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Healthcare Utilization And Expenditure Patterns Among Older Adults With Functional And Medical Decline

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HEALTHCARE UTILIZATION AND EXPENDITURE PATTERNS AMONG OLDER
ADULTS WITH FUNCTIONAL AND MEDICAL DECLINE

by

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DEDICATION

I dedicate this dissertation research first and foremost to my husband and best friend, Matthew Robertson. When I came up with the crazy idea to quit my job and drag you halfway across the country in pursuit of happiness you did not hesitate to encourage and support me. You have sacrificed so much to support my dreams—our dreams—and I will never be able to properly express how grateful I am to have you as my partner in crime, my support in hard times, and my soul mate. You are my dream. LMK.

I also dedicate this dissertation to my children, Hutton Oliver and Calumina Faye. Your father and I have been blessed beyond belief to become your parents during this process. When I started this doctoral program, you two were just silent hopes in our hearts as we slogged through the grad school process. Now that you're both here, you guys are the reason for everything we do—so, more than anything or anyone, this dissertation is truly for you. I love you both so much, and am so grateful that it was God's plan for us to all be a family.

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ABSTRACT

Purpose. As the aged population of this country grows, the U.S. healthcare system will face increased pressure to provide long-term care services and supports to increasing numbers of elderly Medicare beneficiaries. Studies have indicated that unmet long-term care need can lead to increased, unnecessary utilization of the healthcare system, thus further taxing the Medicare system. Little is known about how type of long-term care, as well as how long-term care policies—specifically payment policies—affect health care utilization. The objective of this original dissertation research was to examine the effects of place of residence (community versus residential long-term care facility) and long-term care payer type (private pay versus Medicaid) on Medicare-funded healthcare utilization in terms of both risk of potentially preventable hospitalization (PPH) and Medicare expenditures.

Methods. This study utilized data from the 5% sample of 2013 Medicare claims and enrollment data from the Centers for Medicare and Medicaid Services (CMS) merged with data from the Areas Health Resource File (AHRF). A retrospective cohort analysis examined the healthcare utilization and expenditure patterns of Medicare beneficiaries for whom, based on clinical and demographic factors, the provision of formal, comprehensive long-term care would be appropriate, among four cohorts: Medicare-only beneficiaries residing in the community; Medicare-only beneficiaries residing in long-term care facilities; Medicare/Medicaid dual eligible beneficiaries residing in the

community; and Medicare/Medicaid dual eligible beneficiaries residing in long-term care facilities.

Results. This study found a significantly higher risk of both PPH and having Medicare expenditures in the top 90th percentile among both Medicare-only long-term care facility residents and dual eligible community residents as compared to dual eligible long-term care facility residents, yet Medicare-only long-term care facility residents had significantly lower per capita Medicare expenditures than did their dual eligible counterparts residing in long-term care facilities. The results of this study also indicate that state Medicaid bed hold policies had no statistically significant effect on either risk of PPH or on Medicare expenditures.

Conclusion. The finding that Medicare-only residents of long-term care facilities are less expensive to the Medicare system, on average, than their dual eligible long-term care facility resident peers, yet are more likely to be hospitalized for a preventable condition and are more likely to be among the most expensive Medicare beneficiaries, could indicate differential patterns of intensity of medical response to similar clinical conditions between the two groups. That state Medicaid bed hold policies were not associated with any of the measures of healthcare utilization in our study seems to suggest that this Medicaid policy does not provide the perverse incentive toward higher utilization that some studies suggest.

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CHAPTER 1

INTRODUCTION

As baby boomers age, and medical science leads to increased longevity, the number of elderly Americans in need of long-term care is expected to grow significantly in the coming years (Schneider & Guralnik, 1990; Laxdawalla & Phillipson, 2002; CBO, 2013). However, as Medicare does not provide reimbursement for long-term care services and supports (LTCSS) outside of the post-acute setting, and Medicaid coverage for LTCSS is limited to only those Americans with significant income-based and clinical needs, many Americans rely solely on informal care for their long-term care support, as formal long-term care is prohibitively expensive for the majority of elderly individuals in need of long-term care (CMS, 2015; Wiener, et al., 2013; Office of the Assistant Secretary for Planning and Evaluation, 2013; Genworth, 2016).

Research has found that unmet long-term care need is associated with poor health outcomes and overutilization of the healthcare system (Walsh, E.G., 2012; Sands, et al., 2006; Kuzuya, et al., 2008; Quail, Wolfson, & Lipman, 2011; Hass, et al., 2015). Although long-term has been demonstrated to reduce poor health outcomes among frail elderly individuals, there is also evidence that comprehensiveness of long-term care affects both health outcomes and healthcare utilization (Kuzuya, 2006; Freedman & Spillman, 2014; SCAN Foundation, 2011; Wysocki, et al., 2014). However, research has

also suggested that Medicaid policy can have perverse effects on healthcare utilization—specifically, a number of studies have suggested that the presence of state Medicaid bed hold policies encourage the unnecessary hospitalization of Medicaid beneficiaries—and, to a smaller extent—other beneficiaries, at significant potential costs to the Medicare system (Intrator, et al., 2007; Intrator, et al., 2009; Grabowski, et al., 2010; Unruh, et al., 2013).

The objective of this dissertation research was to examine the interplay between comprehensiveness of long-term care (comparing residents of formal long-term care facilities to similarly-frail individuals residing in the community) and payor status on Medicare-funded healthcare utilization, in terms of both potentially preventable hospitalization (PPH) and Medicare expenditures, utilizing a retrospective cohort analysis which resulted in the creation of four cohorts: Medicare-only beneficiaries residing in the community; Medicare-only beneficiaries residing in long-term care facilities; Medicare/Medicaid dual eligible beneficiaries residing in the community; and Medicare/Medicaid dual eligible beneficiaries residing in long-term care facilities. The specific aims of the study were: 1) examine the risk of PPH between the four matched cohorts; and 2) examine median per capita Medicare expenditures as well as risk of being in the 90th percentile of Medicare expenditures between the four matched cohorts. It is anticipated that while Medicare-only beneficiaries residing in long-term care facilities will have the lowest risk of PPH, the lowest Medicare expenditures per capita, and the lowest risk of being in the 90th percentile of Medicare expenditures, dual-eligible beneficiaries who reside in long-term facilities will be the second lowest group on all

measures, as the protective effect of comprehensive long-term care will outweigh the effects of perverse incentives linked to Medicaid policy.

This dissertation is formatted using the manuscript style: Chapters 4 (Results) and 5 (Conclusions) were replaced with two manuscripts representing the two specific aims examined. Chapter 2 provides a review of scholarly literature as to the current state of long-term care policy in America today, and factors associated with differences in healthcare utilization among individuals in need of long-term care. Chapter 3 provides an overview of the methodology implemented in this study. Chapter 4 examines the effects of long-term care facility residency and payor type of risk of PPH among frail elderly Medicare beneficiaries, while Chapter 5 examines the effects of long-term care facility residency and payor type on Medicare expenditures among frail elderly Medicare beneficiaries. Chapter 6 concludes with a highlight of major findings of this dissertation research.

CHAPTER 2

LITERATURE REVIEW

Need for Long-Term Care in America

The National Institutes of Health define long-term care as “care [that] involves a variety of services designed to meet a person’s health or personal care needs during a short or long period of time,” and goes on to state that long term care services “help people live as independently and safely as possible when they can no longer perform everyday activities on their own” (NIH SeniorHealth, 2015). Essentially, long-term care is an umbrella term that refers to any care provided with the goal of halting functional and medical deterioration and assisting frail individuals with daily living needs. Long-term care can be provided in a number of settings, including skilled nursing facilities, through home visitation programs, in assisted living facilities, or informally by family members, and can include services that range from assistance with instrumental activities of daily living (IADLs) (such as grocery shopping and taking care of pets), to assistance with basic activities of daily living (ADLs) (such as bathing and toileting), to medical services that span a continuum between simple prescription drug management to assistance with continuous dialysis (Lawton & Brody, 1969; Katz, 1983; Reddy, et al., 2007).

In 2012, it was estimated that twelve million Americans were in need of long-term care, (Scan Foundation, 2012), and approximately sixty-three percent of Americans in need of long-term care are aged 65 and older (Eckenwiler, 2007). The vast majority of

older individuals in need of long-term care resided in the community, although nearly two million lived in nursing homes (Kaye, Harrington, & LaPlante, 2010). As the aged population in the United States grows due to increased longevity and the aging of the baby boomers (Schneider & Guralnik, 1990; Lakdawalla & Philipson, 2002), if the proportion of the aged population in need of long-term care remains static, 9.6 million individuals aged 65 and older will need long-term care in 2030, rising to over 14 million in 2050 (CBO, 2013).

Estimates for odds of requiring long-term care during one’s lifetime vary, and take into consideration population-level ADL impairment rates and historical patterns of long-term care utilization. The most widely-used model of long-term care utilization is the “Robinson care status transition matrix,” which employs a Continuous-Time Markov Chain model using data from the 1982, 1984, and 1989 National Long-Term Care Surveys, and has been used in combination with data from the 1985 National Nursing Home Survey to estimate a lifetime risk of need for nursing home care of 39% (Robinson, 2002; Brown & Finkelstein, 2006). However, recent research using more recent data from the Health and Retirement Study suggests that the Robinson model underestimates the need for long-term care by failing to account for nursing home stays that are relatively short—for example, data such as that in the National Long-Term Care Surveys that is collected at one time point per wave fails to catch the many individuals who live in the community at time point one, enter a nursing home between time one and time two, yet either die or are transferred back to the community prior to time two (Hurd, Michaud, & Rohwedder, 2014). Accounting for these “short-stay” nursing home residents through the use of exit interviews, researchers have found a lifetime risk of need for

nursing home care of nearly 58% (Id.). A study conducted using data from the Center for Retirement Research found a similar lifetime risk, with 44% of men estimated to require nursing home care during their lifetime, and 58% of women (Friedberg, et al., 2014).

Comprehensive long-term care that fully meets the needs of recipients can be difficult to achieve through informal care alone, but access to formal long-term care can be prohibitively expensive for many Americans. The average cost of a one month stay in an assisted living facility is \$3,293, while the average cost of one month of nursing home care is \$6,235 for a semi-private room (DHS, 2016). Adult day care services—which allow working caregivers a place to leave their loved ones in need of long-term care while they are at work—cost \$67 per day, which is considerably less expensive than the alternative of in-home health aide care, which costs approximately \$21 per hour, or \$168 per eight-hour day (DHS, 2016).

Provision of and Payment for Long-Term Care

Private Long-Term Care Insurance

Despite the statistics regarding likelihood of need for long-term care in one's lifetime, and the high costs of formal long-term care, only ten percent of individuals over age 50 have purchased long-term care insurance (Andrews, 2010). Much research has been conducted into better understanding private long-term care insurance uptake, with much of the evidence pointing to a fundamental problem with the way that consumers perceive long-term care insurance. Research has shown that consumers do not view long-term care insurance as insurance, but rather as an investment—in essence, consumers view payment of long-term care insurance premiums as a waste of money unless they actually use long-term care, and so are often only incentivized to purchase it if they feel

confident that they will actually need long-term care (Gottlieb & Mitchell, 2015). Insurance companies are aware of this potential adverse selection problem, and adjust for it by increasing the premiums for long-term care insurance based on a number of factors that would indicate higher risk of long-term care utilization—the primary factor being age (Finkelstein & McGarry, 2006; Sloan & Norton, 1997). For instance, while the U.S. government cites the average cost of a long-term care policy as approximately \$2,207 per year for five years of coverage (DHS, 2016), in reality, in South Carolina, this level of premium would be accurate for a healthy sixty-year-old male, and would provide a daily maximum coverage of \$150 per day—while nursing home daily rates average \$190 per day in the state (Genworth, 2016; Genworth, 2015). A healthy seventy-year-old male who wishes to purchase coverage of \$200 per day in South Carolina will need to spend approximately \$7,000 per year in premiums, while an individual in poor health or in need of assistance with multiple ADLs will pay considerably higher premiums, and most likely be subject to a waiting period before benefits accrue (Genworth 2016; Genworth 2015).

These supply-side issues have been examined in depth, with Brown and Finkelstein finding an average 18 percent load factor for long-term care carried by a 65-year-old until death—meaning that for every dollar of premium paid, the beneficiary will only receive 82 cents worth of long-term care benefits—which compares unfavorably to the average load of 8 percent on health insurance (Brown & Finkelstein, 2004; Newhouse, 2002). Brown and Finkelstein also join the researchers who cite limited benefits as a potential explanation of low long-term care insurance uptake, yet assert that neither high costs nor limited benefits can truly explain the relative failure of private long-term care to gain a hold in the market, citing stark differences in actuarial fairness

between males and females (with females actually averaging favorable a load of -4%), as well as the availability of comprehensive coverage that consumers choose not to purchase (Id.) Instead, Brown and Finkelstein point to demand-side factors—particularly the existence of informal care and Medicaid as substitutes for privately insuring for potential long-term care needs (Brown & Finkelstein, 2008).

Medicaid as a Payer for Long-Term Care

Many Americans seem to believe—often mistakenly—that they can rely on Medicaid as an insurer of last resort to provide coverage for any long-term care needs that might arise (Brown, Goda, & McGarry, 2012; Brown & Finkelstein, 2008). In reality, although Medicaid is the primary payer of long-term care in this country, strict income, asset, and medical needs standards set by individual states govern eligibility for Medicaid coverage for long-term care. Although income eligibility standards vary greatly from state to state, a number of states require that individuals aged 65 or older either be eligible to receive benefits under the Supplemental Security Income (SSI) program (which would equate to an income of no more than \$710 per month in 2013 for an individual and \$1,066 for a married couple) or have income below the federal poverty level (which in 2013 was set at \$957.50 per month for an individual and \$1,292.50 per month for a married couple in 2013) in order to be eligible for full Medicaid coverage (Social Security Office of Retirement and Disability Policy, 2012; Office of the Assistant Secretary for Planning and Evaluation, 2013).

Individuals who do not purchase long-term care insurance, and who cannot self-insure, yet require long-term care can attempt to obtain Medicaid-funded long-term care coverage through three avenues: they may choose to engage in what is referred to in the

world of trust and estate law as “Medicaid planning”; they may spend down assets and income on long-term care until their assets and income reach the level of Medicaid eligibility; or they may find an alternative means to receiving long-term care services. The first method— “Medicaid planning”—is highly controversial, as it allows individuals to shelter their assets via a number of legal maneuvers including transfers to spouses, transfers to caregiving children, creation of a number of different types of trusts, and, in some cases, divorce in order to become eligible for Medicaid without spending down assets (Takacs & McGuffey, 2002; Kapp, 2006). Through utilization of this often ethically questionable planning method, individuals who could afford to finance their long-term care for some period of time are instead able to have the necessary long-term care paid in full through the Medicaid system. The federal government has attempted to quell the use of such legal loopholes to game the public long-term care financing system by requiring a 5-year lookback period on many types of asset transfers, while still allowing for transfers designed to leave the spouse of a long-term care recipient with income and assets on which to live, with questionable success (Reif, 2010; Baird, Hurd, & Rohwedder, 2014).

The second option available to those who are in need of long-term care, and hope to obtain coverage through Medicaid, is the income and asset spend-down option. Essentially, if a would-be Medicaid beneficiary is in need of comprehensive long-term care, he or she can begin receiving care by paying out of pocket, and continue to do so until his or her income and assets are diminished to the extent that they become eligible for Medicaid (Wiener, et al., 2013). This option provides allowances for a community-dwelling spouse’s monthly maintenance and housing needs as well as total resource and

home equity allowances for such spouse (CMS, 2016). The income and asset standards set forth by the federal government to protect community-dwelling spouses often do not rise to the level of income and assets that would be sheltered under Medicaid planning methods, but do ensure in nearly all cases that the community-dwelling spouse will not be impoverished if the decision is made to spend-down assets in anticipation of qualification for Medicaid-funded long-term care. In 2013, community-dwelling spouses in all states but Alaska and Hawaii could retain a maximum of \$2,898 for minimum monthly maintenance, \$581.63 for housing, and total resources of \$115,920 in non-housing assets as well as \$802,000 in home equity resources (CMS, 2013).

Medicare's Role in Long-Term Care

By design, Medicare does not cover long term care, instead providing coverage for hospital inpatient and skilled nursing facility care in acute cases and cases in which a determination has been made that care is necessary for a patient's condition to improve or to prevent or slow a decline in condition, as well as home health care in cases in which a physician has certified that the care is medically necessary to treat an illness or injury, and hospice care in cases in which a patient has a life expectancy of less than six months and has chosen to discontinue curative care (Center for Medicare and Medicaid Services, 2015; Jimmo v. Sebelius, 2013). Medicare also covers provider services and visits, surgery, durable medical equipment, lab tests, and prescription drugs (CMS, 2015).

While it would seem that the requirement that skilled nursing care be necessary to prevent or slow a decline in condition could lend itself to considerable long term care coverage for those who need it, in reality, Medicare places additional conditions on the payment for such services. Beneficiaries hoping for Medicare financing of long term care

in a nursing facility must: (1) have had a recent hospital stay of at least three consecutive days; (2) be admitted to a Medicare-certified skilled nursing facility within thirty days of that hospital stay; and (3) be in need of skilled care, such as skilled nursing or therapy, as opposed to help with activities of daily living alone (U.S. Department of Health and Human Services, 2014). Once these three conditions are satisfied, Medicare will only cover one hundred percent of a beneficiary's costs during the beneficiary's first twenty days in the skilled nursing facility, followed by any expenses over \$140.00 per day for the next eighty days, and will not provide any coverage for skilled nursing facility stays in excess of 100 days per year (U.S. Department of Health and Human Services, 2014).

Similarly, although in theory Medicare could be understood to provide long term care services in the form of home health care, coverage for this care, too, is time-limited as well as subject to the condition that the care provided be "medically necessary" in the form of intermittent skilled nursing care, physical therapy, speech-language pathology services, and/or continued occupational therapy to treat an illness or injury (Centers for Medicare and Medicaid Services, 2015). Medicare specifically excludes from coverage personal care and help with activities of daily living in the absence of illness or injury that requires skilled nursing care (Centers for Medicare and Medicaid Services, 2015).

Informal Care

Due in large part of the high costs of formal long-term care, two thirds of older Americans who require long-term care receive this care exclusively through informal, unpaid care provided by family and friends, with an additional twenty-five percent receiving care through a patchwork of informal and formal care (most of whom receive some formal home health services in addition to care provided by loved ones) (Doty,

2010). Less than ten percent of individuals over 65 who are in need of long-term care receive all of their care through a formal long-term care provider (i.e., through a residential care facility) (Id.).

While informal caregiving decreases the burden on publicly-funded insurers of long-term care, and is often regarded as an economical alternative to paying for these services out of pocket, it too comes with steep costs. To begin, informal long-term care places high physiological, emotional, and financial burdens on informal caregivers. Caregiving has been shown to cause chronic stress, and thus to lead to a number of poor physiological and mental health effects (Schulz & Sherwood, 2008; Vitaliano, Zhang, & Scanlan, 2003). Specifically, caregivers have been shown to have lowered immune function and cognition, and increased inflammation and cell aging compared to non-caregivers (Fonareva & Oken, 2014), as well as significantly increased rates of depression and other mental stress (Pinquart & Sorensen, 2003).

The overburdening of caregivers not only harms caregivers themselves, but also threatens the health and well-being of their charges. Studies show that increasing levels of personal and role-based caregiver burden lead to increased hospitalizations and all-cause mortality among frail elderly care recipients (Kuzuya, et al., 2011), though there is evidence that caregiver burden has little to no effect on frail older individual's utilization of physician outpatient services (Reckrey, et al., 2013). Whether such findings may indicate a tendency of overburdened caregivers to forego preventive and non-acute ameliorative care services, thus leading to acute care admissions for ambulatory-care sensitive conditions (ACSCs), is yet to be determined. As informal caregiving is the primary method of provision of long-term care in this country, the potential effects of this

form of care on health outcomes and utilization patterns of those receiving care is a policy concern.

Substitution of Care

For the millions of frail elderly who are in need of long-term care, yet receive either no such care or, more likely, some level of informal care that may leave them with unmet need, substitution of care is a concern. Put simply, if long-term needs are left unmet (or if caregiver strain is such that needs are in danger of not being met), one of two scenarios are likely to unfold: either alternative means of meeting these needs must be found, or these frail individuals' health states will decline in ways that lead to preventable health system utilization, often in the form of potentially preventable hospitalizations (PPH). As virtually all Americans aged 65 and older have either free or low cost health care through Medicare, the most likely source of payment for either of these scenarios would seem to be Medicare.

Recent research suggests that the former scenario—that of seeking Medicare payment for long-term care services in the absence of another form of long-term care coverage—does in fact occur with regard to Medicare Part B home health claims (Avalere Health, 2008). The SCAN Foundation has found that, among Medicare beneficiaries with at least one ADL need, per capita Part B home health care spending is nearly twice as high as per capita Part A home health care spending (\$812 vs 442 in 2005) (Id.). Given that Part A home health referrals (i.e., post-acute referrals) are time-limited, while Part B home health referrals (which originate from a physician outside of an acute setting) are not, these researchers argue that physicians are referring patients in need of long-term care to home health agencies through the Medicare Part B mechanism,

thus using the Medicare system as a substitute payer of long-term care services. Such substitution can only occur with respect to Part B-funded home health services, as nursing facility services and Part A-funded services are time-limited. Similar cost-shifting has also been shown to originate as overt state Medicaid program “Medicare maximization” policies that encourage home health providers to seek out ways to bill Medicare, rather than Medicaid, for home health services (Grabowski, 2007; USGAO, 1997).

The potential for the latter scenario—that of overutilization of the health care system—arises when unmet long-term care need precipitates a decline in health, leading to PPH and other inefficient health system utilization. While the primary focus of long-term care is in providing assistance with ADLs and IADLs, formal long-term care has also proven to be effective in helping to reduce negative health outcomes among recipients. Unmet long-term care needs have consistently been demonstrated to lead to poor health outcomes—individuals with unmet need with regard to assistance with ADLs and IADLs are considerably more likely than their counterparts whose ADL and IADL needs are met to have a potentially preventable hospitalization, to visit the Emergency Department, and to have a large number of physician visits (Walsh, E.G., 2012; Sands, et al., 2006; Xu, et al., 2012; Kuzuya et al., 2008; Quail, Wolfson, & Lippman, 2011; Hass, et al., 2015). Frail elderly individuals with unmet long-term care needs are also at a greater risk of death compared to similarly-situated frail elderly individuals whose long-term care needs are appropriately met (Kuzuya, 2006). Reasons for these negative outcomes include a lack of assistance with managing chronic medical conditions (Allen & Mor, 1997), a lack of assistance with medication management (Kuzuya, 2008)

increased likelihood of accidental injury (LaPlante, et al., 2004; Komisar, Feder, & Kasper, 2005), and increased rates of depression in the population of frail elderly who have unmet long-term care needs (Allen & Mor, 1997), which has been shown to put older adults at increased risk of subsequent physical decline (Penninx, et al., 1998).

Although long-term care in general has been shown to reduce poor health outcomes among individuals in need of such care, there is further evidence that the location and type of the long-term care provided play a role in health outcomes and healthcare utilization. Frail elderly adults who receive comprehensive adult day care services have been shown to have considerably lower mortality and healthcare utilization rates than their counterparts who also live in the community but do not receive such comprehensive services (Kuzuya, 2006). One recent study has found that rates of adverse consequences associated with unmet long-term care need (including self-soiling, inability to bathe, inability to properly manage medications, going without food, and missing health care appointments) were considerably higher among frail elderly who received paid home health services than among similarly situated frail elderly who resided in nursing homes (Freedman & Spillman, 2014). Research conducted by the SCAN Foundation has demonstrated that annual per capita Medicare spending in 2006 for older Americans with disabilities was considerably higher among those beneficiaries who reside in the community (\$18,308) compared to those who resided in assisted living facilities (\$14,001) and skilled nursing facilities (\$14,594) (SCAN Foundation, 2011). Wysocki, et al., have found that elderly users of formal home and community based long-term care services were at increased risk of both potentially preventable hospitalizations and non-potentially preventable hospitalizations compared to elderly nursing home

residents with similar levels of physical and medical decline (Wysocki, et al., 2014). These findings seem to indicate that unmet long-term care need and associated health decline is greater among individuals who live in the community than it is among individuals who receive formal long-term care in residential facilities, which supports the theory that individuals who must rely on informal care for the bulk of their long-term care support will be more likely to utilize the health care system to address health issues that may have been avoidable with proper long-term care services and supports.

Why it Matters

If it is indeed true that individuals with unmet long-term care needs will have poorer health outcomes and higher rates of health system utilization than individuals with similar levels of functional decline and chronic condition morbidity who have no unmet long-term care needs, and it is also the case that comprehensive, formal long-term care leads to fewer unmet needs than informal long-term care, at least with regard to patients with a certain level of functional and health decline, then it seems that our current system of classifying long-term care as separate from health care might be ripe for reevaluation. Currently, Medicare only provides coverage on a limited basis for long-term care, much of which must be post-acute care, and all of which must be tangential to necessary medical care. This has created a situation in which formal long-term care services are only available to individuals who were already eligible for Medicaid by virtue of low-income status, those wealthy enough to afford to pay out of pocket—either directly for services or for long-term care insurance, those sophisticated enough and motivated to engage in Medicaid planning, or those who engage in a spend-down of assets. While the rationale for this seems to be that long-term care is something outside of health care—a

luxury, perhaps—what we are learning about the effects of long-term care (or lack thereof) on health seem to indicate that this theory might be misguided. As our nation looks to preventive care as a way to combat rising health care costs by forestalling the development of disease, we might also do well to consider the potential role of comprehensive long-term care in reducing poor health outcomes, and thus reducing health care utilization.

Medicaid Policy and Health Care Utilization

In theory, to determine whether publicly-funded long-term care services do, in fact, reduce health system utilization we need only examine the effect of Medicaid generosity in long-term care services on health care system utilization among individuals eligible for both Medicare and Medicaid. If health system utilization is significantly higher among similarly situated Medicare-only beneficiaries who do not receive formal long-term care than it is among dual eligible beneficiaries who receive formal, Medicaid-funded long-term care, this could indicate a need to reevaluate current policies as to the public provision of funding for long-term care.

Although Medicaid generosity indices have been used previously to examine the effects of Medicaid policy on various social and health-related outcomes, these indices typically focus on the effects of Medicaid generosity on non-elderly adults or children. We have found only one instance of utilization of a Medicaid long-term care generosity index: a 2010 study by Fossett and Burke utilized an index of Medicaid program generosity developed by Park (Park, 2007) to examine the interaction of multiple state long-term care policies on long-term care spending (Fossett & Burke, 2010). This Medicaid program generosity index was constructed using factor analysis of eight

variables: (1) nursing home payment per diem; (2) nursing home bed ratio per 1,000 elderly aged 65 and over; (3) Medicaid payments to elderly nursing home residents aged 65 and over; (4) ratio of Medicaid payments to nursing homes to private payments; (5) 1915(c) HCBS waiver expenditure per elderly Medicaid enrollee; (6) Medicaid payments for home health per elderly enrollee; (7) percentage of nursing home residents to the elderly population aged 65 years and older; and (8) percentage of the aged Medicaid enrollees to the elderly population aged 65 years and older (Id.).

While this index may provide an effective means of studying demand-side aspects of Medicaid long-term care policy, it cannot be used to answer the question of whether increasing publicly-funded long-term care coverage can decrease unnecessary health care utilization. One reason that we cannot use this model for our study is the dearth of factors that measure the generosity of long-term care eligibility—that is, how easy it is for individuals who need long-term care coverage to meet Medicaid long-term care eligibility requirements. This issue is easily surmountable—indeed, Park accounted for this problem in his dissertation work, controlling in his models for presence or absence of different state-level eligibility programs and income standards (Park, *ibid*).

However, a larger problem with the use of a Medicaid generosity index to determine the effects of Medicaid long-term care coverage on health system utilization emerges. One could reasonably hypothesize that states with more generous Medicaid eligibility policies—and that also have accessible paths to Medicaid-covered long-term care service and support obtainment—should have lower Medicare-funded health care utilization per beneficiary given what we know about long-term care’s ability to decrease unnecessary health care utilization and poor health outcomes. However, this hypothesis

fails to account for the existence of market forces that both precipitate market responses and create unintended perverse incentives in the Medicare and Medicaid long-term care coverage systems. These responses to the market on one hand impede access to long-term care for Medicaid beneficiaries, and on the other actually incentivize the utilization of Medicare-funded acute care services by dual eligible beneficiaries receiving Medicaid-funded long-term care.

The first market response reflects the higher rates that long-term care providers can receive from virtually any payer other than Medicaid, which results in Medicaid-funded long-term care consumers being viewed as the least desirable additions to the patient panel. In 2012, of the 15,652 nursing homes nationwide that accepted Medicaid beneficiaries, 14,332 were also certified to accept individuals whose care was funded by Medicare (CMS, 2013(b)). As the average margin on Medicare payments to nursing homes in this country has been over 10 percent since the turn of the last century (CMS, 2013(b)), while the average shortfall on Medicaid payments has consistently been nearly 10 percent (CMS, 2013(b)), nursing home and home health administrators often view Medicaid-funded long-term care recipients as the least attractive consumers of care (Reschovsky, 1996). Nursing homes in particular compete for higher paying residents, hoping to fill as many beds as possible with Medicare patients (Zinn, et al., 2007; Gleckman, 2013). By prioritizing admissions of Medicare beneficiaries and private pay consumers of care over Medicaid beneficiaries, nursing facilities—and to a lesser extent, home health agencies—reduce the ability of Medicaid-funded frail older adults to access necessary care—particularly those Medicaid beneficiaries who are high acuity, as these individuals would represent steeper losses for providers than would low acuity

beneficiaries (Feng, et al., 2006; Miller, et al., 2009). Thus, we cannot assume that more generous Medicaid long-term care coverage necessarily correlates with sufficient access to needed long-term care services.

The second market response occurs in response to Medicaid bed-hold policies, which have been adopted by thirty-six states and the District of Columbia to provide continuity of nursing home placement in the event that a resident must be hospitalized (National Long-Term Care Ombudsman Resource Center, 2012). These policies provide Medicaid reimbursement for beds that are temporarily empty due to the hospitalization of a Medicaid patient, in return for the facility's reservation of the bed in anticipation of the beneficiary's return. The generosity of Medicaid bed-hold policies vary significantly by state, with some states requiring a minimum nursing home occupancy rate to employ the bed-hold reimbursement payments while others do not, and some states allowing for only four days of reimbursed bed-hold, while others do not set a maximum number of days during which a bed can be held (Id.).

Bed-hold policies were put in place to protect Medicaid beneficiaries by preventing the loss of their beds to more lucrative Medicare and private-pay patients. As Intrator, et al., have pointed out, bed-hold policies have also created a powerful perverse incentive: if the marginal profit of holding a bed under Medicaid-reimbursed bed-hold policy is greater than the marginal profit of keeping the Medicaid patient in the facility, the facility has every incentive to hospitalize the Medicaid beneficiary (Intrator, et al., 2007). Indeed, states with bed-hold policies of at least average generosity have been shown to have significantly higher rates of transfer from nursing homes to hospitals than states without bed-hold policies (Id.; Intrator, et al., 2009).

As these bed-hold policies only apply to nursing home residents whose long-term care services are covered by Medicaid, one would assume that nursing facilities are apt to hospitalize Medicaid beneficiaries at higher rates than their Medicare-funded and private pay counterparts. Grabowski, et al., partially refute this theory in a study that demonstrates the tendency of Medicare-funded short-term stay skilled nursing facility residents in states with generous bed-hold policies to be hospitalized at higher rates than their counterparts residing in states without generous bed-hold policies (Grabowski, et al., 2010). While Grabowski and his colleagues do make the point that Medicaid bed-hold policies likely affect the culture of long-term care facilities as it pertains to hospitalization decisions for all residents, regardless of payer, their study did not examine relative hospitalization rates between those whose care was funded by Medicaid and those whose care was funded by Medicare. While Medicaid bed-hold policies may lead to spillover effects in the non-Medicaid population of long-term care residents, there is evidence that payer status does indeed interact with these policies to contribute to increased rates of hospitalization among Medicaid beneficiaries (Unruh, et al., 2013).

The final market response with potential to affect Medicaid long-term care beneficiaries' utilization of the health care system stems from the interplay between dual eligibility and Medicare's payment for post-acute care services in long-term care facilities. Medicaid long-term care beneficiaries who are also eligible for Medicare are typically eligible for more lucrative Medicare-funded post-acute care once they return to their original long-term care facility following a hospital stay of at least three days. This creates incentives for nursing homes to hospitalize Medicaid beneficiaries unnecessarily in order not only to avoid utilizing nursing home resources to care for a sick patient, but

also to ensure considerably higher reimbursement rates for care provided as the patient recovers from his or her illness (Grabowski, 2007; Ouslander & Berenson, 2011).

Although research into the effects of Medicaid bed-hold policies on health outcomes of Medicaid long-term care beneficiaries as compared to similarly situated long-term care recipients financed through other payment sources is sparse—and even less research has been conducted specifically into the effects of post-acute Medicare payments for Medicaid long-term care beneficiaries—research into the effects of state Medicaid policy on Medicaid beneficiary outcomes has demonstrated that these policies create incentives for providers to transfer Medicaid beneficiaries at significantly higher rates than their non-Medicaid beneficiary counterparts (Konetzka, Spector, & Limcangco, 2008). Individuals whose long-term care is funded by Medicaid have higher rates of hospitalization for ambulatory care sensitive conditions (Konetzka, Spector, & Shaffer, 2004; Spector, et al., 2013), as well as for all-cause hospitalizations (Intrator, Zinn, & Mor, 2004).

Study Purpose

Due to the existence of the market forces described above in the Medicaid long-term care system, we cannot assume that individuals who receive Medicaid-financed long-term care services will utilize Medicare-financed health care in the same way as individuals whose long-term care is funded through non-Medicaid payers. However, even if the current evidence of policy-driven patterns of increased health system utilization by Medicaid-funded long-term care recipients holds, this does not necessarily indicate that Medicaid-funded long-term care recipients do not still benefit from long-term care overall, or that Medicare-financed hospitalizations are not still reduced in this population

as compared to similarly situated individuals who reside in the community. Just as studies have shown the positive effects of appropriate long-term care provision that meets the needs of its recipients, it may be that the perverse incentives that plague Medicaid-funded long-term care are outweighed by the positive overall effect of better care and better coordination of care that comes with receipt of formal long-term care.

The objective of this retrospective cohort analysis was to examine potentially preventable hospitalization (PPH) and Medicare expenditure patterns of Medicare beneficiaries for whom, based on clinical, functional, and demographic factors, the provision of formal, comprehensive long-term care would be appropriate. The study was conducted using information from Medicare claims, available from the Research Data Assistance Center (ResDAC). This study focused on utilization and expenditure patterns among Medicare beneficiaries based on (1) long-term stay in a skilled nursing facility and (2) dual eligibility status. Thus, we compared rates of PPH, as well as Medicare expenditure patterns, between the following four groups:

- (1) Medicare-only beneficiaries residing in the community;
- (2) Medicare-only beneficiaries who are long-stay residents of a residential care facility;
- (3) Medicare/Medicaid dual-eligible beneficiaries, residing in the community; and
- (4) Medicare/Medicaid dual-eligible beneficiaries who are long-stay residents of a residential care facility.

Study subjects were selected based on their clinical, functional, and demographic similarity to ensure similar levels of long-term care need across the four groups. Two specific aims were addressed in this study: the first examined differences in risk of PPH

between the four cohorts while controlling for person-level characteristics that influence risk of hospitalization and overall healthcare utilization as well as state Medicaid bed hold policies, which have been demonstrated to influence risk of hospitalization among Medicaid beneficiaries who reside in long-term care facilities, while the second examined average per capita Medicare expenditures between the four cohorts as well as average total annual Medicare charges between the four cohorts and risk of being in the 90th percentile—or most “high cost”—Medicare beneficiaries. To that end, the following were the aims of this study:

(1) Examine the risk of PPH between four matched cohorts: Medicare-only beneficiaries residing in the community; Medicare-only beneficiaries who are long-stay residents of a residential care facility; Medicare/Medicaid dual-eligible beneficiaries residing in the community; and Medicare/Medicaid dual-eligible beneficiaries who are long-stay residents of a residential care facility.

Hypothesis 1: Medicare-only beneficiaries who are long-stay residents of a residential care facility will have the lowest risk of PPH, followed by Medicare/Medicaid dual-eligible beneficiaries who are long-stay residents of a residential care facility. Both groups receiving formal, residential long-term care will have lower PPH risks than their counterparts with similar levels of long-term care need who reside in the community.

(2) Examine average per capita Medicare expenditures and risk of being a “high cost” Medicare beneficiary between four matched cohorts: Medicare-only beneficiaries residing in the community; Medicare-only beneficiaries who are

long-stay residents of a residential care facility; Medicare/Medicaid dual-eligible beneficiaries residing in the community; and Medicare/Medicaid dual-eligible beneficiaries who are long-stay residents of a residential care facility.

Hypothesis 2: Medicare-only beneficiaries who are long-stay residents of a residential care facility will have the lowest Medicare expenditures, and be the least at risk of being a “high cost” Medicare beneficiary followed by Medicare/Medicaid dual-eligible beneficiaries who are long-stay residents of a residential care facility. Both groups receiving formal, residential long-term care will have lower average Medicare expenditures than their counterparts with similar levels of long-term care need who reside in the community.

CHAPTER 3

METHODOLOGY

Study Design

This study utilized a retrospective cohort design using 2013 Medicare claims data, using state and county FIPS code to merge the Medicare claims data with AHRF data. In addition, information as to Medicaid bed-hold policies by state, authored by The National Long-Term Care Ombudsman Resource Center (National Long-Term Care Ombudsman Resource Center, 2012), was merged with the study data set.

Theoretical Model

Our selection of matching variables was based in part on the Gelberg-Andersen Behavioral Model for Vulnerable Populations (Gelberg, Andersen, & Leake, 2000). Andersen's model emphasizes the impact of both environmental and population variables on an individual's health system utilization. In Andersen's model, environmental factors influence three major forms of population characteristics that themselves affect each other, with predisposing characteristics (i.e., demographic, social, and cultural factors) affecting one's enabling resources (i.e., financial and organizational factors), which in turn affect need for health services (both perceived need and evaluated need) (Babitsch, Gohl, & von Lengerke, 2012). In turn, both perceived and evaluated need affect health behavior in the form of personal health practices and use of health services, which affects health outcomes (Gelberg, Andersen, & Leake, 2000).

We posited that in the population of frail Medicare beneficiaries, predisposing characteristics (e.g., age, sex, and race/ethnicity) affect enabling resources (in this model the enabling resources are comprised of the two statuses that make up our key independent variable: Medicaid eligibility and method of long-term care provision). To begin, age affects method of long-term care provision in that the older a Medicare beneficiary is, the more likely they are to need formal long-term care, as factors such as widowhood and compounding of functional and clinical decline increase with age (Branch & Jette, 1982; Spillman & Lubitz, 2000). At the same time, age also affects ability to self-insure, as long-term care insurance premiums increase significantly with age (AALTCI, 2016). Sex affects enabling resources as men are more likely to have informal long-term care provided by wives (Navaie-Waliser, Spriggs, & Feldman, 2002; Lakdawalla & Philipson, 1998). Race and ethnicity affect enabling resources due to differential cultural norms between whites, African Americans, Hispanics, and Asians as to the burden of providing comprehensive informal care for an elderly relative, perceptions of duty to do so, as well as potential effects of discrimination on access to formal long-term care (Wallace, et al., 1997; Dilworth-Anderson, Williams, & Gibson, 2002; Bradley, et al., 2002).

In turn, we believed that an individual's status as to enabling resources (here, these two characteristics—insurance status and method of provision of long-term care—make up our independent variable of interest) would affect their (or their caregiver's) ability to ensure that their long-term care needs are met in full. We further posited that individuals whose needs are not met through long-term care that is appropriately

comprehensive/responsive to their functional and health needs would be more likely to have these unmet needs manifest in PPH.

While we acknowledge the environmental effects of the health system and public policy on population characteristics, these effects are not integral to our current study. However, we have modified Andersen’s model to account for the effects of external policies on risk of hospitalization. First, residents who live in counties with a higher number of hospital beds per 1000 population, as well as residents who live in counties with practice patterns that are associated with higher rates of hospitalization, will be more likely to be hospitalized generally (Fisher & Wennberg, 2003). Further, research has shown that Medicaid beneficiaries receiving formal, residential long-term care are at increased risk of hospitalization compared to non-Medicaid beneficiaries in the same long-term care facilities and with the same level of functional decline and health status due to the presence of perverse incentives caused by Medicaid long-term care policy (Wysocki, et al., 2014).

Institutional Review Board (IRB)

Approval from the University of South Carolina IRB was granted on March 24, 2016. The study was categorized as “exemption status,” as de-identified secondary data was utilized for this study.

Data Sources

This study utilized data from the 5% sample of 2013 Medicare claims and enrollment data, available from the Centers for Medicare and Medicaid Services (CMS) through the Research Data Assistance Center (ResDAC). ResDAC is a consortium of researchers that house CMS data. The CMS data utilized for this study consisted of

Research Identifiable Files. A total of four 2013 Medicare claims and enrollment data files obtained from ResDac will be used: The Base A/B/C/D segment of the Master Beneficiary Summary File; the Chronic Conditions segment of the Master Beneficiary Summary File; the MedPAR All file; and the Medicare Carrier Claims file.

The Base A/B/C/D segment was used to identify beneficiary's state and county of residence, as well as demographic characteristics and dual eligibility status. The Base A/B/C/D segment includes information as to beneficiary enrollment, including but not limited to ZIP Code (to determine county of residence), date of birth, date of death, race/ethnicity, sex, and dual enrollment status. The Chronic Conditions segment was used to identify presence or absence of one or more chronic conditions, as well as to identify whether or not a beneficiary had a diagnosis of Alzheimer's or other form of senility. The Chronic Conditions segment contains information as to presence or absence of 27 distinct chronic conditions. The Carrier Claims File was used to determine location of residence of the Medicare beneficiary, as it is the only file available to us that allows for discernment of beneficiary place of residence based on the place of service of physician claims. We also used the Carrier Claims file to isolate primary, secondary, and tertiary diagnoses (if available) made by a physician during the beneficiary's first physician visit of the study year. Finally, the MedPAR All file was used to analyze incidence of hospitalization among beneficiaries. The Medicare claims files contain Medicare utilization and expenditure data on an estimated 3 million Medicare beneficiaries for the year 2013.

In addition to these Medicare claims files, the Health Resources and Services (HRSA) Area Health Resource File (AHRF) was used to determine the rurality of

Medicare beneficiaries based on the Urban Influence Code tied to their county of residence.

A compilation of Medicaid bed-hold policies by state, authored by The National Long-Term Care Ombudsman Resource Center, was used to create a dichotomous variable for presence or absence of state bed-hold policies (National Long-Term Care Ombudsman Resource Center, 2012).

Study Sample

The study sample included four cohorts of Medicare beneficiaries whose ADL needs, chronic condition status, and demographic characteristics made them likely to benefit from long-term care services and supports, distinguished by place of residence (community vs. residential care facility), as well as Medicaid long-term care coverage status (eligible for Medicaid-covered long-term care vs. not eligible). The four cohorts were: Medicare-only beneficiaries, residing in the community; Medicare-only beneficiaries who are long-stay residents of a residential care facility; Medicare/Medicaid dual-eligible beneficiaries, residing in the community; and Medicare/Medicaid dual-eligible beneficiaries who are long-stay residents of a residential care facility. Residential care facilities were defined for the purposes of this study as facilities in which individuals reside in order to receive some level of long-term care services, and will include assisted living facilities, group homes, skilled nursing facilities, and nursing facilities, as designated in the Medicare Carrier Claims file. As there is no definitive means of differentiating long-stay residence in a residential care facility in the Medicare claims data, long-stay residence was defined as having two separate Medicare claims linked to a residential care facility in the Carrier Claims file as place of service that originated at

dates of at least 90 days apart. This method approximated that of Intrator, et al., who employed a similar method, using Medicare-required MDS assessments at intervals of at least 90 days when studying Medicare claims data (Intrator, et al., 2007).

Exclusions

In order to arrive at our study sample, we first excluded from the original sample of approximately 3 million Medicare beneficiaries any individuals who are under age 65, thus removing the majority of Medicare beneficiaries who became eligible for Medicare due to a diagnosis of ESRD or other clinical diagnosis, leaving a population that has aged into Medicare eligibility. We also excluded any beneficiaries who turned 65 during the study year to ensure that each beneficiary studied has an entire year of potential claims available for analysis. Further, while the Medicare claims files include Medicare beneficiaries who participate in Medicare Advantage and other Managed Care Organization options, claims data as to these individuals is incomplete, necessitating our exclusion of this population from our study as well.

Creation of Study Cohorts

To ensure, to the best of our ability, that the study population consists only of Medicare beneficiaries who due to functional, health, and demographic factors are likely to need long-term care, we first created a subset of Medicare/Medicaid dual eligible beneficiaries who are long-stay residents of a residential care facility. We then employed a validated matching methodology, with this subset as our reference/case group, ultimately choosing to undertake further analysis utilizing the matching methodology that provides the three control groups (Medicare-only beneficiaries, residing in the community; Medicare-only beneficiaries who are long-stay residents of a residential care

facility; and Medicare/Medicaid dual-eligible beneficiaries, residing in the community). Thus, our final study population included only those beneficiaries who are similar to the Medicare/Medicaid dual eligible beneficiaries who are long-stay residents of residential care facilities in terms of functional, clinical, and demographic characteristics.

Matching Methodology

We undertook a 1:1:1:1 matching methodology to balance the distribution of variables associated with risk of need for long-term care in order to reduce bias in the estimation of need for long-term care. Although propensity score matching is the most common matching method used in observational studies (Pearl, 2010), there is evidence that the use of propensity scores for matching purposes such as ours can lead to a degradation of inferences due to model dependence (King & Nielsen, 2016). Therefore, we enacted an exact matching methodology in lieu of a propensity score matching methodology. Unfortunately, the Medicare claims data available to us does not include concrete indications of functional decline or need for assistance with ADLs. Thus, we chose to rely on clinical indicators of functional decline for which ICD-9 codes exist. While two independent studies have analyzed the effectiveness of using ICD-9 codes to predict “dependency in activities of daily living” (Faurot, et al., 2015) and “functional decline” (Rosen, et al., 2000), respectively, there is very little overlap between the conditions identified in the two studies: Faurot and colleagues have identified nine commonly-coded conditions that can serve as proxies for functional decline, as have Rosen, however, the only two conditions that are associated with functional decline in both studies are decubitus ulcers and forms of paralysis (Table 3.1).

As we did not have a good proxy variable available to indicate functional decline, we matched individuals based on presence of primary, secondary, and tertiary diagnoses of identical combinations of the conditions identified by Faurot, et al., and Rosen, et al., respectively. This method allowed matches to occur based on clinical conditions that do have the potential to indicate functional decline, but also based on clinical conditions such that individuals in our three non-Medicaid formal residential long-term care cohorts will have identical acuity levels to the base cohort. While not ideal, we believed that using the Medicaid formal residential long-term care cohort as a baseline for matching the other three cohorts was the best option available given the limitations in our data set.

Variables on which matches were made included: clinical diagnoses (primary, secondary, and tertiary, if available) as assessed by a physician during the study year, number of chronic conditions, Alzheimer's/senility status, age, sex, and race. These variables were chosen based on a review of the literature which found these person-level characteristics most often associated with need for formal long-term care due to the interplay between age, clinical conditions that affect functional status, chronic condition worsening, the effects of chronic condition worsening on functional status, the effect of senility on functional status, and the effect of sex on frailty, independent of issues of longevity or spousal caregiver availability (Branch & Jette, 1982; Boult, et al., 1994; Millan-Calenti, et al., 2010; Tas, et al., 2007; Marengoni, et al., 2009).

Race and ethnicity have consistently been demonstrated to be associated with type of long-term care utilization (whites have been shown to be significantly more likely to utilize formal long-term care services as compared to African Americans and Hispanics, who tend to rely more heavily on informal avenues of care) (Wallace, et al., 1998).

Researchers have postulated that these differences in utilization of formal long-term care services likely stem in part from cultural differences regarding familial caregiving norms (Mui & Burnette, 1994; Wallace, et al., 1998; Bradley, et al., 2002), although concerns about the existence of systemic barriers to access among non-whites could also partially explain these differences in utilization (Falcone & Broyles, 1994; Cagney & Agree, 1999; Akamigbo & Wolinsky, 2007). We do know, however, that racial and ethnic differences in type of long-term care utilization do not belie lower levels of long-term care need in these populations, as non-whites have also consistently been shown to have poorer health status than whites, both generally and specifically in areas that demonstrate need for long-term care (Fried, et al., 2001; Lapane & Davis, 2004).

Our matching algorithm implemented a greedy/nearest neighbor matching method, without replacement (Austin, 2014). As research has shown that there is little difference between greedy and optimal methods of matching in terms of selection of sets of controls for overall matched pooled samples, the main concern in using greedy versus optimal matching algorithms lies in the ability of optimal matching to reduce distance within each pair (Gu & Rosenbaum, 1993). As our goal was to create matched cohorts to be used for logistic regression analysis, distance between individual matched pairs is not a concern. Furthermore, as our matching algorithm required exact matches as to up to three clinical diagnoses, as well as number of chronic conditions (0, 1-2, or 3+), sex, age group, and race, the potential for significant distance between four-way matched cohorts was low.

Study Variables

Independent Variable

The independent variable of interest for both Aim 1 and Aim 2 was membership in one of four long-term care cohorts (Medicare-only beneficiaries residing in the community; Medicare-only beneficiaries who are long-stay residents of a residential care facility; Medicare/Medicaid dual-eligible beneficiaries who are long-stay residents of a residential care facility; and Medicare/Medicaid dual-eligible beneficiaries, residing in the community).

Dependent Variable

The dependent variable for Aim 1 was risk of PPH. The dependent variables for Aim 2 were (1) median total annual Medicare charges per beneficiary and (2) risk of being in the 90th percentile of Medicare expenditures. Twelve Prevention Quality Indicators (PQI) designated by the Agency for Healthcare Research and Quality as “ambulatory care sensitive conditions” were used as the basis for identification of PPH, with “low birth weight” and “asthma in younger adults” excluded from the list as inappropriate for the study population. In addition, as PPH among older individuals who require long-term care can encompass conditions that would not be considered PPH in healthier populations, we also included conditions identified by a technical expert panel on potentially preventable hospitalizations among dual-eligible beneficiaries who require long-term care as either preventable or manageable among all such beneficiaries or only likely to be preventable or manageable among those beneficiaries who reside in a nursing facility setting (Walsh, et al., 2012). The clinical indicators of PPH used for this study are displayed in Table 3.2.

Control Variables

As our matching algorithm was used to create four distinct cohorts, we needed only to control for the characteristics on which the cohorts were not matched as they pertain to potential to affect risk of PPH, as well as costs of PPH and total Medicare costs, respectively. Thus, beneficiary-level control variables included state Medicaid bed-hold policy (yes/no), rurality of residence (rural versus urban), and, within the two cohorts representing residents of long-term care facilities, facility type (assisted living facility; custodial care facility; skilled nursing facility; or nursing facility), at the beneficiary level.

Analytic Approach

Aim 1

Wald chi-square tests ($\alpha = 0.05$) assessed differences in PPH by cohort status and covariate. Modified Poisson regression models estimated the relative risk of PPH among our four matched cohorts, as well as between the two cohorts representing residents of long-term care facilities, respectively, with dual-eligible beneficiaries residing in long-term care facilities as our referent.

Aim 2

Kruskal-Wallis one-way ANOVA on ranks tests ($\alpha = 0.05$) assessed differences in median per capita Medicare expenditures by cohort status, as well as by level of covariate within each cohort. Modified Poisson regression models estimated the relative risk of membership in the top 90th percentile or “high cost” group of Medicare beneficiaries, among our four matched cohorts, as well as between the two cohorts representing residents of long-term care facilities, respectively, with dual-eligible beneficiaries

residing in long-term care facilities as our referent. Finally, generalized linear models estimated the associations between cohort status and estimated log-transformed total Medicare expenditures per beneficiary.

The statistical analyses were conducted using SAS statistical software, version 9.3 (SAS Institute Inc., Cary, NC). Approval from the University of South Carolina Institutional Review Board was granted on March 24, 2016. The study was categorized as “exemption status,” as de-identified secondary data was utilized for this study.

Table 3.1. Clinical Conditions Associated with Functional Decline in the Literature

Condition	ICD-9 Code(s)	Source
DM Complications	250.4, 250.6, 250.7, 250.9	Faurot, et al.
Podiatric Care	700., 703., 681.1	Faurot, et al.
Heart Failure	428., 425., 429.0, 429.1, 429.3, 429.4	Faurot, et al.
Sepsis	01., 036. 038., 040.0, 041., 032.0, 032.1, 681.,682., 730., 031.0, 031.2, 790.7, 032.82, 032.83, 053.0, 053.13, 054.5, 136.3, 320.0, 785.4, 112.83, 112.81, 112.5	Faurot, et al.
Difficult Walking	719.7, 781.2, 781.3, 438.85, v46.3	Faurot, et al.
Stroke/Brain Injury	348., 430., 431., 432., 852., 853., 854., 349.82, 433.01, 433.11, 433.21, 433.31, 433.91, 434.01, 434.11, 434.91	Faurot, et al.
Weakness	728.2, 728.87, 799.3, 728.2, 728.3, v49.84	Faurot, et al.
Decubitus Ulcer/Pressure Ulcer	707.0, 707.2, 707.	Faurot, et al.; Rosen, et al.
Paralysis/Hemiplegia/Quadriplegia	342., 438.2, 438.3, 438.4, 438.5, 344., 781.4	Faurot, et al.; Rosen, et al.
Multiple Sclerosis	340, 341.0	Rosen, et al.

Cancer	140-165.9, 170-176.9, 179-208.9	Rosen, et al.
Alzheimer's Disease	290, 290.0, 290.1, 290.2, 290.3, 331.0	Rosen, et al.
Dementia other than Alzheimer's	290.4-290.43, 290.8, 290.9, 291.1, 291.2, 294, 294.1, 294.8	Rosen, et al.
Parkinson's Disease	332-332.1	Rosen, et al.
Seizure Disorder	345-345.5, 345.7- 345.9, 780.3	Rosen, et al.

Table 3.2. Clinical Indicators of Potentially Preventable Hospitalization

Condition	Source
Diabetes Short-Term Complications	AHRQ; Walsh, et al.
Perforated Appendix	AHRQ
Diabetes Long-Term Complications	AHRQ; Walsh, et al.
COPD or Asthma	AHRQ; Walsh, et al.
Hypertension	AHRQ
Heart Failure	AHRQ; Walsh, et al.
Dehydration	AHRQ; Walsh, et al.
Bacterial Pneumonia	AHRQ
Urinary Tract Infection	AHRQ
Angina Without Procedure	AHRQ
Uncontrolled Diabetes	AHRQ
Lower-Extremity Amputation among Patients with Diabetes	AHRQ
Anemia	Walsh, et al.
Hypotension	Walsh, et al.
Constipation/Fecal Impaction/Obstipation	Walsh, et al.
Diarrhea	Walsh, et al.
C. Difficile	Walsh, et al.
Gastroenteritis with nausea or vomiting	Walsh, et al.
Cellulitis	Walsh, et al.
Skin Ulcers Including Pressure Ulcers	Walsh, et al.
Lower Respiratory: Pneumonia/Bronchitis	Walsh, et al.
Falls and Trauma	Walsh, et al.
Altered Mental Status/Acute Confusion/Delirium	Walsh, et al.
Psychosis, Severe Agitation, Organic Brain Syndrome	Walsh, et al.

Weight Loss, Nutritional Deficiencies, Adult Failure to Thrive	Walsh, et al.
Seizures	Walsh, et al.

CHAPTER 4

MANUSCRIPT ONE

EFFECTS OF LONG TERM CARE FACILITY RESIDENCY AND PAYER ON RISK
OF POTENTIALLY PREVENTABLE HOSPITALIZATION AMONG FRAIL
ELDERLY MEDICARE BENEFICIARIES¹

¹ Robertson, A.S., Probst, J.C., Bennett, K.J., Crouch, E., & Hardin, J.W. To be submitted to *Journal of Aging and Health*.

ABSTRACT

Purpose. We sought to determine whether and to what extent provision of formal, residential long-term care and payor status were associated with potentially preventable hospitalizations (PPH) among frail Medicare beneficiaries over age 65.

Methods. We conducted a retrospective cohort analysis that matched Medicare beneficiaries based on: (1) clinical indicators of functional decline; (2) number of chronic conditions; (3) diagnosis of Alzheimer's or senility; (4) age group; (5) sex; and (6) race.

The final cohorts (Medicare-only beneficiaries residing in the community; Medicare-only beneficiaries residing in long-term care facilities; Medicare/Medicaid dual eligible beneficiaries residing in the community; and Medicare/Medicaid dual eligible beneficiaries residing in long-term care facilities) included 1,096 beneficiaries each, for a total study sample of 4,384 individuals. Cohort status served as the independent variable.

Our first analysis examined rates of PPH between the four cohorts, while our second analysis examined the relative risk of PPH between the four cohorts. We controlled additionally for state Medicaid bed hold policies, rurality of residence, and, among those residing in long-term care facilities, facility type.

Results. Dual eligible beneficiaries residing in long-term care facilities had the lowest rates of PPH, while Medicare-only beneficiaries residing in long-term care facilities had the highest rates of PPH. Dual eligible beneficiaries residing in long-term care facilities had a significantly lower risk of PPH than either Medicare-only residents of long-term

care facilities or dual eligible beneficiaries residing in the community. State Medicaid bed hold policies were not associated with rates or risk of PPH.

Conclusion. While this study did not succeed in elucidating an association between residential long-term care and PPH, it did identify patterns of PPH between frail elderly residents of long-term care facilities by payor status: specifically, Medicare-only residents of long-term care facilities are at significantly higher risk of PPH than their dual eligible counterparts, which could indicate differential responses to similar clinical conditions that could stem from payment policies.

Background

As the aged population in this country grows, the number of individuals in need of long term care services and supports (LTCSS) will also continue to grow—and is expected to reach 9.6 million Americans aged 65 or older by 2030 (Lakdawalla & Phillipson, 2002; CBO, 2013). While need for LTCSS is not an inevitable result of aging, physical health does decline with age. Twenty percent of individuals aged seventy or older have some form of disability that impacts their ability to care for themselves. Up to fifty percent of individuals aged eighty-five and older having at least one such disability, which may require the use of LTCSS (Chappell & Cooke, 2016; WHO, 2006).

Access to formal long-term care can be prohibitively expensive for many Americans. The average cost of a one-month stay in an assisted living facility is \$3,293, and the average cost of a month of nursing home care is \$6,235 (USDHHS, 2016). As Medicare does not provide reimbursement for LTCSS outside of the post-acute setting (USDHHS, 2014; CMS, 2015), individuals in need of LTCSS must either pay for these services out of pocket (either directly or through the purchase of long-term care

insurance) or qualify for Medicaid-funded long-term care provision based on income and assets (Social Security Office of Retirement and Disability Policy, 2012; Brown & Finkelstein, 2006). Due in large part to the difficulties associated with paying out of pocket or gaining Medicaid eligibility, two-thirds of Americans in need of long-term care receive this care through exclusively informal means (such as utilizing unpaid care provided by family and friends). An additional twenty-five percent receive care through a combination of informal, unpaid care and formal care—usually in the form of home and community-based services (HCBS) (Doty, 2010).

While informal caregiving—alone or combined with formal HCBS—is often regarded as an economical alternative to more formal, intensive LTCSS such as residential long-term care, it too comes with steep costs not only to recipients of care, but potentially to the health care system as a whole. Specifically, research has shown that recipients of informal LTCSS and HCBS—both of which can be understood as being less “comprehensive” than formal, residential long-term care—tend to have more unmet long-term care needs than their peers who receive LTCSS in a comprehensive residential setting (Komisar, Feder, & Kasper, 2005). These unmet long-term care needs, in turn, have been consistently demonstrated to lead to poor health outcomes, particularly with regard to potentially preventable hospitalizations (PPH) (Walsh, et al., 2010; Wysocki, et al., 2014). Potential explanations for these outcomes includes a lack of assistance with managing chronic medical conditions (Allen & Mor, 1997), a lack of assistance with medication management (Kuzuya, 2008), and an increased likelihood of injury due to lack of mobility assistance and supervision (LaPlante, et al., 2004; Komisar, Feder, & Kasper, 2005). There is also evidence of increased rates of depression in the population

of frail elderly who have unmet long-term care needs (Allen & Mor, 1997), which has been shown to place older adults at increased risk of subsequent physical decline (Pennix, et al., 1998).

Recent evidence has caused some to question whether the current policy shift towards providing long-term care services through HCBS rather than residential settings is entirely prudent given the seeming shortfalls of HCBS and informal care in preventing unnecessary health decline and higher rates of PPH (Wysocki, et al., 2014; Konetzka, 2014). If it is true that individuals in need of long-term care fare better under the more comprehensive care received in a residential care setting than they do under the fragmented care characterized by many HCBS and informal care settings (Miller, Allen, & Mor, 2008; Freedman & Spillman, 2014), then a renewed focus on increasing access to comprehensive long-term care is in order.

Alongside studies demonstrating the likely role of comprehensive long-term care in reducing instances of PPH, however, are studies that indicate that two powerful market forces also affect PPH among long-term care recipients, based on payer status. First, many states have enacted bed-hold policies with the intent of protecting Medicaid beneficiaries by preventing the loss of their residential long-term care beds to more lucrative Medicare and private-pay patients. Intrator, et al. assert that these policies have created a powerful perverse incentive: if the marginal profit of holding a bed under Medicaid-reimbursed bed-hold policy is greater than the marginal profit of keeping the Medicaid patient in the facility, the facility has every incentive to hospitalize the Medicaid beneficiary, even if unnecessarily (Intrator, et al., 2007). Indeed, states with bed-hold policies of at least moderate generosity have been shown to have significantly

higher rates of transfer from nursing homes to hospitals than states without such policies (Intrator, et al., 2009). Bed-hold policies only affect twenty-seven states. Further, Medicaid long-term care beneficiaries who are also eligible for Medicare are typically eligible for more lucrative Medicare-funded post-acute care once they return to their original long-term care facility following a hospital stay of at least three days—a fact which some have suggested could encourage long-term care facilities to transfer Medicaid-funded residents to hospitals at higher rates than other residents (Grabowski, 2007; Ouslander & Berenson, 2011).

Thus, while research has indicated that comprehensive care—as provided in residential long-term care facilities—is associated with lower rates of PPH, it has also shown that if that care is reimbursed by Medicaid, as opposed to privately funded, hospitalization rates will be higher. What we do not know—and what we seek to better understand through this research—is whether the protective effects of comprehensive, residential long-term care outweigh the disadvantages associated with Medicaid coverage of these services when it comes to PPH.

Methods

Data Sources

This study utilized data from the 5% sample of 2013 Medicare claims and enrollment data, provided by the Centers for Medicare and Medicaid Services (CMS) through the Research Data Assistance Center (ResDAC). A total of five 2013 Medicare claims and enrollment data files were used: the Base A/B/C/D segment of the Master Beneficiary Summary File; the Chronic Conditions segment of the Master Beneficiary

Summary File; the Part D segment of the Master Beneficiary Summary File; the MedPAR All file; and the Medicare Carrier Claims file.

In addition to these Medicare claims files, we used the Health Resources and Services Administration (HRSA) Area Health Resource File (AHRF) to determine the rurality of Medicare beneficiaries based on the Urban Influence Code tied to the individual beneficiary's county of residence. A compilation of Medicaid bed-hold policies by state, authored by The National Long-Term Care Ombudsman Resource Center, was used to create a dichotomous variable for presence or absence of state bed-hold policies (NLTCORC, 2012).

Study Sample

This study was limited to fee for service Medicare beneficiaries over the age of 65. To ensure a full year of Medicare utilization, beneficiaries who were not aged 65 at the beginning of the study year were excluded, as were beneficiaries who died during the study year. In defining dual eligibility, only those beneficiaries who were dually eligible for both Medicare and Medicaid for the entire study year were counted. Further, only those full-year dual eligible beneficiaries who received full Medicaid benefits were counted as dual-eligible. Similarly, in defining Medicare-only beneficiaries, only those beneficiaries who were never eligible for either full or partial Medicaid benefits were counted. Beneficiaries for whom data as to Zip Code of residence, race, or sex were excluded. These exclusions resulted in an initial sample of 1,305,239 Medicare beneficiaries (1,160,930 Medicare-only beneficiaries residing in the community; 17,700 Medicare-only beneficiaries residing in residential long-term care facilities; 98,916 Medicare/Medicaid dual eligible beneficiaries residing in the community; and 27,693

Medicare/Medicaid dual eligible beneficiaries residing in residential long-term care facilities) to extract the matched cohorts. Individuals were considered to be “residents” of residential long-term care facilities if they had physician claims with a place of service in a long-term care facility for at least three consecutive quarters during the study year.

Study Design

Using a retrospective cohort analysis, we examined the risk of PPH between four matched cohorts: Medicare-only beneficiaries residing in the community; Medicare-only beneficiaries who were long-stay residents of a residential long-term care facility; Medicare/Medicaid dual-eligible beneficiaries residing in the community; and Medicare/Medicaid dual-eligible beneficiaries who were long-stay residents of a residential long-term care facility.

Due to the potential for inherent selection biases in the data, it was necessary to reduce imbalance in the distribution of confounders between the base cohort group (Medicare/Medicaid dual eligible beneficiaries) and the other three cohorts (Stuart, 2010). As research has indicated that the utilization of propensity scores to perform cohort matching increases the imbalance of unmeasured confounders (Brooks & Ohfeldt, 2013; King & Nielsen, 2016), we chose instead to perform an exact matching methodology which utilized a fully blocked randomized experimental design (King & Nielsen, 2016).

The selection of matching variables was based in part on the Gelberg-Andersen Behavioral Model for Vulnerable Populations (Gelberg, Andersen, & Leake, 2000). This model asserts that predisposing characteristics (i.e., demographic, social, and cultural factors) affect an individual’s enabling resources (i.e., financial and organizational

factors), which in turn affect need for health services (both perceived and evaluated need) and health outcomes (Babitsch, Gohl, & von Lengerke, 2012). In turn, both perceived and evaluated need for health services affect health behavior in the form of health practices and the use of health services, which affects health outcomes (Gelberg, Andersen, & Leake, 2000).

Age affects method of long-term care provision in that the older a Medicare beneficiary is, the more likely they are to need formal long-term care, as factors such as widowhood and the compounding of functional and medical decline increase with age (Branch & Jette, 1982; Spillman & Lubitz, 2000). Age also affects ability to self-insure, as long-term care insurance premiums increase significantly with age (AALTCI, 2016). Sex affects enabling resources as men are more likely to have informal long-term care provided by wives (Navaie-Waliser, Spriggs, & Feldman, 2002; Lakdawalla & Philipson, 2002). Race and ethnicity affect enabling resources due to differential cultural norms between whites, African Americans, Hispanics, and Asians as to the burden of providing comprehensive informal care for an elderly relative, perceptions of duty to do so, as well as potential effects of discrimination on access to formal long-term care (Wallace, et al., 1997; Dilworth-Anderson, Williams, & Gibson, 2002; Bradley, et al., 2002).

To accommodate the variables elucidated above, we performed a 1:1:1:1 exact nearest neighbor match, without replacement (Kawabata, Tran, & Hines, 1999), matching on the following beneficiary-level characteristics: (1) clinical diagnosis of one, two, or three clinical indicators of functional decline; (2) number of chronic conditions (zero, one, or two or more); (3) diagnosis of Alzheimer's or senility; (4) age (66-70; 71-75; 76-80; 81-85; 86-90; 91 or older); (4) sex; and (5) race (white, non-Hispanic; African

American, non-Hispanic; Hispanic; Native American/Alaskan Indian; or Other). Clinical indicators of functional decline were based on a number of ICD-9 codes demonstrated by Faurot, et al. and Rosen, et al.), respectively, to be valid indicators of functional decline in elderly adults (Faurot, et al., 2015; Rosen, et al., 2000) (Table 4.1). Individuals were matched on the other four variables based on a review of the literature that showed these individual-level characteristics are most often associated with need for formal long-term care due to the interplay between age, the effects of chronic condition multi-morbidity on functional status, the effects of senility on functional status, and the effect of sex on frailty, independent of issues of longevity or spousal caregiver ability (Branch & Jette, 1982; Boult, et al., 1994; Stuck, et al., 1999; Millan-Calenti, et al., 2010; Tas, et al., 2007; Marengoni, et al., 2009; Cawthon, et al., 2007).

The goal of the matching methodology was to ensure that the four study cohorts were similar in terms of characteristics that are known to affect need for long-term care. We used Medicare/Medicaid dual eligible beneficiaries residing in long-term care residential facilities as our base cohort under the theory that individuals in this group were the most likely to be in need of residential long-term care, as eligibility for Medicaid coverage of residential long-term care requires considerable documentation (Grabowski, 2007). The final study sample consisted of four matched study cohorts of 1,096 Medicare beneficiaries each, for a total study sample of 4,384 individuals (Table 4.3). Contrary to Fossett & Burke, we believe that any index of Medicaid generosity in long-term care must account not only for demand-side aspects of Medicaid long-term care policy, but also supply-side aspects, including the effects of the market incentives we have discussed above (Fossett & Burke, 2010).

Independent Variable: Cohort Status

The independent variable, cohort status, was designed to measure the interaction between long-term care payer type (private pay versus Medicaid coverage) and place of residence (community versus residential long-term care setting). Medicare-only beneficiaries residing in residential long-term care facilities for this amount of time would be unlikely to have their long-term care services covered by Medicare due to the time-limited nature of Medicare post-acute payment for long-term care services, and would thus be paying for these services privately, either directly out of pocket or through a long-term care insurance benefit.

Dependent Variable: Potentially Preventable Hospitalization

The dependent variable was occurrence of a PPH. In defining a PPH in the elderly population, we began by including twelve of the fourteen Prevention Quality Indicators designated by the Agency for Healthcare Research and Quality as “ambulatory care sensitive conditions,” excluding “low birth weight” and “asthma in younger adults.” (Agency for Healthcare Research and Quality, 2012). In addition, recognizing that PPH among frail older adults who require long-term care can encompass conditions that would not be considered PPH in younger, healthier populations, we also included conditions identified by a technical expert panel on PPH among dual-eligible beneficiaries who require long-term care. A list of all conditions for which hospitalization was defined as a PPH, and their accompanying ICD-9 codes, can be found in Table 4.2.

Covariates

For the regression analyses, control variables included state Medicaid bed-hold policy (yes/no), rurality of residence (rural versus urban), and within the two cohorts

representing residents of long-term care facilities, facility type (assisted living facility; custodial care facility; skilled nursing facility; or nursing facility), at the beneficiary level. While the effects of regional practice patterns and state-level Medicaid policies beyond bed-hold policy quite likely affect PPH in this population, we lacked the statistical power to control for either Hospital Referral Region or state. Further, the complexity of differences in Medicaid policies from state to state preclude an accurate grouping of states by long-term care Medicaid generosity.

Analytical Approach

Wald chi-square tests ($\alpha = 0.05$) assessed differences in PPH by cohort status and covariate. Modified Poisson regression models estimated the relative risk of PPH among our four matched cohorts, as well as between the two cohorts representing residents of long-term care facilities, respectively, with dual-eligible beneficiaries residing in long-term care facilities as our referent. As our matching methodology had already controlled for clinical indicators of frailty, number of chronic conditions, Alzheimer's/senility status, age, sex, and race/ethnicity, we did not control for these covariates in the adjusted model. A separate analysis of these variables using modified Poisson regression modeling confirmed that the inclusion of these matching variables as control variables had no effect on other variables in the model. The statistical analyses were conducted using SAS statistical software, version 9.3 (SAS Institute Inc., Cary, NC).

Results

Unadjusted Rates of PPH

Table 4.4 displays the unadjusted rates of PPH, as well as unadjusted odds of PPH. Dual eligible beneficiaries who resided in a long-term care facility had the lowest

rates of PPH among the four matched cohorts, while Medicare-only beneficiaries who resided in long-term care facilities had the highest rates of PPH. Other factors associated with higher rates of PPH include sex (with females having higher rates of PPH than males), and rurality (with rural individuals having higher rates of PPH than their urban counterparts). Individuals with two or more chronic conditions had significantly higher rates of PPH than individuals with no chronic conditions, and individuals with a diagnosis of Alzheimer's or other form of dementia had considerably higher rates of PPH than did individuals without such a diagnosis. Residents of assisted living facilities and custodial care facilities were significantly less likely to have a PPH than were residents of skilled nursing facilities; there was no statistical difference in likelihood of PPH between residents of skilled nursing facilities and residents of nursing facilities or beneficiaries residing in the community. Factors that were not associated with PPH in the bivariate analysis were age and race. Further, the presence of a state Medicaid bed hold policy was not associated with rate of PPH.

Adjusted Risk of PPH

Multivariate modified Poisson regression modeling estimated the relative risk of PPH in the study population. To better elucidate the effects of the covariates on risk of PPH, seven models were performed: three examining the effects of cohort status, state Medicaid bed-hold policies, and rurality, successively, among all four cohorts, and four examining the effects of cohort status, state Medicaid bed-hold policies, rurality, and type of residential facility, successively, among beneficiaries residing in long-term care facilities (Tables 4.5 and 4.6).

The first analysis examined the risk of PPH by cohort status alone among all four cohorts, and reflects the information provided in Table 4.4. In the first model, the cohort of Medicare-only beneficiaries residing in long-term care facilities had the highest risk of PPH (RR 1.31, $p=0.0056$) when compared to the cohort of dual eligible beneficiaries residing in long-term care facilities, followed by the cohort of dual eligible beneficiaries who resided in the community (RR 1.24, $p = 0.0301$). The second and third models, which controlled for state bed-hold policies and state bed-hold policies as well as rurality, respectively, had very little effect on risk of PPH across the four study cohorts, with the final model demonstrating a 34% higher risk of PPH for Medicare-only LTC facility residents relative to dual eligible LTC facility residents ($p = 0.0030$), and a 25% higher risk of PPH for dual eligible beneficiaries residing in the community compared to dual eligible LTC facility residents ($p = 0.0239$).

In the next analysis, we restricted our examination to residents of LTC facilities. Models 4 through 6 present relative risk by cohort, sequentially adding state bed-hold policies and rurality (Table 4.6). In all models in this analysis, Medicare-only beneficiaries residing in residential long-term care facilities had a significantly higher risk of PPH than did Medicare/Medicaid dual eligible beneficiaries residing in residential long-term care facilities.

The final model, which controlled for the additional variable of type of long-term care facility, demonstrated a considerably higher relative risk of PPH among Medicare-only LTC facility residents relative to dual eligible LTC facility residents (RR 1.53, $p <.0001$). This final model also showed a significantly higher risk of PPH among residents of nursing home (skilled nursing facilities and nursing facilities), compared to

residents of assisted living facilities (RR 3.03 for residents of skilled nursing facilities, and RR 2.61 for residents of nursing facilities).

Discussion

The results of our study suggest that dual eligible beneficiaries residing in long-term care facilities are significantly less likely than both Medicare-only LTC facility residents and dual eligible beneficiaries residing in the community to have a PPH, and, further, that the risk of PPH among Medicare-only LTC facility residents is 53% higher than the risk of PPH among dual eligible LTC facility residents after accounting for the type of long-term care facility in which beneficiaries reside.

Given that most state Medicaid policies are more likely to cover nursing home care than care in assisted living facilities, yet assisted living facilities are considerably more affordable—particularly when paying out of pocket—it is not surprising that 82.1% of dual-eligible long-term care facility residents resided in a nursing facility of some form, while only 40.4% of Medicare-only long-term care facility residents residing in a nursing facility, with 59.6% of that population residing in assisted living facilities or custodial care facilities (See Table 4.3). The finding that residents of skilled nursing facilities were at a three-fold risk of PPH compared to residents of assisted living facilities—and that residents of nursing facilities had a PPH risk level of two and a half times that of assisted living facility residents, however, argues against the hypothesis on which this research was based. If comprehensiveness of care reduced risk of PPH, we would expect residents of facilities providing less comprehensive care—i.e., assisted living and custodial care facilities—to have a higher risk of PPH than residents receiving comprehensive nursing and medical care alongside personal assistance. As our findings

demonstrate the opposite, further research will be necessary to better understand the association between type of long-term care facility and risk of PPH. It is likely that residents of nursing facilities and skilled nursing facilities are sicker than residents of assisted living and custodial care facilities in ways for which we were unable to account in our matching methodology.

Although the results of this research did not succeed in identifying the effects of place of residence (community versus long-term care facility), our study did elucidate patterns of PPH between frail elderly residents of long-term care facilities by payer status. Controlling through either matching methodology or regression analysis for a number of covariates, we have found that the significantly higher risk of PPH we have ascertained among Medicare-only LTC facility residents cannot be attributed to frailty level (as measured by clinical indicators of frailty), race/ethnicity, Alzheimer's/senility status, age, sex, rurality of residence, or state Medicaid bed-hold policy.

Although we lacked the statistical power to control for regional practice patterns or state-level policies beyond presence of a state Medicaid bed-hold policy, the fact that state bed-hold policies were found to be insignificant in predicting risk of PPH indicates that suspected perverse incentives towards increased unnecessary hospitalizations among Medicaid long-term care residents may not be a significant factor in risk of PPH in the population of frail elderly. These findings contradict those of researchers who have found positive correlations between hospitalization and state Medicaid bed-hold policies (Intrator, et al., 2007; Intrator, et al., 2009; Grabowski, et al., 2010; Unruh, 2013). The most recent previous research of the effects of Medicaid bed-hold policies on hospitalization used data collected between the years 2000 and 2005, so it is possible that

facilities have adjusted appropriately to the perverse incentives inherent in bed-hold policies in the intervening time between 2005 and the year of our study, 2013. It is also possible that the findings of previous researchers could be attributed to large sample sizes, as sample sizes for these studies were 22 million person-quarters for Unruh, et al.'s study, and 3.3 million observations for Grabowski, et al.'s study, respectively. More research will be necessary to determine whether and to what extent other regional, state, and national policies may affect risk of PPH in this population, as well as to understand what other factors could be contributing to the significant differences in risk of PPH, particularly between the two cohorts representing LTC facility residents.

While a PPH is indicative of a lack of appropriate preventive and ameliorative care leading up to the preventable hospitalization, and while we feel that the most likely explanation of our findings hinges on issues of policy, we cannot discount the possibility that in some cases a PPH may be the preferred outcome, such that a lack of PPH may be indicative of untreated conditions that would require a PPH admission to properly treat. Specifically, it is possible that potential differences in treatment of private pay long-term care residents as compared to residents for whom care is reimbursed by Medicaid, such as differences in facility quality and availability of patient advocates, could help to explain the significantly lower risk of PPH among the dual eligible LTC resident population. Further analysis will be aimed at examining specific types of PPH by payer status and long-term care facility type.

Limitations

This study was limited by a relatively small sample size, which not only prevented us from controlling for state of residence—which would have allowed us some

ability to broadly measure the effects of Medicaid and other long-term care policies specific to each state—but also prevented us from controlling for regional differences in practice patterns based on Hospital Referral Regions. Our sample size of 4,384 also did not provide us with a large enough sample to subset race or ethnicity by more than two levels.

Our study was also partially limited by our reliance, of necessity, on clinical indicators of frailty to match members of the other three cohorts to the dual eligible beneficiaries residing in long-term care facilities. Information regarding the utilization of oxygen, hospital beds, and mobility devices was only available for community-dwelling beneficiaries. Thus, while the cohorts are well matched in terms of frailty and potential need for long-term care, information as to DME use among all cohort members would have strengthened our study.

Finally, as our study analyzed only Medicare claims data, we only had information pertaining to home health services reimbursed by Medicare, and did not have information as to the home health or other supportive services utilized by either Medicare-only or dual-eligible beneficiaries residing in the community. This information would have been a powerful covariate to consider in our successive Poisson regression modeling.

Conclusion

Our findings suggest that dual eligible residents of LTC facilities are at a significantly lower risk of PPH than their similarly situated counterparts who are either Medicare-only residents of LTC facilities or dual eligible beneficiaries residing in the community. The reasons for the significant differences in risk of PPH—particularly

between Medicare-only residents of LTC facilities and dual eligible LTC facility residents—is not readily apparent, and cannot be explained by a number of covariates associated in the literature with PPH. It seems likely that variables that could not be controlled for in our model—particularly regional practice patterns and state-level policies, but also potential differences in quality of care linked to payer status—may help to explain our findings.

Table 4.1. Clinical Indicators of Functional Decline, with sources

Condition	ICD-9 Code(s)	Source
DM Complications	250.4, 250.6, 250.7, 250.9	Faurot, et al.
Podiatric Care	700., 703., 681.1	Faurot, et al.
Heart Failure	428., 425., 429.0, 429.1, 429.3, 429.4	Faurot, et al.
Sepsis	01., 036.038., 040.0, 041., 032.0, 032.1, 681., 682., 730., 031.0, 031.2, 790.7, 032.82, 032.83, 053.0, 053.13, 054.5, 136.3, 320.0, 785.4, 112.83, 112.81, 112.5	Faurot, et al.
Difficult Walking	719.7, 781.2, 781.3, 438.85, v46.3	Faurot, et al.
Stroke/Brain Injury	348., 430., 431., 432., 852., 853., 854., 349.82, 433.01, 433.11, 433.21, 433.31, 433.91, 434.01, 434.11, 434.91	Faurot, et al.
Weakness	728.2, 728.87, 799.3, 728.2, 728.3, v49.84	Faurot, et al.
Decubitus Ulcer/Pressure Ulcer	707.0, 707.2, 707.	Faurot, et al.; Rosen, et al.
Paralysis/Hemiplegia/Quadriplegia	342., 438.2, 438.3, 438.4, 438.5, 344., 781.4	Faurot, et al.; Rosen, et al.
Multiple Sclerosis	340, 341.0	Rosen, et al.
Cancer	140-165.9, 170-176.9, 179-208.9	Rosen, et al.
Alzheimer's Disease	290, 290.0, 290.1, 290.2, 290.3, 331.0	Rosen, et al.
Dementia other than Alzheimer's	290.4-290.43, 290.8, 290.9, 291.1, 291.2, 294, 294.1, 294.8	Rosen, et al.
Parkinson's Disease	332-332.1	Rosen, et al.
Seizure Disorder	345-345.5, 345.7-345.9, 780.3	Rosen, et al.

Table 4.2. Indicators of Potentially Preventable Hospitalizations, with sources

Condition	Source
Diabetes Short-Term Complications	AHRQ; Walsh, et al.
Perforated Appendix	AHRQ
Diabetes Long-Term Complications	AHRQ; Walsh, et al.
COPD or Asthma	AHRQ; Walsh, et al.
Hypertension	AHRQ

Heart Failure	AHRQ; Walsh, et al.
Dehydration	AHRQ; Walsh, et al.
Bacterial Pneumonia	AHRQ
Urinary Tract Infection	AHRQ
Angina Without Procedure	AHRQ
Uncontrolled Diabetes	AHRQ
Lower-Extremity Amputation among Patients with Diabetes	AHRQ
Anemia	Walsh, et al.
Hypotension	Walsh, et al.
Constipation/Fecal Impaction/Obstipation	Walsh, et al.
Diarrhea/Gastroenteritis	Walsh, et al.
C. Difficile	Walsh, et al.
Cellulitis	Walsh, et al.
Skin Ulcers Including Pressure Ulcer	Walsh, et al.
Lower Respiratory: Pneumonia/Bronchitis	Walsh, et al.
Falls and Trauma	Walsh, et al.
Altered Mental Status/Acute Confusion/Delirium	Walsh, et al.
Psychosis, Severe Agitation, Organic Brain Syndrome	Walsh, et al.
Weight Loss, Nutritional Deficiencies, Adult Failure to Thrive	Walsh, et al.
Seizures	Walsh, et al.

Table 4.3. Characteristics of Study Cohorts, 2013 Medicare Claims Files, CMS

	Medicare Only, Community-Dwelling	Medicare Only, LTC Resident	Dual Eligible, Community Dwelling	Dual Eligible, LTC Resident	Percentage
Total	1096	1096	1096	1096	100%
Sex*					
Male	346	346	346	346	31.6%
Female	750	750	750	750	68.4%
Age Group*					
66-70	109	109	109	109	9.9%
71-75	119	119	119	119	10.9%
76-80	171	171	171	171	15.6%
81-85	244	244	244	244	22.3%
86-90	232	232	232	232	21.2%
91+	221	221	221	221	20.2%
Race*					
White, Non-Hispanic	943	943	943	943	86.0%
Non-White, or White, Hispanic	153	153	153	153	14.0%
Rurality*					
Urban	916	916	916	916	83.6%
Rural	180	180	180	180	16.4%
Alzheimer's/Senility*					
No	362	362	362	362	33.0%

Yes	734	734	734	734	67.0%
Chronic Condition Number*					
0	20	20	20	20	1.8%
1	126	126	126	126	11.5%
2+	950	950	950	950	86.7%
Bed Hold Policy**					
No	409 (37.3%)	452 (41.2%)	323 (29.5%)	358 (32.7%)	
Yes	687 (62.7%)	644 (58.8%)	773 (70.5%)	738 (67.3%)	
Type of Long-Term Care Facility**					
None/Community Resident	1096 (100%)	0	1096 (100%)	0	
Assisted Living	0	515 (47.0%)	0	132 (12.0%)	
Custodial Care	0	138 (12.6%)	0	64 (5.8%)	
Nursing Facility	0	405 (37.0%)	0	864 (78.8%)	
Skilled Nursing Facility	0	38 (3.5%)	0	36 (3.3%)	

*Indicates matching variable; **Indicates control variable

Table 4.4. Unadjusted Rate of Potentially Preventable Hospitalization, 2013, Medicare Claims Data, CMS

	% PPH	p-value	Unadjusted Odds Ratio
Cohort			
Medicare Only, Community-Dwelling	16.70	0.0392	1.235 (0.978-1.560)
Medicare Only, LTC Resident	18.34		1.384 (1.100-1.741)
Dual Eligible, Community-Dwelling	17.34		1.292 (1.025-1.629)
Dual Eligible, LTC Resident	13.96		Reference
Sex			
Male	14.88	0.0400	Reference
Female	17.37		1.202 (1.008-1.432)
Age Group			
66-70	15.14	0.8216	Reference
71-75	15.76		1.049 (0.732-1.502)
76-80	17.84		1.217 (0.878-1.688)
81-85	16.39		1.099 (0.805-1.502)
86-90	17.35		1.177 (0.861-1.608)
91+	16.18		1.082 (0.788-1.486)
Race			
White, Non-Hispanic	16.83	0.2663	Reference

Non-White, or White, Hispanic	15.03		0.874 (0.689-1.108)
Rurality			
Urban	15.91	0.0126	Reference
Rural	19.49		1.841 (1.528-2.218)
Alzheimer's/Senility			
No	11.40	<.0001	Reference
Yes	19.14		1.280 (1.054-1.554)
Chronic Condition Number			
0	1.25	<.0001	Reference
1	2.78		2.256 (0.293-17.395)
2+	18.74		18.209 (2.530-131.057)
Bed Hold Policy			
No	16.6	0.9803	Reference
Yes	16.57		0.998 (0.845-1.179)
Type of Long-Term Care Facility		<.0001	
Skilled Nursing Facility			Reference
None (Community)	7.47		0.706 (0.474-1.050)
Assisted Living Facility	9.85		0.278 (0.141-0.550)
Custodial Care Facility	22.52		0.376 (0.207-0.685)
Nursing Facility	17.25		0.717 (0.480-1.073)

Table 4.5. Adjusted Relative Risk of Potentially Preventable Hospitalization, by Cohort Status, All Cohorts, 2013, Medicare Claims Data, CMS

	Model 1	Model 2	Model 3
Cohort			
Medicare Only, Community-Dwelling	1.20	1.20	1.22
Medicare Only, LTC Resident	1.31*	1.31*	1.34*
Dual Eligible, Community-Dwelling	1.24*	1.24*	1.25*
Dual Eligible, LTC Resident	Ref	Ref	Ref

Bed Hold Policy			
No		Ref	Ref
Yes		1.01	1.02
Rurality			
Urban			Ref
Rural			1.25*

*= p <.05; ** = p <.0001

Table 4.6. Adjusted Relative Risk of Potentially Preventable Hospitalization, by Cohort Status, 2013, Medicare Claims Data, CMS

	Model 4	Model 5	Model 6	Model 7
Cohort				
Medicare Only, LTC Resident	1.31*	1.32*	1.35*	1.53**
Dual Eligible, LTC Resident	Ref	Ref	Ref	Ref
Bed Hold Policy				
No		Ref	Ref	Ref
Yes		1.06	1.07	1.10
Rurality				
Urban			Ref	Ref
Rural			1.29*	1.24
Facility Type				
Assisted Living				Ref
Custodial Care				1.26

Skilled Nursing Facility				3.03*
Nursing Facility				2.61*

* = $p < .05$; ** = $p < .0001$

CHAPTER 5

MANUSCRIPT TWO

EFFECTS OF LONG TERM CARE FACILITY RESIDENCY AND PAYER ON
TOTAL MEDICARE EXPENDITURES AMONG FRAIL ELDERLY MEDICARE
BENEFICIARIES¹

¹ Robertson, A.S., Bennett, K.J., Probst, J.C., Crouch, E., & Hardin, J.W. To be submitted to *Journal of Health Politics, Policy, and Law*.

ABSTRACT

Purpose. We sought to determine whether and to what extent provision of formal, residential long-term care and payor status were associated with Medicare expenditure patterns among frail Medicare beneficiaries over age 65.

Methods. We conducted a retrospective cohort analysis that matched Medicare beneficiaries based on: (1) clinical indicators of functional decline; (2) number of chronic conditions; (3) diagnosis of Alzheimer's or senility; (4) age group; (5) sex; and (6) race. The final cohorts (Medicare-only beneficiaries residing in the community; Medicare-only beneficiaries residing in long-term care facilities; Medicare/Medicaid dual eligible beneficiaries residing in the community; and Medicare/Medicaid dual eligible beneficiaries residing in long-term care facilities) included 1,096 beneficiaries each, for a total study sample of 4,384 individuals. Cohort status served as the independent variable. Our first analysis examined median per capita Medicare beneficiaries by cohort status, while our second analysis examined risk of being "high cost" Medicare beneficiaries (i.e., having expenditures in the 90th percentile of Medicare expenditures). We controlled additionally for state Medicaid bed hold policies, rurality of residence, and, among those residing in long-term care facilities, facility type.

Results. Dual eligible beneficiaries residing in long-term care facilities had a significantly lower risk of being "high cost" than did Medicare-only beneficiaries residing in long-term care facilities or dual eligible beneficiaries residing in the community. However, dual eligible beneficiaries residing in long-term care facilities had significantly higher per

capita expenditures than Medicare-only long-term care facility residents. State Medicaid bed hold policies were not associated with Medicare expenditures.

Conclusion. While this study did not succeed in elucidating an association between residential long-term care and Medicare expenditures in general, they do suggest that dual eligible beneficiaries residing in long-term care facilities are less costly to the Medicare system than dual eligible beneficiaries residing in the community. The finding that Medicare-only long term care facility residents have lower per capita Medicare expenditures than their dual eligible counterparts, yet are at greater risk of being “high cost” beneficiaries may suggest patterns of higher-intensity medical care for Medicare-only residents of long-term care facilities compared to their dual eligible peers.

Background

In recent years, the focus of American long-term care policy—particularly Medicaid long-term care policy—has shifted away from residential care and towards the provision of long-term care services and supports (LTCSS) through home and community based services (HCBS) (Kaiser Family Foundation, 2012). Similarly, as Medicare does not provide reimbursement for long-term care outside of the post-acute setting, individuals who are not eligible for Medicaid long-term care coverage are relying more and more on informal home and community-based care, including care provided without direct costs most often by family members. While this “rebalancing” of long-term care towards informal and community-based services is often viewed as an economically efficient, it is possible that a focus away from comprehensive long-term care merely shifts costs to the Medicare system, as unmet long-term care needs have the potential to increase healthcare utilization, and thus expenditures.

Research suggests that recipients of informal or formal community-based long-term care are more likely to have unmet long-term care needs than their counterparts receiving LTCSS in residential facilities (Freedman & Spillman, 2014). Further, these unmet long-term care needs have been associated with increased incidence of all-cause hospitalizations, ED visits, and physician visits (Walsh, et al., 2010; Sands, et al., 2006; Huiping, et al., 2012; Kuzuya et al., 2008; Quail, Wolfson, & Lippman, 2011; Hass, et al., 2015; Kuzuya, 2006). Reasons for these negative outcomes include a lack of assistance with managing chronic medical conditions (Allen & Mor, 1997), a lack of assistance with medication management (Kuzuya, 2008) increased likelihood of accidental injury (LaPlante, et al., 2004; Komisar, Feder, & Kasper, 2005), and increased rates of depression in the population of frail elderly who have unmet long-term care needs (Allen & Mor, 1997), which has been shown to put older adults at increased risk of subsequent physical decline (Pennix, et al., 1998). Thus, we might assume that Medicare beneficiaries in need of long-term care who reside in the community will have higher total Medicare costs than Medicare beneficiaries in need of long term care who reside in residential long-term care facilities. Unfortunately, however, the long-term care policy landscape is more complicated than this.

Specifically, in attempting to understand health care costs among elderly individuals in need of long-term care, we must consider not only type of care in terms of residential setting, but also type of care in terms of payer context. There is a growing body of literature that asserts an association between payer type and health outcomes and utilization—an association that is influenced by policies at the local, state, and national level. Researchers have identified two market forces that incentivize the utilization of

Medicare-funded acute care services by dual eligible beneficiaries receiving Medicaid-funded long-term care in residential facilities. First, the existence of state Medicaid bed-hold policies has been demonstrated to increase hospitalization rates among not only Medicaid beneficiaries residing in long-term care facilities, but also to a smaller extent among Medicare-only beneficiaries residing in such care facilities (Intrator, 2007; Grabowski, 2010). In addition, Medicaid long-term care beneficiaries who are also eligible for Medicare are typically eligible for more lucrative Medicare-funded post-acute care once they return to their original long-term care facility following a hospital stay of at least three days. This policy creates a clear incentive to hospitalize Medicaid beneficiaries unnecessarily, and at potentially considerable costs to the Medicare system, in order not only to avoid utilizing nursing home resources to care for a sick patient, but also to ensure considerably higher reimbursement rates for care provided as the patient recovers from his or her illness (Grabowski, 2007; Ouslander & Berenson, 2011).

Wysocki, et al.'s finding that elderly users of formal home and community based long-term care services were at increased risk of both potentially preventable hospitalizations and non-potentially preventable hospitalizations compared to elderly nursing home residents with similar levels of physical and medical decline provides insight into differences in avoidable hospitalizations between dual eligible beneficiaries by type of long-term care (Wysocki, 2014). However, a thorough understanding of elderly long-term care policy requires an examination not only of those Medicare beneficiaries whose LTCSS are covered by Medicaid, but also those beneficiaries who either pay for LTCSS out of pocket or who rely solely on informal care. Our research seeks to shed light on the interplay between the seeming protective effects of

comprehensive, residential care on one hand and, on the other, the effects of perverse incentives towards unnecessary health care utilization by residents of long-term care facilities for whom care is reimbursed by Medicaid on the other. We address these questions by examining expenditures across four cohorts of Medicare beneficiaries, characterized by residence and payor status, matched based on likely health care need.

Methods

Data Sources

We obtained a 5% sample of 2013 Medicare claims and enrollment data from the Centers for Medicare and Medicaid Services (CMS). This study utilized five 2013 Medicare claims and enrollment data files: the Base A/B/C/D segment of the Master Beneficiary Summary File; the Chronic Conditions segment of the Master Beneficiary Summary File; the Part D segment of the Master Beneficiary Summary File; the MedPAR All file; and the Medicare Carrier Claims file. We linked the Medicare claims data to the Health Resources and Services Administration (HRSA) Area Health Resource File (AHRF) to determine the rurality of Medicare beneficiaries based on the Urban Influence Codes. We created a dichotomous variable for presence of a state Medicaid bed-hold policy (yes/no) using a compilation of Medicaid bed-hold policies by state published by The National Long-Term Care Ombudsman Resource Center (NLTCORC, 2012).

Study Sample

We limited our study population to fee for service Medicare beneficiaries over the age of 65. To ensure each beneficiary studied had a full year of Medicare utilization available for analysis, beneficiaries who were not aged 65 at the beginning of the study

year were excluded, as were beneficiaries who died during the year. In defining dual eligibility, only those beneficiaries who were dually eligible for both Medicare and Medicaid for the entire study year were counted. Further, only those full-year dual eligible beneficiaries who received full Medicaid benefits were counted as dual-eligible. In defining Medicare-only beneficiaries, only those beneficiaries who were never eligible for either full or partial Medicaid benefits were counted. Beneficiaries for whom data as to Zip Code of residence, race, or sex were excluded. Individuals were classified as “residents” of long-term care facilities if they had physician claims (drawn from the Carrier Claims file) with a place of service in a long-term care facility for at least three consecutive quarters during the study year.

Our final study population of four matched cohorts of 1,096 Medicare beneficiaries each (or 4,384 total Medicare beneficiaries) was drawn from a final study sample of 1.3 million Medicare beneficiaries (1,160,930 Medicare-only beneficiaries residing in the community; 17,700 Medicare-only beneficiaries residing in residential long-term care facilities; 98,916 Medicare/Medicaid dual eligible beneficiaries residing in the community; and 27,693 Medicare/Medicaid dual eligible beneficiaries residing in residential long-term care facilities).

Study Design

Using a retrospective cohort analysis, we examined median Medicare expenditures and estimated log-transformed total Medicare costs, as well as risk of having Medicare expenditures in the top 90th percentile of all Medicare beneficiaries with expenditures (i.e., of being “high cost” Medicare beneficiaries). Beneficiaries were sorted into four matched cohorts: Medicare-only beneficiaries residing in the community;

Medicare-only beneficiaries who were long-stay residents of a residential long-term care facility; Medicare/Medicaid dual-eligible beneficiaries residing in the community; and Medicare/Medicaid dual-eligible beneficiaries who were long-stay residents of a residential long-term care facility. Characteristics of these cohorts are displayed in Table 5.1.

Due to the potential for selection bias, we sought to reduce the imbalance in the distribution of confounders between our base cohort group (Medicare/Medicaid dual eligible beneficiaries) and our three cohorts (Stuart, 2010). As research indicates that propensity score matching can increase the imbalance of unmeasured confounders (Brooks & Ohsfeldt, 2013; King & Nielson, 2016), our study employed an exact matching methodology, utilizing a fully blocked randomized experimental design (King & Nielson, 2016).

We based our selection of variables on which to perform this matching in part on the Gelberg-Andersen Behavioral Model for Vulnerable Populations (Gelberg, Andersen, & Leake, 2000). The Gelberg-Andersen Model asserts that predisposing characteristics (i.e., demographic, social, and cultural factors) affect an individual's enabling resources (i.e., financial and organizational factors), which affect need for health services (both perceived and evaluated need) and health outcomes (Babitsch, Gohl, & von Lengerke, 2012). In turn, both perceived and evaluated need for health services affect health behavior in the form of health practices and the use of health services, which affects health outcomes (Gelberg, Andersen, & Leake, 2000).

We performed a 1:1:1:1 exact nearest neighbor match, without replacement (Kawabata, Tran, & Hines, 1999), matching on the following beneficiary-level

characteristics: (1) clinical diagnosis of one, two, or three clinical indicators of functional decline; (2) number of chronic conditions (zero, one, or two or more); (3) diagnosis of Alzheimer's or senility; (4) age (66-70; 71-75; 76-80; 81-85; 86-90; 91 or older); (4) sex; and (5) race (white, non-Hispanic; African American, non-Hispanic; Hispanic; Native American/Alaskan Indian; or Other). Clinical indicators of functional decline were based on a number of ICD-9 codes demonstrated by Faurot, et al., and Rosen, et al., respectively, to be valid indicators of functional decline in elderly adults (Faurot, et al., 2015; Rosen, et al., 2000) (Table 4.1). Individuals were matched on the other four variables based on a review of the literature that showed these individual-level characteristics are most often associated with need for formal long-term care due to the interplay between age, the effects of chronic condition multi-morbidity on functional status, the effects of senility on functional status, and the effect of sex on frailty, independent of issues of longevity or spousal caregiver ability (Branch & Jette, 1982; Boulton, et al., 1994; Stuck, et al., 1999; Millan-Calenti, et al., 2010; Tas, et al., 2007; Marengoni, et al., 2009; Cawthon, et al., 2007).

Independent Variable: Cohort Status

Our independent variable, cohort status, was designed to measure the interaction between long-term care payer type (private pay versus Medicaid coverage) and place of residence (community versus residential long-term care setting). In order to be classified as a long-term resident of a long-term care facility, beneficiaries must have had physician claims with a place of service code in a long-term care facility (defined as an assisted living facility, custodial care facility, nursing facility, or skilled nursing facility) for three consecutive quarters during the study year.

Dependent Variables

The dependent variable in the bivariate analysis was median per capita Medicare expenditures. The dependent variable in the Poisson regression analysis was membership in the 90th percentile of Medicare expenditures. The dependent variable in the generalized linear model analyses was the log-transformed total Medicare expenditures per beneficiary. We analyzed the log transformed total expenditures due to skewness in the data (Skewness Statistic 2.806). The dependent variable in the Poisson regression analyses was a beneficiary's status as having Medicare expenditures in the top 90th percentile of all Medicare beneficiaries with expenditures during the study year. We analyzed the entire 5% sample of Medicare beneficiaries' claims data to determine that the 90th percentile of expenditures for Medicare beneficiaries with at least \$1 in Medicare expenditures was \$22,081 per capita. Thus, individuals in our study population whose annual Medicare expenditures were greater than this amount were considered "high cost" Medicare beneficiaries

Covariates

For the regression analyses, we controlled for state Medicaid bed-hold policy (yes/no), rurality of residence (rural versus urban), and, within the two cohorts representing residents of long-term care facilities, facility type (assisted living facility; custodial care facility; skilled nursing facility; or nursing facility), at the beneficiary level. While we acknowledge that the effects of regional practice patterns and state-level Medicaid policies beyond bed-hold policy quite likely healthcare expenditures in this population, we lacked the statistical power to control for either Hospital Referral Region or state.

Analytical Approach

Kruskal-Wallis one-way ANOVA on ranks tests ($\alpha = 0.05$) assessed differences in median per capita Medicare expenditures by cohort status, as well as by level of covariate within each cohort. Modified Poisson regression models estimated the relative risk of membership in the top 90th percentile or “high cost” group of Medicare beneficiaries, among our four matched cohorts, as well as between the two cohorts representing residents of long-term care facilities, respectively, with dual-eligible beneficiaries residing in long-term care facilities as our referent. As our matching methodology had already controlled for clinical indicators of frailty, number of chronic conditions, Alzheimer’s/senility status, age, sex, and race/ethnicity, we did not control for these covariates in the adjusted models. A separate analysis of these variables using modified Poisson regression modeling confirmed that the inclusion of these matching variables as control variables had no effect on other variables in the model. Finally, generalized linear models estimated the associations between cohort status and estimated log-transformed total Medicare expenditures per beneficiary. The statistical analyses were conducted using SAS statistical software, version 9.3 (SAS Institute Inc., Cary, NC). Approval from the University of South Carolina Institutional Review Board was granted on March 24, 2016. The study was categorized as “exemption status,” as de-identified secondary data was utilized for this study.

Results

Median per capita Medicare expenditures by cohort status are presented in Table 5.2. Unadjusted bivariate analyses detected significant differences in median per capita Medicare expenditures across the four cohorts. Medicare-only beneficiaries residing in

the community had the lowest median per capita Medicare expenditures, at \$6,987, while dual eligible beneficiaries residing in the community had the highest, at \$12,547. Median per capita Medicare expenditures were higher for dual eligible beneficiaries residing in long-term care facilities (\$10,276) than they were for Medicare-only beneficiaries residing in long-term care facilities (\$8,953).

Characteristics associated with higher median per capita Medicare expenditures across all cohorts were a diagnosis of Alzheimer's or other form of senility and presence of two or more chronic conditions. White beneficiaries had significantly higher median per capita Medicare expenditures than did non-white or white, Hispanic beneficiaries, but only among beneficiaries living in the community.

The degree to which beneficiaries fell into the "high cost" Medicare expenditures group are presented in Table 5.3. Of note, more than 10% of beneficiaries were "high cost" across all groups, which is to be expected given the high level of morbidity documented in Table 5.1. The proportion of individuals in the "high cost" group was highest among Medicare-only residents of long-term care facilities (31.93%), and lowest among Medicare-only beneficiaries residing in the community (22.17%). Proportion of beneficiaries in the "high cost" group were considerably higher among dual eligible beneficiaries residing in the community (30.84%) as compared to dual eligible beneficiaries residing in long-term care facilities (26.92%).

Rates of presence in the "high cost" group increased with age until age 81, then declined, with a high of 31.87% among beneficiaries aged 76-80, and a low of 21.95% among beneficiaries aged 91 and older. Both increased chronic condition numbers and presence of an Alzheimer's/senility diagnosis were associated with higher rates of

presence in the “high cost” group in the bivariate analysis. Nearly 46% of residents of skilled nursing facilities were in the “high cost” group, while only 12.07% of assisted living facility residents were in the “high cost” group.

Adjusted Risk of Presence in the High Cost Medicare Expenditures Group

Multivariate modified Poisson regression modeling estimated the relative risk of membership in the “high cost” group of Medicare beneficiaries in our study population. In order to better elucidate the effects of the covariates on risk of being in the “high cost” group, two analyses were performed: the first analysis included three models examining the effects of cohort status, state Medicaid bed-hold policies, and rurality, successively, among all four cohorts, (Table 5.4) while the second included four models examining the effects of cohort status, state Medicaid bed-hold policies, rurality, and type of residential facility, successively, among beneficiaries residing in long-term care facilities (Table 5.5).

In the first analysis, Model 1 examined the risk of being “high cost” by cohort status alone among all four cohorts, and found that the cohort of Medicare-only beneficiaries residing in long-term care facilities had the highest risk (RR 1.19, $p < .05$) when compared to the cohort of dual eligible beneficiaries residing in long-term care facilities, followed by the cohort of dual eligible beneficiaries who resided in the community (RR 1.15, $p < .05$). The second and third models, which controlled additionally for state bed-hold policies and state bed-hold policies as well as rurality, respectively, had very little effect on risk of being “high cost” between the four study cohorts, with the third model demonstrating a 19% higher risk for Medicare-only LTC facility residents relative to dual eligible LTC facility residents ($p < .05$), and a 14%

higher risk of PPH for dual eligible beneficiaries residing in the community compared to dual eligible LTC facility residents ($p < .05$).

The second analysis—which compared only the two cohorts representing residents of LTC facilities—was similar to Models 1 through 3 in terms of relative risk by cohort as well as by each covariate. However, the final model, Model 7, which controlled for the additional variable of type of long-term care facility, demonstrated a considerably higher relative risk of being “high cost” among Medicare-only LTC facility residents relative to dual eligible LTC facility residents (RR 1.33, $p < .0001$). This final model also showed a significantly higher risk of being “high cost” among residents of nursing homes (skilled nursing facilities and nursing facilities), compared to residents of assisted living facilities (RR 3.96 for residents of skilled nursing facilities, and RR 2.92 for residents of nursing facilities, $p < .0001$).

Total Expenditures Per Beneficiary

We performed two generalized linear models to examine actual Medicare expenditures per beneficiary: the first examined log-transformed total Medicare expenditures per beneficiary among the four study cohorts, adjusting for bed-hold policies and rurality, while the second examined log-transformed total Medicare expenditures per beneficiary between only the two cohorts representing residents of LTC facilities, controlling for facility type in addition to bed-hold policies and rurality. In the first model, actual total Medicare expenditures per beneficiary were significantly lower for Medicare-only beneficiaries (both those who resided in the community, and those who resided in residential long-term care facilities) as compared to dual eligible residents of long-term care facilities, while urban beneficiaries had higher total Medicare

expenditures per beneficiary than did rural beneficiaries. However, in the second model, while differences in total Medicare costs by rurality remained significant, differences in total expenditures between Medicare-only and dual eligible long-term care residents were no longer significant.

Discussion

Our findings suggest that the hypothesis on which this research was based—namely, that more comprehensive long-term care would have a protective effect on health care utilization, and thus Medicare spending—was incorrect. We found that residents of skilled nursing facilities have a nearly four-fold risk of being “high cost” Medicare beneficiaries, while residents of nursing facilities have a nearly three-fold risk, compared to residents of assisted living facilities. Further research will examine the association between type of long-term care facility and health care expenditures. It is likely that residents of nursing facilities and skilled nursing facilities are sicker than residents of assisted living and custodial care facilities in ways that we were unable to account for in our matching methodology. It is also possible that residents of nursing and skilled nursing facilities are at a higher risk of exposure to sicker individuals, given the proximity of residents to one another and the potential for contagion as medical professionals move from patient to patient.

The results of our study do suggest that dual eligible beneficiaries residing in long-term care facilities are less costly to the Medicare system than dual eligible beneficiaries residing in the community. Median expenditures among dual eligible residents of long-term care facilities were \$2,271 lower than median Medicare expenditures among dual eligible beneficiaries residing in the community—a pattern that

is borne out in the results of our Poisson regression analysis, with dual eligible beneficiaries residing in the community at a 14% higher risk of being a “high cost” Medicare beneficiary than dual eligible residents of long-term care facilities. It is possible that, among dual eligible beneficiaries, comprehensiveness of care does indeed play a role in preventing high-cost health care utilization. On the other hand, it is also possible that total combined Medicare and Medicaid costs are higher for dual eligible beneficiaries residing in long-term care facilities than for dual eligible beneficiaries residing in the community—it will be important for further research to explore total costs to the system.

Medicare-only residents of long-term care facilities were found to have a 33% higher risk of being a “high cost” Medicare beneficiary than dual eligible residents of long-term care facilities, while Medicare-only beneficiaries residing in the community are at an 18% lower risk of being “high cost” than are dual eligible residents of long-term care facilities. However, the results of our generalized linear analysis demonstrate that, at the median, Medicare-only beneficiaries have lower total Medicare expenditures per capita than their dual-eligible counterparts who reside in long-term care facilities. That Medicare-only long-term care facility residents have lower total per capita Medicare expenditures than their dual eligible long-term care facility resident counterparts, yet are at a 33% higher risk of being “high cost” Medicare beneficiaries is an important finding that may suggest yet uncovered patterns of higher intensity medical care for Medicare-only residents of long-term care facilities than for their dual eligible counterparts. Given that beneficiaries in each cohort are highly similar, these potential differential treatment patterns would not likely be indicative of different levels of acuity. Further research will examine what utilization patterns are associated with risks of being high cost, and

whether Medicare-only long-term care residents differ in patterns of total Medicare utilization from their dual eligible counterparts.

Limitations

This study was limited by our relatively small sample size, which not only prevented us from controlling for state of residence—which would have allowed us to broadly measure the effects of Medicaid and other long-term care policies specific to each state—but also from controlling for regional differences in practice patterns based on Hospital Referral Regions. Our sample size of 4,384 also did not provide us with a large enough sample to subset race or ethnicity by more than two levels.

Our study was also partially limited by our reliance, by necessity, on clinical indicators of frailty to match members of the other three cohorts to the dual eligible beneficiaries residing in long-term care facilities. While we did have access to HCPCS and CPT codes that indicated home use of oxygen, hospital beds, and mobility devices among beneficiaries residing in the community, information as to the utilization of oxygen, hospital beds, and mobility devices among beneficiaries residing in long-term care facilities was not readily available. Information as to DME use among all cohort members would have strengthened our study.

Finally, as we had access only to Medicare claims data, we did not have information as to the home health or other supportive services paid for privately by either Medicare-only or dual-eligible beneficiaries residing in the community.

Table 5.1: Characteristics of Study Cohorts, 2013 Medicare Claims Files, CMS

	Medicare Only, Community-Dwelling	Medicare Only, LTC Resident	Dual Eligible, Community Dwelling	Dual Eligible, LTC Resident	Percentage
Total	1096	1096	1096	1096	100%

Sex					
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91+	221	221	221	221	20.2%
Race					
White, Non-Hispanic	943	943	943	943	86.0%
Non-White, or White, Hispanic	153	153	153	153	14.0%
Rurality					
Urban	916	916	916	916	83.6%
Rural	180	180	180	180	16.4%
Alzheimer's/Senility					
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Yes	734	734	734	734	67.0%
Chronic Condition Number					
0	20	20	20	20	1.8%
1	126	126	126	126	11.5%
2+	950	950	950	950	86.7%
Bed Hold Policy					

No	409 (37.3%)	452 (41.2%)	323 (29.5%)	358 (32.7%)	
Yes	687 (62.7%)	644 (58.8%)	773 (70.5%)	738 (67.3%)	
Type of Long-Term Care Facility					
None/Community Resident	1096 (100%)	0	1096 (100%)	0	
Assisted Living	0	515 (47.0%)	0	132 (12.0%)	
Custodial Care	0	138 (12.6%)	0	64 (5.8%)	
Nursing Facility	0	405 (37.0%)	0	864 (78.8%)	
Skilled Nursing Facility	0	38 (3.5%)	0	36 (3.3%)	

Table 5.2: Median Medicare Expenditures by Cohort, Medicare Claims Files, CMS * = p <.05; ** = p <.0001

	Medicare Only, Community- Dwelling (n = 1096)	Medicare Only, LTC Resident (n = 1096)	Dual Eligible, Community Dwelling (n = 1096)	Dual Eligible, LTC Resident (n = 1096)	P-Value (Kruskal-Wallis), for cohort comparison	Total (n = 4,384)
Total	\$6,987	\$8,953	\$12,547	\$10,276	<.0001	\$9,991
Sex						
Male	\$5,649	\$8,576	\$12,903	\$10,123	<.0001	\$9,601
Female	\$7,547	\$9,623	\$12,284	\$10,297	<.0001	\$10,186
Age Group (d)						
66-70	\$5,071	\$7,386	\$12,282	\$14,341**	<.0001	\$9,469
71-75	\$6,524	\$14,136	\$13,935	\$12,873	0.0037	\$11,429
76-80	\$7,886	\$9,772	\$13,462	\$13,452	0.0005	\$11,333
81-85	\$7,622	\$8,751	\$14,370	\$11,269	0.0001	\$11,040
86-90	\$7,355	\$11,328	\$12,088	\$8,881	0.0023	\$9,884
91+	\$6,045	\$7,877	\$11,001	\$6,660	0.0136	\$7,781
Race a, c						

White, Non-Hispanic	\$7,192*	\$8,880	\$12,836*	\$10,293	<.0001	\$10,267
Non-White, or White, Hispanic	\$5,061	\$9,622	\$9,629	\$9,939	<.0001	\$8,644
Rurality b						
Urban	\$7,314	\$10,115*	\$12,811	\$10,083	<.0001	\$10,184
Rural	\$5,031	\$5,688	\$11,414	\$11,092	<.0001	\$9,421
Alzheimer's/ Senility a, b, c, d						
No	\$4,731**	\$6,913*	\$10,264**	\$9,676*	<.0001	\$7,748
Yes	\$8,874	\$11,313	\$14,218	\$10,581	<.0001	\$11,228
Chronic Condition Number a,b,c,d						
0	\$1,225**	\$2,209**	\$2,720**	\$4,254**	0.0373	\$2,144
1	\$1,909	\$2,911	\$4,133	\$4,184	<.0001	\$3,146
2+	\$8,714	\$11,437	\$14,707	\$11,710	<.0001	\$11,793

Bed Hold Policy						
No	\$7,891	\$8,423	\$12,585	\$10,620	0.0001	\$9,911
Yes	\$6,577	\$9,623	\$12,462	\$10,168	<.0001	\$10,112
Type of Long-Term Care Facility b						
None/Community Resident	\$6,987	n/a	\$12,547	n/a	<.0001	\$10,078
Assisted Living	n/a	\$5,951**	n/a	\$10,262	0.0167	\$7,331
Custodial Care	n/a	\$14,277	n/a	\$11,259	0.0866	\$6,972
Nursing Facility	n/a	\$10,976	n/a	\$10,252	0.7238	\$17,116
Skilled Nursing Facility	n/a	\$23,968	n/a	\$10,343	0.0040	\$10,324

- (a) indicates differences are significant within the Medicare-Only, Community-Dwelling group,
 (b) indicates differences are significant within the Medicare-Only, LTC Resident group,
 (c) indicates differences are significant within the Dual Eligible, Community-Dwelling group, and
 (d) indicates differences are significant within the Dual Eligible, LTC Resident gro

Table 5.3. Factors associated with Costs in the 90th Percentile (“High Cost”) Medicare Group, 2013 Medicare Claims File, CMS

	% High Cost	p-value
Cohort		
Medicare Only, Community-Dwelling	22.17	<.0001
Medicare Only, LTC Resident	31.93	
Dual Eligible, Community-Dwelling	30.84	
Dual Eligible, LTC Resident	26.92	
Sex		
Male	28.32	0.7195
Female	27.80	
Age Group		
66-70	27.29	<.0001
71-75	29.83	
76-80	31.87	
81-85	31.15	
86-90	26.83	
91+	21.95	
Race		
White, Non-Hispanic	28.26	0.2791
Non-White, or White, Hispanic	26.14	
Rurality		
Urban	28.25	0.3898
Rural	26.76	
Alzheimer’s/Senility		

No	23.07	<.0001
Yes	30.38	
Chronic Condition Number		
0	3.75	<.0001
1	7.54	
2+	31.18	
Bed Hold Policy		
No	28.27	0.7365
Yes	27.80	
Type of Long-Term Care Facility		
Skilled Nursing Facility	45.70	<.0001
None (Community)	26.51	
Assisted Living Facility	12.07	
Custodial Care Facility	15.76	
Nursing Facility	31.43	

Table 5.4. Adjusted Relative Risk of Having Medicare Expenditures in the 90th Percentile, All Cohorts, Medicare Claims Files, CMS, * = p <.05; ** = p <.0001

	Model 1	Model 2	Model 3
Cohort			
Medicare Only, Community-Dwelling	0.82*	0.82*	0.82*
Medicare Only, LTC Resident	1.19*	1.18*	1.18*
Dual Eligible, Community-Dwelling	1.15*	1.15*	1.14*
Dual Eligible, LTC Resident	Ref	Ref	Ref
Bed Hold Policy			

No		Ref	Ref
Yes		0.98	0.98
Rurality			
Urban			Ref
Rural			0.95

Table 5.5. Adjusted Relative Risk of Having Medicare Expenditures in the 90th Percentile, Only Residents of LTC Facilities, Medicare Claims Files, CMS, *= p <.05; ** = p <.0001

	Model 4	Model 5	Model 6	Model 7
Cohort				
Medicare Only, LTC Resident	1.19*	1.19*	1.18*	1.33*
Dual Eligible, LTC Resident	Ref	Ref	Ref	Ref
Bed Hold Policy				
No		Ref	Ref	Ref
Yes		0.99	0.99	1.01
Rurality				
Urban			Ref	Ref
Rural			0.92	0.87
Facility Type				
Assisted Living				Ref
Custodial Care				1.29
Skilled Nursing Facility				3.96**
Nursing Facility				2.92**

Table 5.6. Factors associated with Log-Transformed Total Medicare Expenditures Per Capita, All Cohorts 2013 Medicare Claims Files, CMS

Parameter	β	SE	p-value
Intercept	9.1772	0.06	<.0001
Cohort Status			
Medicare Only, Community-Dwelling	-0.4537	0.06	<.0001
Medicare Only, LTC Resident	-0.1376	0.06	0.0146
Dual Eligible, Community-Dwelling	0.0311	0.06	0.5790
Dual Eligible, LTC Resident	Ref	Ref	Ref
Bed-Hold Policy			
No	-0.0031	0.04	0.9410
Yes	Ref	Ref	Ref
Rurality			
Urban	0.1413	0.05	0.0055
Rural	Ref	Ref	Ref

Table 5.7. Factors associated with Log-Transformed Total Medicare Expenditures Per Capita, Only Residents of LTC Facilities, 2013 Medicare Claims Files, CMS

Parameter	β	SE	p-value
Intercept	8.7909	0.12	
Cohort Status			
Medicare Only, LTC Resident	-0.0451	0.06	0.4347
Dual Eligible, LTC Resident	Ref	Ref	Ref
Bed-Hold Policy			
No	-0.0406	0.06	0.4746

Yes	Ref	Ref	Ref
Rurality			
Urban	0.1866	0.07	0.0069
Rural	Ref	Ref	Ref
Facility Type			
Assisted Living	-0.8216	0.14	<.0001
Custodial Care	-0.6010	0.14	<.0001
Skilled Nursing Facility	Ref	Ref	Ref
Nursing Facility	-0.2140	0.11	0.0509

CHAPTER 6

CONCLUSION

As the population of elderly Americans continues to increase, the U.S. healthcare system will be faced with growing pressure not only to provide medical care that is cost-effective, but to address issues—such as need for long-term care—that affect health services utilization. This original dissertation research examined the interplay between place of residence (community versus residential long-term care facility) and long-term care payer type (private pay versus Medicaid) on Medicare-funded healthcare utilization among elderly Medicare beneficiaries in need of long-term care services and supports.

Results presented in manuscripts one and two were based on analyses of 2013 Medicare claims data from the Centers for Medicare and Medicaid Services (CMS), obtained from the Research Data Assistance Center (ResDac), merged with data from the Area Health Resource File (AHRF). A retrospective cohort analysis was implemented to examine differences in rates and risk of potentially preventable hospitalization (PPH), as well as differences in Medicare expenditure patterns, between four matched cohorts: Medicare-only beneficiaries residing in the community; Medicare-only beneficiaries residing in long-term care facilities; Medicare/Medicaid dual eligible beneficiaries residing in the community; and Medicare/Medicaid dual eligible beneficiaries residing in long-term care facilities.

Regression analysis revealed a significantly higher risk of both PPH and having Medicare expenditures in the top 90th percentile among both Medicare-only long-term

care facility residents and dual eligible community residents as compared to dual eligible long-term care facility residents. However, while there was no statistical difference in median per capita Medicare expenditures between dual eligible community residents and dual eligible long-term care facility residents, Medicare-only long-term care facility residents had significantly lower per capita Medicare expenditures than did their dual eligible counterparts residing in long-term care facilities. This finding that Medicare-only residents of long-term care facilities are less expensive to the Medicare system, on average, than their dual eligible long-term care facility resident peers, yet are more likely to be hospitalized for a preventable condition and are more likely to be among the most expensive Medicare beneficiaries, could indicate differential patterns of intensity of medical response to similar clinical conditions between the two groups. Whether such proposed differences in intensity could belie inappropriately low levels of response to dual eligible beneficiaries, or inappropriately high levels of response to Medicare-only beneficiaries will be the subject of future research.

Our study also found, contrary to the results of previous studies, that state Medicaid bed hold policies had no statistically significant effect on either risk of PPH or on Medicare expenditures. Indeed, the results of this study seem to indicate that perverse incentives that have been suggested by a number of researchers to encourage overutilization of Medicare-funded services for dual eligible beneficiaries—particularly those dual eligible beneficiaries residing in long-term care facilities—may not play as large of a role in Medicare-funded health system utilization, and that, in fact, some other factor—or set of factors—encourages higher utilization among Medicare-only residents of long-term care facilities. Further research will examine specific types of utilization of

Medicare-funded health care, with a specific focus on types of PPH associated with higher costs of care, and differences in patterns of these types of PPH between Medicare-only and dual eligible long-term care facility residents.

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