their assets are depleted, and then qualify for Medicaid coverage, a strategy called “Medicaid spend down” (Anthony et al., 2017; Sollitto, 2017).

Medicare offers limited coverage for LTSS and does not pay for custodial services (i.e., non-medical care) provided either at home or in a nursing home or assisted living facility (Cubanski et al., 2015). Covering only short-term stays in Medicare-certified skilled nursing facilities (SNFs), the program typically serves seniors in rehabilitation after being hospitalized (Delaware Health and Social Services, 2016). To be eligible for SNF care coverage, beneficiaries must have stayed for at least three days in the hospital as an inpatient. Medicare coverage for SNF care depends on the length of stay and decreases over time (Sollitto, 2018).

Medicaid was originally conceived to cover the primary and acute healthcare needs of those who qualified or were close to qualifying for cash welfare programs. Over time, however, the program has expanded its coverage to other populations and types of services, including long-term care. By the mid-1970s, Medicaid had become the major public funder of long-term services provided in nursing care facilities; by the mid-1990s, it had also become the major public funding source for home and community long-term care services (Adams et al., 2017; O’Keeffe et al., 2010).

In 2013, of the \$338.8 billion spent in LTSS, \$144.5 billion (43%) was funded by Medicaid and \$73.9 billion (22%) by Medicare. Together, the two programs invested \$218.4 billion in LTSS, which comprised about 65 percent of all the LTSS spending in 2013 (Anthony et al., 2017). As a consequence of Medicare limited coverage (see Table 2) and few affordable options in the private insurance market, Medicaid tends to continue to be the primary payer for long-term services and supports in the country.

Table 2: Summary of Healthcare Coverage Provided by Government

Program	MEDICARE	MEDICAID
General definition	Federal healthcare program for the elderly and certain people with disabilities, regardless of income.	Federal and state healthcare program for individuals who have financial and medical needs.
General coverage	Acute care services, post-acute services, physician visits, and prescription drugs.	Acute care, physical and behavioral health, and long-term care services.
LTSS coverage	Skilled nursing facility care for a limited number of days. It does not cover non-medical services.	Covers long term services and supports provided either in institutions or through HCBS.
Eligibility for LTSS coverage	Individuals who have been placed in a Medicare-certified nursing facility following a 3-day hospital admission.	Medicaid beneficiaries who meet the state's level of care criteria.

Note: Data from Grabowski (2007), Cassidy (2012), and Delaware Health and Social Services (2016).

2.3 Strategies to Improve Cost-Effectiveness of LTSS

The combination of an aging population with advancements in assistive and medical technology allowing people with disabilities to live longer and more independently is expected to increase the need for LTSS dramatically in the near future (Reaves & Musumeci, 2015). As low-

income adults with LTSS needs are among the most complex and expensive populations covered by Medicaid, there has been increasing pressure on state and federal policymakers to find more cost-effective ways to provide LTSS in institutional and community-based settings (Anthony et al., 2017; Reaves & Musumeci, 2015).

2.3.1 Rebalancing the LTSS System

Many states have used MLTSS as a key strategy to “rebalance” the LTSS system. Rebalancing in this context has been defined as “moving away from a dependency on institutional care towards a system of comprehensive community-based long-term services and supports (LTSS)” (C. H. Woodcock, 2011, p. 2). By increasing access to home and community-based services, governments also expect to improve beneficiaries’ quality of life and reduce healthcare costs (Lewis et al., 2018).

As stated previously, long-term services and supports include both institutional care, such as services provided in nursing care and intermediate-care facilities, and home and community-based services (HCBS), such as personal care services, adult day healthcare programs, home modifications, respite care, and assistive technology (Watts, Musumeci, & Ubri, 2017). Historically, however, the majority of public funding to LTSS has been to cover institutional care. When Medicaid was first enacted, mandatory coverage for LTSS was only for people aged 21 or older, placed in a SNF. States had the option to fund home health services and private duty nursing services, but as most HCBS were optional and federal funding for services provided in

community-based settings was limited, a so-called “institutional bias” was created in the country (Anthony et al., 2017; O’Keeffe et al., 2010; The Henry J. Kaiser Family Foundation, 2015).

Today, under the Medicaid program, nursing facility care continues to be mandatory and HCBS optional. Nevertheless, an increase in LTSS expenditures towards home and community-based services is happening, and the percentage of LTSS spending on HCBS has steadily increased in recent decades (Anthony et al., 2017; Dobson, Gibbs, Mosey, & Smith, 2017). In the 2016 fiscal year, HCBS represented 57 percent of total Medicaid LTSS expenditures (Eiken, Sredl, Burwell, & Amos, 2018). This change is the result of a combination of individual and family preferences, the enactment of the 1990 Americans with Disabilities Act (ADA), and the Supreme Court’s Olmstead decision, which established legal obligations for states to provide care in the least restrictive setting (C. H. Woodcock, 2015). It is also the result of governments’ concerns with the high costs of institutional LTSS, since, the annual costs of nursing facility care are almost twice the cost of having home health aide (Anthony et al., 2017; Reaves & Musumeci, 2015).

2.3.2 Medicaid Managed Care

The Medicaid program uses several models to pay providers and to deliver services to beneficiaries. Traditionally, the program has used a fee-for-service model through which providers are reimbursed for each service given to those enrolled in Medicaid. This model, however, has been considered a barrier to high-quality care for rewarding volume of appointments and tests, regardless of their medical necessity, quality, or effective contribution to patient outcomes. Under this model, beneficiaries are the ones responsible for finding services

covered by Medicaid (Adams et al., 2017; Shugarman et al., 2015). Over the past few decades, an alternative service delivery and payment method has been increasingly used: Medicaid Managed Care.

Developed as a system model to better manage cost, utilization, and quality in healthcare, managed care is the delivery of health benefits and additional services through contracted arrangements between state Medicaid agencies and health plans that act as managed care organizations (MCOs) (U.S. Centers for Medicare and Medicaid Services, n.d.-c). Under this delivery system, MCOs receive a predetermined monthly fee (per-member-per-month rate), also called capitated rate, and coordinate care through a network of health professionals and services. In fully capitated arrangements, contracts are risk-based, which means that MCOs assume the financial risk of providing all the services considered medically needed and established in their contract with the Medicaid agency (Kilgore, 2015). Therefore, if an MCO fails to keep members³ healthy, and their service utilization incurs costs above what the MCO is paid, the MCO bears the difference.

On the other hand, if the MCO keeps the members healthy and manages well their utilization and costs, it can keep part or all of the savings from what it received from the state (Adams et al., 2017). Under managed care, the Medicaid program aims to improve quality and coordination of care, as MCOs receive a capitated global payment to provide all acute and primary care, and in some instances to also provide behavioral health and long-term services and supports. Governments also expect to be able to predict more accurately and control costs

³ “Members” is the term MCOs use for the people they serve under managed care products (Kilgore, 2015).

(Adams et al., 2017; Dobson et al., 2017; Kaiser Commission on Medicaid and the Uninsured, 2011; Shugarman et al., 2015).

The number and share of Medicaid beneficiaries enrolled in managed care has increased at a rapid pace in recent decades. In 2005, out of the 45.4 million Medicaid enrollees, 28.6 million (62.9%) were under managed care (Shugarman et al., 2015). By 2016, 54.6 million Medicaid beneficiaries (68.1%) were enrolled in managed care, having their acute, primary, and specialty care needs managed by MCOs. Nevertheless, while 37 states had at least 50 percent of the Medicaid population enrolled in managed care by 2016, this share varied greatly by state, and by the populations and benefits covered (U.S. Centers for Medicare and Medicaid Services, 2018b). In the case of Medicaid managed care, it is up to state governments determine which populations are included or exempt and which benefits are “carved in” and “carved out” (i.e., included or not) in their contracts with MCOs.

Capitated risk-based managed care is a policy option with the potential to address the lack of integration between Medicare and Medicaid programs, while promoting efficiency and cost-effectiveness in healthcare. In this context, a key term has emerged: care coordination. Care coordination, which encompasses a broad effort to integrate multiple systems and providers of care, has been considered by the Institute of Medicine as essential to ensure seamless, safe, and high-quality healthcare. As health plans are at financial risk for the cost of healthcare utilization, care coordination is also an important strategy for better outcomes and use of resources (Grabowski, 2007; Shugarman et al., 2015). Care coordination is described in more detail in section 3.3 of this document.

Long-term services and supports and their beneficiaries, in both institutional and home and community-based settings, have frequently been carved out of Medicaid managed care and kept on fee-for-service arrangements. This was due to a combination of beneficiary and family concerns with keeping critical non-medical services, and limited experience of health plans with managing LTSS, in special HCBS (Anthony et al., 2017). In the last decade, however, an increasing number of states have carved in LTSS in their managed care plans. In 2016, 22 states were providing some LTSS under risk-based managed care contracts with health plans, and other states were about to launch new managed long-term services and support programs (Shugarman et al., 2015). Managed long-term services and supports (MLTSS) is discussed in detail in the next section.

3.0 Managed Long-Term Services and Supports (MLTSS)

Managed long-term services and supports (MLTSS) is the delivery of LTSS through capitated Medicaid managed care programs. Services and supports are provided to beneficiaries with functional limitations or chronic illnesses with the main purpose of allowing them to live or work in their setting of choice. MLTSS consist of programs with capitated payments for Medicaid beneficiaries and also for those with Medicare and Medicaid benefits (i.e., full duals) (U.S. Centers for Medicare and Medicaid Services, 2017c). MLTSS programs provide a broad array of medical and social services, such as personal care, home-delivered meals, and transportation, to people with long-term care needs living in institutions (nursing facilities or intermediate care facilities) or in the community (where services are provided in their homes or community settings such as adult day care centers) (Dobson et al., 2017).

Enrollment in MLTSS is based on financial eligibility, which is determined by the state Medicaid agency, and on functional eligibility, which is determined based on an initial assessment to determine the individual's level of care (LOC). The initial LOC assessment is conducted by the state agency or its selected vendor – normally an Area Agency on Aging (AAA) or a Center for Independent Living (CIL). States often use an Independent Enrollment Broker, which is a neutral third party, to enroll and assist members with health plan selection (Kilgore, 2015).

In MLTSS, states contract with healthcare plans and other entities to deliver LTSS either as a stand-alone benefit or as part of a comprehensive service package that includes physical and behavioral health as well as LTSS (Soper, Lipson, Dominiak, & Lloyd, 2018). MLTSS programs are

delivered through an arrangement between the state Medicaid program and managed care organizations (MCOs), which become accountable for the delivery of services and supports that meet quality and other standards stated in the contract (U.S. Centers for Medicare and Medicaid Services, 2013). When operating an MLTSS program, MCOs are expected to conduct a comprehensive needs assessment with each beneficiary, and to coordinate care in order to achieve individualized outcomes, previously agreed upon by the beneficiary and family caregiver, when appropriate. It is expected that on the long-run, MLTSS programs will lead to a decrease in costs of care and greater budget predictability (Center for Health Care Strategies, 2017).

3.1 The Growth of MLTSS in the United States

In 1989, Arizona was the first state to implement MLTSS in the country, paving the way for many other states (Dobson et al., 2017). Responding to demographic and fiscal pressures, the number of states adopting this model grew from 8 states in 2004 to 24 in 2017, and the number of MLTSS programs increased from 19 in 2012 to 41 in 2017 (Adams et al., 2017; Lewis et al., 2018).

Enrollment in this type of program doubled from 2012 to 2017, when the total MLTSS program enrollment reached 1.8 million (Lewis et al., 2018). While Medicaid MLTSS programs differ in the populations they enroll, most states (19 of 24 in 2017) have used MLTSS to serve older adults and people with physical disabilities (Lewis et al., 2018). Increasingly, states have included individuals with behavioral health conditions in their MLTSS programs, seeking to better integrate physical and behavioral healthcare (Dobson et al., 2017).

3.2 Funding for MLTSS

Medicaid spending in MLTSS increased 182 percent from 2012 to 2015 and reached \$29 billion in FY 2015 (Eiken, Sredl, Burwell, & Woodward, 2017). States have leveraged funding opportunities and program design flexibilities offered by the federal government to promote LTSS reforms, such as the Medicaid waivers (Anthony et al., 2017). Medicaid waivers and demonstration authorities allow states to test different service delivery and payment models. As each authority has distinct criteria and limitations, states can also opt for using waivers concurrently. States have increasingly used section 1115 waivers to combine programs offered by section 1915 (b) managed care waivers and section 1915 (c) home and community-based services waivers under a single authority (Musumeci et al., 2018). As a consequence, in 2017 most MLTSS programs were authorized by 1115 demonstration waivers (46%), followed by 1915(b) waivers (27%) (Lewis et al., 2018).

Many states have found the 1115 waivers to be an opportunity to streamline program management, improve care coordination, and increase access to home and community-based services, since with this type of waiver they can provide HCBS to multiple populations under a single authority. In 2016, all 11 states with MLTSS 1115 waivers enrolled seniors and people with disabilities, for a total of 900,000 beneficiaries. Five states also enrolled people with intellectual or developmental disabilities, and six states expanded HCBS coverage to individuals with functional needs and “at risk” of being institutionalized. In 10 of the 11 states, MLTSS enrollment is mandatory (Watts et al., 2017).

3.3 Contributions of MLTSS to Coordinated and Value-Based Care

Care coordination has been considered a key strategy to provide timely, efficient, and quality care to individuals, and it is particularly important for those in need of long-term services and supports (Adams et al., 2017; Saucier & Burwell, 2015). As states move their LTSS programs into managed care and away from fee-for-service arrangements, they reinforce a system that incentivizes accountability and effectiveness. Increasingly, MLTSS contracts between states and MCOs and between MCOs and providers have been risk-based and value-based, which means that services are paid for based on quality instead of quantity of care provided. In fact, these two elements, care coordination and value-based care, are intertwined, since “when MCOs are at risk for providing more types of services, the potential to coordinate services is greater, and there are fewer opportunities to shift costs to other payers” (Kaiser Commission on Medicaid and the Uninsured, 2011, p. 6).

Care coordination is an essential component of MLTSS, as it connects beneficiaries to medical and non-medical services, improves patient experience, and reduces costs. Individuals in need of LTSS often have complex and chronic health conditions that require frequent visits to the healthcare system, ongoing supports, and continuous monitoring. Traditionally provided under Medicaid HCBS programs, care coordination is gaining a leading role in programs that provide comprehensive care, including LTSS and behavioral health (Saucier & Burwell, 2015). A 2015 research study conducted by Truven Health Analytics and published by the AARP Public Policy Institute examined the characteristics of care coordination models used in MLTSS programs in the country. In general care, coordinators are social workers or nurses who manage a mixed

caseload of community and institution residents. Care coordinators normally work for a health plan, but sometimes they work for a third party: a community-based organization or a health system contracted by the MCO (Saucier & Burwell, 2015).

Moreover, as Medicaid is the largest LTSS public funder in the country, states have been seeking ways to ensure that MCOs and providers deliver appropriate, quality and cost-effective services. As part of the shift from fee-for-service to managed care models, states are adopting value-based contracts with MCOs and incentivizing them to do the same with their service providers (Ensslin & Kruse, 2016). Alignment of payment systems with MLTSS programmatic goals is one of the key principles of the Centers for Medicare and Medicaid Services (CMS) for strong Managed Long-Term Services and Supports programs. “Capitation rates that encourage the delivery of high quality services in home and community-based settings and support the goal of community integration, as well as contracts that provide performance-based incentives tied to outcome measures and penalties for poor performance or non-compliance, are effective tools to achieve (MLTSS) goals” (U.S. Centers for Medicare and Medicaid Services, 2013, p. 2).

3.4 MLTSS in Delaware

In the state of Delaware, the population is aging at a faster pace than the overall American population (U.S. Department of Commerce, n.d.). It is estimated that the population aged 65 and over will increase about 91 percent from 2011 to 2030, and the number of people aged 85 and over will increase about 200 percent in the same period (Delaware Health and Social Services, 2011a).

In 2011, Delaware's long-term care system was fragmented and heavily institutional, with 3,000 individuals living in nursing facilities and 1,800 receiving services under community waivers. Providers were contracted in a fee-for-service system, and there were limited options and choices for consumers (Delaware Health and Social Services, 2011b). The state of Delaware was spending more than 90 percent of its Medicaid long-term care budget in institutional care, paying about \$81,000 annually for each of the 2,421 nursing facility residents for which Medicaid was the primary payer (Delaware Health and Social Services, 2011a).

Aiming to address these issues, the state launched the Delaware Diamond State Health Plan Plus (DSHP Plus), in April 2012. The DSHP Plus program was approved by CMS as an extension of the state's 1115 demonstration (DSHP), and expanded managed care to new populations, including groups previously receiving home and community-based services under the Elderly and Disabled (E/D) and AIDS waivers.

When implementing the DSHP Plus program, Delaware changed its level of care (LOC) criteria to make the HCBS requirement less restrictive than the nursing facility requirement. Individuals in need of assistance with one activity of daily living (ADL) are eligible for HCBS, and those in need of assistance for two or more ADLs are eligible for nursing facility (Pavle, Saucier, Amos, & Kasten, 2017). This change aimed to help rebalance the LTSS system in the state by encouraging home and community support to individuals with long-term care needs to prevent or delay the need for institutionalization (Delaware Health and Social Services, 2011a).

Upon meeting the LOC criteria to receive HCBS, enrollees are eligible for a benefit package. This package includes personal care, respite care for caregivers, adult day services, cognitive services, personal emergency response system, independent activities of daily living

service (i.e., chore services), home-delivered meals, specialized medical equipment and supplies, community transition services, and minor home modifications determined to be cost-effective and medically necessary (Delaware Health and Social Services, 2011b; Highmark Health Options, 2018).

Since this is a mandatory program, all Medicaid beneficiaries in Delaware considered eligible for LTSS are assigned to one of two MCOs operating the MLTSS program in the state. In January 2015, Highmark Health Options – a partnership between Highmark Health and Gateway Health – became one of the MCOs responsible for coordinating and providing LTSS in both institutional and community-based settings (Delaware Health and Social Services, 2017b; Mercer Government Human Services Consulting, 2017). As of June 2017, Highmark Health Options had 2,484 members eligible for LTSS, 69 percent being community residents receiving HCBS, and 31 percent being nursing facility residents (Mercer Government Human Services Consulting, 2017).

Immediately upon enrollment into Highmark Health Options (HHO), the member is assigned to a case manager based on the individual's needs, county of residence, and care setting (i.e., nursing facility or community setting). Case managers are responsible for coordinating care across physical health, behavioral health, and long-term services and supports (Delaware Health and Social Services, 2017a).

Based on the initial assessment of a member's behavioral, economic, environmental, medical, social, and spiritual strengths and needs, case managers work with members and families to develop individualized plans of care. These plans consider each member's needs, risk factors, goals, preferences, and existing support system. Each plan describes the type, scope, amount, frequency, and start and end dates of each service to be provided, as well as the

member's goals and preferences for treatment. Case managers continuously monitor and periodically review and update these plans with members and their families (Highmark BCBSD Inc., 2014).

In addition, case managers periodically contact members, in person or through telephone calls. New members in the program receive an initial in-person visit within ten business days of enrollment. Further, those living in community settings receive quarterly in-person visits, and those living in nursing facilities receive an in-person visit every six months. All members in the program receive monthly phone calls from their case managers and annual reassessment of their level of care (the initial one is conducted by the state Medicaid agency staff) (Mercer Government Human Services Consulting, 2017).

The program also offers financial management and general support for those who choose to self-direct their personal care services. In cases of "self-directed" services, the member, or someone chosen by the member, becomes the legal employer of the paid caregiver and is responsible for choosing the provider (Delaware Health and Social Services, 2011b, 2017a; Highmark Health Options, 2018). One of the expected outcomes of Highmark Health Options is that members who receive HCBS can demonstrate the ability to maintain their independence and stay safely in their homes and communities, an outcome that is aligned with the concept of aging in place. Appendix A presents the logic model for Highmark Health Options, developed based on a literature review about the program and validated by the program's Executive Director.

3.5 Home and Community-Based Services in MLTSS Programs

Home and community-based services (HCBS) are health and human services that aim to meet individuals' medical needs and to support their daily living, in some cases complementing the care provided by families and friends (U.S. Centers for Medicare and Medicaid Services, 2017b; Weaver & Roberto, 2017). HCBS encompasses services such as personal care, adult day care programs, case management, habilitative services (i.e., healthcare services that help individuals to keep or improve functioning for daily living), home modifications, respite care, and assistive technology (Watts et al., 2017). They are designed to promote independence and choice for care recipients and help older adults stay at home longer, delaying or avoiding their institutionalization (Chen & Thompson, 2010; Weaver & Roberto, 2017).

The capitation rate paid by state governments to health plans in MLTSS programs encourages the use of HCBS to support people in their homes by providing services appropriate to their needs as an alternative to institutional care (National MLTSS Health Plan Association, 2017b). Many states have anticipated that incentives built into their MLTSS programs will lead to increasing beneficiary access to HCBS (Musumeci, 2015), and some states have already reported that home and community-based services comprised about 70 percent of their annual MLTSS expenditures (Libersky et al., 2018).

3.5.1 Personal Care / Attendant Care Services

Personal care services are non-medical services rendered to community-dwelling older adults or people with illnesses or disabilities to help them with everyday activities (Summer & Ihara, 2005). These services provide hands-on assistance with ADLs, such as eating, bathing, dressing, toileting, transferring (e.g., walking from one place to another), and feeding, as well as with some instrumental activities of daily living (IADLs), such as meal preparation, light housework, grocery shopping, money management, and transportation (Office of Inspector General, 2012; U.S. Centers for Medicare and Medicaid Services, 2017d, 2018c).

In most cases, informal caregivers (i.e., family and friends) are those responsible for providing personal care to people with long-term care needs, but individuals with limited family support or with increasing care needs often need to turn to paid sources of personal care. While some people pay out of pocket for these services, many individuals rely on public programs, such as Medicare and Medicaid, to access this benefit (National Quality Forum, 2016; Summer & Ihara, 2005).

A national survey conducted by National Alliance for Caregiving and AARP Public Policy Institute (2015) found that personal care activities, which include dealing with urine and fecal incontinence, assisting with bathing or showering, and helping the care recipient to and from the toilet, are considered by informal caregivers the most difficult support to provide. Personal care services are also critical for older adults to continue living in their homes with quality and independence (U.S. Centers for Medicare and Medicaid Services, 2018c) and a key component of Medicaid spending on home and community-based services (Iritani, 2017).

Highmark Health Options offers its LTSS members living in community settings (other than assisted living facilities) the benefit of having “attendant care services,” which is the term used by HHO for personal care services. The program also offers members the option of “self-directed attendant care,” giving them more choice and control over who provides the service and how (Highmark Health Options, 2018). Under this category, care recipients are allowed to hire family members or friends as their providers (Khatutsky, Anderson, & Wiener, 2006).

Self-direction, also called consumer-direction, has been defined by The National Institute on Consumer-Directed Long-Term Services as:

a philosophy and orientation to the delivery of home and community-based services whereby informed consumers make choices about the services they receive. They can assess their own needs, determine how and by whom these needs should be met, and monitor the quality of services received (Coleman, 2001, p. 1).

Self-directed services have been especially popular among older adults, as they prefer being able to manage their own care with the support of family and friends (Coleman, 2003). Studies with Medicaid beneficiaries have found that older adults receiving consumer-directed personal care services are more satisfied with the care received and with the overall care arrangements and less likely to report unmet needs than those receiving personal care services through the traditional agency-directed model. There is no evidence of a difference in the quality of service provided under consumer direction, and self-directed beneficiaries have similar health outcomes to their counterparts whose services were arranged by agencies (Simon-Rusinowitz, Loughlin, Ruben, Martinez Garcia, & Mahoney, 2010; Wiener, Anderson, & Khatutsky, 2007).

When beneficiaries choose to self-direct these services, they receive financial management and general support from a fiscal employer agent that manages payment and taxes,

which also helps the member find and train attendant care employees (Highmark Health Options, 2018). They also must have a backup plan for times when the attendant care employee is not available or does not show up. Case managers are expected to report potential cases of abuse, neglect, or exploitation (e.g., fraud), and a 1-800 number is also available for beneficiaries to report them directly (Highmark Health Options, 2018).

4.0 Need and Opportunity to Evaluate HCBS Provided under MLTSS Programs

The Managed Long-Term Services and Supports (MLTSS) model was created to address serious issues related to long-term care in the United States and to promote better care experience to populations with complex health and social needs. Aiming also to better support those who want to live and age in their communities and to offer more cost-effective care solutions, MLTSS programs have been increasingly adopted as a way to expand home and community-based services (U.S. Centers for Medicare and Medicaid Services, n.d.-d). However, despite its rapid growth in the country, little is known to date about the actual results and cost-effectiveness of the MLTSS model, and few studies on the value of MLTSS programs have been published (Dobson et al., 2017).

4.1 The Promise of Managed Long-Term Services and Supports

The provision of managed care to Medicaid LTSS enrollees has been adopted in the country with great expectations for its positive impacts. An issue brief published by Kaiser Commission on Medicaid and the Uninsured (2011) stated that the model was appealing from a financial standpoint due to its potential to deliver more cost-effective services and to increase budget predictability. It was also a promising strategy for better service coordination and integration, and for helping rebalance the LTSS system in favor of community-based services. The

model was also praised for helping managed care organizations (MCOs) become an important source of data about LTSS costs, quality, and outcomes.

On its website [Medicaid.gov: Keeping America Healthy](https://www.medicare.gov/keeping-america-healthy), the Centers for Medicare & Medicaid Services (CMS) presents the MLTSS model as an increasingly adopted strategy to expand home and community-based services, promote community inclusion, ensure quality, and increase efficiency (U.S. Centers for Medicare and Medicaid Services, n.d.-d). By integrating physical, behavioral health, institutional, and community-based LTSS, the model has also been lauded for having the potential to improve quality of care by addressing individuals' needs more holistically and by promoting better interaction between acute care and LTSS (Harrington, Wiener, Ross, & Musumeci, 2017).

Figure 1 displays the theory of change of the MLTSS model, designed based on the literature review for this dissertation. The central assumption is that long-term services and supports (when provided in a coordinated, person-centered, cost-effective way, and in the most integrated setting) lead to outcomes at the patient level (e.g., better utilization of services, better health outcomes, better experience of care, and better quality of life). This will lead to results at the system level (e.g., rebalance in the LTSS in favor of HCBS and cost control by MCOs), which contribute to important results at the policy level and in population health.

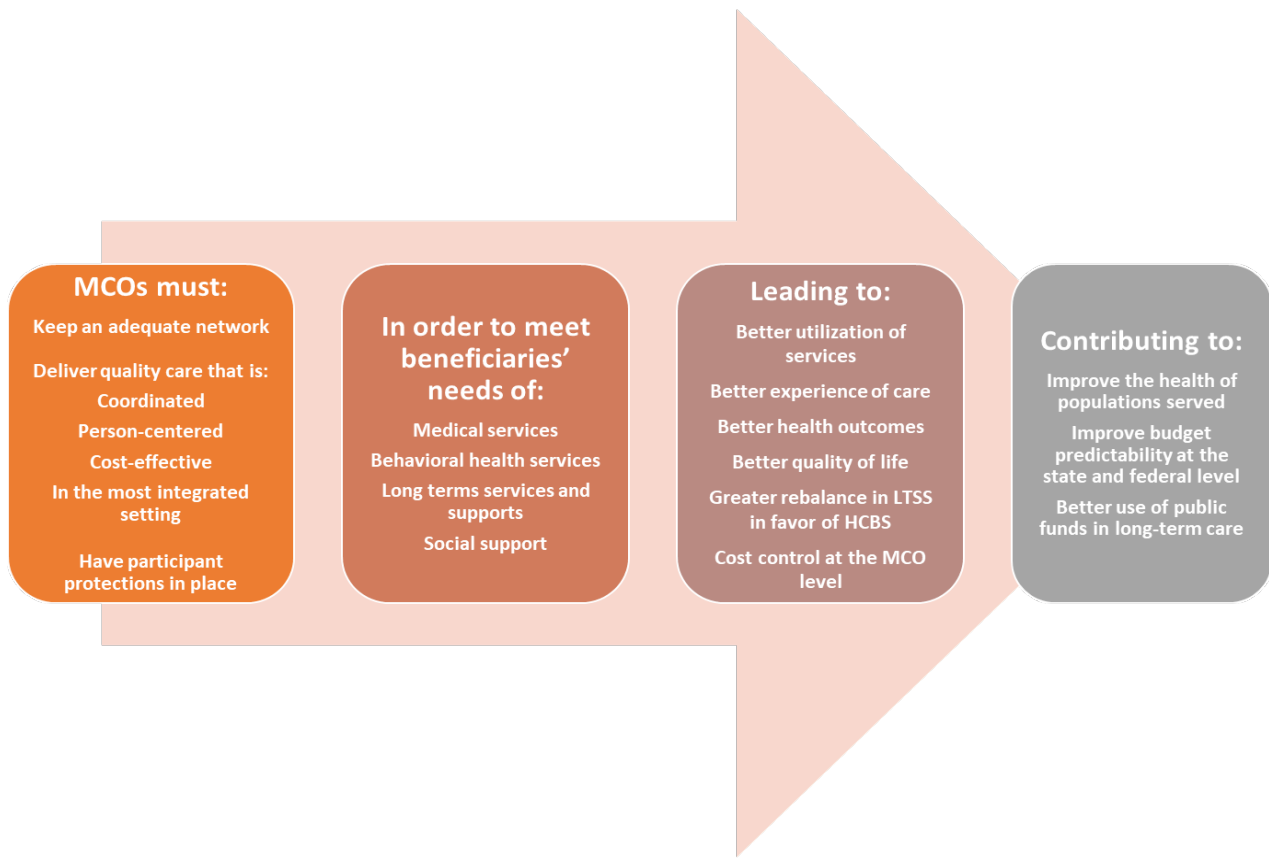


Figure 1. Theory of Change of the Managed Long-Term Services and Supports Model

4.2 Existing Evaluations of MLTSS Programs

Existing evaluations of MLTSS programs can be classified into four main categories, based on the type of study: (1) mandatory by the government, (2) commissioned by CMS, (3) conducted by national associations of MLTSS and HCBS providers, and (4) conducted by universities.

4.2.1 Evaluations required by government

The 1997 Balanced Budget Act established that all state Medicaid agencies that contract with MCOs have a quality assessment and improvement strategy aligned with the U.S. Department of Health and Human Services standards. The act also requires that external quality review organizations evaluate and report on MCO's ability to provide access to quality and timely care and services (U.S. Centers for Medicare and Medicaid Services, 2012a).

An external quality review organization (EQRO) is an independent organization responsible for providing external quality reviews (EQRs) for MCOs based on standards developed by the U.S. Department of Health and Human Services in partnership with the National Governors Association (National Council on Medicaid Home Care, 2013; Paradise & Musumeci, 2016). EQROs must conduct an annual external quality review of each health plan operating as an MCO and deliver technical reports, which states are required to post on their websites by April 30 of each year (Commonwealth of Pennsylvania Department of Human Services, 2018).

The methodology used by EQROs to perform annual reviews of MLTSS plans includes five main steps: (1) collecting information from the state Medicaid agencies and MCOs, (2) reviewing all documents using compliance EQR review tools provided by or adapted from CMS protocols, (3) conducting on-site visits for document review and interviews with MCO leadership teams and staff (and with MCO providers and contractors when feasible), (4) performing data analysis, and (5) reporting to MCOs and states (Mercer Government Human Services Consulting, 2017; U.S. Centers for Medicare and Medicaid Services, n.d.-e).

4.2.2 Evaluations commissioned by CMS

In 2014, CMS started a national, cross-state evaluation of the section 1115 demonstrations, including those that expanded managed care to provide LTSS for beneficiaries who are frail or disabled. The purpose of this evaluation was to assess the general performance of the demonstrations, their outcomes, and impact (U.S. Centers for Medicare and Medicaid Services, n.d.-a). Along with providing guidance for states to develop their own section 1115 demonstrations evaluation design (U.S. Centers for Medicare and Medicaid Services, n.d.-g) and to prepare evaluation reports (U.S. Centers for Medicare and Medicaid Services, n.d.-h), CMS commissioned Mathematica Policy Research, Truven Health Analytics, and the Center for Health Care Strategies to conduct an independent evaluation of recent MLTSS programs (Pavle et al., 2017). This evaluation aims to assess three things: (1) changes over time in per-user MLTSS spending, (2) service utilization by MLTSS enrollees in comparison to that of fee-for-service LTSS beneficiaries, and (3) quality of care provided to MLTSS enrollees in comparison to what is provided to fee-for-service LTSS beneficiaries (Libersky et al., 2018).

In January 2018, CMS released an interim report with preliminary findings for changes in MLTSS spending and service utilization, and a final evaluation report is expected for 2019. In the interim report, MLTSS spending patterns, including the balance of LTSS spending on HCBS and per-user spending, were analyzed based on data from 17 states that reported complete MLTSS expenditures in 2015. Differences in utilization of services between MLTSS and fee-for-service systems were assessed through comparisons of MLTSS enrollees in two states' programs – New York's Managed Long-Term Care program and Tennessee's CHOICES program – with a similar

group of people receiving LTSS under the traditional model. Findings demonstrated positive results regarding rebalancing the LTSS system, with HCBS accounting for 63.2 percent of the LTSS expenditures among the 17 states in 2015. Nevertheless, findings regarding utilization of services showed mixed results. In New York, enrollment in MLTSS program was associated with lower use of institutional services and more use of HCBS, especially personal care; it was also associated with lower hospitalization rates, fewer and shorter hospital stays. In Tennessee, however, while enrollment in MLTSS was associated with increased use of personal care services, it was also associated with higher hospital use, especially among the Medicare-Medicaid beneficiaries (Libersky et al., 2018).

4.2.3 Evaluations done by national associations of MLTSS and HCBS providers

In 2016, the National Association of States United for Aging and Disabilities and the Center for Health Care Strategies created the MLTSS Institute to advance improvements in key MLTSS policy areas, facilitate sharing and learning among states, and offer technical assistance to states and MCOs (Dobson et al., 2017). Acknowledging the need for greater evidence about the value of this model of care, the Institute surveyed 12 states operating MLTSS programs in the country: Arizona, Florida, Iowa, Kansas, Massachusetts, Minnesota, New Jersey, New Mexico, Rhode Island, Tennessee, Texas, and Virginia. The survey instrument consisted of 37 questions about different MLTSS policy areas, and the states' responses were supplemented with additional information from published literature and reports. The final document, entitled "Demonstrating the Value of Medicaid MLTSS Programs," does not identify technical specifications of the

methods used or identify the respondents. The report summarizes the states' progress with MLTSS in four areas: (1) rebalancing LTSS spending; (2) improving member experience, quality of life, and health outcomes; (3) reducing waiver lists and increasing access to services; (4) increasing budget predictability and managing costs (Dobson et al., 2017).

In the same year, 2017, the national association of health plans that currently have contracts with states to manage Medicaid LTSS programs released the report "The Value of Managed Long-Term Services and Supports." The document presents a series of benefits of the model compared to the traditional fee-for-service LTSS. According to the authors, MLTSS provides a better experience of care for Medicaid beneficiaries, and greater opportunity to continue living independently through increased access to HCBS. The model also results in better health outcomes and quality of life. And, by increasing access to HCBS, MLTSS helps states to make better use of limited resources, serving a greater number of beneficiaries and with better results. Ultimately, the whole society benefits from the model for having lower healthcare spending overall, including those with the most complex care needs (National MLTSS Health Plan Association, 2017b).

4.2.4 Evaluations conducted by universities

States have also contracted with universities to conduct independent assessments of their MLTSS programs. In 2016, the Florida Agency for Health Administration commissioned Florida State University to evaluate the Agency's Florida Long-Term Care Managed Care Program in the 2014-15 fiscal year, in terms of access, quality, and cost-effectiveness of care (Florida State

University, 2017). Similarly, the Pennsylvania Department of Human Services Office of Long-Term Living contracted the University of Pittsburgh Medicaid Research Center to conduct a comprehensive multi-year evaluation of the implementation and outcomes of Community Health Choices, the new MLTSS program being implemented in the state (Degenholtz & Cole, 2017).

4.2.5 Commonalities and limitations of existing studies

The evaluations presented above vary in their purpose and methodology, but they have some commonalities. First, most studies used data reported by states or state-level secondary data. Second, even though MLTSS programs serve a diverse population and differ on covered benefits, all studies of outcomes present general results of the programs, not specifying them by sub-populations. Third, most studies used convenience samples of states, and do not use comparison groups to assess the effectiveness of the model. And finally, studies that offered an overview of MLTSS in the country presented different pieces of evidence from each program and state evaluated, which does not allow for generalization of results, and does not offer an adequate comparison of performance among programs.

A large part of government oversight has been making sure MCOs are compliant with their contractual obligations. Much of the focus has been on the implementation of MLTSS in the states and on the procedures in place, rather than on the effective results of the model and on the factors that have contributed or hindered the expected outcomes and impact. Evaluators have recommended that MCOs and states improve data collection, monitoring, and evaluation

of program outcomes, especially in areas such as enrollee and family satisfaction, quality of life, physical health outcomes, and program cost-effectiveness (Dobson et al., 2017; Lipson, 2018).

4.3 Issues and Roles with Performance and Quality Evaluation in MLTSS

Even though assessing performance and quality is fundamental to appraising the value of any health service and model of care, efforts to define an appropriate and standardized way to measure performance and quality in MLTSS programs are still underway. With the lack of national measures, state Medicaid agencies have developed their own measures for MLTSS programs, resulting in approaches varying from one state to the next, and in most LTSS measures being state specific and not validated (Lipson, 2018; National MLTSS Health Plan Association, 2018; Saucier et al., 2012; Soper et al., 2018).

According to the National MLTSS Health Plan Association (2017a, p. 1), “while MLTSS plans are required to collect, analyze, and report on volumes of data about our members and the services they receive, there are, to date, no generally agreed-upon, national, validated measures to hold us accountable for the quality of those services or to reliably compare our performance state-by-state and nationally.” The need for national standardized MLTSS measures was also discussed in the MLTSS Summit, part of the annual Managed Care Congress held in Washington, DC, in February 2018. Lipson (2018), a senior researcher at Mathematica Policy Research, also highlighted the existence of serious challenges to develop MLTSS measures. These challenges include issues with data availability and reporting feasibility, great differences, and capabilities of MCOs’ data systems; the subjectivity of concepts such as quality of life and community

integration; and states' various contract models and requirements, which complicate efforts to develop standardized measures. Also, data for risk-adjusted LTSS outcome measures based on functional limitations is generally unavailable and hard to collect (Lipson, 2018).

Quality in healthcare was defined in 1990 by the Institute of Medicine as the delivery of health services that lead to desired health outcomes and are consonant with current professional knowledge (U.S. Government Accountability Office, 2017). States have direct responsibility for overseeing LTSS providers' quality of care in fee-for-service arrangements, but when they adopt the MLTSS model, they delegate this authority to MCOs. Therefore, when contracting with states, MCOs assume responsibility for all services set in the contract, and also for monitoring the quality of providers who deliver LTSS medical and non-medical services in both institutional and community-based settings. (U.S. Department of Health and Human Services, 2013).

4.4 MLTSS and the Opportunity for Better Evaluation of HCBS

Despite the increasing adoption of the managed care model for LTSS programs, little is known about the value of MLTSS in its capacity to fulfill its promise to improve health outcomes and control costs by offering coordinated care to those with long-term care needs (Dobson et al., 2017). In the context of MLTSS programs, home and community-based services play an essential role in helping older adults to remain in the community, living with quality and independence, as well as in helping states to expand their capacity to serve Medicaid beneficiaries with LTSS needs (National MLTSS Health Plan Association, 2017b).

Building an effective HCBS system has become a vital task for governments, policymakers, and MCOs, and understanding how these services support older adults ability to age in place has been seen as an essential step in this process (Chen & Thompson, 2010). Besides, the adoption of the managed care model to provide LTSS has generated increased attention to the need for better evaluation of home and community-based services, their quality, and outcomes (National Quality Forum, 2016).

MLTSS programs, on the other hand, create a better environment for the design and implementation of HCBS evaluations. Under the MLTSS model, case managers are expected to assess the needs of each member holistically and to connect them to medical and non-medical services, improving members' experience and the use of healthcare services (Saucier & Burwell, 2015). This person-centered care, a central piece of the MLTSS model, has been seen as an opportunity to improve quality measurement in HCBS (AcademyHealth, 2015), and managed care organizations are expected to become a valuable new source of data for LTSS evaluations (Kaiser Commission on Medicaid and the Uninsured, 2011).

MLTSS performance measures are often different from those for other services, and, in the context of MLTSS programs, diverting nursing facility admissions and reducing potentially and unnecessary care have been identified as ways to assess HCBS quality and the value of MLTSS (Soper et al., 2018). Also, knowing the risk factors for long-term nursing facility stays and identifying home and community-based services that help prevent this outcome can help inform policy and program decisions about how to better allocate resources among LTSS/HCBS beneficiaries (Greiner et al., 2014).

With the spread of MLTSS programs in the country, MCOs have become a new and important source of data about the efficacy and effectiveness of the model and the various benefits offered to its participants (Kaiser Commission on Medicaid and the Uninsured, 2011). To date, most of the government oversight has been on MCOs' compliance with contractual obligations and program regulations. However, an increasing interest in outcomes evaluation has already been demonstrated by CMS (Lipson, 2018; U.S. Centers for Medicare and Medicaid Services, 2018a).

5.0 Evaluation Study

This evaluation is an observational retrospective cohort research study (Gordis, 2014) that uses enrollment and claims data of Highmark Health Options (HHO) members who participated in the program between January 1, 2015, and December 31, 2017. The main study purpose is to investigate whether attendant care services, provided to older adults as part of an MLTSS program, contribute to their aging in place, avoiding long-term institutionalization. Aging in place is here defined as “the ability for people to age in their homes and communities, safely and independently, and having the support needed to transition well through life changes” (Arai et al., 2012; Centers for Disease Control and Prevention, 2009; Greenfield, 2012; Tang & Lee, 2011; Wiles et al., 2011).

Five other home and community-based services, which are also part of the package of benefits available to Highmark Health Options LTSS members and contribute to the common purpose of helping community-dwelling seniors to age in place, were included in the study as potential confounders. They are adult day care, personal emergency response system (PERS), home-delivered meals, in-home respite care, and minor home modifications.

5.1 Evaluation Approach

The design process of this evaluation followed the principles of Utilization-Focused Evaluation, the approach developed by Michael Quinn Patton (Patton, 1997). According to

Patton, the value of an evaluation should be judged by its usefulness to its intended users, and therefore, evaluations should be planned and implemented in ways that increase the likely utilization of its findings to inform decisions and improve the program and organizational performance (BetterEvaluation, n.d.).

As this evaluation study aims to respond to the information needs of the HHO team and Gateway Health, I used different means to gather their impressions about the program and its potential results, and their input on what would make this evaluation useful for them. This process encompassed a field trip to Delaware in August 2018 (which included a meeting with case managers and supervisors, and observation in two “ridealongs” with case managers), key informant interviews with members of the HHO senior team, and weekly meetings with the senior leadership in the Research, Development & Analytics department at Gateway Health, in Pittsburgh, PA.

5.2 Evaluation Focus and Scope

The definition of the evaluation focus and scope considered the literature review on MLTSS, HCBS, and the information collected with the abovementioned stakeholders. As the MCO of the program, Gateway Health is interested in evaluating to what extent attendant care services contribute to reducing long-stay nursing facility (LSNF) admissions of older adults, and if these results are different when services are self-directed.

According to Boaz and Muller (1994, p. 393),

The long stays can absorb a large share of nursing home resources. These are the stays that the elderly try to avoid or postpone as long as possible because they prefer living in the community to spending the remaining months or years of their lives in a nursing home. These are also the stays that are relevant to the Medicaid program because the risk of "spending down" to poverty increases with the length of stay.

This study considers LSNF admissions those that last 90 days or longer. The 90-day cutoff has been used by other researchers to distinguish between nursing facility admissions for rehabilitation purposes and those for institutional long-term care (X. Cai & Temkin-Greener, 2015).

5.2.1 Research Questions and Hypotheses

The primary focus of this evaluation is on the effect of personal care, also called attendant care services, on avoiding LSNF admissions. To this end, this study will respond to three research questions and test their related hypotheses:

Table 3: Research Questions and Hypotheses

Research Questions	Hypotheses
1. Does receiving attendant care services help older adults to age in place, avoiding long-term institutionalization?	<i>Those receiving attendant care services are less likely to have long-stay nursing facility admissions.</i>
2. Does the <u>dosage</u> of attendant care services make a difference in the likelihood of having long-stay nursing facility admissions?	<i>The greater the dosage of attendant care services, the lower the odds of having a long stay nursing facility admission.</i>
3. Does the <u>type</u> of attendant care services make a difference in the likelihood of having long-stay nursing facility admissions?	<i>The odds of having a long stay nursing facility admission are not significantly different between those who receive attendant care services from an agency and those who self-directed these services.</i>

5.3 Study Methods

5.3.1 Study sample and cohorts

The study population consisted of Delaware community-dwelling older adults (65+), Medicaid beneficiaries, who were assessed by the state department as eligible for nursing facility level of care, and who enrolled in the HHO program in 2015 – 2017. As illustrated in Figure 2, 491 individuals met the study eligibility criteria: be an older adult, living in a community setting other than an assisted living facility, and who was enrolled in the program as an LTSS member for at least six full months.

These criteria ensure that all study members were entitled to receive all HCBS benefits provided to HHO members and that despite any eventual eligibility gap during the study period, they were enrolled in the program as LTSS/HCBS members for at least six full months.

Members who were classified as HCBS but had a LSNF admission within three days from enrollment were excluded from the study. In conversations with Gateway Health leadership, it was concluded that these cases were probably misclassified as HCBS.

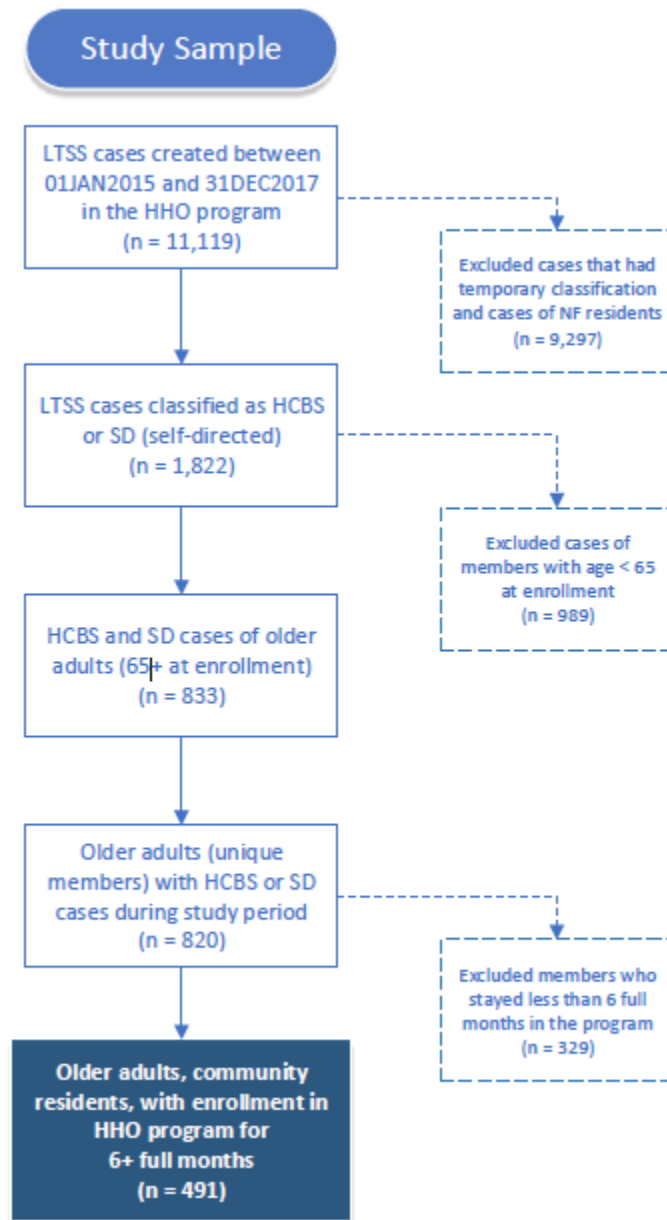


Figure 2. Flowchart of the Study Sample

To answer the research questions posed for this study, I grouped participants in different cohorts, by dosage and type of attendant care services received during the study period, as displayed in Figure 3.

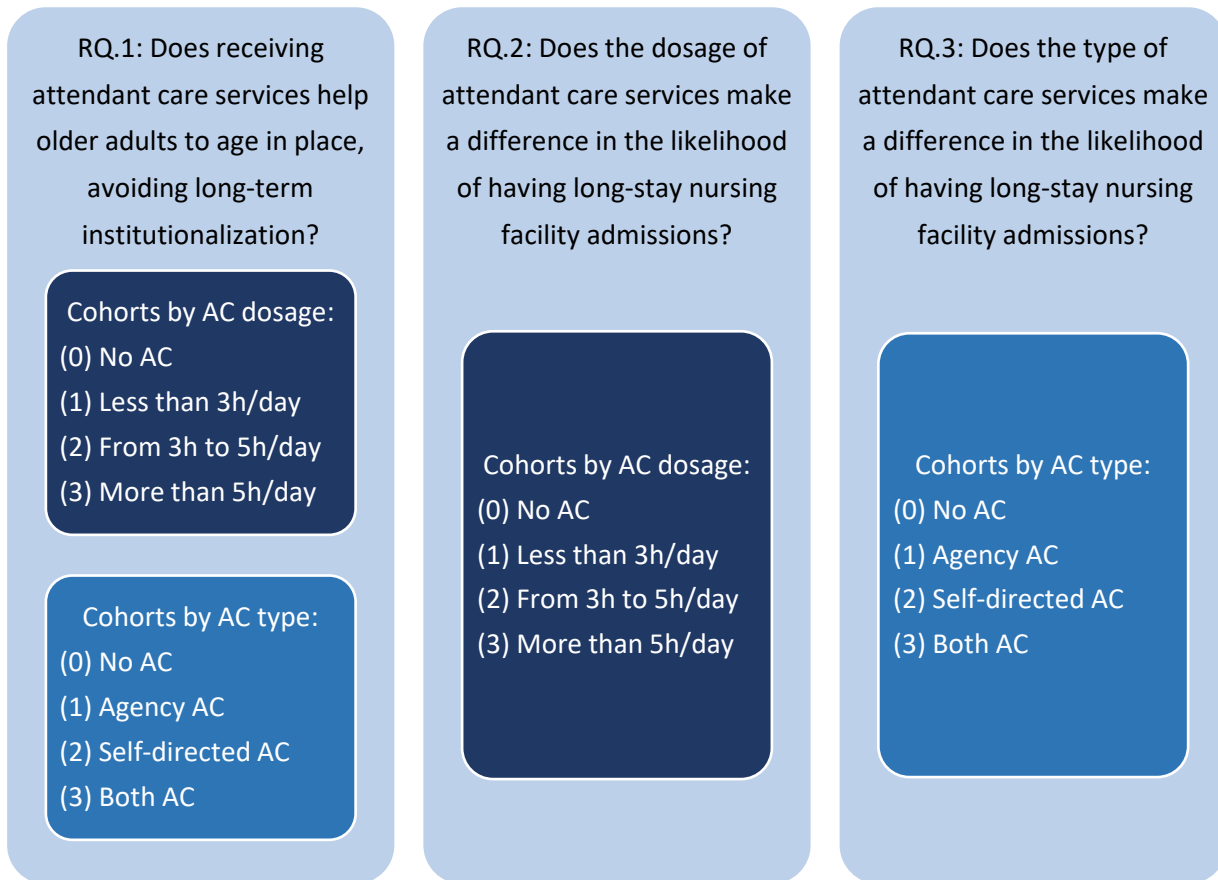


Figure 3. Research Questions and Study Cohorts

5.3.2 Data sources

This study uses claims, eligibility, and enrollment data provided by Gateway Health, the MCO responsible for the HHO program in Delaware. As data collected from members and providers is stored in different database schemas, the process of finding, organizing, and cleaning the data for this study was accomplished in steps. First, I built separate datasets with members' information on six topics: demographics, program enrollment, use of attendant care services, baseline health conditions, use of other key HCBS, and nursing facility stays (Appendix B contains diagrams describing the processes of building the study datasets). Then I compiled aggregated per-member data into a master dataset with the variables described below, as shown in Figure 4.

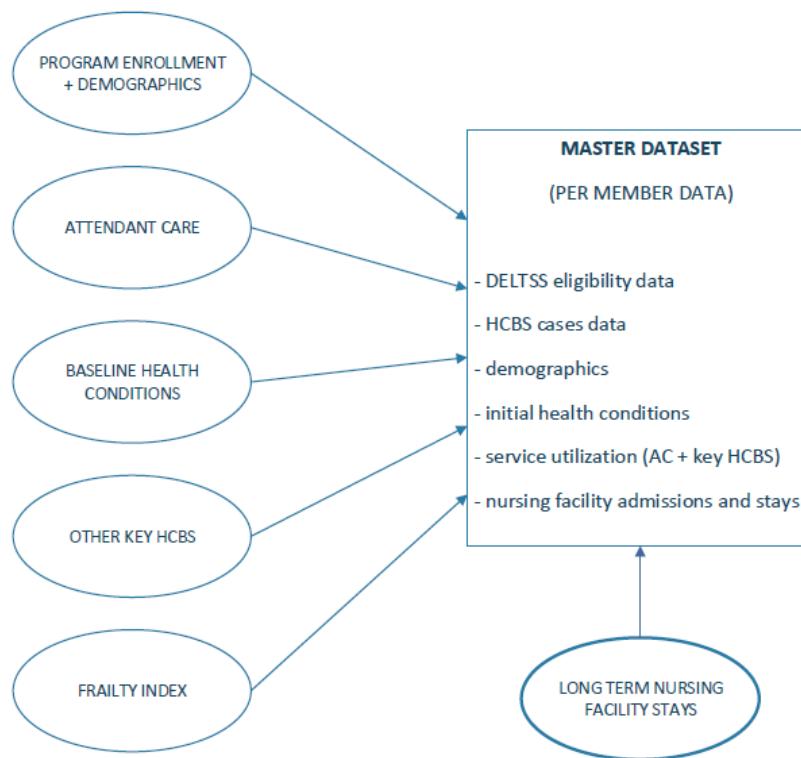


Figure 4. Study Datasets

5.3.3 Study variables

The selection of study variables was based on the literature review of MLTSS and HCBS, on the conceptual framework developed for this research, and on the data available for this study. I also included factors that have been identified in the literature as important confounders for interventions targeting older adults (Bakk, Cadet, Lien, & Smalley, 2017; Blackburn et al., 2016; X. Cai & Temkin-Greener, 2015; Ewen et al., 2017; Fields, Anderson, & Dabelko-Schoeny, 2014; Hwang, Cummings, Sixsmith, & Sixsmith, 2011; Keall et al., 2015; McCann et al., 2005; Meucci, Gozalo, Dosa, & Allen, 2016; Stewart & Irvin, 2017).

The main predictor in this study is the use of attendant care services. Using claims data, I identified members who had attendant care services during the study period. From the HCPCS⁴ codes it was possible to distinguish regular attendant care services (provided by an agency) from self-directed attendant care services, which allowed me to classify members in four categories according to attendant care (AC) type: (0) no AC, (1) agency AC, (2) self-directed AC, and (3) both types of AC. I calculated the dosage of attendant care services received during the study period by summing up all hours of services provided, calculating the number of days members received such a service and computing AC dosage as the average number of hours per day.

This study's outcome of interest is *long-stay nursing facility admissions*. As there is not much variation in the count of LSNF admissions (91% of members who had LSNF admissions

⁴ The Healthcare Common Procedure Coding System (HCPCS) was created by the Centers for Medicare and Medicaid Services (CMS) to standardize billing procedures. The system includes two levels of codes: level I includes Current Procedural Terminology (CPT) codes created and managed by the American Medical Association (AMA), and level II includes codes created and managed by CMS to identify non-physician services (Torrey, 2018).

during the study period had only one admission), I created a dichotomous variable for the dependent variable (DV): members who had at least one LSNF admission (1), and those who did not have LSNF admissions during the study period (0).

Confounding factors selected to this study are related to conditions considered predictors of nursing facility admissions, as well as demographics considered by other authors as predisposing factors for healthcare utilization in the United States (Q. Cai, Salmon, & Rodgers, 2009) (Figure 5). Previous studies have identified frailty, chronic and complex health conditions (which lead to higher utilization of healthcare resources), and poor coordination of services as predictors of institutionalization, hospitalization, and increased risk of death of older adults (Bakk et al., 2017; Fields et al., 2014; McCann et al., 2005; Meucci et al., 2016; Newcomer et al., 2016). In order to account for the influence of these three factors – frailty, healthcare utilization, and coordination risk – I assessed them at baseline and included them in the statistical models. Baseline was defined as the date of enrollment as LTSS/HCBS in the Highmark Health Options.

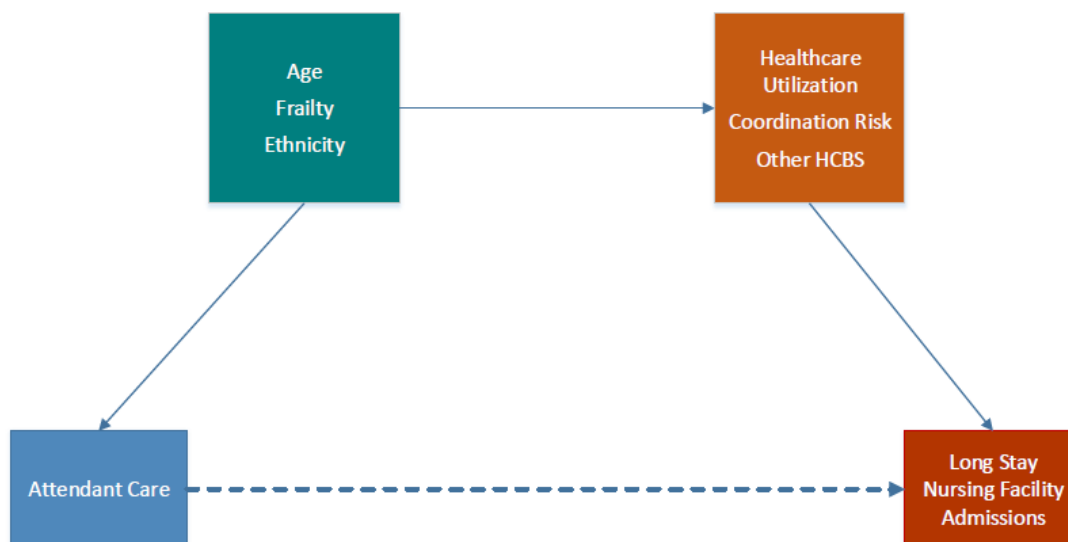


Figure 5. Predictive and Confounding Factors of Long-Stay Nursing Facility Admissions

Measures related to these three factors are calculated by the DSTHS Care Analyzer[®] (Care Analyzer), an NCQA-certified HEDIS⁵ software that uses the Johns Hopkins Adjusted Clinical Groups System to predict healthcare utilization based on patient's age, gender, and medical and pharmacy claims data (DST Health Solutions, 2015; Johns Hopkins Bloomberg School of Public Health, 2014). The Johns Hopkins Adjusted Clinical Groups (ACGs) are a diagnostic-based and person-focused method of categorizing individuals based on their illnesses and expected need of healthcare resources (Austin, van Walraven, Wodchis, Newman, & Anderson, 2011; Johns Hopkins Bloomberg School of Public Health, 2014). Several studies have used the Johns Hopkins ACG system to measure comorbidity in order to predict healthcare utilization and mortality (Antoniou, Ng, Glazier, Kopp, & Austin, 2014; Austin, Stanbrook, Anderson, Newman, & Gershon, 2012; Austin et al., 2011; Huntley, Johnson, Purdy, Valderas, & Salisbury, 2012). The ACGs system has been compared with other comorbidity classification methods used for risk stratification and predictive analyses (such as the Charlson and Elixhauser indices) and has been considered of comparable accuracy (Antoniou et al., 2014; Huntley et al., 2012).

Based on Johns Hopkins ACGs, Care Analyzer creates various variables, such as a frailty flag, resource utilization band, and coordination risk. The first variable, frailty flag, is a medically frail condition marker. It is a dichotomous variable that indicates whether an individual aged 18 or older has a diagnosis falling within any one of the 10 clusters that represent medical problems associated with frailty (malnutrition, dementia, severe vision impairment, decubitus ulcer, urine

⁵ HEDIS is the Healthcare Effectiveness Data and Information Set developed by the National Committee for Quality Assurance (NCQA), a not-for-profit organization working to improve healthcare quality (National Committee for Quality Assurance (NCQA), 2018).

incontinence, fecal incontinence, social support needs, fall, difficulty walking, and loss of weight) (Johns Hopkins Bloomberg School of Public Health, 2014). Considering that a better measure of the degree of frailty was necessary, I created two new variables for this study: Frailty Sum and Frailty Index. For those two variables, I identified claims with diagnosis and procedure codes related to the 10 clusters of conditions used by Johns Hopkins' model (Johns Hopkins Bloomberg School of Public Health, 2014). Frailty Sum is the total number of clusters of frailty conditions associated with the member in a specific period. Frailty Index measures the proportion of clusters of frailty associated with the member in a specific period, and it varies from 0 to 1 (1 being equal to having all 10 clusters of conditions). When used as a baseline measure, both Frailty Sum and Frailty Index were computed based on claims from services provided to the members within 90 days from their enrollment as HCBS/LTSS in the program.

The second variable, resource utilization band (RUB), groups individuals in categories based on their ACGs and estimates of healthcare resources use. There are six categories for this variable, going from Healthy Users to Very High Users (Johns Hopkins Bloomberg School of Public Health, 2014). For this study, this variable was renamed Healthcare Utilization and recoded: 0 (No valid information) as 0 (Unknown); 1 (Healthy Users) and 2 (Low Users) as 1 (Low); 3 (Moderate Users) as 2 (Moderate); 4 (High Users) and 5 (Very High Users) as 3 (High).

The third variable, coordination risk, categorizes individuals into three levels of coordination risk, which means the risk of having coordination issues. This measure considers the ACGs, the number of different providers taking care of the member, and whether the member

has seen a generalist in the measurement period⁶ (Johns Hopkins Bloomberg School of Public Health, 2014). The source of the baseline values for these two variables was the first Care Analyzer report produced for the members after 90 days from their enrollment as HCBS/LTSS in the program. For this study, this variable was recoded for easier interpretation: UCI (Unlikely to experience coordination issues) as 1 (Low), PCI (Will possibly experience coordination issues) as 2 (Moderate), and LCI (Will likely experience coordination issues) as 3 (High). A category 0 (Unknown) was created for members with missing information.

Other independent variables used in this study are related to members' demographics: age at baseline (baseage), sex, and self-identified ethnicity. For this study, ethnicity was renamed and recoded according to its distribution in the study population, to guarantee groups with enough members for meaningful statistical analysis. The new variable, Ethnic Group, categorizes members as White (1), Black/African American (2), or Another Ethnicity (3), which encompasses Hispanic/Latino, Amerindian/Alaskan, Asian / Pacific Island, and Hawaiian / Pacific Island.

Finally, to account for other HCBS delivered to members during the study period, I created a variable named Key HCBS. From all claims related to study members, I identified the 20 most common HCBS delivered during the study period. I then selected those that were offered as part of the LTSS program and validated the list with an HHO program manager. Five key HCBS were included in this study: adult day care, personal emergency response system (PERS), home-delivered meals, in-home respite care, and minor home modifications.⁷ The variable Key HCBS

⁶ Gateway Health gets monthly Care Analyzer reports, which use up to 2 years of member's claims.

⁷ The five key HCBS have the following HCPS codes and description: S5105 (Day care services, center-based; services not included in program fee, per diem), S5161 (Emergency response system; service fee per month), S5170 (Home

was coded in three categories: (0) no key HCBS, (1) few key HCBS (1 to 2 services), and (2) many key HCBS (3 to 5 services).

5.3.3.1 Study master dataset

As previously mentioned, the study master dataset contains variables and measures needed to answer the research questions, and other variables created or recoded as part of the analysis. Table 4 presents some of the variables and measures included in this master dataset and their data source.

Table 4: Study Variables

Data Source	Variable Name	Definition	Type
HHO case management system	Case_Type	Identification of member's case in the HHO case management system	Categ.
	Member	Member's ID in the HHO program. The main identifier used when merging datasets	Categ.
	Birth_DT	Member's date of birth	Date
	Sex	Member's sex, recoded as 0 – Male, 1 – Female	Categ.
	Death_DT*	Member's date of death. Used in the study to identify the number of deaths during the study period	Date
	EthnicGroup	Member's self-identified ethnic origin. Recoded as: 1 – White, 2 – Black/African American, 3 – Another Ethnicity	Categ.
	Case_Start	Date when HCBS or SD case was open	Date
	Case_End	Date when HCBS or SD case was closed	Date
New variables	<i>Case_Gap</i>	For members with more than one case during the study period, it measures the interval between Case_End1 and Case_Start2, in days	Discrete
	<i>Case_ValidEnd</i>	For members with Case_Gap of less than 91 days, it is equal to Case_End2. For members with Case_Gap greater than 91 days, it is equal Case_End1, as the second case was not used in this study	Date
	<i>Death</i>	Binary flag indicating those who died during the study period	Dichot.

delivered meals, including preparation, per meal), S5150 (Unskilled respite care, not hospice, per 15 minutes), S5165 (Home modifications, per service).

Table 4 Continued

Data Source	Variable Name	Definition	Type
Gateway Medicaid enrollment datasets	LOB_CD	Member's line of business / type of insurance plan as identified on eligibility datasets (e.g., Medicaid, Medicare). Used in the study to identify eligibility information for Delaware Medicaid LTSS members	Categ.
	Member_id	Member's ID in the new information system adopted by HHO in January 2018 (EHS). Used in the study to identify claims of services provided at the end of 2017	Categ.
	Elig_Start_DT	Member's beginning of eligibility as Medicaid LTSS	Date
	Elig_End_DT	Member's end of eligibility as Medicaid LTSS	Date
New variables	<i>StudyEnd_DT</i>	Member's end of participation in the study. In most cases, it is equal to Elig_End_DT. Members with Elig_End_DT after the end of the study period were assigned the date 31DEC2017	Date
	<i>Baseline_DT</i>	Member's beginning of participation in the study. It is equal to Elig_Start_DT or to Case_Start, whatever is later	Date
	<i>BaseAge</i>	Member's age at baseline date	Contin.
	<i>count_MM</i>	Member's total time in the study measured in full months between Baseline_DT and StudyEnd_DT	Discrete
	<i>count_CAreP</i>	Member's total number of Care Analyzer reports produced during the study period	Discrete
DSTHS Care Analyzer ⁸ (these variables were renamed in this study)	Base_Report_dt	Date of Care Analyzer report used for baseline information	Date
	Base_Frailty_F	Binary flag indicating if a member was considered frail at baseline (0/1)	Dichot.
	Base_Coordination_Risk	Member's baseline risk of having coordination issues. Recoded as: 0 – Unknown, 1 – Low, 2 – Moderate, 3 – High	Ordinal
	Base_Healthcare_Utiliz	Member's baseline level of healthcare services use. Recoded as: 0 – Unknown, 1 – Low, 2 – Moderate, 3 – High	Ordinal
Claims	LOB_ID	Member's line of business / type of insurance plan as identified on their claims. Used in the study to identify claims of services provided to Delaware LTSS members	Categ.

⁸ The DSTHS Care Analyzer[®] is an NCQA-certified HEDIS SoftwareSM solution that uses the Johns Hopkins Adjusted Clinical Groups (ACG) System to predict healthcare utilization based on claims data (DST Health Solutions, 2015; Johns Hopkins Bloomberg School of Public Health, 2014).

Table 4 Continued

Data Source	Variable Name	Definition	Type
New variables	<i>Ag/SD_AC_count_clm</i>	Member's count of claims related to Attendant Care Services provided during the study period (through Agency or Self-Directed)	Discrete
	<i>Ag/SD_AC_Min_DOS_DT</i>	The first day of AC services provided to the member during the study period	Date
	<i>Ag/SD_AC_Max_DOS_Thru</i>	Last day of AC services provided to the member during the study period	Date
	<i>Ag/SD_AC_Total_SVC_Dur</i>	Total number of days when a member received AC services during the study period	Discrete
	<i>Ag/SD_AC_Total_SVC_Qty</i>	Total number of hours of AC services provided during the study period	Contin.
	<i>Ag/SD_AC_Dosage</i>	Average hours per day of AC services provided (total svc qty/ total svc dur)	Contin.
New variables	<i>AC_Dosage</i>	Identification of member's cohort based on total dosage: 0 – no AC, 1 – less than 3h/day, 2–3h to 5h/day, 3 – more than 5h/day	Categ.
	<i>AC_Type</i>	Identification of member's cohort based on the type of attendant care: 1 – Agency AC, 2 – Self-directed AC, 3 – Both AC, 4 – None	Categ.
	<i>Min_AC_DOS_St</i>	For members who received both types of AC, this variable identifies the first day of services	Date
	<i>Max_AC_DOS_Thru</i>	For members who received both types of AC, this variable identifies the last day of services	Date
	<i>Total_AC_Dosage</i>	Member's total dosage of attendant care services during the study period	Contin.
	<i>AdutlDay, HomeMod Meals, PERS, Respite</i>	Binary flag indicating if the member received other key HCBS during the study period (0/1)	Dichot.
	<i>OtherServ_Sum</i>	Member's total number of other key HCBS received during the study period	Discrete
	<i>KeyHCBS</i>	Member's use of other key HCBS: 0 – no other key HCBS, 1 – Few (1–2 key HCBS), 2 – Many (3–5 key HCBS)	Ordinal
	<i>Frailty_Sum</i>	Member's sum of conditions associated with frailty, measured at baseline	Discrete
	<i>Frailty_Index</i>	The proportion of frailty conditions out of the 10 clusters associated with frailty (range: 0 to 1), measured at baseline	Discrete
	<i>Frailty_Claims90</i>	Binary flag indicating if members had claims associated with frailty within 90 days from baseline (0/1)	Dichot.
	<i>LSNF</i>	Binary flag indicating if members had a long stay nursing facility admission during the study period (0/1)	Dichot.
	<i>Count_LSNF</i>	Member's total number of long-stay nursing facility admissions during the study period	Discrete

Table 4 Continued

Data Source	Variable Name	Definition	Type
New variables	<i>LSNF1_Admit_dt</i>	Member's first long-stay nursing facility admission date	Date
	<i>LSNF1_Discharge_dt</i>	Member's first long-stay nursing facility discharge date	Date
	<i>TimeToLSNF</i>	Days between baseline and first long-stay nursing facility admission dates	Discrete

* Missing and unknown values were exchanged for imputed values as described in the Statistical Analyses section.

5.4 Statistical Analyses

The process of building the study datasets and all statistical analyses were completed in SAS Enterprise Guide version 7.11 HF (SAS Institute Inc., 2015). When assessing for missing data in the master dataset, I identified two variables with missing values: Frailty Index (missing data of 6 members who did not have claims within 90 days from their enrollment in the program), and Base Healthcare Utilization (missing data of 34 members who had “unknown” as value in the Care Analyzer report). I used the hot-deck procedure for imputation, following the steps proposed by Groves et al. (2009). First, I sorted the dataset by AC_dosage, sex, baseage, frailty_sum, base_coordination_risk, and otherserv_sum. Then, I replaced the missing values by the mode value of members with similar characteristics.

Next, I performed descriptive statistics to assess similarities and differences between study cohorts. For categorical variables such as sex, ethnicity, frailty flag, coordination risk, healthcare utilization, other key HCBS, and death I ran chi-square goodness of fit tests. For numeric variables, such as age, frailty index, frailty sum, and total AC dosage, I performed one-

way ANOVA tests. Even though the assumption of normality was not met for all variables, ANOVA (analysis of variance) is considered relatively robust test even when data is not normally distributed (Gravetter & Wallnau, 2013). When the assumption of homogeneity of variance was not met, I reported the results of Welch's ANOVA test.

To build the multivariate logistic regression models, I used a purposeful selection of covariates, following the steps proposed by Hosmer, Lemeshow, and Sturdivant (2013). I started by assessing the association of the independent variables with the outcome variable LSNF admissions. For that end, I performed bivariate logistic regression and, as this step served as a screening process for the first multivariate model, I used a significance level of 0.25. Variables that were significantly associated with the outcome were included in the first multivariate models. For easier interpretation of odds ratio, instead of using the variable frailty index, I used frailty sum (total count of frailty conditions at baseline) in these analyses. In the analysis of the association between AC type and LSNF, a measure of the total dosage of attendant care services and initial frailty were included in the final regression model.

This study used two sets of analysis:

- **Analysis 1** had the primary goal of answering research question 1 (Does receiving attendant care services help older adults to age in place, avoiding long-term institutionalization?) and the secondary goal of answering research question 2 (Does the dosage of attendant care services make a difference in the likelihood of having long-stay nursing facility admissions?). For this analysis, I built and tested the multivariate logistic regression models displayed in Figure 6.

- **Analysis 2** had the primary goal of answering research question 3 (Does the type of attendant care services make a difference in the likelihood of having long-stay nursing facility admissions?) and the secondary goal of validating the findings from analysis 1 related to research question 1. For this analysis, I built and tested the multivariate logistic regression models displayed in Figure 7.

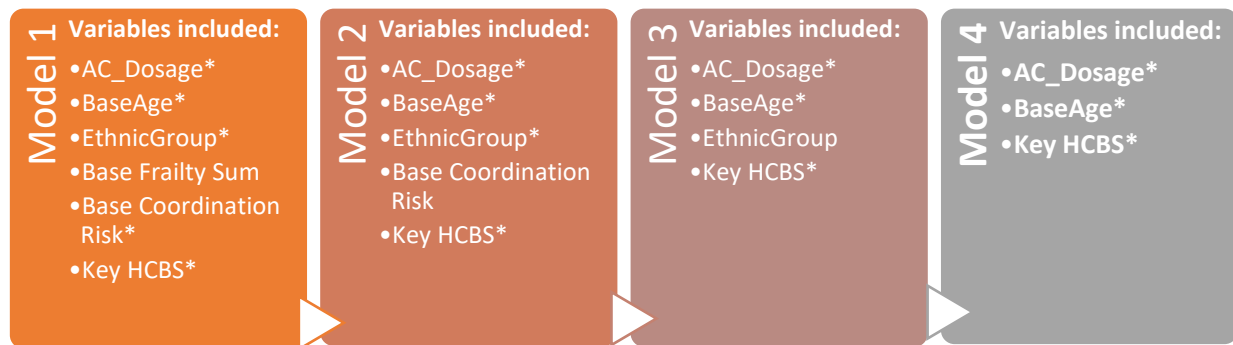


Figure 6. Multivariate Logistic Regression Models for Research Questions 1 and 2

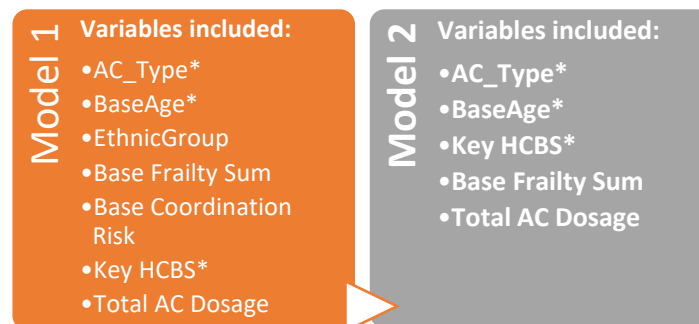


Figure 7. Multivariate Logistic Regression Models for Research Questions 1 and 3

In both figures above, variables with an asterisk were significant at $\alpha = .05$. As variables were deleted, I compared the models' fit statistics (i.e., Akaike's Information Criterion – AIC, and Schwartz Bayesian Information Criterion – SC) to make sure the new model (with fewer

variables) had a better fit than the old one (Cohen, Cohen, West, & Aiken, 2015; Hosmer et al., 2013).

At this point, I included the variables that did not have a significant association with the outcome when assessed in the bivariate analysis, but that could make an important contribution when in the presence of other factors (Hosmer et al., 2013). Neither sex nor healthcare utilization at baseline had significant Wald statistics, so they were not included in the final model (results not shown).

To validate the manual model building processes that I had used, I performed the stepwise backwards regression procedure available in SAS. The automatic selection process confirmed that model 4 from Figure 6 was the most parsimonious one. For analysis 2, factors that were not statistically significant, but that I considered important for a better assessment of the effect of AC type, were included in the final model (i.e., frailty at baseline and total AC dosage).

The next step was the investigation of multicollinearity and the effect of interactions among predictors. AC study group proved to be moderately correlated with base age and key HCBS, with variance inflation factors (VIF) close to 1, showing that the assumption of multicollinearity was met. When added to the regression model, interactions between AC dosage and age, AC dosage and key HCBS, AC type and age, and AC type and key HCBS were not significantly associated with the outcome (results not shown).

The final model for analysis 1 had convergence criterion satisfied, as well as Pearson, Deviance, and Hosmer and Lemeshow statistics with p values above .05. Aware of the limitations of traditional measures of goodness of fit for logistic regression mentioned by Allison (2014), I also calculated the Tjur's statistic, which resulted in an $R^2 = .1508$. Finally, I checked the ROC

curve, which has an area of 0.7495, indicating that the model has an acceptable ability to discriminate between the individuals who experience the outcome of interest of those who do not (Hosmer et al., 2013). The final model for analysis 2 also had convergence criterion satisfied. Pearson, Deviance, and Hosmer and Lemeshow statistics had p. values above .05, and Tjur's statistic resulted in an $R^2 = .1879$. The ROC curve has and an area of 0.7844, indicating acceptable discrimination.

6.0 Results

The 491 community-dwelling older adults included in this study had, at baseline, average age of 77.6 (± 8.2) years. The majority were women (72.3%), 55.4 percent self-identified as White, 38.5 percent Black / African American, and 6.1 percent other ethnicities. The Johns Hopkin's Care Analyzer detected frailty in only 25 percent of study participants at baseline, who had an average baseline frailty index of 0.05 (± 0.7), which indicates that participants had 0 to 1 frailty conditions identified in their claims within 90 days from their program enrollment. Data of the Care Analyzer also shows that 46.2 percent had low healthcare utilization at baseline, and 88.8 percent had low coordination risk, which means they had a low risk of having coordination issues due to complex health conditions associated with having multiple care providers. Service claims indicate that the majority of participants (85.3%) used attendant care services during the study period, 62 percent used 1 to 2 of the other home and community-based services (HCBS) included in this research, and 22.4 percent used 3 to 5 of these HCBS. There were only 14 cases of death among participants during the study period.

For analysis 1, participants were divided into four cohorts based on attendant care (AC) dosage. As shown in Table 5, out of the 491 study participants, 14.7 percent did not have AC services, 31.6 percent received up to 3h/day of services on average, 33.8 percent received an average of 3h to 5h/day of services, and 20 percent received an average of 5h/day or more of AC services during the study period.

Members in the four cohorts were similar in some demographics, such as sex and ethnicity, with all groups having a majority of Female and White members. Coordination risk at baseline was mostly low for all groups, and the distribution of cases of death was not statistically different among study cohorts. The Johns Hopkin's Care Analyzer frailty flag at baseline was statistically different, with members in the cohort with no attendant care having proportionally frailer members (43.1%). However, the initial frailty index, which is a more sensitive measure, was not significantly different. Time in program, which was measured in full months from enrollment to the end of the study or disenrollment date (whichever came later), was not significantly different among study groups.

Members in the four study cohorts were significantly different at baseline in terms of age and healthcare utilization. The cohort with the highest dosage of AC had older members (average baseline age of 79.2 ± 8.6), and the group with no AC had a proportionally greater number of high utilizers (44.4%). Study groups were also significantly different regarding the use of other key HCBS. The group with no AC had a greater proportion of members who did not receive the other HCBS included in this study (45.8%). On the other hand, the group with a higher dosage of AC services was also the group that mostly used 3 to 5 other key HCBS during the study period (33.7%). The group with no AC had a significantly higher proportion of members with long-stay nursing facility (LSNF) admissions (48.6%) than the groups with attendant care services. Overall, 88 members (17.9%) had LSNF admissions during the study period.

Table 6 displays unadjusted odds ratios and 95 percent confidence intervals for the association between all independent variables included in this study and LSNF admissions. Bivariate analyses show that the odds ratios of having a LSNF admission were significantly lower

for those who had AC services than for those who did not have this service (reference category), ranging from 0.184 (CI=0.097–0.349) for those who had less than 3h/day of services to 0.134 (CI=0.061–0.291) for those who had 5h/day or more. Other factors that proved to be significantly associated with long-stay nursing facility admissions were ethnicity, baseline age, coordination risk at baseline, and receiving other key home and community-based services.

Results of the hierarchical multivariate logistic regression analyses are presented in Table 7. When accounting for other predictors, receiving AC services was significantly associated with lower odds of having LSNF admissions, which supports hypothesis 1. Furthermore, the likelihood of having such outcome decreased as the dosage of AC services increased: (aOR=0.252, CI=0.122–0.517) for those who received less than 3h/day of services, (aOR=0.205, CI=0.094–0.445) for those who received between 3h to 5h/day, and, (aOR=0.188, CI=0.077–0.462) for those who received 5h/day or more, when compared to those who did not have AC services. These results support hypothesis 2.

Table 5: Characteristics of Study Participants Grouped by Dosage of Attendant Care Services

Variables	All (n = 491)	No Att. Care (n = 72, 14.7%)	Att. Care <3h/day (n = 155, 31.6%)	Att. Care 3–5h/day (n = 166, 33.8%)	Att. Care 5h or more/day (n = 98, 20.0%)	p-value ^a
Age at Baseline (mean±SD)	77.6±8.2	76.0±7.9	76.9±8.3	77.9±7.8	79.2±8.6	.0456*
Sex						.0840
Male (0)	136 (27.7%)	27 (37.5%)	38 (24.5%)	50 (30.1%)	21 (21.4%)	
Female (1)	355 (72.3%)	45 (62.5%)	117 (75.5%)	116 (70.0%)	77 (78.6%)	
Ethnicity						.3775
White (1)	272 (55.4%)	46 (63.9%)	91 (58.7%)	83 (50.0%)	52 (53.1%)	
Black / African American (2)	189 (38.5%)	24 (33.3%)	54 (34.8%)	70 (42.2%)	41 (41.8%)	
Another Ethnicity (3)	30 (6.1%)	2 (2.8%)	10 (6.5%)	13 (7.8%)	5 (5.1%)	
Frailty Flag at Baseline						.0010*
No (0)	368 (75.0%)	41 (56.9%)	125 (80.7%)	130 (78.3%)	72 (73.5%)	
Yes (1)	123 (25.0%)	31 (43.1%)	30 (19.3%)	36 (21.7%)	26 (26.5%)	
Frailty Index at Baseline (mean±SD)	0.05±.07	0.06±.07	0.04±.06	0.04±.06	0.06±.07	.1397
Healthcare Utilization at Baseline						<.0001*
Low (1)	227 (46.2%)	13 (18.1%)	76 (49.0%)	85 (51.2%)	53 (54.1%)	
Moderate (2)	125 (25.5%)	27 (37.5%)	40 (25.8%)	37 (22.3%)	21 (21.4%)	
High (3)	139 (28.3%)	32 (44.4%)	39 (25.2%)	44 (26.5%)	24 (24.5%)	
Coordination Risk at Baseline						.1099
Low (1)	436 (88.8%)	67 (93.1%)	134 (86.5%)	144 (86.8%)	91 (92.9%)	
Moderate (2)	26 (5.3%)	1 (1.4%)	7 (4.5%)	14 (8.4%)	4 (4.1%)	
High (3)	29 (5.9%)	4 (5.6%)	14 (9.0%)	8 (4.8%)	3 (3.1%)	
Other Key HCBS						<.0001
No (0)	52 (10.6%)	33 (45.8%)	14 (9.0%)	3 (1.8%)	2 (2.0%)	
Few (1–2 services)	329 (67.0%)	34 (47.2%)	110 (71.0%)	122 (73.5%)	63 (64.3%)	
Many (3–5 services)	110 (22.4%)	5 (6.9%)	31 (20.0%)	41 (24.7%)	33 (33.7%)	
Months in Program (mean±SD)	17.7±8.0	16.3±8.2	18.8±8.2	18.0±7.4	16.8±8.3	.1166
Death						.4330
No (0)	477 (97.2%)	72 (100.0%)	150 (96.8%)	161 (97.0%)	94 (95.9%)	
Yes (1)	14 (2.9%)	0 (0.0%)	5 (3.2%)	5 (3.0%)	4 (4.1%)	

Table 5 Continued

Variables	All (n = 491)	No Att. Care (n = 72, 14.7%)	Att. Care <3h/day (n = 155, 31.6%)	Att. Care 3- 5h/day (n = 166, 33.8%)	Att. Care 5h or more/day (n = 98, 20.0%)	p-value ^a
LSNF Admissions						<.0001
No (0)	403 (82.1%)	37 (51.4%)	132 (85.2%)	147 (88.6%)	87 (88.8%)	
Yes (1)	88 (17.9%)	35 (48.6%)	23 (14.8%)	19 (11.5%)	11 (11.2%)	

^a Analysis of variance or chi-square statistical tests, depending on the variable considered.

Table 6: Association of Independent Variables and Long-Stay Nursing Facility Admissions

Independent Variables	Bivariate Analysis		
	OR	95% CI	p-value ^a
Attendant Care Dosage			<.0001*
No Attendant Care (0)	1.00		
Less than 3h/day (1)	0.184	0.097–0.349	
3h–5h/ day (2)	0.137	0.070–0.266	
5h/day or more (3)	0.134	0.061–0.291	
Age at Baseline	1.042	1.013–1.072	.0040*
Sex			.6692
Male (0)	1.00		
Female (1)	0.895	0.539–1.487	
Ethnicity			.0381*
White (1)	1.00		
Black / African American (2)	0.602	0.365–0.991	
Another Ethnicity (3)	0.258	0.060–1.114	
Frailty at Baseline	1.249	0.911–1.767	.1585*
Healthcare Utilization at Baseline			.3147
Low (1)	1.00		
Moderate (2)	1.250	0.726–2.153	
High (3)	0.763	0.426–1.365	
Coordination Risk at Baseline			.0373*
Low (1)	1.00		
Moderate (2)	0.163	0.022–1.218	
High (3)	0.145	0.020–1.083	
Other Key HCBS			<.0001*
No (0)	1.00		
Few (1)	0.139	0.074–0.260	
Many (2)	0.079	0.034–0.186	
Attendant Care Type			<.0001*
No Attendant Care (0)	1.00		
Agency AC (1)	0.227	0.129–0.401	
Self-directed AC (2)	0.050	0.020–0.128	
Both AC (3)	0.108	0.035–0.335	
Total AC Dosage	0.700	0.615–0.796	<.0001*

* p< .25

Table 7: Hierarchical Logistic Regression to Evaluate the Association of Attendant Care Dosage and Long-Stay Nursing Facility Admissions

Independent Variables	Adjusted OR (95% CI); p-value ^a			
	Model 1	Model 2	Model 3	Model 4
Attendant Care Dosage	.0031	.0027	.0009	<.0001*
No Attendant Care	1.00	1.00	1.00	1.00
Less than 3h/day	0.313 (0.147–0.667)	0.307 (0.144–0.652)	0.281 (0.134–0.587)	0.252 (0.122–0.517)
3h–5h/ day	0.273 (0.121–0.615)	0.267 (0.119–0.600)	0.238 (0.108–0.526)	0.205 (0.094–0.445)
5h/day or more	0.215 (0.085–0.542)	0.218 (0.087–0.547)	0.214 (0.086–0.530)	0.188 (0.077–0.462)
Age at Baseline	1.050 (1.017–1.084) .0029	1.049 (1.016–1.082) .0035	1.053 (1.020–1.087) .0014	1.057 (1.023–1.091) .0007*
Other Key HCBS	.0004	.0003	.0003	.0010*
No (0)	1.00	1.00	1.00	1.00
Few (1–2 services)	0.233 (0.105–0.516)	0.230 (0.104–0.509)	0.243 (0.113–0.522)	0.296 (0.144–0.612)
Many (3–5 services)	0.152 (0.056–0.414)	0.150 (0.055–0.408)	0.161 (0.060–0.428)	0.185 (0.071–0.480)
Ethnicity	.0378	.0387	.0613	
White	1.00	1.00	1.00	
Black / African American	0.547 (0.307–0.974)	0.550 (0.309–0.979)	0.586 (0.333–1.032)	
Another Ethnicity	0.233 (0.049–1.111)	0.235 (0.050–1.110)	0.261 (0.057–1.208)	
Coordination Risk at Baseline	.0496	.0566		
Low (1)	1.00	1.00		
Moderate (2)	0.166 (0.021–1.322)	0.173 (0.022–1.376)		
High (3)	0.145 (0.018–1.084)	0.157 (0.020–1.237)		
Frailty Conditions at Baseline	1.257 (0.860–1.837) .2380			

^a Analyses used a significance level of 0.05.

For analysis 2, participants were divided into four cohorts based on the type of attendant care services received during the study period. Out of the 491 study participants, 14.7 percent did not have attendant care services, 49.5 percent only received attendant care services provided by an agency, 27.1 percent only received self-directed attendant care, and 8.8 percent received both types of attendant care services.

Characteristics of the 491 study participants are presented in Table 8, with comparisons among the study cohorts. Members in the four cohorts were similar in sex, with all groups having a majority of women. Also, the distribution of cases of death, and time in program were not statistically different among the study groups.

However, when grouped by dosage, members who received different types of attendant care services were different in most demographics and health conditions. The cohort that received both types of AC had older members, with an average baseline age of 80.6 (± 9.2) years. While there was a greater concentration of White members in the cohorts with no AC and agency AC only (65.9% and 60.1%, respectively), 50.9 percent the members in the self-directed AC group were African Americans.

Once more, the Johns Hopkins' Care Analyzer frailty flag at baseline was statistically different, with members in the cohort with no AC having proportionally frailer members (56.9%). In this analysis, however, the initial frailty index was also statistically different, with self-directed members being less frail at the baseline than members in the other cohorts, and members who received both types of AC being more frail.

Consistent with findings of the first analysis, the cohort with no AC had a greater proportion of members classified as high utilizers of healthcare services at baseline (44.4%).

Coordination risk at baseline was also statistically different, with the self-directed AC group having proportionally more members with moderate and high risk (18.8%) than the other cohorts.

The total dosage of AC services received was significantly different between groups, with members who got both types of AC receiving an average dosage 80 percent greater than the whole study cohort (6.00 ± 2.8 hours/day). Groups were also significantly different regarding their use of other key HCBS. Those with no AC were the ones with lower utilization of other key HCBS, while in the cohort with both AC types, all members received some other key HCBS. Once more, the group with no AC had a significantly higher proportion of members with LSNF admissions (48.6%) than the groups with AC services, with the group of self-directed services having the lowest proportion of members with this outcome (4.5%).

The results of the bivariate associations between AC type and total AC dosage with LSNF were included in the bottom of Table 6. Both factors proved to be significantly associated with the study outcome. The unadjusted odds ratios of having a LSNF admission range from 0.227 (CI=0.129–0.401) for members who had agency AC services, to 0.050 (CI=0.020–0.128) for those who had self-directed AC services.

The results of the multivariate hierarchical regression analyses presented in Table 9 validate the findings of the first analysis, confirming hypothesis 1. When accounting for other predictors (e.g., age and frailty at baseline, total AC dosage, and the use of other key HCBS), receiving AC services is significantly associated with lower odds of having LSNF admissions. Furthermore, the different types of AC services yielded different results. Those who self-directed their AC services had the lowest odds of having an LSNF admission (aOR=0.073, CI=0.026–0.202),

followed by those who had both types of AC services (aOR=0.133, CI=0.039–0.457), and by those who had only agency AC services (aOR=0.308, CI=0.158–0.599). These results do not support hypothesis 3.

Both analyses showed that those with AC services had significantly lower LSNF admissions than those who did not have this type of services. Nevertheless, the OR confidence intervals for the three groups with AC services overlap in both analyses. This might be an indication that the impact of services is not statistically different for those with different dosage and type of AC. Further analysis is needed to confirm these hypotheses.

Table 8: Characteristics of Study Participants Grouped by Type of Attendant Care Services

Variables	All (n = 491)	No Att. Care (n = 72, 14.7%)	Agency AC (n = 243, 49.5%)	Self-directed AC (n = 133, 27.1%)	Both AC types (n = 43, 8.8%)	p-value ^a
Age at Baseline (mean±SD)	77.6±8.2	76.0±7.9	77.6±8.3	77.4±7.6	80.6±9.2	.0344*
Sex						.2318
Male (0)	136 (27.7%)	27 (37.5%)	65 (26.8%)	34 (25.6%)	10 (23.3%)	
Female (1)	355 (72.3%)	45 (62.5%)	178 (73.3%)	99 (74.4%)	33 (76.7%)	
Ethnicity						.0194*
White (1)	272 (55.4%)	46 (63.9%)	146 (60.1%)	59 (44.4%)	21 (48.8%)	
Black / African American (2)	189 (38.5%)	24 (33.3%)	80 (32.9%)	67 (50.4%)	18 (41.9%)	
Another Ethnicity (3)	30 (6.1%)	2 (2.8%)	17 (7.0%)	7 (5.3%)	4 (9.3%)	
Frailty Flag at Baseline						.0022*
No (0)	368 (75.0%)	41 (56.9%)	190 (78.2%)	104 (78.2%)	33 (76.7%)	
Yes (1)	123 (25.0%)	31 (43.1%)	53 (21.8%)	29 (21.8%)	10 (23.3%)	
Frailty Index at Baseline (mean±SD)	0.05±.07	0.06±.07	0.05±.07	0.03±.05	0.07±.08	.0015*
Healthcare Utilization at Baseline						<.0001*
Low (1)	227 (46.2%)	13 (18.1%)	129 (53.1%)	61 (45.9%)	24 (55.8%)	
Moderate (2)	125 (25.5%)	27 (37.5%)	54 (22.2%)	33 (24.8%)	11 (25.6%)	
High (3)	139 (28.3%)	32 (44.4%)	60 (24.7%)	39 (29.3%)	8 (18.6%)	
Coordination Risk at Baseline						.0256*
Low (1)	436 (88.8%)	67 (93.1%)	219 (90.1%)	108 (81.2%)	42 (97.7%)	
Moderate (2)	26 (5.3%)	1 (1.4%)	13 (5.6%)	12 (9.0%)	0 (0.0%)	
High (3)	29 (5.9%)	4 (5.6%)	11 (4.5%)	13 (9.8%)	1 (2.3%)	
Total AC Dosage (mean±SD)	3.33±2.3	0.00±0.0	3.57±1.8	3.83±1.4	6.00±2.8	<.0001*
Other Key HCBS						<.0001*
No (0)	52 (10.6%)	33 (45.8%)	17 (7.0%)	2 (1.5%)	0 (0.0%)	
Few (1–2 services)	329 (67.0%)	34 (47.2%)	168 (69.1%)	95 (71.4%)	32 (74.4%)	
Many (3–5 services)	110 (22.4%)	5 (6.9%)	58 (23.9%)	36 (27.1%)	11 (25.6%)	
Months in Program (mean±SD)	17.7±8.0	16.3±8.2	18.8±8.2	18.0±7.4	16.8±8.3	.1166
Death						.2543
No (0)	477 (97.2%)	72 (100.0%)	237 (97.6%)	127 (95.5%)	41 (95.4%)	
Yes (1)	14 (2.9%)	0 (0.0%)	6 (2.5%)	6 (4.5%)	2 (4.7%)	

Table 8 Continued

Variables	All (n = 491)	No Att. Care (n = 72, 14.7%)	Agency AC (n = 243, 49.5%)	Self-directed AC (n = 133, 27.1%)	Both AC types (n = 43, 8.8%)	p-value ^a
LSNF Admissions						<.0001
No (0)	403 (82.1%)	37 (51.4%)	200 (82.3%)	127 (95.5%)	39 (90.7%)	
Yes (1)	88 (17.9%)	35 (48.6%)	43 (17.7%)	6 (4.5%)	4 (9.3%)	

^a Analysis of variance or chi-square statistical tests, depending on the variable considered.

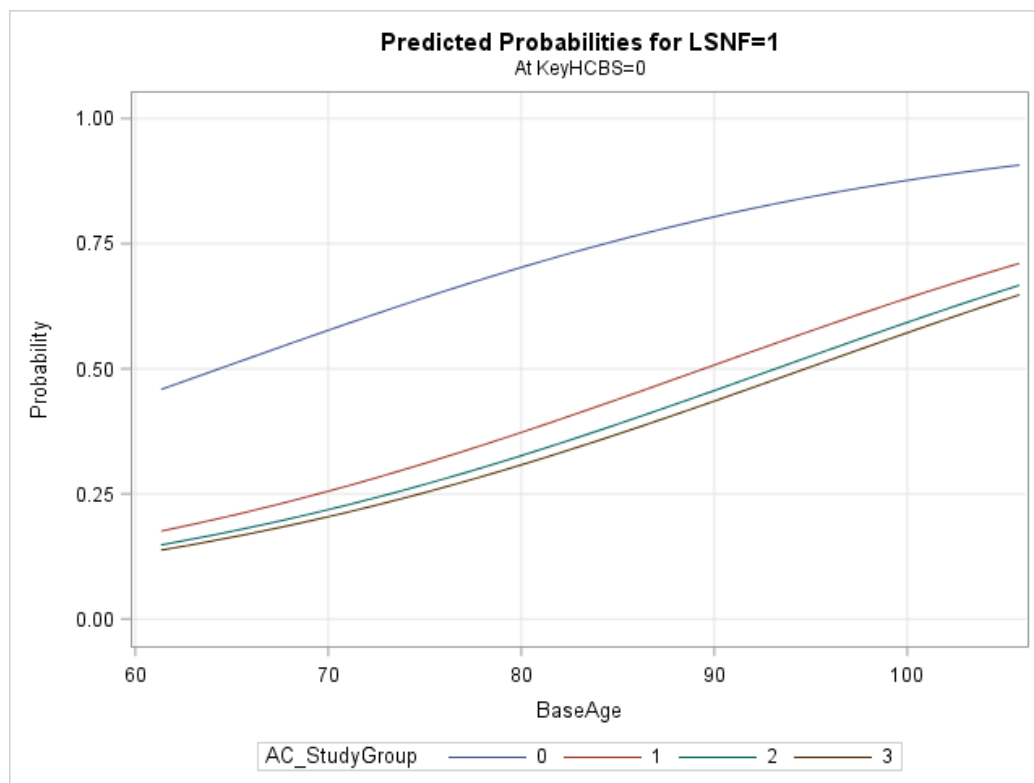
Table 9: Hierarchical Logistic Regression to Evaluate the Association of Attendant Care Type and Long-Stay Nursing Facility Admissions

Independent Variables	Adjusted OR (95% CI); p-value ^a	
	Model 1	Model 2
Attendant Care Type	.0146	.0016*
No Attendant Care (0)	1.00	1.00
Agency AC (1)	0.487 (0.198–1.201)	0.383 (0.162–0.908)
Self-directed AC (2)	0.139 (0.040–0.481)	0.095 (0.029–0.315)
Both AC (3)	0.249 (0.052–1.191)	0.190 (0.041–0.889)
Age at Baseline	1.053 (1.019–1.088) .0020	1.059 (1.026–1.094) .0005*
Other Key HCBS	.0013	.0039*
No (0)	1.00	1.00
Few (1–2 services)	0.267 (0.120–0.591)	0.346 (0.168–0.714)
Many (3–5 services)	0.176 (0.064–0.483)	0.215 (0.082–0.563)
Frailty Conditions at Baseline	1.180 (0.801–1.738) .4035	1.129 (0.770–1.656) .5333
Total Attendant Care Dosage	0.917 (0.767–1.096) .3406	0.934 (0.783–1.114) .4473
Ethnicity	.0785	
White	1.00	
Black / African American	0.631 (0.350–1.136)	
Another Ethnicity	0.220 (0.045–1.082)	
Coordination Risk at Baseline	.0663	
Low (1)	1.00	
Moderate (2)	0.167 (0.020–1.365)	
High (3)	0.170 (0.021–1.384)	

^a Analyses used a significance level of 0.05.

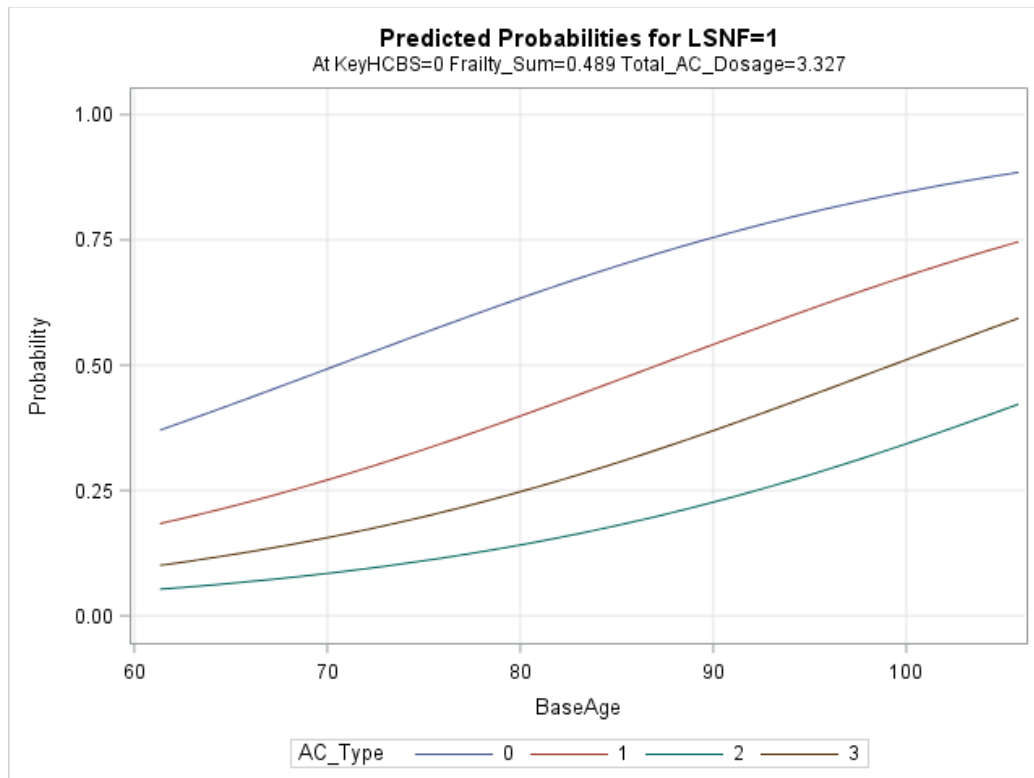
6.1 Other Important Findings

Multivariate logistic regression analyses indicate that there were two other factors significantly associated with long-stay nursing facility admission: age and use of key home and community-based services. As displayed in Figures 8 and 9, age at baseline was positively associated with the study outcome. Nevertheless, the provision of AC services helped reduce the probability of long-stay nursing facility admissions of older adults at all ages.



Note: AC_StudyGroups: (0) No Attendant Care Services; (1) Less than 3h/day; (2) 3h–5h/ day; (3) 5h/day or more

Figure 8. Effect of Age and Dosage of Attendant Care Services in Long-Stay Nursing Facility Admissions



Note: AC_Type: (0) No Attendant Care Services; (1) Agency AC; (2) Self-directed AC; (3) Both AC

Figure 9. Effect of Age and Type of Attendant Care Services in Long-Stay Nursing Facility Admissions

The use of other key home and community-based services was, on the other hand, negatively associated with LSNF admissions. As presented in Table 7, when grouped by AC dosage, participants who used 1 to 2 of the other key HCBS had an odds ratio of 0.296 (CI=0.144–0.612), and those who used 3 to 5 other key HCBS had an odds ratio of 0.185 (CI=0.071–0.480), with those who did not use any of the other HCBS included in this study as the reference category. When grouped by AC type, the same type of correlation between key HCBS and LSNF admissions was found. As presented in Table 9, participants who used 1 to 2 of the other key HCBS had an odds ratio of 0.346 (CI=0.168–0.714), and those who used 3 to 5 other key HCBS had an odds ratio of 0.215 (CI=0.082–0.563), when compared to those who did not use any of the five key HCBS included in the study.

7.0 Discussion

This evaluation research study investigated the effectiveness of attendant care (AC) services to avoid long-term institutionalization of older adults, when provided as part of a managed long-term services and supports (MLTSS) program. In the context of MLTSS programs, diverting nursing facility admissions and reducing potentially unnecessary care have been identified as ways to assess home and community-based services (HCBS) quality and the value of MLTSS (Soper et al., 2018). Knowing the risk factors of long-term nursing facility stays interests older adults, their families, health professionals, and policy makers (Kojima, 2018), and identifying home and community-based services that help prevent this outcome can help inform policy and program decisions about how to better allocate resources among LTSS/HCBS beneficiaries (Greiner et al., 2014).

Using enrollment and claims data of 491 older adults enrolled in an MLTSS program for at least six months in the period between January 2015 and December 2017, this study aimed to answer three questions:

1. Does receiving attendant care services help older adults to age in place, avoiding long-term institutionalization?
2. Does the dosage of attendant care services make a difference in the likelihood of having long-stay nursing facility admissions?
3. Does the type of attendant care services make a difference in the likelihood of having long-stay nursing facility admissions?

Consistent with other studies, long-stay nursing facility (LSNF) admissions was defined as those with a length of stay of 90 days or longer, differentiating them from short-term stays, which tend to have rehabilitation purposes (Boaz & Muller, 1994; Q. Cai et al., 2009; Sands et al., 2012). Participants were flagged if they had at least one LSNF admission during the study period.

Comparative analyses of participants with different AC dosage and type found significant differences in their demographics and initial health conditions. The cohort with no AC services had a greater proportion of high utilizers and frailer individuals at baseline, which was defined as the first 90 days of enrollment. When members were compared on their utilization of healthcare services at baseline, the control group (no AC services) had 44.4 percent of its members with high healthcare utilization, whereas in the other groups, less than 30 percent of members were high utilizers. One of the assumptions is that members with no AC services had more emergency room visits and inpatient admissions, which could be confirmed in further investigations, as well as the possible correlation between higher healthcare utilization and lack of attendant care services.

Frailty at baseline was assessed in two ways. First, the frailty flag, a dichotomous measure computed by the Johns Hopkins' Care Analyzer software, was used. Results indicated statistically significant differences among study cohorts, with the group that had no AC having a greater proportion of individuals flagged as frail. To validate these findings, a more sensitive measure was applied: frailty index. The statistical difference in frailty degree was not maintained when members were grouped by AC dosage, but it was confirmed when members were grouped by type of AC. In this second analysis, the cohort with only self-directed AC had the lowest initial frailty index ($0.03 \pm .05$).

Study cohorts were also significantly different regarding the use of other key HCBS. Among services that are included in the HHO/LTSS package of benefits, the five HCBS mostly used by study participants (other than attendant care) during the study period were (1) adult day care, (2) personal emergency response system (PERS), (3) home-delivered meals, (4) in-home respite care, and (5) minor home modifications. Using the count of these key HCBS, the cohort with no AC had a greater proportion of members with no other HCBS (45.8%). On the other hand, in the cohort with a higher dosage of AC services (5h/day or more), 33.7 percent used many (3–5) other HCBS. These findings indicate that even though all study members were eligible for the same LTSS benefits, the use of HCBS services was not evenly distributed among them. It also points to an important potential correlation between receiving AC and using other HCBS.

The average age of study participants when they enrolled in the HHO program as LTSS/HCBS was 77.6, with a standard deviation of 8 years. When grouped by AC dosage or AC type, however, participants had significantly different ages at baseline. Older members were in the group with a higher dosage of AC services (79.2 ± 8.6), and also in the group that received both types of AC (80.6 ± 9.2). These results indicate the need for further investigation of the extent to which HCBS services target individuals based on demographics and existing social supports, which has been mentioned by other authors (Chen & Thompson, 2010; Wysocki et al., 2015).

The two sets of logistic regression analysis conducted to evaluate the association of AC services and LSNF admissions yield different, but complementary, results. Analysis 1 looked at whether receiving AC services lowers the risk of LSNF admissions, and whether results are different depending on the dosage (average hours/day) of services received. Analysis 2 also

looked at whether receiving AC services lower the risk of LSNF admissions, and whether the type of attendant care received (agency, self-directed, both) led to different results.

Both analyses confirmed the hypothesis that those receiving AC services are less likely to have LSNF admissions. When organized in groups by AC dosage, those with AC had at least 75 percent lower odds of LSNF admissions than those who did not receive AC services. As the dosage increases, the odds of LSNF decreases, with those receiving 5h/ day or more of AC services being 81 percent less likely to have an LSNF admission than those in the control group. Further analysis is needed to assess if differences in likelihood observed between participants with different dosage of AC services are statistically significant.

Policymakers have highlighted the vital role of attendant/personal care services to enable older adults who need help with activities of daily living (ADLs) to continue living in their homes (Office of Inspector General, 2012; U.S. Centers for Medicare and Medicaid Services, 2018c). These services have also been considered a key component of Medicaid, increasing spending on HCBS through MLTSS programs (Iritani, 2017). However, despite their acknowledged potential to avoid nursing home placement (Muramatsu et al., 2007; Sands et al., 2012; Weaver & Roberto, 2017), studies of the association between HCBS and nursing facility admissions have found inconsistent results. Some researchers have found that recipients of HCBS have a lower rate of nursing facility admissions, whereas others found opposite results (Chen & Thompson, 2010; McCann et al., 2005).

Also, authors have pointed to the lack of formal guidelines determining the ideal dosage of HCBS to be provided to recipients, and to little evidence about whether HCBS dosage is associated with long-term nursing facility stays (Sands et al., 2012). Researchers have also stated

that for better evaluation of HCBS effectiveness there was a need for studies with a more clear description of services provided, by type and intensity (Wysocki et al., 2015).

The second analysis confirmed the effect of AC services on lowering the odds of LSNF admissions. However, findings from this analysis do not support the initial hypothesis that the odds of having an LSNF admission were similar between those who receive AC services from an agency and those who self-direct these services. In fact, study participants who had only self-directed AC were 93 percent less likely to have an LSNF admission than those in with no AC services, and 23.5 percent less likely to have this outcome than those who only received agency AC services. Participants who had both types of AC services during the study period had 87 percent lower odds of LSNF admission than those in the control group, and 17.5 percent lower odds than those with only agency AC services. Further analysis is needed to assess if differences in likelihood observed between participants with different types of AC services are statistically significant.

Previous studies on self-directed services found that older adults prefer to manage their own care with the help of family and friends (Coleman, 2003). They also found that those who self-direct their services have greater satisfaction with care, and similar quality of service and health outcomes, than those with attendant care arranged by agencies (Simon-Rusinowitz et al., 2010; Wiener et al., 2007). When adopting the MLTSS model, many states have the goal of increasing consumer choice (Lewis et al., 2018), which in the realm of attendant care services means providing the option for self-directed services.

These findings indicate a positive and significant effect of AC services on avoiding long-stay nursing facility admissions. Nevertheless, further research is needed to investigate factors

that might be barriers and facilitators of access to this type of service. While all LTSS/ HCBS members enrolled in the Highmark Health Options are entitled to the same benefits, it would be important to assess what are the main things case managers consider when offering services to each member, and to what extent personal choice plays a role in the final decision of getting attendant care services or not.

Increasing consumer choice is one of the goals of MLTSS programs, and, to this end, states have attempted to offer more options of services, providers, and settings to beneficiaries (Lewis et al., 2018). Qualitative research with case managers and program participants would help clarify how this strategy has been applied in the context of Highmark Health Options, and to what extent this might have led to important differences found in the “no attendant care cohort.” Interviews or focus groups with case managers, family members, and care recipients would also contribute to the identification and better understanding of factors not included in this study, but that might affect both the delivery of services and the likelihood of having long-stay nursing facility admissions.

Moreover, while time in program was not significantly different among study cohorts, further analyses should look at extent results vary as members receive MLTSS for longer periods. As being in the program for at least six full months was an eligibility criterion, all members who were enrolled for less than this time were excluded from the study. Nevertheless, comparisons between members who had MLTSS for 6 and for 12 months, might bring additional insights about the effect of program enrollment time on the expected outcome of avoiding nursing facility admissions.

While primarily looking at the effect of AC services, this study identified two other factors that strongly predicted long stays in nursing facilities: age and the use of other key HCBS. In both study analyses, age was a significant predictor of long-term nursing facility stays, with the odds of having this outcome being about 1.06 times higher for each additional year of age at baseline. These results are consistent with other studies that investigated predictive factors for nursing home admissions of older adults (Q. Cai et al., 2009; X. Cai & Temkin-Greener, 2015; Greiner et al., 2014).

Both analyses also found that having other HCBS strongly contributes to avoiding LSNF admissions, and the benefits increase as the count of HCBS increases. Results of the first analysis showed that when other factors, such as age and AC dosage are accounted for, those who received one or two of these key HCBS were 70 percent less likely to have an LSNF admission than those in the control group. Furthermore, those who received between three and five other HCBS were 81.5 percent less likely to have an LSNF admission than the control group. The second analysis confirmed these results, with a slightly lower difference between AC and control groups.

This dissertation fills some of the gaps found in the literature review by focusing on one sub-population enrolled in MLTSS programs and by investigating the effectiveness of a type of home and community-based service commonly used to prevent institutionalization of older adults: attendant care services. In addition, this evaluation used data collected by a managed care organization (MCO) (Kaiser Commission on Medicaid and the Uninsured, 2011) and looked at the outcome of avoiding LSNF admissions, which has been considered an appropriate measure to assess HCBS quality and the value of MLTSS (Soper et al., 2018).

This research reveals valuable data on members' demographics, health conditions, and service utilization that is collected by MCOs. It is my strong belief that the potential of existing data should be fully explored by any organization before new instruments for data collection are created. In this sense, MCOs are in a very strategic place to effectively use data already collected from members and providers in research and evaluation studies that would add new knowledge and help inform decisions at the community, organizational, and policy levels.

The National MLTSS Health Plan Association has proposed a set of LTSS performance measures derived from data already available to MCOs, and that would not require major new data collection or data processing work. The Association also stated that MLTSS outcomes measures should (1) be applicable to what MCOs are accountable for; (2) be stratified by demographic and functional status factors, to account for the diverse populations served by MLTSS programs; and (3) be aligned with existing state and federal requirements to avoid redundancy (National MLTSS Health Plan Association, 2016, 2017a).

While there is great potential for research and evaluation using data collected by MCOs, the fact that data is collected on a continuous basis from different sources and for various purposes creates a challenging task for researchers. Differing from other secondary datasets, such as those that result from surveys or census, data available for research in an MCO is in numerous formats and databases, requiring a great amount of time for data mining and dataset merges and cleaning, and for tests that assure its consistency and construct validity. These and other challenges have been pointed out by experienced researchers in policy and healthcare services (Lipson, 2018).

Home and community-based services provided to MLTSS members are expected to provide benefits at the individual level (e.g., greater ability to continue living independently in community settings; better experience of care, health outcomes, and quality of life) as well as at the organizational and policy levels (e.g., greater efficiency and effectiveness with use of LTSS resources) (National MLTSS Health Plan Association, 2017b). This dissertation focuses on only one of the expected outcomes of offering HCBS as part of MLTSS programs: avoid nursing facility admissions. Also, while this study's findings indicate the benefits of HCBS and, more specifically, personal care services, it is important to highlight that researchers and policy makers have pointed out potential risks of using home and community-based services (e.g., depression, social isolation, loneliness, and apprehension about needing help) and personal care services (e.g., neglect, abuse, and theft) to beneficiaries (U.S. Centers for Medicare and Medicaid Services, 2018c; Wysocki et al., 2015).

7.1 Strengths and Limitations of this Study

This dissertation study leverages data already collected by a managed care organization of long-term services and supports, longitudinally and at the individual level. Using the utilization-focused evaluation approach, I designed this study to answer relevant evaluation questions posed by the HHO program's team and the senior leadership at Gateway Health. It is also the first evaluation study with this scope conducted in the program, and it has the purpose of informing future decisions about improving services for older adults in Delaware and other states where Gateway Health operates.

The analyses presented here are bound to the limitations of using data not collected for research purposes, and therefore, study findings should be considered in the context of limitations associated with using existing administrative data. First, it is important to acknowledge that participants' frailty conditions were assessed based on diagnosis and procedure codes recorded by health providers on claims and, therefore, might have limited accuracy. Also, even though Johns Hopkins Care Analyzer uses up to two years of claims to calculate their measures, data on members' prior healthcare utilization, frailty flag, and coordination risk was minimal at baseline (considered the first 90 days of enrollment).

Moreover, data sources used for this study did not include information on factors that have been considered important confounders in studies of HCBS and nursing facility admissions. These factors include living arrangements, family resources (e.g., marital status, number of children), availability of informal care support, and level of functional impairment (i.e., number of dependencies in ADLs and IADLs) (Q. Cai et al., 2009; Chen & Thompson, 2010; Hwang et al., 2011; Muramatsu et al., 2007; Sands et al., 2012; Weaver & Roberto, 2017; Wysocki et al., 2015).

Lastly, the quasi-experimental design used in this study does not allow for conclusions about causality (Cook, Campbell, & Shadish, 2002; Sands et al., 2012); the design and the fact that all study participants are from Delaware and are enrollees of the Highmark Health Options program limits generalizations of the findings.

8.0 Conclusion

This evaluation research study offers evidence that attendant care services provided as part of a managed long-term services and supports (MLTSS) program effectively help avoid long-term institutionalization of older adults, contributing to their aging in place. Findings indicate that those who have attendant care services are less likely to have a long stay nursing facility admission than those who do not have this type of home-based service. Furthermore, the greater the dosage, here measured in average hours of attendant care services per day, the lower the likelihood of long-term nursing facility stays. And finally, the use of self-directed attendant care yields ever more positive results.

While these findings are preliminary and should not be used to make prescriptive recommendations about the amount and type of attendant care services to members, they give a basis for important policy and program discussions about MLTSS resources allocation. Personal care services have an essential role in the context of increasing demand for LTSS and the desire of older adults to age in place.

8.1 Recommendations for Practice and Research

As the use of data from managed-care organizations (MCOs) for research and evaluation purposes increases, efforts to organize databases in a more user-friendly way and to create documentation, such as data dictionaries and training materials for data analysts and

researchers, will become fundamental. This movement has already started at Gateway Health. Moreover, MCOs should discuss, internally and among themselves, which MLTSS outcome and quality measures better attend their current and future information and reporting needs.

In addition to accounting for factors not included in this study, such as level of informal care support and functional and cognitive limitations, future research should also look at whether home and community-based services (HCBS) provided as part of MLTSS programs help postpone institutionalization of older adults. This would require the use of more advanced statistical analysis, such as survival analysis with Cox proportional hazards regression with competing risks.

Moreover, further investigation is necessary for a better understanding of how HCBS complement each other in the common goal of helping older adults continue living in the community with independence, quality, and safety. This study shows that a greater count of HCBS leads to lower institutionalization, but other questions remain to be answered: Which factors are taken into consideration when defining different “packages” of LTSS/HCBS benefits for members with different needs and characteristics? How are services so diverse in nature, dosage, and purpose combined to attend to individuals’ needs? Is there an optimal combination of services to address the goal of avoiding long-stay nursing facility admissions?

Finally, as experimental designs are problematic with this population, for ethical and logistic reasons, the use of other sampling and analytical methods should be explored, such as propensity score matching and regression discontinuity analysis, to increase the internal and external validity of studies. The use of mixed-methods approaches would also enhance research and evaluations conducted by MCOs, allowing them to have a more comprehensive

understanding of participants' trajectories and perceptions that help contextualize the story told by enrollment and claims data.

Appendix A Highmark Health Options (HHO) Logic Model

Highmark Health Options – HHO Managed Long-Term Services and Supports in Delaware

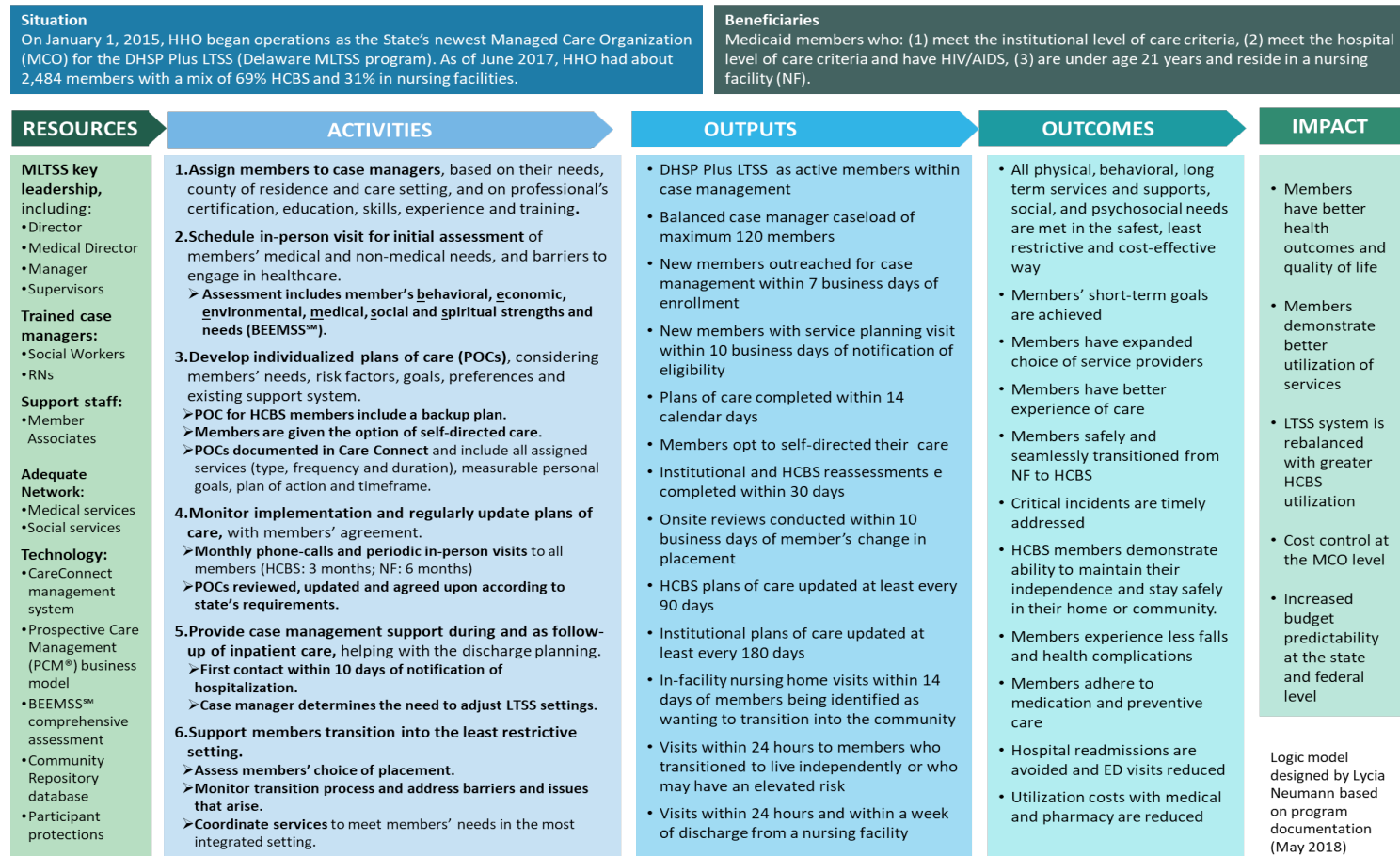


Figure 10. Logic Model

Appendix B Datasets Building Process

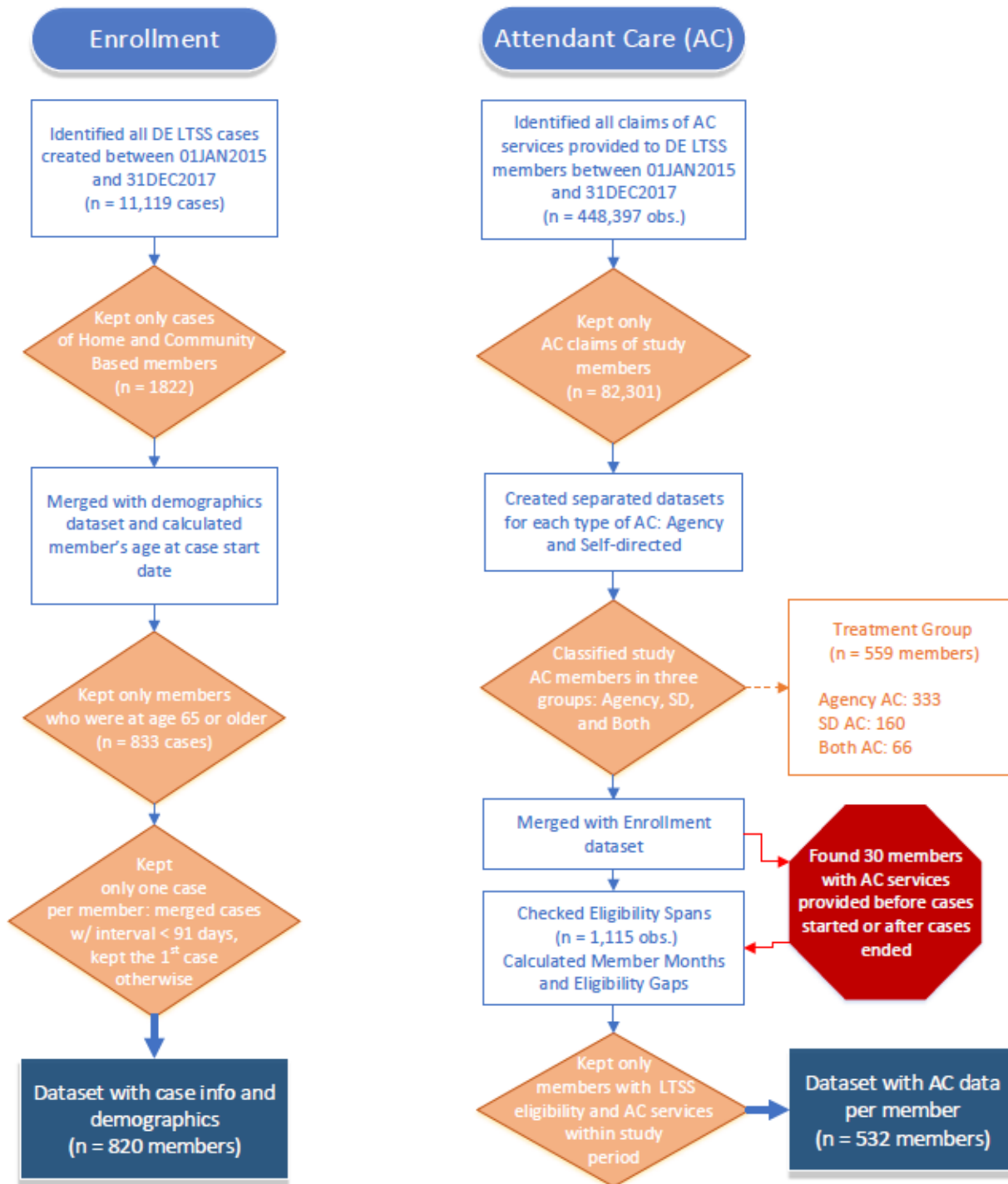


Figure 11. Flowcharts of Dataset Building Process: Enrollment and Attendant Care Services

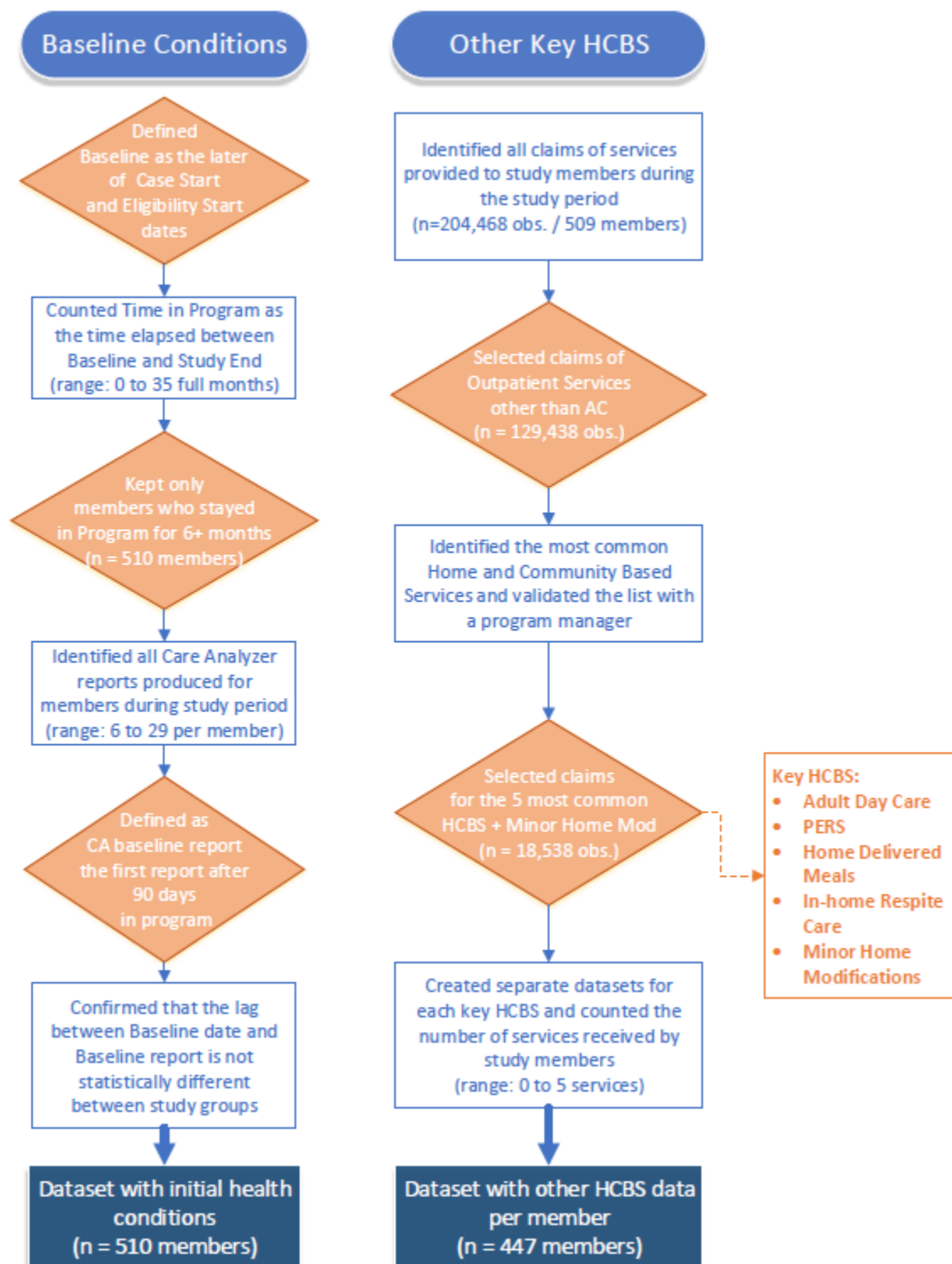


Figure 12. Flowcharts of Dataset Building Process: Baseline Conditions and Other Key HCBS

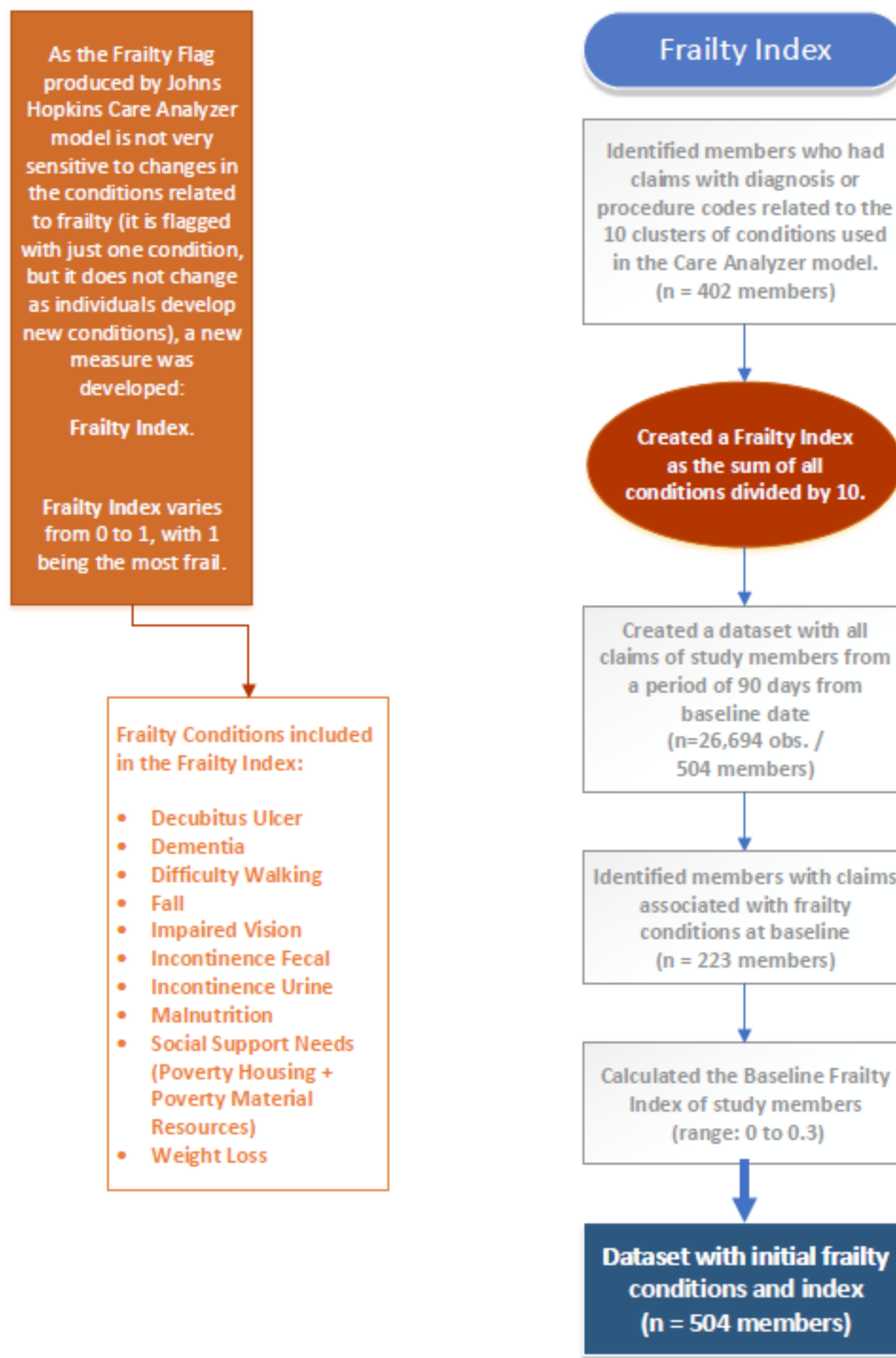


Figure 13. Flowchart of Building Process: Frailty Index

Bibliography

- AcademyHealth. (2015). *Measuring the Quality of Home and Community-Based Services: A Conversation about Strategic Directions for Research and Policy*. Retrieved from https://www.thescanfoundation.org/sites/default/files/academyhealth_hcbs_quality_meeting_handout.pdf
- Adams, C., Gebru, F., & Kimmel, L. (2017). MEDICAID 101: AN OVERVIEW.
- Allison, P. D. (2014). *Measures of fit for logistic regression*. Paper presented at the SAS Global Forum, Washington, DC.
- American Elder Care Research Organization. (2016, February 2016). Activities & Instrumental Activities of Daily Living - Definitions, Importance and Assessments. Retrieved from <https://www.payingforseniorcare.com/longtermcare/activities-of-daily-living.html>
- Anderson, S. (2016). A Brief History of Medicare in America. Retrieved from Medicareresources.org website: <https://www.medicareresources.org/basic-medicare-information/brief-history-of-medicare/>
- Anthony, S., Traub, A., Lewis, S., Mann, C., Kruse, A., & Herman Soper, M. (2017). *Strengthening Medicaid Long-Term Services and Supports in an Evolving Policy Environment: A Toolkit for States*. Retrieved from https://www.chcs.org/media/Strengthening-LTSS-Toolkit_120717.pdf
- Antoniou, T., Ng, R., Glazier, R. H., Kopp, A., & Austin, P. C. (2014). Comparison of comorbidity classification methods for predicting outcomes in a population-based cohort of adults with human immunodeficiency virus infection. *Ann Epidemiol*, 24(7), 532-537.
- Arai, H., Ouchi, Y., Yokode, M., Ito, H., Uematsu, H., Eto, F., . . . Sasaki, H. (2012). Toward the realization of a better aged society: messages from gerontology and geriatrics. *Geriatr Gerontol Int*, 12(1), 16-22.
- Austin, P. C., Stanbrook, M. B., Anderson, G. M., Newman, A., & Gershon, A. S. (2012). Comparative ability of comorbidity classification methods for administrative data to predict outcomes in patients with chronic obstructive pulmonary disease. *Ann Epidemiol*, 22(12), 881-887. doi:10.1016/j.annepidem.2012.09.011
- Austin, P. C., van Walraven, C., Wodchis, W. P., Newman, A., & Anderson, G. M. (2011). Using the Johns Hopkins Aggregated Diagnosis Groups (ADGs) to predict mortality in a general adult population cohort in Ontario, Canada. *Med Care*, 49(10), 932-939. doi:10.1097/MLR.0b013e318215d5e2
- Bakk, L., Cadet, T., Lien, L., & Smalley, A. (2017). Home modifications among community-dwelling older adults: a closer look at race and ethnicity. *J Gerontol Soc Work*, 60(5), 377-394.
- BetterEvaluation. (n.d.). Utilization-Focused Evaluation. Retrieved from https://www.betterevaluation.org/en/plan/approach/utilization_focused_evaluation
- Blackburn, J., Locher, J. L., & Kilgore, M. L. (2016). Comparison of Long-term Care in Nursing Homes Versus Home Health: Costs and Outcomes in Alabama. *Gerontologist*, 56(2), 215-221. doi:10.1093/geront/gnu021
- Boaz, R. F., & Muller, C. F. (1994). Predicting the risk of "permanent" nursing home residence: the role of community help as indicated by family helpers and prior living arrangements. *Health Serv Res*, 29(4), 391-414.
- Cai, Q., Salmon, J. W., & Rodgers, M. E. (2009). Factors associated with long-stay nursing home admissions among the US elderly population: comparison of logistic regression and the Cox

- proportional hazards model with policy implications for social work. *Social work in health care*, 48(2), 154-168.
- Cai, X., & Temkin-Greener, H. (2015). Nursing Home Admissions Among Medicaid HCBS Enrollees: Evidence of Racial/Ethnic Disparities or Differences? *Med Care*, 53(7), 566-573. doi:10.1097/mlr.0000000000000379
- Cassidy, A. (2012). *Care for Dual Eligibles. Efforts are afoot to improve care and lower costs for roughly 9 million people enrolled in both Medicare and Medicaid*. Retrieved from https://www.healthaffairs.org/doi/10.1377/hpb20120613.634976/full/healthpolicybrief_70.pdf
- Center for Health Care Strategies. (2017). *Medicaid Managed Long-Term Services and Supports Programs: State Update*. Retrieved from <https://www.chcs.org/resource/medicaid-managed-long-term-services-supports-programs-state-update/>
- Centers for Disease Control and Prevention. (2009). Healthy Places Terminology. Retrieved from <https://www.cdc.gov/healthyplaces/terminology.htm>
- Chen, Y. M., & Thompson, E. A. (2010). Understanding factors that influence success of home- and community-based services in keeping older adults in community settings. *J Aging Health*, 22(3), 267-291. doi:10.1177/0898264309356593
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2015). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). New York, NY: Routledge.
- Coleman, B. (2001). *Consumer-Directed Services for Older People*. Retrieved from https://assets.aarp.org/rgcenter/il/ib53_services.pdf
- Coleman, B. (2003). *Consumer-Directed Personal Care Services for Older People in the U.S*. Retrieved from https://assets.aarp.org/rgcenter/health/ib64_cd.pdf
- Commonwealth of Pennsylvania Department of Human Services. (2018). *2016 External Quality Review Report: Statewide Medicaid Managed Care Annual Report*. Retrieved from http://www.dhs.pa.gov/cs/groups/webcontent/documents/document/c_274386.pdf
- Cook, T. D., Campbell, D. T., & Shadish, W. (2002). *Experimental and quasi-experimental designs for generalized causal inference*: Houghton Mifflin Boston, MA.
- Cubanski, J., Swoope, C., Boccuti, C., Jacobson, G., Casillas, G., Griffin, S., & Neuman, T. (2015). *A Primer on Medicare: Key Facts about the Medicare program and the people it covers*. Retrieved from Kaiser Family Foundation website: <https://www.kff.org/medicare/report/a-primer-on-medicare-key-facts-about-the-medicare-program-and-the-people-it-covers/>
- Degenholtz, H. B., & Cole, E. (2017). *Community HealthChoices Evaluation Plan: Project Narrative*.
- Delaware Health and Social Services. (2011a). *Delaware Diamond State Health Plan Plus: Waiver Amendment Request Submitted Under Authority of Section 1115 of the Social Security Act* Retrieved from <https://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Waivers/1115/downloads/de/Diamond-State-Health-Plan/de-dshp-waiver-amend-072011.pdf>.
- Delaware Health and Social Services (Producer). (2011b). *Diamond State Health Plan Plus: DHSP - Plus*. [PowerPoint slides]
- Delaware Health and Social Services. (2016). *3 Steps to Medicaid Long -Term Care Services*. Department of Health and Social Services - DHSS.
- Delaware Health and Social Services. (2017a). *2018 Medicaid Managed Care: Master Service Agreement*. Delaware Health and Social Services Retrieved from http://www.dhss.delaware.gov/dhss/dmma/files/mco_msa2018.pdf.
- Delaware Health and Social Services. (2017b). *Diamond State Health Plan: Section 1115 Quarterly Report*. Retrieved from <https://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Waivers/1115/downloads/de/Diamond-State-Health-Plan/de-dshp-qtrly-rpt-jan-mar-2016.pdf>

- Dobson, C., Gibbs, S., Mosey, A., & Smith, L. (2017). *Demonstrating the Value of Medicaid MLTSS Programs*. Retrieved from <http://www.nasuad.org/sites/nasuad/files/FINAL%20Demonstrating%20the%20Value%20of%20MLTSS%205-12-17.pdf>
- DST Health Solutions. (2015). *DSTHS CareAnalyzer®, Version 9.4: Patient Results Column Definitions*. Unpublished internal document.
- Eiken, S., Sredl, K., Burwell, B., & Amos, A. (2018). *Medicaid Expenditures for Long-Term Services and Supports in FY 2016*. Retrieved from <https://www.medicaid.gov/medicaid/ltss/downloads/reports-and-evaluations/ltss expenditures 2016.pdf>
- Eiken, S., Sredl, K., Burwell, B., & Woodward, R. (2017). *Medicaid Expenditures for Long-Term Services and Supports (LTSS) in FY 2015*. Retrieved from <https://www.medicaid.gov/medicaid/ltss/downloads/reports-and-evaluations/ltss expenditures ffy 2015 final.pdf>
- Ensslin, B., & Kruse, A. (2016). State Trends in the Delivery of Medicaid Long-Term Services and Supports. Retrieved from <https://www.chcs.org/media/CHCS-MLTSS-Scan-7-20-16.pdf>
- Ewen, H. H., Washington, T. R., Emerson, K. G., Carswell, A. T., & Smith, M. L. (2017). Variation in Older Adult Characteristics by Residence Type and Use of Home- and Community-Based Services. *Int J Environ Res Public Health*, 14(3). doi:10.3390/ijerph14030330
- Family Caregiver Alliance. (2016). *Caregiver Statistics: Demographics*. Retrieved from <https://www.caregiver.org/caregiver-statistics-demographics>
- Fields, N. L., Anderson, K. A., & Dabelko-Schoeny, H. (2014). The effectiveness of adult day services for older adults: a review of the literature from 2000 to 2011. *J Appl Gerontol*, 33(2), 130-163. doi:10.1177/0733464812443308
- Florida State University. (2017). *Independent Assessment of the Florida Statewide Medicaid Managed Care Long-term Care Program: Final Interim Report (FY 2014-15)*. Retrieved from https://ahca.myflorida.com/medicaid/Policy_and_Quality/Quality/performance_evaluation/MER/contracts/med186/MED186_Final_Interim_Report.pdf
- Gordis, L. (2014). *Epidemiology* (5th ed.). Philadelphia: Elsevier.
- Grabowski, D. C. (2007). Medicare and Medicaid: conflicting incentives for long-term care. *Milbank Q*, 85(4), 579-610. doi:10.1111/j.1468-0009.2007.00502.x
- Gravetter, F. J., & Wallnau, L. B. (2013). *Statistics for the behavioral sciences* (9 ed.): Cengage Learning.
- Greenfield, E. A. (2012). Using ecological frameworks to advance a field of research, practice, and policy on aging-in-place initiatives. *The gerontologist*, 52(1), 1-12.
- Greiner, M. A., Qualls, L. G., Iwata, I., White, H. K., Molony, S. L., Sullivan, M. T., . . . Setoguchi, S. (2014). Predicting nursing home placement among home- and community-based services program participants. *Am J Manag Care*, 20(12), e535-536.
- Groves, R. M., Fowler Jr, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2009). *Survey methodology* (2nd ed. Vol. 561): John Wiley & Sons.
- Harrington, C., Wiener, J. M., Ross, L., & Musumeci, M. (2017). *Key Issues in Long-Term Services and Supports Quality*. Retrieved from <http://files.kff.org/attachment/Issue-Brief-Key-Issues-in-Long-Term-Services-and-Supports-Quality>
- Highmark BCBS Inc. (2014). *Case Management for DHSP Plus LTSS*. Program proposal. Highmark BCBS Inc.
- Highmark Health Options. (2018). *Highmark Health Options 2018 Member Handbook: Diamond State Health Plan Plus LTSS*. Retrieved from <https://www.highmarkhealthoptions.com/sites/default/files/Delaware%20LTSS%20Member%20Handbook%20-%20Final%20Web.pdf>

- Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied Logistic Regression*. New York, UNITED STATES: John Wiley & Sons, Incorporated.
- Houser, A., Fox-Grage, W., & Ujvari, K. (2012). *Across the States: Profiles of Long-Term Service and Supports*. Retrieved from <https://www.aarp.org/home-garden/livable-communities/info-09-2012/across-the-states-2012-profiles-of-long-term-services-supports-AARP-ppi-ltc.html>
- Huntley, A. L., Johnson, R., Purdy, S., Valderas, J. M., & Salisbury, C. (2012). Measures of multimorbidity and morbidity burden for use in primary care and community settings: a systematic review and guide. *Ann Fam Med*, 10(2), 134-141. doi:10.1370/afm.1363
- Hwang, E., Cummings, L., Sixsmith, A., & Sixsmith, J. (2011). Impacts of home modifications on aging-in-place. *Journal of Housing for the Elderly*, 25(3), 246-257.
- Iritani, K. M. (2017). *Medicaid Personal Care Services: More Harmonized Program Requirements and Better Data Are Needed*. Retrieved from <https://www.gao.gov/assets/690/684424.pdf>.
- Johns Hopkins Bloomberg School of Public Health. (2014). *The Johns Hopkins ACG® System: Version 11.0 Technical Reference Guide*. Technical Guide.
- Kaiser Commission on Medicaid and the Uninsured. (2011). *Examining Medicaid Managed Long-Term Service and Support Programs: Key Issues to Consider*. Retrieved from <https://kaiserfamilyfoundation.files.wordpress.com/2013/01/8243.pdf>
- Kaye, H. S., & Harrington, C. (2015). Long-term services and supports in the community: toward a research agenda. *Disabil Health J*, 8(1), 3-8. doi:10.1016/j.dhjo.2014.09.003
- Keall, M. D., Pierse, N., Howden-Chapman, P., Cunningham, C., Cunningham, M., Guria, J., & Baker, M. G. (2015). Home modifications to reduce injuries from falls in the Home Injury Prevention Intervention (HIPI) study: a cluster-randomised controlled trial. *The Lancet*, 385(9964), 231-238.
- Khatutsky, G., Anderson, W. L., & Wiener, J. M. (2006). Personal care satisfaction among aged and physically disabled Medicaid beneficiaries. *Health Care Financ Rev*, 28(1), 69-86.
- Kilgore, J. (2015). Managed Care and MLTSS 101 [PowerPoint slides].
- Kojima, G. (2018). Frailty as a predictor of nursing home placement among community-dwelling older adults: a systematic review and meta-analysis. *Journal of Geriatric Physical Therapy*, 41(1), 42-48.
- Lewis, E., Eiken, S., Amos, A., & Saucier, P. (2018). *The Growth of Managed Long-Term Services and Supports Programs: 2017 Update*. Retrieved from <https://www.medicaid.gov/medicaid/managed-care/downloads/ltss/mltssp-inventory-update-2017.pdf>
- Libersky, J., Lipson, D., Liu, S., Collins, A., Turoff, L., Li, J., . . . Irvin, C. (2018). *Managed Long-Term Services and Supports: Medicaid 1115 Demonstration Interim Evaluation Report*. Retrieved from <https://www.medicaid.gov/medicaid/section-1115-demo/downloads/evaluation-reports/mltss-interim-eval-report.pdf>
- Lipson, D. (2018). *MLTSS Quality Measures... a quick tour of the landscape*. Paper presented at the 2018 Managed Care Congress - MLTSS Summit, Washington D.C. PowerPoint presentation retrieved from
- McCall, N. (2001). Long term care: Definition, demand, cost, and financing. In N. McCall (Ed.), *Who Will Pay for Long Term Care?: Insights from the Partnership Programs* (pp. 3-31). Chicago: Health Administration Press.
- McCann, J. J., Hebert, L. E., Li, Y., Wolinsky, F. D., Gilley, D. W., Aggarwal, N. T., . . . Evans, D. A. (2005). The effect of adult day care services on time to nursing home placement in older adults with Alzheimer's disease. *Gerontologist*, 45(6), 754-763.
- Mercer Government Human Services Consulting. (2017). *2017 External Quality Review: State of Delaware - Highmark Health Options*. Unpublished internal document.

- Meucci, M. R., Gozalo, P., Dosa, D., & Allen, S. M. (2016). Variation in the presence of simple home modifications of older Americans: findings from the National Health and Aging Trends Study. *J Am Geriatr Soc*, 64(10), 2081-2087.
- Miller, M. (2016). How to fix U.S. long-term care over the long haul. *Reuters*. Retrieved from <https://www.reuters.com/article/us-column-miller-longtermcare/how-to-fix-u-s-long-term-care-over-the-long-haul-idUSKCN0VK1F7>
- Muramatsu, N., Yin, H., Campbell, R. T., Hoyem, R. L., Jacob, M. A., & Ross, C. O. (2007). Risk of nursing home admission among older americans: does states' spending on home- and community-based services matter? *J Gerontol B Psychol Sci Soc Sci*, 62(3), S169-178.
- Musumeci, M. (2015). *Rebalancing in Capitated Medicaid Managed Long-Term Services and Supports Programs: Key Issues from a Roundtable Discussion on Measuring Performance*. Retrieved from <http://files.kff.org/attachment/issue-brief-rebalancing-in-capitated-medicaid-managed-long-term-services-and-supports-programs-key-issues-from-a-roundtable-discussion-on-measuring-performance>
- Musumeci, M., Rudowitz, R., Hinton, E., Antonisse, L., & Hall, C. (2018). *Section 1115 Medicaid Demonstration Waivers: The Current Landscape of Approved and Pending Waivers*. Retrieved from The Henry J. Kaiser Family Foundation
- National Alliance for Caregiving, & AARP Public Policy Institute. (2015). *Caregiving in the U.S.: 2015 report*. Retrieved from <https://www.aarp.org/content/dam/aarp/ppi/2015/caregiving-in-the-united-states-2015-report-revised.pdf>
- National Association of Community Health Centers. (n.d.). *Summary of State Waiver Options*. Retrieved from <http://www.nachc.org/wp-content/uploads/2015/10/CMS-MCD-Waiver-one-pager-FINAL.pdf>
- National Committee for Quality Assurance (NCQA). (2018). *HEDIS and Performance Measurement*. Retrieved from <https://www.ncqa.org/hedis/>
- National Council on Medicaid Home Care. (2013). *CMS Publishes Guidance on MLTSS External Quality Review Protocols*. In. Washington D.C.: National Council on Medicaid Home Care.
- National MLTSS Health Plan Association. (2016). *Comments on Quality Measure Development and Maintenance for CMS Programs Serving Medicare-Medicaid Enrollees and Medicaid-Only Enrollees*. Retrieved from <http://mltss.org/wp-content/uploads/2016/10/National-MLTSS-Association-Quality-Measure-Comment-Letter.pdf>
- National MLTSS Health Plan Association. (2017a). *Model LTSS Performance Measurement and Network Adequacy Standards for States*. Retrieved from <http://mltss.org/wp-content/uploads/2017/05/MLTSS-Association-Quality-Framework-Domains-and-Measures-042117.pdf>
- National MLTSS Health Plan Association. (2017b). *The Value of Managed Long-Term Services and Supports*. Retrieved from <http://mltss.org/wp-content/uploads/2017/05/MLTSS-Integrated-Value-Statement-Final-1-3-17.pdf>
- National MLTSS Health Plan Association. (2018). *Comments submitted to NQF Patient Experience & Function Standing Committee Re: LTSS measures under consideration for endorsement*. Retrieved from <http://mltss.org/wp-content/uploads/2018/04/NQF-MLTSS-Quality-Measure-Assn-comments-FINAL.pdf>
- National Quality Forum. (2016). *Quality in Home and Community-Based Services to Support Community Living: Addressing Gaps in Performance Measurement*. Retrieved from https://www.qualityforum.org/Publications/2016/09/Quality_in_Home_and_Community-Based_Services_to_Support_Community_Living_Addressing_Gaps_in_Performance_Measurement.aspx

- Newcomer, R. J., Ko, M., Kang, T., Harrington, C., Hulett, D., & Bindman, A. B. (2016). Health Care Expenditures After Initiating Long-term Services and Supports in the Community Versus in a Nursing Facility. *Med Care*, 54(3), 221-228. doi:10.1097/mlr.0000000000000491
- O'Keeffe, J., Saucier, P., Jackson, B., Cooper, R., McKenney, E., Crisp, S., & Moseley, C. (2010). *Understanding Medicaid home and community services: a primer*: US Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation.
- Office of Inspector General. (2012). *Personal Care Services: Trends, Vulnerabilities, and Recommendations for Improvement. A Portfolio*. Retrieved from <https://oig.hhs.gov/reports-and-publications/portfolio/portfolio-12-12-01.pdf>.
- Olivari, B. S., Baumgart, M., Lock, S. L., Whiting, C. G., Taylor, C. A., Iskander, J., . . . McGuire, L. C. (2018). CDC Grand Rounds: Promoting Well-Being and Independence in Older Adults. *MMWR Morb Mortal Wkly Rep*(67), 1036-1039. doi: <http://dx.doi.org/10.15585/mmwr.mm6737a4>
- Paradise, J., & Musumeci, M. (2016). *CMS's Final Rule on Medicaid Managed Care: A Summary of Major Provisions*. Retrieved from <http://files.kff.org/attachment/CMSs-Final-Rule-on-Medicaid-Managed-Care>
- Patton, M. Q. (1997). *Utilization-focused evaluation*: Sage publications.
- Pavle, K., Saucier, P., Amos, A., & Kasten, J. (2017). *The Impact of Managed Long-Term Services and Supports (MLTSS) Policies on Access to LTSS*. Retrieved from <https://www.medicaid.gov/medicaid/section-1115-demo/downloads/evaluation-reports/1115-ib16-508-mltss-access.pdf>
- Peebles, V., & Bohl, A. (2014). The HCBS Taxonomy: A New Language for Classifying Home- and Community-Based Services. *Medicare & Medicaid Research Review*, 4(3), mmrr2014-2004-2003-b2001. doi:10.5600/mmrr.004.03.b01
- Reaves, E. L., & Musumeci, M. (2015). *Medicaid and Long-Term Services and Supports: A primer*. Retrieved from <https://www.kff.org/medicaid/report/medicaid-and-long-term-services-and-supports-a-primer/>
- Reinhard, S., Accius, J., Houser, A., Ujvari, K., Alexis, J., & Fox-Grage, W. (2017). *Picking Up the Pace of Change: A State Scorecard on Long-Term Services and Supports for Older Adults, People with Physical Disabilities, and Family Caregivers*. Retrieved from <http://www.longtermscorecard.org/~media/Microsite/Files/2017/Web%20Version%20LongTerm%20Services%20and%20Supports%20State%20Scorecard%202017.pdf>
- Reinhard, S., Feinberg, L. F., Choula, R., & Houser, A. (2015). *Valuing the Invaluable: 2015 Update*. Retrieved from <https://www.aarp.org/content/dam/aarp/ppi/2015/valuing-the-invaluable-2015-update-new.pdf>
- Roberts, M. S. (Producer). (2018). Determinates of the Organization, Financing and Delivery of Health Care. *Health Policy and Management in Public Health* [PowerPoint presentation]
- Sands, L. P., Xu, H., Joseph Thomas III, S. P., Craig, B. A., Rosenman, M., Doebbeling, C. C., & Weiner, M. (2012). Volume of home-and community-based services and time to nursing-home placement. *Medicare & Medicaid Research Review*, 2(3).
- SAS Institute Inc. (2015). *SAS Enterprise Guide (Version 7.11 HF3)*. Cary, NC,USA.
- Saucier, P., & Burwell, B. (2015). *Care Coordination in Managed LongTerm Services and Supports*. Retrieved from <https://www.aarp.org/content/dam/aarp/ppi/2015/care-coordination-in-managed-long-term-services-and-supports-report.pdf>
- Saucier, P., Kasten, J., Burwell, B., & Gold, L. (2012). *The Growth of Managed Long-Term Services and Supports (MLTSS) Programs: A 2012 Update*. Retrieved from https://www.medicaid.gov/medicaid-chip-program-information/by-topics/delivery-systems/downloads/mltssp_white_paper_combined.pdf

- Shugarman, L. R., Bern, J., & Foster, J. (2015). *White Paper: The Value of Medicaid Managed Care*. Retrieved from <https://www.healthmanagement.com/wp-content/uploads/HMA-Value-of-MMC-White-Paper-FINAL-111215.pdf>
- Simon-Rusinowitz, L., Loughlin, D. M., Ruben, K., Martinez Garcia, G., & Mahoney, K. J. (2010). The benefits of consumer-directed services for elders and their caregivers in the cash and counseling demonstration and evaluation. *Public Policy and Aging Report*, 20(1), 27-31.
- Sollitto, M. (2017, 3.30.2017). Qualifying for Medicaid to Pay for Long-Term Care. Retrieved from <https://www.agingcare.com/Articles/medicaid-and-long-term-care-133719.htm>
- Sollitto, M. (2018, 01.05.2018). Does Medicare Cover Stays in Skilled Nursing Facilities? Retrieved from https://www.agingcare.com/Articles/Medicare-coverage-of-skilled-nursing-facility-153265.htm?utm_source=Newsletter&utm_medium=Email&utm_campaign=Newsletter%20-%20January%2017,%202018&acst=7d6a3712-3f51-48da-a6d5-d3702d89706e&key=7644b5b1-b281-415d-9636-28fcfbf3af3&mkt_tok=eyJpIjoiTWpnMlIUUmXOek15WkdFeilsInQiOiJHeGszU0ticHZXd0c3MVZoY3lCNTVMM2NPRjBkb0c0dU1HdHEzNUZreWlDMjIraytmXC9YdDN0aXY2OWpmNXFzeFNwRUFCRGN6QUppRMmplRWJQamY4V1djMGZaVTVVVV1kOTGE3Zm9OUkNEK2ZRNm1iMjBQRmVaUDQwSlpPeFg4RVMifQ%3D%3D
- Soper, M. H., Lipson, D., Dominiak, M., & Lloyd, J. (2018). *Achieving Value in Medicaid Home- and Community-Based Care: Considerations for Managed Long-Term Services and Supports Programs*. Retrieved from <https://www.chcs.org/resource/achieving-value-in-medicaid-home-and-community-based-care-considerations-for-managed-long-term-services-and-supports-programs/>
- Soper, M. H., & Phillip, A. M. (2017). Advancing Medicaid Managed Long-Term Services and Supports Programs, What's Next? Retrieved from <https://www.chcs.org/advancing-medicaid-managed-long-term-services-supports-programs-whats-next/>
- Stewart, K., & Irvin, C. (2017). *Does early use of community-based long-term services and supports lead to less use of institutional care?* Retrieved from <https://www.medicaid.gov/medicaid/ltss/downloads/money-follows-the-person/hcbasadiversiontoiltc.pdf>
- Summer, L. L., & Ihara, E. S. (2005). *The Medicaid Personal Care Services Benefit: Practices in States that Offer the Optional State Plan Benefit* Retrieved from https://assets.aarp.org/rgcenter/health/2005_11_medicaid.pdf
- Tang, F., & Lee, Y. (2011). Social support networks and expectations for aging in place and moving. *Research on Aging*, 33(4), 444-464.
- Thach, N. T., & Wiener, J. M. (2018). *An Overview of Long-Term Services and Supports and Medicaid*. Retrieved from <https://aspe.hhs.gov/system/files/pdf/259521/LTSSMedicaid.pdf>
- The Henry J. Kaiser Family Foundation. (2015). *Long-Term Care in the United States: A Timeline*. Retrieved from <https://www.kff.org/medicaid/timeline/long-term-care-in-the-united-states-a-timeline/>
- Torrey, T. (2018). Medicare's HCPCS Codes for Payments. Retrieved from <https://www.verywellhealth.com/what-are-medicare-hcpcs-codes-2614952>
- U.S. Centers for Medicare and Medicaid Services. (2008). *Medicare Current Beneficiary Survey (MCBS): Glossary*. CMS.gov: U.S. Centers for Medicare and Medicaid Services Retrieved from https://www.cms.gov/research-statistics-data-and-systems/research/mcbs/downloads/2008_appendix_b.pdf
- U.S. Centers for Medicare and Medicaid Services. (2012a). *Application of Existing External Quality Review Protocols to Managed Long Term Services and Supports*. U.S. Centers for Medicare and

- Medicaid Services Retrieved from <https://www.medicaid.gov/medicaid-chip-program-information/by-topics/delivery-systems/downloads/cmcs-eqr-protocols.pdf>.
- U.S. Centers for Medicare and Medicaid Services. (2012b). *"At-a-Glance" Guide to Federal Medicaid Authorities Useful in Restructuring Medicaid Health Care Delivery or Payment* U.S. Centers for Medicare and Medicaid Services Retrieved from <https://www.chcs.org/resource/at-a-glance-guide-to-federal-medicaid-authorities-useful-in-restructuring-medicaid-health-care-delivery-or-payment/>.
- U.S. Centers for Medicare and Medicaid Services. (2013). *Summary - Essential Elements of Managed Long Term Services and Supports Programs*. U.S. Centers for Medicare and Medicaid Services Retrieved from <https://www.medicaid.gov/medicaid-chip-program-information/by-topics/delivery-systems/downloads/mltss-summary-elements.pdf>.
- U.S. Centers for Medicare and Medicaid Services. (2015). *Medicare & Medicaid Milestones 1937 - 2015*. CMS Website Retrieved from <https://www.cms.gov/About-CMS/Agency-Information/History/Downloads/Medicare-and-Medicaid-Milestones-1937-2015.pdf>.
- U.S. Centers for Medicare and Medicaid Services. (2016). *Beneficiary Services*. Retrieved from <https://www.cms.gov/Medicare/Coordination-of-Benefits-and-Recovery/Beneficiary-Services/Overview.html>
- U.S. Centers for Medicare and Medicaid Services. (2017a). *Dual Eligible Beneficiaries under Medicare and Medicaid*. Centers for Medicare and Medicaid Services Retrieved from <https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/Medicare-Beneficiaries-Dual-Eligibles-At-a-Glance-TextOnly.pdf>.
- U.S. Centers for Medicare and Medicaid Services. (2017b, 12/05/2017). *Home and Community-based Services*. Retrieved from <https://www.cms.gov/Outreach-and-Education/American-Indian-Alaska-Native/AIAN/LTSS-TA-Center/info/hcbs.html>
- U.S. Centers for Medicare and Medicaid Services. (2017c). *Moving from FFS to Managed Long Term Services and Supports*. U.S. Centers for Medicare and Medicaid Services Retrieved from <https://www.medicaid.gov/medicaid/hcbs/downloads/training/ffs-to-mltss.pdf>.
- U.S. Centers for Medicare and Medicaid Services. (2017d, 2017.07.11). *Program Integrity: Personal Care Services (PCS)*. Retrieved from <https://www.cms.gov/Medicare-Medicaid-Coordination/Fraud-Prevention/Medicaid-Integrity-Education/personal-care-services.html>
- U.S. Centers for Medicare and Medicaid Services. (2018a). *Measures for Medicaid Managed Long Term Services and Supports Plans: Technical Specifications and Resource Manual*. U.S. Centers for Medicare and Medicaid Services Retrieved from https://www.medicaid.gov/medicaid/managed-care/downloads/ltss/mltss_assess_care_plan_tech_specs.pdf.
- U.S. Centers for Medicare and Medicaid Services. (2018b). *Medicaid Managed Care Enrollment and Program Characteristics, 2016*. Retrieved from <https://www.medicaid.gov/medicaid-chip-program-information/by-topics/data-and-systems/medicaid-managed-care/downloads/2014-medicaid-managed-care-enrollment-report.pdf>
- U.S. Centers for Medicare and Medicaid Services. (2018c). *Vulnerabilities and Mitigation Strategies in Medicaid Personal Care Services*. Retrieved from <https://www.cms.gov/Medicare-Medicaid-Coordination/Fraud-Prevention/FraudAbuseforProfs/Downloads/vulnerabilities-mitigation-strategies.pdf>
- U.S. Centers for Medicare and Medicaid Services. (n.d.-a). *1115 Demonstration Evaluations*. Retrieved from <https://www.medicaid.gov/medicaid/section-1115-demo/evaluation-reports/index.html>
- U.S. Centers for Medicare and Medicaid Services. (n.d.-b). *Eligibility*. Retrieved from <https://www.medicaid.gov/medicaid/eligibility/index.html>
- U.S. Centers for Medicare and Medicaid Services. (n.d.-c). *Managed Care*. Retrieved from <https://www.medicaid.gov/medicaid/managed-care/index.html>

- U.S. Centers for Medicare and Medicaid Services. (n.d.-d). Managed Long Term Services and Supports. Retrieved from <https://www.medicaid.gov/medicaid/managed-care/ltss/index.html>
- U.S. Centers for Medicare and Medicaid Services. (n.d.-e). Quality of Care External Quality Review. Retrieved from <https://www.medicaid.gov/medicaid/quality-of-care/medicaid-managed-care/external-quality-review/index.html>
- U.S. Centers for Medicare and Medicaid Services. (n.d.-f). Section 1115 Demonstrations. Retrieved from <https://www.medicaid.gov/medicaid/section-1115-demo/index.html>
- U.S. Centers for Medicare and Medicaid Services. (n.d.-g). *Section 1115 Demonstrations: Developing the Evaluation Design*. Retrieved from <https://www.medicaid.gov/medicaid/section-1115-demo/downloads/evaluation-reports/developing-the-evaluation-design.pdf>.
- U.S. Centers for Medicare and Medicaid Services. (n.d.-h). *Section 1115 Demonstrations: Preparing the Evaluation Report*. Retrieved from <https://www.medicaid.gov/medicaid/section-1115-demo/downloads/evaluation-reports/preparing-the-evaluation-report.pdf>.
- U.S. Department of Commerce. (n.d.). United States Census Bureau: Quick Facts Delaware. Retrieved from <https://www.census.gov/quickfacts/DE>
- U.S. Department of Health and Human Services. (2013). *Quality in Managed Long-Term Services and Supports Programs*. Retrieved from <https://aspe.hhs.gov/report/quality-managed-long-term-services-and-supports-programs>
- U.S. Government Accountability Office. (2017). *Medicaid Managed Care: CMS Should Improve Oversight of Access and Quality in States' Long-Term Services and Supports Programs*. Retrieved from <https://www.gao.gov/products/GAO-17-632>.
- Watts, M. O. M., Musumeci, M., & Ubri, P. (2017). *Medicaid Section 1115 Managed Long-Term Services and Supports Waivers*. Retrieved from <https://www.kff.org/medicaid/report/medicaid-section-1115-managed-long-term-services-and-supports-waivers-a-survey-of-enrollment-spending-and-program-policies/>
- Weaver, R. H., & Roberto, K. A. (2017). Home and Community-Based Service Use by Vulnerable Older Adults. *Gerontologist*, 57(3), 540-551. doi:10.1093/geront/gnv149
- Wiener, J. M., Anderson, W. L., & Khatutsky, G. (2007). Are consumer-directed home care beneficiaries satisfied? Evidence from Washington state. *Gerontologist*, 47(6), 763-774.
- Wiles, J. L., Leibing, A., Guberman, N., Reeve, J., & Allen, R. E. (2011). The meaning of “ageing in place” to older people. *The gerontologist*, gnr098.
- Woodcock, C., Stockwell, I., Tripp, A., & Miligan, C. (2011). *Rebalancing long-term services and supports: Progress to date and a research agenda for the future*. Retrieved from Baltimore, MD: <http://www.hilltopinstitute.org/publications/RebalancingLTSS-ProgressToDateAndResearchAgendaForFuture-June2011.pdf>
- Woodcock, C. H. (Producer). (2011, 2018.04.20). The State Perspective: Rebalancing Long-Term Services and Supports. [PowerPoint slides] Retrieved from <http://www.commonwealthfund.org/~media/files/publications/blog/2011/oct/woodcock-ltss-briefing.pdf>
- Woodcock, C. H. (2015). *Long-term services and supports: challenges and opportunities for states in difficult budget times*. Retrieved from <https://www.hilltopinstitute.org/wp-content/uploads/publications/LTSSChallengesandOpportunitiesforStatesindifficultBudgetTimes-December2011.pdf>
- Wysocki, A., Butler, M., Kane, R. L., Kane, R. A., Shippee, T., & Sainfort, F. (2015). Long-Term Services and Supports for Older Adults: A Review of Home and Community-Based Services Versus Institutional Care. *J Aging Soc Policy*, 27(3), 255-279. doi:10.1080/08959420.2015.1024545