Title
Outcomes Management In Home Care: Preventing Re-Hospitalizations

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Publication Date
2014

Peer reviewed|Thesis/dissertation

OUTCOMES MANAGEMENT IN HOME CARE:

PREVENTING RE-HOSPITALIZATION

by

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DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Nursing & Health Policy

in the

[redacted]

DEDICATION & ACKNOWLEDGEMENTS

I dedicate this dissertation to those extraordinary individuals without whose support I would not have accomplished this personal milestone. My thanks should first be extended to Dr. Shirley Chater for her wisdom in personally introducing me to Drs. Harrington and Kayser-Jones. This one inspiring meeting led to further discussion with Dr. Harrington and put me on a path towards this degree. Charlene – I had no idea when I began this work how fortunate I was to have you for my Advisor. I knew a little about you, but nothing about the degree to which your work has influenced and shaped both our profession and the future healthcare delivery system for older adults. You are amazing. Thank you. And to Dr. Alan Bostrom – your capacity to translate complex modeling into elegant representations of what I wanted to communicate was just amazing. And to Drs. Newcomer and Portillo. Again, thank you. I would not be completing this work if you had not been so willing to continue along with me in achieving my long-awaited goal. I will continue to work. The return on your investment remains high.

Above all, however, this work is dedicated to my late husband, James Sullivan. His encouragement throughout our life together and conviction as to the value to the profession and to patient care has inspired me throughout my life, and has pushed me forward despite some very challenging years. My Sully was the greatest nurse I've ever known and his healing presence will continue to inspire and frame the work I do in the future.

ABSTRACT

Outcomes Management in Home Care:

Preventing Re-hospitalization

Kathleen Sullivan, PhD(c), RN

Significance: Home Care is an integral part of an episode of care and recovery and many patients are now recipients of home healthcare services following a hospital discharge. Nursing care delivered in the home can prevent costly unplanned returns to the acute care setting. Many studies have evaluated the factors associated with re-admissions, but little is known about the factors associated with re-admissions of Medicare beneficiaries enrolled in an episode of home health care.

Methods: Using a sample comprised of 100% of Medicare patients enrolled in an episode of home healthcare in a large Home Health Agency in California (N = 6,249, of whom 740 experienced a re-hospitalization), this secondary analysis examined four years of data derived from the Outcomes and Assessment Information Data Set (O.A.S.I.S.) for the prevalence of, and factors associated with hospitalization use. Descriptive statistics were used to describe the study sample. A multivariate logistic regression was used to determine the risk of hospitalization associated with variables in the model. A Chi-Square analysis was conducted to measure the integrity of the overall model.

Results: 11.8% of the study population experienced a re-hospitalization. Controlling for socio-demographic, clinical, and utilization factors, the odds and rates of hospitalization varied by the presence of eight key variables, the strongest of which were clinical factors. Patients with depression and dyspnea, pulmonary, cardiac, or cancer-related diagnoses, impaired capacity to perform activities of daily living (ADL) and who were dependent on medication management were most likely to experience a re-hospitalization. Patients who required more nursing visits were also more likely to be re-hospitalized. Cross tabs done on this variable were significant for advanced age (>76), pain interfering with activity (71.5%) and the presence of wounds or stasis ulcers (34.9%).

Implications: Identifying and modifying factors associated with hospitalization in home health recipients may result in lower rates of hospitalization, decreased cost, and better outcomes. Home Health agencies have an opportunity to be instrumental in developing interventions that address social determinants of health, as well as influencing health policy related to both the clinical, functional, and other sociodemographic factors that may impact hospitalization.

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CHAPTER 1: INTRODUCTION

Statement of the Problem

Home Care is an integral part of an episode of care and of a patient's recovery and many patients are now recipients of home health care services following hospital discharge. Nursing care delivered in the home may prevent or minimize unplanned returns to the acute setting (Anderson, Hanson, DeVilder & Helms, 1996). Readmission to the hospital has received much attention in the hospital and medical review literature, although little has been found addressing unplanned readmissions to a hospital while the patient was under an active plan of care with a home health agency, particularly during the 30-day period immediately following a preceding hospital stay. While re-hospitalization in general has been widely studied and evaluated via meta-analysis (Soeken, Prescott, Herron, & Creasia, 1991), few studies have examined re-hospitalization for patients seen by home health care agencies (Anderson, Helms, Hanson & DeVilder, 1999; Hoskins, Walton-Moss, Clark, Schroeder, & Thiel, 1999; Fortinsky, Madigan, Sheehan, Tullai-McGuinness, Kleppinger, 2014). There is limited but growing evidence concerning home health care and hospital readmissions as well as on the related issues of quality of care and cost. Such evidence is particularly important to the home care industry if Federal reforms limit payment for episodes of care and reimbursement for case mix adjustment (Anderson et al., 1999; Rosati & Huang, 2007; Navarro, Enguidanos & Wilber, 2012).

Hospitalization costs for fee-for-service Medicare beneficiaries uses from $106 billion in 2005 to $116 billion in 2010. (O'Connor & Davitt, 2012). The costs to Medicare for potentially preventable hospitalizations may be as high as $12 billion per year. The 100 most frequent re-

hospitalizations diagnostic related groups (DRG's) account for over 73% of total re-hospitalizations. Ten percent of these belong to 19 DRG's, which indicates that "planned" or otherwise not avoidable re-hospitalizations were an important consideration in evaluating overall re-hospitalization "avoidable" rates. Heart failure has often been found to be the most frequent reason for re-hospitalization within 30 days (Hamner & Ellison, 2005).

The existing literature suggests that possible predictors of the risk of hospitalizations for patients enrolled in a home health episode of care include demographic characteristics, type of insurance, severity of illness, readiness for hospital discharge, the quality and quantity of home health services provided, and the availability of an informal caregiver. Other factors linked to hospitalization include the complexity of treatment associated with specific health conditions and compliance with medication (Rosati & Huang, 2007; Rosati, Huang, Navaie-Waliser & Feldman, 2003; Corrigan & Martin, 1992; Kansagara, Englander, Salanitro, Kagen, Theobald, Freeman & Kripalani, 2011) and functional impairment of the lower body (Culler, Porchman & Przybylski, 1998). Kansagara et al. (2011). Review of the literature on hospitalization prediction found that current risk prediction models designed for clinical purposes tended to perform better if applied to specific populations.

Functional status at the start of care, potential for falling, multiple medication usages and a prior history of high resource consumption are all predictors of re-hospitalization. The strongest predictors, however, are clinical ones and generally include an admitting diagnosis of congestive heart failure, ischemic heart disease, diabetes, and renal failure (Rosati & Huang, 2007). This is especially true when three or more of these diagnoses are present (Paddock, & Hirdes, 2003).

An important goal in home health care is delivering targeted care that could potentially prevent a patient from being hospitalized. At a minimum, risk models could be used by clinicians so that they are cued into addressing problems before the patient deteriorates to the stage where a hospital stay is unavoidable. The CMS, in conjunction with the Home Health Quality Improvement Organization Support Center, Quality Insight of Pennsylvania, launched the 12-month Home Health Quality Improvement (HHQI) National Campaign, 2007. HHQI sought to provide the industry with the best practice intervention tools for reducing acute care hospitalizations throughout the country. One of the eight recommendations that came out of this campaign in 2007 was that agencies should implement risk assessments at start of care in order to focus care plans and to direct resources efficiently (Schade, Esslinger, Anderson, Sun & Knowles, 2009).

Purpose of the Study

The purpose of this study is to determine whether certain patient characteristics are associated with potentially avoidable home health re-hospitalization rates. The specific research question framing this study is "what patient-level, predisposing, enabling, and need variables at admission to an episode of Medicare homecare are associated with the discharge from home care because of hospitalization?" The purpose of this study is to identify risk factors that are associated with events of acute care hospitalization within 60 days of admission to home health care using data that is readily available at start of care, and to build a model to predict risk.

Research Aims

The research aims for this study were as follows:

RESEARCH AIM # 1

Describe the prevalence of re-hospitalizations by a population of patients in a large home health agency in California who are enrolled in an episode of home health care.

RESEARCH AIM # 2

Examine the home health care recipient's sociodemographic and health-related characteristics that are associated with hospitalization and specifically determine how the risk of hospitalization varies by presence and severity of factors identified on the Oasis instrument completed upon admission to home health care.

RESEARCH AIM # 3

Examine whether the risk of re-hospitalization varies by the number and frequency of skilled nursing visits the patient received.

Hypotheses

The following directional hypotheses will be evaluated in this study:

H_1: There will be a lower re-hospitalization rate for this study's population as compared to the national average of 25%.

H_2: There will be differences in the presence and severity of risk factors identified on the OASIS instrument for patients with, and without a re-hospitalization.

H_3: There will be a lower rate of re-hospitalization for patients with higher Nursing visit frequency within the first fourteen days of enrollment into home health care.

Contribution of this Dissertation Research

Home health is at the forefront of providing post-acute services to an aging and often acutely ill population. In 2008, there were over 9000 Medicare certified home health agencies in

the United States and over 100 million patient visits were made (CMS, 2010). Many of these patients admitted for an episode of home care are at risk of re-hospitalization (Rosati et al., 2003). Re-hospitalization following discharge from an index acute care stay has significant cost and quality implications which can be measured in terms of the impact on patients, families and society. Reduced hospital stays and the rapid discharge of patients to home health agencies (HHA) raise the question as to the impact on unplanned readmissions to acute care facilities for those patients. Hospitalization is widely viewed as a poor outcome of Medicare home care (Shaughnessy, Hittle et al., 2002), yet the literature is inconclusive about which patient level factors are most important in predicting which patients will be hospitalized and why (Anderson et al., 1999; Madigan, Schott & Matthews, 2001; Fortinsky et al., 2014).

Preventing re-hospitalization is one of the major objectives of home healthcare. A recent study found that 20% of Medicare beneficiaries discharged from the hospital were re-hospitalized within 3 days. Fifty-two percent of surgical patients and 67% of medical patients were either re-hospitalized or died within the first year after discharge (Jenks, Williams, Coleman, 2009). According to Wolff, Meadow, Weiss, Boyd and Leff (2008) and Peter Boling (2009), 29% of patients receiving an episode of home health care experienced a re-hospitalization within 30 days.

Although hospitalization may be an unavoidable consequence due to declining health, the variation in the rates of home health agency risk adjusted rates for re-hospitalization across the country suggest a significant opportunity to prevent avoidable admissions (Rosati & Huang, 2007). A major challenge in the current health care system is the transitioning of patients across different health settings. Patients with chronic conditions are particularly vulnerable to gaps in care associated with these transitions. The risks associated with poor transitions include

medication errors, incomplete or inaccurate transfer information and lack of appropriate follow up care. These patients return to the hospital at higher rates generating overall higher healthcare costs, especially for Medicare (Coleman, Parry, Chalmers, & Min, 2006)

Increasingly scarce resources of both human and financial capital and the impending advent of Pay for Performance, and the bundling of post acute care payments (Mor, Intrator, Feng & Grabowski, 2010), make it imperative that home health agencies better manage high cost and quality sensitive patients such as those at risk for re-hospitalization. Improved clinical prognostic capability among admitting clinicians is essential to the creation of focused care plans and better communication among home care team members with the goal of minimizing re-hospitalizations in high risk patients (Fortinsky, Madigan, Sheehan, Tullai-McGuinness & Fenster, 2006), and improving the quality of home care for Medicare patients.

Research on readmission for patients receiving skilled home care is growing. The identification of patients at risk for poor discharge outcomes such as re-hospitalization is an important area not only of research but of evidence-based practice as well. Although much is known about individual characteristics associated with hospitalization, such knowledge has not been synthesized into a standardized instrument that could be used in home care to identify patients at risk for hospitalization. It would be of significant value to the home health industry if the Outcome and Assessment Information Set (OASIS) data already collected, could also be used to guide clinical decision-making and care planning by identifying those patients at risk for re-hospitalization, without adding another data collection instrument (Bowles & Cater, 2003).

According to (Shaughnessy, Crisler, Schlenker & Arnold, 1997), three categories of outcome measures are relevant to home health care: end result outcomes, intermediate result outcomes, and utilization outcomes. An end result outcome is a change in health status between

two or more time points such as between the admission and discharge to the home health agency. Outcome measures defined as changes in patient health status between the start and end of care can form a reasonable foundation upon which to determine whether one home health agency or a group of agencies is, on the average performing better or worse than other agencies. An intermediate result outcome is a change in a patient or informal caregiver's behavior, emotions, or knowledge that can influence the patient's end result outcome changes or may often facilitate attaining end result outcomes. Although not unequivocally the case, utilization outcomes are often used as proxy measures for end result outcomes as one can infer a change in patient health status. A utilization outcome (or proxy outcome) reflects a change in condition, typically substantial, as evidenced by a patient accessing higher levels of care over time. Examples of utilization outcomes include hospital admission and emergent care visits. Use of each of these types of health services tends to suggest that a substantial change in patient health status has occurred. (Shaughnessy, Schlenker & Hittle, 1994).

In 2002, CMS implemented outcomes based quality improvement (OBQI) for home health care providers nationwide. Forty-one of the OASIS outcome measures were used for outcome based quality improvement (OBQI) demonstrations. These included (1) functional outcomes such as improvement in ambulation/locomotion, improvement in toileting, and improvement in management of oral medications, (2) physiologic outcomes such as the improvement in the status of surgical wounds, improvement in dyspnea, and improvement in urinary incontinence, (3) emotional/behavioral/cognitive outcomes such as improvement in anxiety level, and (4) selected utilization outcome measures such as acute care hospitalization (CMS, 2002). Most studies on outcomes in home health using OASIS data conducted since introduction of the instrument either focus, or include as part of the study, re-hospitalization as a

key index of quality in home care (Bowles & Cater, 2003; Keepnews, Capitman & Rosati, 2004; Rosati et al., 2003, Fortinsky et al., 2014).

Research on re-hospitalization from the home health perspective is often limited by methodological issues on how long the patients are followed after an index hospitalization and critical questions about the length of time following an index hospitalization stay that truly reflects issues related to that hospital stay. The most critical period for re-hospitalization of all home health patients is within the first four weeks of admission to home health. For elders (over 85) the time period is shorter- a mean of 13-18 days (Rosati & Huang, 2007; Fortinsky et al., 2006; Anderson et al., 1999). Twenty-five percent are readmitted within the first seven days of the admission to home care (Home Health Quarterly, 2005; Vasquez, 2008). Reasons for re-hospitalizations may be patient specific (decline in health status, development of a new problem (Madigan, Tullai-McGuinness & Neff, 2002), or as a result of a failure of the discharge planning process for hospital-based patients (Ashton & Wray, 1996).

In addition to promoting better outcomes for the patient, preventing hospital re-admission helps avoid negative consequences for the home health agency. Under the home health prospective payment system the agency receives a sum of money to care for the patient for 60 days based on the results of the OASIS instrument completed by the admitting clinician. If a patient is re-admitted to the hospital from home care, the home care nurse must repeat the lengthy OASIS assessment instrument on discharge and again upon readmission back to the agency (Bowles & Cater, 2003; Fortinsky, Madigan & Tullai-McGuinness, 2000). It would be beneficial for the patients as well as the home health agency to be able to identify patients at risk for re-hospitalization in order to target resources effectively.

Evidence increasingly suggests that identifying and modifying the factors associated with re-hospitalization may result in a decrease in re-hospitalizations and better health outcomes (Madigan, Schott & Matthews, 2001; Rosati & Huang, 2007; Solomon, Wagner, Marenberg, Acampora, Inouye 1993; Navarro et al., 2012). The findings from this study will fill a scientific gap in current knowledge and may serve to enhance the capacity of the Home Care Industry to be more strategic with patient data present in all organizations in optimizing outcomes including decreasing re-hospitalizations.

Factors Associated with Re-hospitalization

Factors that have been shown to be predictive of re-hospitalization for all groups of patients include: a diagnosis of heart failure, hypertension or diabetes; prior re-hospitalizations; home health length of stay; increased severity of illness with co-morbidities; older age; and longer length of stay for the index hospitalization (Anderson, Hanson, DeVilder & Helms, 1996, 1999; Hoskins et al., 1999; Rosati & Huang, 2007; Vinson, Rich, Sperry, Shah & McNamara, 1990; Madigan et al., 2001; Anderson & Steinberg, 1984). Ashton and Wray's (1996) study of 1,723 patients showed that a diagnosis of cardiovascular disease or malignancy and history of prior hospital admission explained 60% of readmitted patients.

The work being done by the Agency for Healthcare Research and Quality (AHRQ) on reducing avoidable hospitalization brings in additional contextual variables associated with the risk of re-hospitalization to include inadequate transitions/communication between providers, medication mismanagement post discharge, and the lack of access to timely after care, especially to the primary care physician (Jack, Chetty, Anthony, Greenwood, Sanchez, Johnson, Forsythe, O'Donnell, Paasche-Orlow, Manasseh, Martin & Culpepper (2009).

Anderson et al. (1999) and Madigan et al. (2001) reported reasons for re-hospitalization while enrolled in an episode of home health in four categories: a) the primary diagnosis worsened; b) the secondary diagnosis worsened; c) a new problem developed; or d) other. Fortinsky et al. (2006) found that a primary home care diagnosis of skin or wound problems and dyspnea severity were among the most statistically significant risk factors for hospitalization while receiving home health services followed by diabetes and a decreased level of functional ability. Thirty-nine percent of the patients who were readmitted were readmitted for a new problem that prompted an unplanned return to the hospital. Fifty-six percent of the patients were readmitted for exacerbation of the primary or secondary diagnosis. Twenty percent of the unplanned readmissions for new problems were related to cardiovascular problems. Madigan et al. (2001) confirmed this result finding no identifiable prediction of re-hospitalization and attributing this finding to re-hospitalizations being predominantly due to a new problem. Hamner and Ellison (2005) added psychosocial factors to the list of factors affecting hospitalization, noting those that lived alone and those that lived in a facility (Richardson, 2003) were at greater risk of re-hospitalization.

It is well established that the staggering costs of treating the five million Americans with chronic heart failure are primarily attributable to inpatient hospitalizations (O'Connell, 2000; Adams, Fonnarow, Emerman, LeJemtel, Costanzo, Abraham, Berkowitz, Galvao & Horton, 2005). Braunstein, Anderson, Gerstenblith, Weller, Niefeld & Herbert (2003) found that approximately 40% of patients with CHF having five or more co-morbidities were associated with over 80% of the hospital days experienced by all patients with CHF. Over half of unplanned readmissions for patients with heart failure are potentially preventable and can also be associated with medication or diet non-compliance, failure to seek timely attention when symptoms recur,

inadequate discharge planning and follow-up, as well as poor social support (Quinn, 2006; Felker, Leimberger, Califf, Cuffe, Massie & Adams, 2004).

Other positive predictors noted in the literature include age, non-compliance with medication, medication discrepancies upon discharge from a hospital stay, the absence of a cardiologist as the primary care physician during the prior hospital stay, living alone, and patients admitted through the emergency department (Hamner & Ellison, 2005).

The most comprehensive work to date related to risk factors for acute care hospitalization from an episode of home health care was conducted by CMS in order to develop risk adjustment models for the Home Care Compare initiative. Researchers at the Center for Health Services Research, University of Colorado Health Science Center (2003) developed a stratified risk adjustment model following the work of Shaughnessy and Hittle (2002) using data from the Outcome and Assessment Information Set (OASIS) from a national developmental sample of 500,000 Medicare and Medicaid recipients. This modeling was for risk adjustment purposes when comparing agency level hospitalization rates (Shaughnessy, Hittle, Crisler, Powell, Richard & Kramer, 2002). Fifty-one factors contributed to the prediction of acute care hospitalization (Fortinsky et al., 2006). In the context of the Andersen (1995) framework, these included predisposing (gender, age), enabling (living alone) and need (use of catheter, co-morbid conditions and deficits in the activities of daily living factors). Risk stratification is an essential best practice and the first step to building an organizational foundation for a hospitalization reduction program (Anderson & Baekaler, 2008).

Home Health Utilization and Hospitalization

The Prospective Payment System for Medicare home health services potentially encourages a reduction in the number of visits a home health patient might receive. Under PPS, a prospectively determined per episode payment rate is case mix adjusted using 80 home health resource groups (HHRG's). A subset of questions from the OASIS instrument is used to calculate the episodic Medicare payment level in three domains; clinical, functional and service (Schlenker, Powell & Goodrich, 2005).

When studying home care as it is provided by home health agencies, the relationship between outcomes and the number of visits have not been found to be linear. The lack of a positive correlation between resource use and hospitalization rates suggests several areas for further research. Research to date in this area has been relatively simple from a theoretical perspective with insufficient attention to other kinds of factors (i.e., OASIS, derived data, etc.) that can influence the relationship between resource use and patient outcomes. (Fortinsky & Madigan, 1997; Penrod, Kane, Finch, & Kane, 1998; Adams, Corbett & Michel, 2000; O'Connor, Bowles, Feldman, St. Pierre, Jarrin, Shoh & Murtough, 2014).

In January, 2007, Medicare launched the Home Health Quality Improvement National campaign with the goal of improving the quality of care by reducing avoidable hospitalizations during Medicare home health episodes. One of the best proactive recommendations to come from this initiative deals with visit utilization after finding fewer re-hospitalizations in patients for whom more frequent visits were rendered early in the plan of care.

According to Rogers, Perlic and Madigan (2007), front-loading of visits can be effective in reducing hospitalization for some conditions such as for heart failure, although no significant differences were found for re-hospitalization of patients with diabetes. Front-loading of visits is

defined as 60% or more of total planned visit frequency occurring within the first 14 days of care. This not only increases symptom surveillance, but also promotes more intensive patient teaching which is associated with avoiding re-hospitalization (Rogers & Schott, 2008). Controlling for both the number and frequency of skilled nursing visits in addition to the OASIS data in this study will provide unique information beyond those factors already associated with re-hospitalization found in the current literature.

CHAPTER 2: REVIEW OF THE LITERATURE & THEORETICAL FRAMEWORK

Review of the Literature: Introduction

The purpose of this next section is to provide an overview of the literature on acute resource utilization among home health recipients. Relatively little research on hospitalization has been conducted which focuses specifically on home health recipients. Since the overarching goal of this study was to examine predictors of acute care use by home health recipients, a critical analysis of the literature on the Outcomes and Assessment Information Set (OASIS) and its psychometric properties, outcomes measurement in home health, the effects of prospective payment reimbursement on home health outcomes and the literature on chronic disease and re-hospitalization will be presented. Chapter 2 will then be concluded with an overview of the conceptual model used to illustrate the complexity of factors associated with hospitals' use by home health recipients.

Background

Medicare certified home health care in the United States has its genesis in community and public health nursing in the late 19th and early 20th centuries (Barkauskas & Stocker, 2000). Today, home health care is a well-defined benefit for Medicare recipients needing intermittent in-home skilled nursing, physical, occupational or speech therapy and social work. Because Medicare is the predominant payer for skilled home health care in the United States, its policies and practices strongly shape how home health care is provided. In particular, Medicare's approaches to quality monitoring and improvement, payment, eligibility and cost and utilization

monitoring impact the practice of home health care in both the public and private sectors (Shaughnessy & Hittle, 2002).

Home care is an integral part of an episode of care and of a patient's recovery and many patients are now recipients of home health care services following hospital discharge. Nursing care delivered in the home may prevent or minimize unplanned returns to the acute setting (Anderson, Hanson, DeVilder & Helms, 1996; Rosati et al., 2003). Readmission to the hospital has received much attention in the hospital and medical review literature, although little has been found addressing unplanned readmissions to a hospital while the patient was under an active plan of care with a home health agency, particularly during the 30-day period immediately following a preceding hospital stay.

An important goal in home health care is delivering targeted care that could potentially prevent a patient from being hospitalized. At a minimum, risk models could be used by clinicians so that they are cued into addressing problems before the patient deteriorates to the stage where a hospital stay is unavoidable. Functional status at the start of care, potential for falling, multiple medication usages and a prior history of high resource consumption are all predictors of re-hospitalization. The strongest predictors, however, are clinical ones which include an admitting diagnosis of congestive heart failure, ischemic heart disease, diabetes, and renal failure (Rosati & Huang, 2007).

The Balanced Budget Act of 1997

Concerns about the vulnerability of the home care population began with the publication in 1986 by Sabatino of "The Black Box of Home Care Quality." By removing several restrictions on the provision and supply of home health care, the Omnibus Reconciliation Act of 1980

encouraged home health utilization and the entry of for-profit agencies into Medicare resulting in an increase from 2,924 agencies to 5,695 agencies by 1990 (Bishop & Karon, 1989; Health Care Financing Administration [HCFA] Customer Information System [HCIS], 2000). By 1997, home health expenditures had grown from 2.6 billion to 16.7 billion and visits per beneficiary rose from 23 to 73 (Schlenker, Powell, & Goodrich, 2005).

By 1995, many policy makers were concerned that the rapid increase in Medicare expenditures might be due to fraudulent and abusive billing. That same year, the Center for Medical and Medicaid Services (CMS), formerly the Health Care Financing Administration (HCFA), the Administration on Aging (AOA), and the Office of the Inspector General (OIG) created a fraud and abuse prevention initiative called Operation Restore Trust (ORT) (McCall & Korb, 2003; McCall, Korb, Petersons & Moore, 2003). Known throughout the home health care industry as "Operation Destroy Trust," ORT provided for audits, criminal investigations, surveys and inspections to identify fraud and abuse in home health agencies, nursing homes and medical equipment supply providers.

In response to these trends, Congress enacted a comprehensive set of changes in Medicare payment for home health care through the Balanced Budget Act of 1997. This legislation imposed limits and decreases in reimbursement through the enactment of an interim payment system (IPS) followed by the implementation of a prospective payment system (PPS) for home health in October of 2000. The atmosphere post-BBA emphasized the seriousness of the federal interest in regulating compliance with eligibility and coverage rules, in moderating cost escalations in the interim, and in imposing prospective payment systems that could require significant new administration functions. Because of the limits in the IPS, some analysts expressed concern that beneficiaries' access to home care could be endangered (United States

General Accounting Office [USGAO], 1998; Ahrens, 2005; The Lewin Group, 1998). Similar concerns were expressed in regard to PPS. Within just two years, the IPS resulted in a 50% reduction in total visits rendered to home health recipients and a greater than 50% decrease in Medicare expenditures for home health (HCFA, 1999; Komisar & Feder, 1998; McCall, Komisar, Petersons & Moore, 2001). Agency closures and withdrawals from the Medicare program reduced the number of agencies nationwide as well by over 30% (HCFA, 2000). Throughout these changes there was no uniform, accurate outcome-based information to isolate possible quality problems and target quality improvement efforts as payments decreased under IPS or under a per-case reimbursement methodology such as a prospective payment system in home health.

The Balanced Budget Act's Impact on Quality

Fifteen studies address the current and potential impact to patient outcomes as a result of the Balanced Budget Act of 1997 (BBA). The BBA made modifications to eligibility and coverage rules but its most important change was to legislate the development of a prospective payment system (PPS) for home health reimbursement (McCall et al., 2001).

In October of 2000, Medicare began reimbursing all home health agencies using a prospective payment system. Under PPS Medicare pays an agency a set payment rate based on a patient's classification upon admission to service with the agency in one of eighty home health resource groups (HHRG's) as determined by using the OASIS instrument for each 60-day episode of care (Collins, Herness, Martenas, & Robertson, 2007).

Before the BBA was enacted, home health agencies were reimbursed their costs for providing services to Medicare beneficiaries. After the BBA was enacted, home health agencies

were reimbursed a specified amount of money regardless of their costs; initially under an interim system of payment (IPS) and then under prospective payment (PPS) in 2000. The IPS placed stringent limits on home health costs which had increased in annual expenditures from 23 visits per episode of care in 1988 to over 173 by 1997. Costs per beneficiary increased from $78 to $352 during this period as well (Brown, Phillips, Bishop, Thornton, Ritter & Klein, 1997). This phase of cost reduction initiated by the BBA alone yielded $7.9B or 5% of total Medicare expenditures (CMS, 2003; Schlenker et al., 2005). The PPS which followed the IPS in 2000 encouraged further reductions. A study by the U.S. General Accounting Office (USGAO, 2000) found that the average visits per episode of care declined by 24% from just prior to IPS through early 2001 (Schlenker et al., 2005). Fourteen percent of home health agencies nationally closed during the 15 months from October, 1997 through January, 1999. By September, 2000, the GAO was reporting a 48% reduction in home health spending with sharp declines in both the numbers of users and services used. The number of recipients declined by 22% and the number of visits per patient were cut by nearly 50% (USGAO, 2000; McCall et al., 2003).

While the goal of the IPS/PPS and the administrative and regulatory reforms was to reign in what was perceived as an expanding and inefficient home health benefit, there was concern it would change home health care agencies' behavior toward those Medicare beneficiaries needing the most care. In reaction to the financial constraints imposed by PPS, agencies could reduce the number of visits per patient, shift the skill mix of visits, or not accept certain high cost cases.

McCall, et al. (2003) explored the utilization and outcomes for all beneficiaries discharged from acute care hospitals during this period. A little more than 40% of discharge planners believed that the percentage of home health patients who had a hospital re-admission increased post-BBA. These authors found that there was a fall off in home health care as a post-

acute care service following institutional care. This was true for all Diagnostic Related Groups (DRG's) but diabetes. Further, the utilization of home health visits for all DRG's fell by 39-54%; the majority of which was for patients on service for more than 120 days.

Hospital discharge planners interviewed in the Medicare Payment Advisory Commission [MedPac] Study (2003) also reported access problems related to their ability to find home health care for more complex patients such as those requiring wound care, daily or lengthy care, or other expensive supplies. The decline of this type of patient claim was validated by MedPac despite demographic indicators that might indicate an increasing need for complex home health services (Eaton, 2005; Medicare Payment Advisory Commission [MedPac], 2005). After passage of the BBA, several policy analysts described problems that could occur for the sickest and most frail patients (Gage, 1999; Komisar & Feder, 1998; The Lewin Group, 1998; Smith, Maloy, & Hawkins, 2000; McCall et al., 2003). These studies focused on access issues using surveys of agencies, discharge planners and other key informants, and analysis of Medicare claims data. Their findings confirmed a substantial number of agencies closed, service utilization decreased, and the marketplace changed drastically. However, it was unclear whether access to care had been adversely affected.

These studies estimate the early impact of the BBA on a range of home health utilization and quality measures and examine whether particular subgroups of the Medicare population were differentially impacted.

Do these reductions in beneficiary use result in poor health care outcomes for beneficiaries, the Medicare program or providers? The reductions seen were truly dramatic and suggest the opportunity to explore the consequences of such a substantial reduction in what could arguably be the most popular set of services available through the Medicare program. Future

change to the Medical Home Health benefit need to be evaluated carefully in new research which focuses on the value of the program in preserving access to high quality, lower cost health care.

Quality Management in Home Health

The pathway from data gathering to published outcomes in home health care contains many scientific, clinical, and political uncertainties. This pathway may be viewed as a two-way process whereby the scope and accuracy of data collection influence the limits of available information which in turn influences the availability of dependable outcome information which in turn leads to change in practice and policy. Conversely, practice and policy actions lead back to possible revisions in data scope and data collection accuracy protocols (Fortinsky & Madigan, 2004).

Prior to the late 1980s, home care quality management was largely a reaction to Medicare regulations, which in turn focused primarily on structure. Studies of home health quality were carried out mostly by individual providers for internal review. The outcomes that were considered were often related to agency performance and not patient outcomes (Williams, 1995). Regulatory compliance was the primary driver behind organizational quality improvement efforts. Internal, as well as external auditing focused on whether medical necessity for services was clearly documented in the medical record and whether paperwork timeline deadlines were met.

Home care can affect many facets of an individual's health for which outcome measures can be constructed such as physiologic status, functional status, health-related knowledge, compliance with medical regimen and satisfaction with care (Kramer, Shaughnessy, Bauman, & Crisler, 1990). However, health care outcomes in the home environment are influenced by more

than the interventions of the home health care provider. Outcomes are influenced by all aspects of a home health patient's environment so it is important to select measures of the quality of care which correspond to the attributes of health on which a home health agency is expected to impact. Aggregate patient outcomes from a given home health agency will be influenced as much if not more by agency case mix as by the quality of services provided. Although such differences are adjusted for using multivariate methods, stratification using a classification system that controls for such differences is more effective and practical for evaluating the quality of home health care (Shaughnessy et al., 2002).

According to Shaughnessy et al. (1997), three categories of outcome measures are relevant to home health care: end result outcomes, intermediate result outcomes, and utilization outcomes. An end result outcome is a change in health status between two or more time points such as between the admission and discharge to the home health agency. Outcome measures defined as changes in patient health status between the start and end of care can form a reasonable foundation upon which to determine whether one home health agency or a group of agencies is, on the average performing better or worse than other agencies. An intermediate result outcome is a change in a patient or informal caregiver's behavior, emotions, or knowledge that can influence the patient's end result outcome changes or may often facilitate attaining end result outcomes. A utilization outcome (or proxy outcome) reflects a change in condition, typically substantial, as evidenced by a patient accessing higher levels of care over time. Examples of utilization outcomes include hospital admission and emergent care visits. Use of each of these types of health services tends to suggest that a substantial change in patient health status has occurred. Although this is not unequivocally the case, utilization outcomes are often used as proxy measures for end result outcomes as one can infer a change in patient health status.

The measures thus far developed using the OASIS document emphasize end result and utilization outcomes. They have been determined to be important to measuring the effectiveness of home health care, although much criticism can be found in the literature as to challenges identified with psychometric properties associated with the use of the OASIS instrument such as reliability and validity (Fortinsky & Madigan, 2004; Hittle, Shaughnessy, Crisler, Powell, Richard & Conway, 2003).

The OASIS Instrument

In 1999, CMS mandated national implementation of the OASIS instrument to capture home health patient-level information. OASIS is the only major data set ever developed for a large component of our health care delivery system that has been focused first and foremost on measuring and improving end result outcomes on behalf of patients (CMS, 2002; Shaughnessy et al., 2002). The OASIS instrument as originally conceived was intended to be a precise, uniform data set tailored to the unique features of home health care and integral to the comprehensive assessment routinely completed by home health providers.

Research on readmission for patients receiving skilled home care has been limited but is growing. The identification of patients at risk for poor discharge outcomes such as re-hospitalization is an important area not only of research but of evidence-based practice as well. Although much is known about individual characteristics associated with hospitalization, such knowledge has not been synthesized into a standardized instrument that could be used in home care to identify patients at risk for hospitalization.

The *Probability* of Readmission Assessment (PRA) scale has long been used in the outpatient setting in screening patients for risk of hospital readmission and a high test-retest

reliability has been reported (k=.78) (Bowles & Cater, 2003). The OASIS and the PRA contain many of the same patient characteristics associated with readmissions such as severity of illness, medical diagnosis, functional status, and prior hospital stay information. It would be of significant value to the home health industry if the OASIS data, already collected, could also be used to guide clinical decision-making and care planning by identifying those patients at risk for re-hospitalization, particularly for those patients with chronic disease such as heart failure without adding another data collection instrument (Bowles & Cater, 2003; Schade & Brehm, 2010).

Outcomes Based Quality Improvement

Throughout the 1990s, researchers at the University of Colorado worked with over 200 home health agencies to establish a system to monitor the quality of care for home health agency patients (Shaughnessy, Crisler, Schlenker, & Arnold, 1997). This 15-year program evolved through several overlapping stages of research, development, pilot testing of outcome measures, clinical and methodological review and demonstration and evaluation activities. Data and outcome measures were iterated, refined and reduced through field testing at more than 200 home health agencies nationwide. The reviews were designed to evaluate each measure in terms of its clinical validity and utility, importance to patient health, and expected measurement precision while adjusting for case mix differences among home health agencies. The final data set for risk adjusting outcomes in home health care was named the Outcome and Assessment Information Set (OASIS). Based on the OASIS, both the state of New York and the Robert Wood Johnson Foundation supported a pilot test of a quality assurance system known as Outcomes Based Quality Improvement (OBQI). Participating home health agencies received the first industry reports on the proportion of patients who improved or deteriorated in selected

domains between their admission to service and discharge (CMS, 2002; Shaughnessy et al., 2002).

Since its inception, the continuous quality improvement (CQI) movement has shaped quality management efforts in the United States health care system (Shaughnessy et al., 1997; Schiff & Rucker, 2001). Salient features of an effective continuous quality improvement (CQI) program include an emphasis on clinically useful and sensitive indicators of quality that can be measured across time periods, ongoing reporting of statistical information on such measures that permits timely comparisons of present with past performance, and sufficient clarity and meaningfulness of findings so that clinicians, managers, and payers can encourage and implement changes in care behaviors to improve quality.

In 2002, CMS implemented outcomes based quality improvement (OBQI) for home health care providers nationwide. Forty-one of the OASIS outcome measures were used for outcome based quality improvement (OBQI) demonstrations. These included (1) functional outcomes such as improvement in ambulation/locomotion, improvement in toileting, and improvement in management of oral medications, (2) physiologic outcomes such as the improvement in the status of surgical wounds, improvement in dyspnea, and improvement in urinary incontinence, (3) emotional/behavioral/cognitive outcomes such as improvement in anxiety level, and (4) selected utilization outcome measures such as acute care hospitalization (CMS, 2002). In 2010, process measures were added to the new OASIS-C in order to improve the reporting on outcome. Potentially avoidable event reporting was added in 2011 (CMS, 2014)

Most of the published studies on outcomes post-implementation of PPS address data obtained from the first few years of PPS. Since data inaccuracies are more likely to be prevalent in new rather than mature systems, later time periods should also be studied. National training

efforts organized and funded by CMS did not begin until 2002. These efforts included in the scope of work for CMS funded quality improvement organizations (QIO's) focused on training home health agency staff in using outcome reports to improve outcomes. The potential impact of this work should also be evaluated as compared to these initial studies on the impact of PPS on home health outcomes. Analyses of change in outcomes from specific diagnoses could also shed light on whether outcome effects under PPS differ by condition, with possibly more negative results seen for chronic patients (Schlenker et al., 2005). It may also be important in the future to verify the hospitalization and emergent care results derived from OASIS data against total claims data on Medicare recipients.

The demographic imperatives over the next 20 years will increase demand for chronic care services and promote the development of a fuller range of clinical and social support services. Home health will be an important component of any such model. How we organize and pay for this continuum of service in a way that ensures access while assuring efficient use of resources is imperative (McCall et al., 2001).

As post-acute care services continue to grow into an increasingly important part of the Medicare program, their organization, payment strategies, and focus of control need to be re-thought. (Medicare Payment Advisory Commission [MedPac], 2001) recommended that the Secretary of Health and Human Services develop a patient classification system from a common core of data elements predicting costs across settings. Such a classification system would be an important first step in designing a prospective payment system for post-acute care providers offering more direct incentives to treat individual patients across all settings (McCall et al., 2003).

After the initial research where outcome measures and OASIS data items were

empirically tested, two large-scale demonstration trials were designed where participating agencies selected outcome measures to improve. Agencies in this phase were asked to choose hospitalization as one of their two target outcomes per year as reduction in hospitalization rates can be associated with lowering the total cost of care (Shaughnessy, Crisler & Bennett, 2000; Shaughnessy & Hittle, 2002).

In less than five years the home health industry moved from an environment with extremely diverse data collection protocols and little or no dissemination of quality related information, to an environment in which uniformly collected clinical data are transformed into information and then into reports using these quality indicators as quality measures (Fortinsky & Madigan, 2004). Of the 41 risk adjusted quality indicators derived from the OASIS document, 11 were made publicly available in November of 2003 nationwide. These 11 were increased to 12 when the CMS made its last modifications to the risk adjustment model in 2008. Consumers can compare agency quality indicators at the CMS website (www.cms.hhs.gov/questions/hhq) and by telephone.

Psychometric Properties of the OASIS Instrument

Switzer, Wisniewski, Belle, Drew, and Schultz (1999) offer practical suggestions concerning the selection and use of instruments. The psychometric properties of the instrument as well as the context in which it will be used are critical considerations prior to choosing or using an instrument to gather data. Context includes factors such as constraints on data gathering capabilities, while psychometrics focuses on the properties of the instrument as it functions within the context. The psychometric properties of reliability and validity are discussed in this paper relative to the OASIS instrument.

Aside from brief reports by the OASIS developers (Shaughnessy, Crisler, Schlenker, & Arnold, 1994), little is known about the psychometric properties of the OASIS instrument. (Shaughnessy, Crisler, Schlenker, & Arnold, 2002). There are few published studies testing the reliability or validity of the OASIS instrument, and most address only one or two of the domains of items found in the instrument. Key authors of frequently referenced studies include Madigan, Tullai-McGuinness, and Fortinsky (2000), who examined reliability and accuracy, Berg (1999) who evaluated reliability as part of a project developing a case mix adjustor for prospective payment, and Rosati, Neder, Huang, and Feldman, (2002) who compared interrater reliability of live assessments compared to a sample review of medical records. Investigators considering using OASIS data to examine patient outcomes have raised questions about psychometric properties that were not necessarily part of the development of the standardized data collection instrument (Madigan & Fortinsky, 2000; Neal, 2000; and Madigan, Tullai-McGuinness & Fortinsky, 2003) such as the apparent lack of consideration of the unpredictability of the home environment as a variable in the original studies conducted by Shaughnessy at the University of Colorado.

Reliability

Reliability is the stability of a measurement instrument over time (Nunnally & Bernstein, 1994). This consistency can be across repeated administrations of the same instrument (test-retest), across different groups of participants, or with different data collectors (interrater reliability). Reliability of assessments conducted of a single rater at different time points or of two different raters is evaluated with the Intra class coefficient for continuous variables and kappa for dichotomous or ordinal-level variables (Switzer et al, 1999) such as those associated

with the OASIS instrument. Acceptable Kappa scores are >.60 (Nunnally & Bernstein, 1994). Internal consistency is also an indicator of reliability by demonstrating the degree to which the items are measuring the same domain. This is measured by co-efficient alpha. These are the reliability measures found in the literature on the OASIS instrument.

Initial OASIS reliability and validity testing provided a rough approximation of interrater reliability for specific items (Shaughnessy et al., 1994; Hittle et al., 2003). Shaughnessy et al (1994, 1997) reported kappas for interrater reliability ranging from .50 to 1.0 for functional status items, .60 for dyspnea, .60 for pain, and from .79 to 1.0 for behavioral items. Madigan (2002) reported on a small (37 cases) intrarater reliability study involving one assessment visit/patient with the clinician completing OASIS items during or immediately after the assessment, and then completing an OASIS form again within 48 hours. They found kappas ranging from .41 to 1.0 for functional status items; .5 to .66 for dyspnea; and from .61 to 1.0 for behavioral items. In addition, Neal (2000), looking at "agreement," compared the interrater reliability of nurses versus rehabilitation therapists in completing the OASIS, and found an overall 60% agreement between nurses and physical therapists, with notable exceptions (more than 50%) in the area of safety hazards in the home, and in grooming, and toileting.

In response to concerns voiced by the home health industry, Shaughnessy et al. (2002) conducted a quasi-experimental design study with prospective pre/post and study/control components within two multi-year demonstration trials in 28 states and in 73 home health agencies. These studies involved 157,548 older adults from 27 states involved in a national demonstration project from 1995 to 2000, and 105,917 patients admitted to 19 agencies in a New York state trial. 248,621 patients from the demonstration project agencies served as the control group. Outcome measurements included improvement and stabilization outcome rates in

functional, physiological, emotional/behavioral and cognitive health domains. The authors concluded that OBQI had a pervasive effect on outcome improvement in home health patients. The authors used kappa values of 0.41- 0.60 as moderate, 0.61 – 0.80 as substantial, and values in excess of 0.80 as "almost perfect" agreement as recommended by Nunnally and Bernstein (1994). An outcome measure was considered to be reliable for OBQI if the underlying data item used to compute the outcome had an interrater coefficient (weighted Kappa) > 0.60. The raters included two skilled nurses trained in using OASIS who performed duplicate assessments within 24 hours of one another for 46 patients from five agencies. Only two of the 38 health status outcome measures used in the OBQI reports had co-efficient less than 0.60 and 25 of them had levels greater than .70.

Berg (1999) looked at interrater reliability as part of a project to develop a case mix adjustment methodology for Medicare prospective payment. In this case agency clinicians served as data gatherers and three days were allowed to pass between assessments. According to Shaughnessy & Hittle (2002), both of these research design elements introduce potential unreliability as a result of not controlling for the competency of the clinician or the timing of the assessment. The comparison means for kappa were 0.69 and 0.58 for Studies 1 and 2, respectively.

Madigan and Fortinsky (2004) have since conducted a more extensive study using a concurrent assessor-observer approach, expanding their study to 436 clinicians employed by 29 Ohio homecare agencies. These researchers reported on the psychometric properties of intrarater reliability instead of interrater reliability because of the costs associated with having two reviewers going to patients' homes at the same time. Co-efficient alpha was determined as the measure of internal consistency for the domain of physical function, the affective domain of

depressive symptoms, and the behavior domain for cognitive decline at both admission and discharge. The functional domain had good internal consistency ratings at 0.86 at admission and 0.91 at discharge. The two mental health domains had no co-efficient alpha greater than 0.56, indicating less than adequate internal consistency (De Palma, 2002). Cohen's kappa, the usual measure of interrater reliability, did not apply to this study because there were multiple raters of the same patient, rather than two raters for a series of patients.

Madigan and Fortinsky (2004) again conducted additional interrater reliability testing as part of a larger study designed to examine the relationship between Medicare home health outcomes and resource use. This final interrater reliability sample included 88 patients from 21 agencies, each of whom had one interrater reliability assessment. Weighted kappas were used in order to capture the extent of disagreement as well as agreement. Results showed that all OASIS items had kappa values of at least .70, with the majority exceeding .60.

The Center for Home Care Policy and Research, Visiting Nurse Service of New York conducted the only provider sponsored study on the reliability and validity of the OASIS instrument. Phase I consisted of an initial and subsequent assessment of the same patient 72 hours later by the same nurse. Patients were randomly selected at the start of care. Phase II involved a comparison of the admit OASIS to other clinical information available in the medical record. Phase I was an evaluation of the instrument's interrater reliability and was conducted over a period of 11 months. Phase II was a review of 141 medical records. Based on Cohen's kappa, the researchers found that the overall interrater reliability was low (< .40) with very inconsistent agreement in the medical record validation sample (Rosati, Neder, Huang, & Feldman, 2002).

Similar to the study conducted by the VNS of New York, Kinatukara, Rosati and Huang

(2003, 2005) conducted a three-phase study which examined intrarater reliability, interrater reliability and comparison of the OASIS assessment data to pertinent fields in the form used by Medicare certified home health agencies to document the plan of treatment for submission to the physician for signature (CMS 485). As in the prior study, Kinatukara, Rosati and Huang (2005) found that the reliability for many items was considerably lower than found in prior studies and that there were notable inconsistencies between several domains within the OASIS document and the CMS 485.

According to Kinatukara, Rosati and Huang (2005) another important difference among the original studies conducted by Shaughnessy as well as others to date has been the type of rater used to complete the OASIS. Given the multiple uses of OASIS data, a critical question is whether two clinicians will assign the same response to an OASIS item for the same patient. Clinical assessment items are commonly assumed to have adequate interrater reliability if the value of the reliability co-efficient (weighted Kappa for OASIS items with more than two possible response categories) is >.60 (Landis & Koch, 1977). Shaughnessey et al. (2000) used paid, experienced research assistants to test the interrater reliability of the instrument. Subsequent researchers have used paid assistants, working clinicians, side-by-side ratings, and delayed time point ratings. Berg (1999), Neal (2000), and Madigan and Fortinsky (2000) used two clinicians for the same patient at delayed time points. Hittle et al. (2003) showed that the best results were obtained by limiting the delay to 24 hours. Berg (1999) used practicing agency clinicians to complete the assessments while Madigan and Fortinsky (2000) conducted a psychometric evaluation through a secondary data analysis designed to examine the relationships between health care outcomes and resource consumption. Intrarater reliability was studied using a delay timeframe. Unlike Hittle et al. (2003), Berg (1999) used multiple different assessments

and allowed up to three days between the initial and subsequent assessments which increased the likelihood that real change in a patient occurred. As a result of the difference in their approach, these research design elements

introduce potential unreliability that is related more to the method of data collection than to the OASIS items themselves. O'Connor and Davitt (2012) conducted a review of 12 studies finding as did the other studies that the reliability of the OASIS instrument ranged from low to moderate, adding that these results appeared to vary by item studied.

These studies underscore the importance of more thorough and widespread reliability and validity testing of the OASIS instrument, as well as improvements in organizational systems and practitioner training to ensure consistent utilization of OASIS. Interrater reliability should be tested at the agency level on a routine basis in order to optimize the integrity of the OASIS date nationally. Based on the inconsistent findings reported in these studies , it is unclear whether prior reliability findings (Shaughnessy et al, 2002) can be generated to current practice because the previous research did not account for the stresses and unpredictability of the home health setting (Kinatukara, Rosati & Huang, 2005). There are no studies available in the literature which addresses the incremental erosion to item reliability as a result of rater inexperience or training variations.

Validity

The term "validity" denotes the scientific utility of a measuring instrument, on how well it measures what it purports to measure. Since all forms of validity involve scientific generalities and the measurements of attributes are common to all validations, some have argued that there really is only one form of validity, construct validity. Establishing construct validity of an

instrument produces a construct that is (1) well defined through a variety of observables, (2) is well represented by alternative measures, and (3) relates strongly to the constructs of interest (Nunnally & Bernstein, 1994). Since there are over 100 items on the OASIS instrument measuring different constructs, existing studies look at only a few questions at a time. Because validity is context specific, validating a measure must be viewed as a process of accumulating evidence that supports the meaningfulness of the measure rather than a discreet endpoint at which validity is proven (Switzer et al, 1999). Very little research can be found in the home health literature addressing validity of the OASIS instrument. What little there is, focuses on specific constructs of interest.

If OASIS items are to be used in research, the degree to which multi-item scale can be built in accordance with the conceptual domains of patient outcomes traditionally accepted needs to be assured (Covinsky, Wu, Landefeld, Connors, Phillips, Tsevat, Dawson, Lynn, & Fortinsky, 1999). Madigan and Fortinsky (2000) published one of only a few studies on validity to any degree, evaluating construct validity through principal axis factor analysis method, and using an oblique rotation for domains with more than one factor, expecting theoretically, that there would be inter-relationships between items within the domains.

Madigan and Fortinsky's work showed that the functional domain had the best validity. Using principal risk factor analysis within each domain, it was evident that affect and behavioral domains were problematic using data from a previous study of ten home health agencies in Ohio completed in 1996. Bivariate correlations within the domains were small to moderate at (0.13 to 0.31), supporting the oblique rotation. Principal axis factor analysis was done on the functional, affect and behavioral domains. Factor loadings great than .55 are considered good, those exceeding .70 are excellent (Comrey & Lee, 1992). The admission functional domain items

loaded onto one factor with factor loadings that were all greater than 0.61 explaining 56.3% of the variance. The discharge functional domain items also loaded onto one factor, again with factor loadings greater than 0.74 and 68.9% of the variance explained. Two factors were extracted from the affect domain, with 21.6% of the variance explained, although only hopelessness had a strong loading. The second factor explained 5.5% of the variance. For the discharge affect domain, the data loaded onto only one factor, explaining 31.7% of the variance with factor loadings exceeding 0.57% for three items. The admission behavioral items loaded onto three factors, explaining only 13.0, 6.3, and 4.2 percent respectively. The discharge behavioral items loaded onto two factors inadequately explaining only 22.6% and 11.3% of the variance respectively. From these results, the authors concluded that the functional domain was sufficiently reliable with internal consistency alphas equal to 0.86 and 0.91 respectively. The affect and behavior domains were more problematic, and the internal consistency was less than adequate for both, suggesting that these scales should be revised or treated as subscales when used in research.

DePalma (2002) also evaluated construct validity and found that all factors emerged in one of three domains; functional (ambulation, bathing, grooming, medication management and transferring), affect (depression) and behavioral (related to cognitive decline), with the functional domain the clearest. Consistent with Nunnally and Bernstein's (1994) recommendations, the authors suggest further work examining discriminant/convergent validity, so that the OASIS domains can be compared to existing, well-documented instruments to ascertain whether the OASIS performs as well.

Tullai-McGuinness, Madigan and Fortinsky (2009) conducted further research looking at criterion validity, using the "gold standard" comparison tools short form portable mental status

questionnaire (SPMSQ), the activities of daily living (ADL) and instrumental activities of daily living (IADL) questionnaires of the older Americans Resource and Service (OARS) instrument, the Center of Epidemiology Studies Depression Scale (CES-D Scale) and the Brief Symptom (BSI) tool. Their finding in this study suggests that the OASIS is valid for measures of ADLs and cognition, but may not be sufficiently sensitive for depressive symptoms and IADL items. The highest correlation among the three domains was .69 for ambulation.

Cook, Monahan, and McHorney (2003) argue that limiting a scale to the items that homogeneously discriminate compromises the primary objective, optimal reliability and validity. If OASIS is to be truly relied upon as a scientific tool, evaluation of convergent/discriminant validity is also needed. Fortinsky, Garcia, Sheehan, Madigan and Tullai-McGuinness (2003) later uncovered considerable redundancy among item difficulty estimates in the areas of ADL's and IADL's, recommending the use of the Rasch model of item response theory for future development of the OASIS instrument as IRT methods can be more helpful than the standard Guttmann scaling used by Katz for IADL/ADL measurement in developing better health outcome measures and particularly in assessing change over time (Hays, Morales & Reise (2000) such as intended with the OASIS instrument.

Guttman scales items are arranged such that a respondent who agrees with a particular item also agrees with items of lower rank order. Guttman scales work best for constructs that are hierarchical and highly structured. In the Rasch model, the IRT is better used for analyzing data from assessments to measure things such as abilities, attitudes, and personality traits. Rasch models are particularly useful in the health profession because of their general applicability and with large databases such as the OASIS. (Tullai-McGuinness, Madigan & Fortinsky, 2009).

OASIS Instrument Burden

The effective use of OASIS data for monitoring and improving quality of care as well as for assessing fair and appropriate payment for home health service requires that meaningful and accurate data be collected without undue burden on patients and providers of care.

Concerns have been raised by industry experts as to the burden and benefits associated with the OASIS instrument since its requirement by the HCFA (now CMS) of all Medicare certified home health agencies in 1998. Concerns are predominantly focused on (a) the length of the OASIS instrument and its burden to patients upon initial contact with the agency, (b) the length of the instrument and its impact on clinician satisfaction, (c) concerns about subjecting non-Medicare/Medi-caid patients to the questions imposed by the instrument, (d) confidentiality as it relates to the transmission of OASIS data, (e) that only a small subset of the data elements gathered are used for calculating prospective payment reimbursement on Medicare patients, and (f) concerns relating to interrater reliability and the impact on the validity and comparability of publicly reported outcomes (Fazzi, Agoglia, Mazza, Glading-DiLorenzo, 2006).

Hittle et al. (2003) compared clinician time required to complete patient assessments with and without OASIS. Data were collected in 1997 and 1998 and involved 41 patients and two home health agencies. Clinicians were not employees of the home health agencies and were specifically trained for the data collection. According to these outcomes, the removal of this source of variability ensured that the study reflected reliability of the OASIS assessment items, rather than differences among clinicians in training or ability, presenting their results as a more accurate portrayal of the time required to complete OASIS assessments. Hittle et al. (2003), GAO Study (2001) and Madigan and Fortinsky (2000) reported reasonable consistency between OASIS and non-OASIS assessment time, although the studies acknowledged that such

consistency may be dependent on the expertise of the clinical staff completing the OASIS and therefore may not reflect the reality found in the field.

Accuracy

Another issue which was not studied in the original OASIS research was that of accuracy. Accuracy, as compared to reliability or validity is a characteristic of the correctness of an answer as opposed to the answer's appropriateness to the question (validity) or the consistency of the measure (reliability) (Nunnelly & Bernstein, 1994). Problems with OASIS accuracy could be attributed to the measurement of particular OASIS items, assessment competency of the clinician, and/or the clinician's knowledge of OASIS. Accuracy, for the purposes of Madigan and Fortinsky (2000, 2003) was defined as the extent of agreement of assessment responses by home health care clinicians with "gold standard" responses based on uniform instructions on completing OASIS items and expertise from home health care nurse research.

Madigan, Tullai-McGuinness and Fortinsky (2003) expanded the work on the role accuracy plays in examining reliability using video simulation of 436 clinicians from 29 Ohio home health agencies which compared the OASIS scoring of nurses and physical therapists. Clinicians in the study completed the OASIS instrument after viewing a simulated video of an OASIS assessment considered by the researchers as the "gold" standard. Accuracy for the admission items was high (>80% correct). Among discharge OASIS items, accuracy was high for 13 of the 17 items (76%), although transferring and bathing were low at 45.4% and 68.7% respectively.

Although the majority of the items were rated accurately, where variances in rates were noted, nurses were more likely to agree with the correct answer than therapists. This finding was

not expected by the authors who acknowledge anecdotally that nurses tend to record patient self-reports of function while therapists tend to make patients demonstrate degree of function. They did find, however, that what discrepancies existed most often led to patients being assigned lower Home Health Resource Group (HHRG), which means less reimbursement to the home health agency.

Contextual Issues and Other Considerations

Developing publicly reported quality measures for home health patients presents challenges related to data reliability and validity, comprehensiveness of measures, detection bias, representativeness of the population measured and risk adjustment, and interpretation, especially at the home health agency level (Sangl, Saliba, Gifford, & Hittle, 2005). OASIS measures emphasize clinical outcomes applicable to most home health patients, rather than to disease specific outcomes. Certain metrics however, found within the instrument may be useful for examining some disease specific outcomes such as those associated with heart failure. They also represent data gathered at artificially established points in time which may not be the best method to capture clinically discernable changes in health status.

The results reported by Rosati, Neder, Huang and Feldman (2002); Kinatukara (2005); and Madigan and Fortinsky (2000), are based on studies using field clinicians within a home health agency and suggest that results do depend on the differences in clinicians. Detection bias as a result of clinician skill level is a significant issue. And, since it is unlikely in the face of today's workforce shortages that home health agencies will be able to keep highly skilled, specifically trained OASIS clinicians such as those used by the major research studies, the effect on the National OASIS database incurred as a result of variances in clinician detection bias needs

to be acknowledged, studied, and taken into consideration by policy makers.

Finally, because of data constraints and ill-defined methodological issues, revision to the risk adjustment process has only occurred twice since the instrument's inception, once in 2002 and again in January of 2008. The original outcome indicator testing process did not include all states nor all provider types. The authors of the instrument have recommended that extensive propensity analysis using K-to-1 patient-level matching using distance minimization, propensity scoring to render test control comparisons more precise, extended simultaneous uses of multiple goodness of fit statistics such as R2's, and C-statistics, and risk adjustment using different units of analysis, including both agency and patient level analysis be done (Shaughnessy et al, 2002).

Madigan and Fortinsky (2000) recommend that the affect domain of depressive symptoms and the behavioral domain of cognitive decline not be used as factors on collective domains before more work is done to establish psychometric projections. They do recommend that the functional domain questions be used as this domain proved sufficiently reliable and had the strongest factor analysis and construct validity results.

The Prospective Payment System

The Prospective Payment System (PPS) is one of the many changes in reimbursement that has affected the delivery of health care. Originally developed for hospitals, it has become a major factor in how all insurance is reimbursed. Initially implemented in 1982 for payments to hospitals, the Prospective Payment System was extended to payments for skilled nursing facilities and home health agency services by the Balanced Budget Act of 1997 (Medicare Payment Advisory Commission, 1998; McCall & Korb, 2003).

The provisions of the BBA were specifically targeted at reducing the payments for home

health care. As a result of the implementation of PPS, reimbursement moved from per visit to per episode which created a potential incentive for home health providers (as was already true with both acute hospitals and skilled nursing facilities) to control their costs by reducing utilization.

Under the Home Health PPS, a prospectively determined per-episode payment rate is case-mix adjusted using 80 mutually exclusive Home Health Resource Groups (HHRG's). Each Medicare episode is classified into a HHRG using a subset of items from the OASIS which has been collected by all home health agencies. Much like when the hospital industry moved from per diem reimbursements to episodic reimbursements under diagnostic related groups (DRGs) in the early eighties, potential concern exists relative to the shift in economic incentives from one encouraging the use of services to one which incentivizes the provider on cost containment as measured by a decrease in service utilization (Schlenker et al., 2005).

McCall, Korb, Petersons and Moore (2003) and McCall, et al. (2001) studied the potential effects of this shift in economic incentive, showing that home health providers can change utilization patterns when financial incentives change, suggesting that reforms should be conducted carefully and results monitored. A study by the Government Accounting Office (GAO) also found that the average visits per episode declined by 24% (29-22 visits) from just prior to PPS to the first half of 2001 (USGAO, 2002; Kulesher, 2006).

Methods

Empiric studies for review were obtained via computerized literature search of PubMed and CINAHL using key words "home health," "home care," "home health and outcomes," "OASIS," "home health outcomes and OASIS," "prospective payment and home health outcomes," and "BBA 1997." Subsequent searches wee conducted using key words "disease

management", "heart failure", "chronic disease", "re-admission rates", "re-admission rates and heart failure" and "cost and heart failure". Searches were limited to studies published between 1995 and 2013, although seminal works found in referenced studies published prior to 1995 were included in this review. This search yielded 90 relevant studies on home health outcomes and 12 government reports. An additional 35 studies were included addressing re-hospitalization rates and chronic disease. These results were then limited to 110 leaving 97 empiric articles and 13 government reports that were reviewed in detail, the results of which are presented in this literature review. Some of the studies were used in the background section of this paper. Studies focusing primarily on interventions aimed at reducing re-hospitalization, those seeking to build a predictive model and those conducted outside the United States were eliminated for purposes of this review.

The review of the literature indicated four major themes by which all the articles reviewed were categorized. This categorization serves as the organizing framework for this paper. These thematic categories were identified as (1) improving and measuring outcomes in home health, (2) chronic disease management and re-hospitalization, (3) the effects of prospective payment on outcomes and utilization in home health, and (4) the psychometric properties of the OASIS instrument. The psychometric properties of the OASIS instrument from which clinical outcomes data are extracted will be discussed in the chapter on methods. Studies specific to home care are limited. From a health service perspective, outcomes of home health care include satisfaction with care, patient outcomes, and service utilization outcomes. Studies pertaining to quality improvement frameworks, patient satisfaction and the cost/benefit of home health care are discussed tangentially, but are outside the scope of this literature review and were not reviewed in detail.

Service utilization outcomes refer to the use (or non-use) of health services (i.e., hospitalization) that are potentially attributable to the (home) health care under consideration. Utilization outcomes have been used more frequently than end-result or immediate-result outcomes because data are more readily available on such outcomes from secondary sources. Utilization outcomes are actually surrogate end-result outcome measures because an assumption must be made that hospitalization, for example, is appropriate or inappropriate in view of the patient's condition. This makes it challenging to adjust utilization outcomes for risk factors that comprehensively take into consideration the natural progression of the patient's disease process because the multiplicity of reasons for the hospitalization can be extensive (Shaughnessy, Schlenker, Hittle, 1994; Rosati et al., 2007).

Studies on the impact of utilization of home health services on patient outcomes began with the growth of managed care when Shaughnessy, Crisler, Arnold, Kramer, Powell and Schlenker (1994) found that HMO patients had much shorter home health episodes as compared to traditional fee-for-service Medicare patients, but were more impaired at discharge (Brown, Phillips, Bishop, Thornton, Ritter and Klein, 1997). Boult, Kane and Brown (2000) demonstrated that home care was associated with greater caregiver satisfaction, less use of more expensive services, and improved outcomes. Continuing health care reform and the escalation of health care cost make the evaluation of resource utilization and patient outcomes increasingly important (Shaughnessy et al., 1997; Lee & Mills, 2000). The major challenge in the current home health care environment as in other sectors, is to enhance quality within the constraints imposed by limited resources. For the purposes of this section of the paper, quality of care connotes a positive aspect of care where an assumption is made that standards exist according to which the positive or negative aspects of care or to what the provider did or failed to do can be judged

(Sangl, Saliba, Gifford, & Hittle, 2005; Ashton & Wray, 1996). Satisfaction with care, although closely linked to achieving other clinical outcomes, is beyond the scope of a study on re-hospitalization and will not be discussed in this review.

There have been approximately 35 studies addressing patient care outcomes in home health since the OASIS instrument was introduced. Early work to assess the initial changes in home health outcomes under Medicare home health prospective payment system found that outcome changes were mixed and generally modest (Schlenker, Powell & Goodrich, 2005; Fortinsky, Garcia, Sheehan, Madigan & Tullai-McGuiness, 2003; Fortinsky & Madigan, 2004; McCall et al., 2003; Madigan, Schott & Matthews, 2001). Favorable changes included higher improvement rates under PPS for functioning and dyspnea, higher community discharge rates and lower hospitalizations and emergent care rates (Madigan et al, 2001; Rosati, Huang, Navaie-Waliser, & Feldman, 2003; Shaughnessy et al., 2002).

Re-Hospitalization Outcomes

While re-hospitalization in general has been widely studied and evaluated via meta-analysis (Soeken et al., 1991), few studies have examined re-hospitalization for patients seen by home health care agencies (Anderson, Helms, Hanson & DeVilder ,1999; Hoskins, Walton-Moss, Clark, Schroeder, & Thiel, L. ,1999). In the studies by Anderson, descriptive designs were used and information was collected only about patients who were re-hospitalized. There was no comparison group of those who remained at home, making it impossible to determine which home health care patients were at highest risk of re-hospitalization or which factors were associated with this risk (Madigan et al., 2001).

The confounding variables associated with factors such as the environment and other

psychosocial aspects of the patients are poorly defined and not well understood (Anderson et al., 1999). Recent research emphasizes problems encountered by patients after discharge and describes relationships between demographic information, post-discharge interventions, and re-hospitalizations. However, patients readmitted while receiving home care services have not been a focal point for research as reported in the current literature Coleman, Min, Chomiak and Kramer (2004).

Hospitalization is widely viewed as a poor outcome of Medicare home care (Shaughnessy, Hittle et al., 2002; Rosati et al., 2007), yet the literature is inconclusive about which patient level factors are most important in predicting which patients will be hospitalized and why, particularly when examined in the context of a guiding conceptual framework (Madigan, Tullai-McGuiness, & Neff, 2002; Fortinsky, Madigan, Sheehan, Tullai-McGuinness, & Forster, 2006). Interestingly, most studies reviewed were a-theoretical. Only four of the studies were conducted using a conceptual framework. Of those that used a model, the Andersen Behavioral Model was most frequently used (three times) followed by Donabedian's Structure, Process, Outcome Theory (one time). Hospitalization is regarded as a highly important target utilization outcome measure in the CMS-supported OBQI initiative because it signals potentially serious declines in patient health status and because avoidance of hospitalization is thought to reflect effective clinical decision-making and communication among home health agency staff (Shaughnessy, Hittle et al., 2002; Fortinsky et al., 2006); Fortinsky, R., Madigan, E., Sheehan, J., Tullai-McGuinness, S., Fenster, J. (2006).

Re-hospitalization outcomes are challenging to evaluate because home health care is provided for a variety of populations by several levels of health care providers making it difficult to correlate the amount or caliber of home health care received to pre-determined outcomes such

as decreased hospital days. The expectation that home health care can serve as a substitute for more expensive institutional care may not be realistic across populations of home health care patients (Madigan et al., 2002).

The lack of a positive correlation between resource use and hospitalization rates suggests several areas for further research. When studying home care as it is provided by home health agencies, the relationship between outcomes and the number of visits have not been found to be linear. Research to date in this area has been relatively simple from a theoretical perspective with insufficient attention to other kinds of factors that can influence the relationship between resource use and patient outcomes (Fortinsky & Madigan, 1997; Kansagara et al, 2011; Penrod, Kane, Finch, & Kane, 1998; Adams, Corbett, & Michel, 2000).

Much of the post-PPS implementation studies address the impact to patient care quality as a result of fewer visits anticipated or reimbursement incentives shifted from one encouraging more visits to one that encouraged fewer visits. Utilization data combined with patient characteristics and outcome information helps us to better understand the complex relations between patient condition, services rendered, and outcomes achieved (Shaughnessy et al., 1997). Early study results were mixed which may have been due to the challenges associated with using data gathered primarily by home health agency clinicians using new, Federally-mandated assessment instruments. Issues of inter and intra rater reliability have made the quality of this early data suspect and will be explored in depth in the Methods Chapter (Adams et al., 2000; Brown et al, 1997; Hedrick & Inui, 1986).

The extensive literature concerning hospital readmissions is grounded in a medical or hospital perspective failing to address hospital admissions during an episode of home care. Since OBQI measures became publicly reported by CMS in 2004 on the Home Health Compare

website (www.medicare.gov), the national rate of acute care hospitalization for home health care Medicare patients has remained relatively stable; (a) 2004 – 28%; (b) 2005/06 – 28.4% (CMS, 2006). Based on the statistics it can be assumed that at least half of all home care agencies have risk-adjusted acute care hospitalization rates of higher than 28%. Twenty-five percent of all home health agencies in 2004 had an average hospitalization rate of over 45% (Home Health Quarterly, 2005). Therefore, reducing hospitalization rates should be an important objective for both health care providers and policy makers (Rosati & Huang, 2007). Madigan et al. (2001) raise the question as to whether home health agencies should use any re-hospitalization rate as an indicator of the success or failure of home health on the prevention of re-hospitalizations or whether a statistically predictable re-hospitalization base rate should be established. Regardless, this measure of agency performance is likely to become a significant factor in future efforts by CMS to implement a Pay for Performance Initiative for Home Health (Humphrey, 2002).

Hospitalization was selected by Shaughnessy et al. (2002) as the most pivotal outcome because it would be readily measurable for non-OBQI patients and on a pre-post basis for OBQI patients. The magnitude of the improvement in hospitalization rates (29.3%) as a result of the implementation of OBQI methods based on the use of OASIS instrument proved significant in the original demonstration studies. Most studies on outcomes in home health using OASIS data conducted since introduction of the instrument either focus, or include as part of the study, re-hospitalization as a key index of quality in home care (Bowles & Cater, 2003; Keepnews, Capitman, & Rosati, 2004; Rosati et al., 2003; Rosati & Huang, 2007).

It is generally assumed that the more time that elapses between discharge and readmission the less likely it is that medical care processes during the prior stay played a significant role in readmission. Of unscheduled readmissions of medical-surgical patients

occurring within a year of discharge from an index hospital stay, 35-40% occurred within the first four weeks (Soeken et al., 1991; Vinson, Rich, Sperry, Shah & McNamara, 1990; Rosati & Huang, 2007).

Research on re-hospitalization from the home health perspective has been limited by methodologic issues on how long the patients are followed after an index hospitalization and critical questions about the length of time following an index hospital stay that truly reflects issues related to that hospital stay. The most critical period for re-hospitalization of all home health patients is also within the first four weeks of admission to home health. For elders (over age 85) the time period is shorter – a mean of 13-18 days (Rosati & Huang, 2007; Fortinsky et al., 2006; Anderson et al., 1999). Twenty-five percent are readmitted within the first seven days of the admission to home care (Home Health Quarterly, 2005; Vasquez, 2008). Reasons for re-hospitalizations may be patient specific (decline in health status, development of a new problem) (Madigan et al., 2002), or as a result of a failure of the discharge planning process for hospital-based patients (Ashton & Wray, 1996).

Hughes, Ulasevich, Weaver, Henderson, Manheim and Kubal (1997) conducted a meta analysis of the literature available at the time on the impact of home care services on hospital days. Researchers found only a small to moderate beneficial effect size (-.38) of home care on reduction in hospital days. These effect sizes reported, while not large, were consistent however, and showed that home care did have an impact on hospitalizations, in particular for the terminally ill. Hoskins and Duffy (2005) concur in their study of hospital re-admissions of patients with congestive heart failure but add that an important consideration in evaluating outcomes is the lack of consistency in evaluating and reporting the achievement of outcomes at discharge or transfer.

In addition to promoting better outcomes for the patient, preventing hospital readmission helps avoid negative consequences for the home health agency. Under the home health prospective payment system the agency receives a sum of money to care for the patient for 60 days based on the results of the OASIS instrument completed by the admitting clinician. If a patient is readmitted to the hospital from home care, the home care nurse must repeat the lengthy OASIS assessment instrument on discharge and again upon readmission back to the agency (Bowles & Cater, 2003; Fortinsky, Madigan & Tullaie-McGuiness, 2000). It would be beneficial for the patients as well as the home health agency to be able to identify patients at risk for re-hospitalization in order to target resources effectively.

Factors Affecting Re-Hospitalization

Factors that have been shown to be predictive of re-hospitalization for groups of patients include: a diagnosis of heart failure, hypertension, or diabetes; prior re-hospitalizations; number of home health care days received; increased severity of illness with co-morbidities; older age; and longer length of stay for the index hospitalization (Anderson, Hanson, DeVilder & Helms,1996, 1999; Hoskins et al., 1999; Rosati & Huang, 2007; Vinson et al., 1990; Madigan et al., 2001; Anderson & Steinberg, 1984; Fortinsky et al., 2014). Ashton and Wray's (1996) study of 1,723 patients showed that a diagnosis of cardiovascular disease or malignancy and a history of prior hospital admission explained 60% of readmitted patients. Fortinsky, et al. (2006) found that a primary home care diagnosis of skin or wound problems and dyspnea severity were among the most statistically significant risk factors for hospitalization while receiving home health services followed by diabetes and a decreased level of functional ability. Evidence on re-hospitalization indicates that 30-48% of home health care patients are re-hospitalized because

they develop a new problem (Anderson et al., 1996; Madigan et al., 2001).

The work done by Anderson et al. (1999) and Madigan et al. (2001) reported reason for re-hospitalization in four categories: a) the primary diagnosis worsened; b) the secondary diagnosis worsened; c) a new problem developed; or d) other. Thirty-nine percent of the patients who were readmitted were readmitted for a new problem that prompted an unplanned return to the hospital. Fifty-six and two hundredth percent of the patients were readmitted for exacerbation of the primary or secondary diagnosis. Twenty percent of the unplanned readmissions for new problems were related to cardiovascular problems. Madigan et al. (2001) confirmed this result finding no identifiable prediction of re-hospitalization and attributing this finding to re-hospitalizations being predominantly due to a new problem. Hamner and Ellison (2005) added psychosocial factors to the list of factors affecting hospitalization, noting those that lived alone and those that lived in a facility (Richardson, 2003) were at greater risk of re-hospitalization.

Chronic Disease Management

The number of individuals with chronic disease is growing at an unprecedented rate due to the aging of the population and the increased longevity of persons living with chronic disease. Disease management programs consisting of clinical and administrative resources targeted at improving care for specific diseases represent a focused approach to overcoming the structural problems associated with traditional reimbursement streams and delivery systems. Studies have confirmed the effectiveness of disease management programs that employ evidence-based clinical protocols, encourage patient self-management, and provide clinical decision support for the health care team (Wagner, 1997; Wise, Bahl, Mitchell, West, & Carli, 2006). Disease management programs contain costs through improving the quality of care such as engaging

patients to be compliant with evidence-based therapies, controlling utilization and improving the cost per unit of service (Fireman, Bartlett & Selby, 2004) such as achieving a shift from care provided in the acute care hospital to care which is provided in a clinic or in the patient's home.

In hopes of improving CHF outcomes, disease management programs (DMP) have been developed to standardize and optimize CHF treatment. These programs focus on disease education for the patient and continuing support after hospital discharge. DMPs have the potential to reduce morbidity and mortality for patients with CHF. The benefit of the intervention depends on age, severity of disease, guideline-based treatment at baseline, and DMP modalities (Gohler, Januzzi, Worrell, Osterziel, Gazelle, Dietz & Siebert, 2006).

The effectiveness of multidisciplinary non-pharmacological approaches for improving outcomes in patients with chronic heart failure has been well established (Gwadry-Sridhar, Flintoff, Lee, D., Lee, H. & Guyatt, 2004). Interest is increasing in remote monitoring devices for delivering care which incorporate information communication technology, either as telemonitoring (transfer of physiological data such as blood pressure, weight, electrocardiograph detail and oxygen saturation) or as regular structured telephone contacts between patients and health care providers which may or may not include the transfer of physiological data (Clark, Inglis, McAlister, Cleland & Stewart, 2007).

The optimal management plan and best outcomes in heart failure appear to be delivered by multi-disciplinary programs where the nurse assumes a pivotal role. Traditional Medicare Certified Home Health programs are an example of a Medicare benefit whose services are delivered by a predominantly nurse-led multi-disciplinary team. Home Health programs can optimize the care they provide to patients enrolled into these programs with heart failure and better prevent unnecessary hospitalizations if they can learn to better utilize the OASIS

instrument as a tool for identifying positive predictors of risk of hospitalization for these patients upon admission to the agency.

The most comprehensive work to date related to risk factors for acute re-hospitalization was conducted for purposes of developing risk adjusted models for (using the OASIS instrument) Home Health Compare initiatives by CMS (Center for Health Services Research [CHSR], 2003). Fifty-one factors were found to contribute to the prediction of acute care hospitalization for Medicare/Medicaid patients enrolled in an episode of home health care (Fortinsky et al., 2000). Hoskins, Walton-Moss, Clark, Schroeder and Thiel, L. (1999) looked at home health patients with heart failure and found a history of prior hospitalization and a short home health stay to be associated with re-hospitalization. Fortinsky et al. (2006) identified statistically significant factors for re-hospitalization noting that 80% were admitted for acute exacerbation of chronic disease which was predominantly determined to be heart failure.

The literature is inconclusive as to factors associated with re-hospitalization of patients receiving home health services. The readmission rates and factors affecting readmission rates vary widely depending on the specific population studied, duration of follow-up, whether the study is prospective or retrospective, and whether the use of measures intended to prevent re-hospitalization were included for study. What literature exists is also mixed as to whether all ages and all patients versus disease or age-specific subsets should be studied. Studies using a retrospective design are limited as to providing detailed information on the events surrounding the re-hospitalization, yet little prospective research has been done to determine predictability on home health care admissions of those patients at the highest risk of re-hospitalization (Madigan et al, 2002; Madigan et al., 2001; Rosati & Huang, 2007; Fortinsky et al., 2000, 2014). Conversely, certain negative predictors of early hospital readmission after discharge for patients

with CHF have been identified in the literature and include home-based interventions, appropriate medical intervention, availability of multidisciplinary heart failure management programs post-discharge, and focused intervention by case managers during the hospital stay (Hallerbach, Francoeur, Pomerantz, Oliner, Morris, Eiger, Cohn & Goldfinger, 2008).

Each home health agency's re-hospitalization rates are closely monitored by state and federal regulatory agencies and are intended for use by potential home health patients or referring physicians in search of a qualified provider of home health services. A low re-hospitalization rate suggests that the agency as a whole is anticipating and managing the needs of its patient population and is, as in the case of patients with congestive heart failure, successfully contributing to both quality and cost for these patients across the continuum of care. Strategic use of the OASIS instrument as a tool for identifying positive predictors of the risk of re-hospitalization once patients with chronic disease are admitted to the agency may be key to developing care plans that focus available resources on mitigating the risk of being re-hospitalized.

Theoretical Perspective

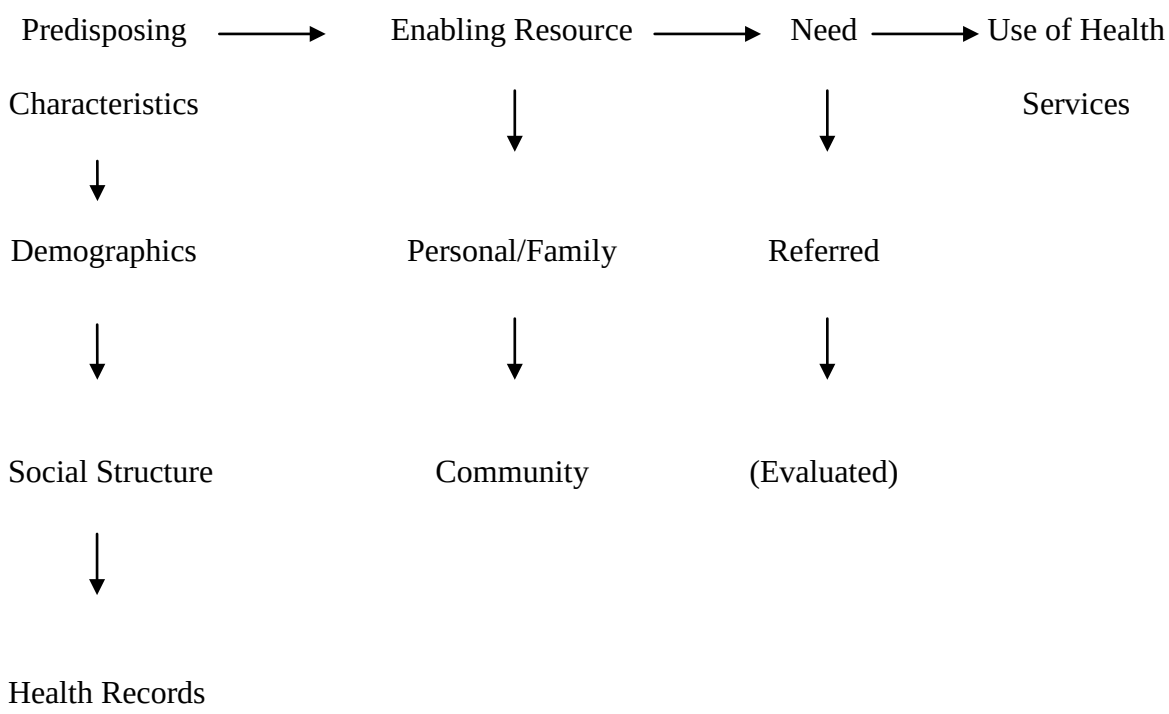
The Andersen Behavioral Model

Model Development

The initial behavioral model developed in the 1960s suggests that people's use of health services is a function of their predisposition to use services, factors that enable or impede access and the level of need for care. The model was originally designed to explain the use of personal health services rather than to focus on the interactions that take place as people access care or on health outcomes (Aday & Andersen, 1974).

Figure 2.1

The Initial Andersen Behavioral Model (1960's)



Phase II of the model was developed by Aday and other collaborators at the Center for Health Administration Studies, University of Chicago (Aday, Andersen & Fleming, 1980). This phase explicitly included the health care system recognizing the importance of health policy, resources, and the organization in the health system as important determinants of a population service use. Other developments included some elaboration on the measures of health services use, including those representing type, size, purpose, and coordinated services received in an episode of illness. Customer satisfaction was also added as an explicit outcome within the model since utilization studies need to examine use in the context of health outcome.

A third phase of the model evolved during the late eighties, spurred on by the explicit recognition that health services are supposed to have something to do with maintaining and improving the health status of the population, both as perceived by the population and evaluated by the professionals. This model now recognized the importance of personal health practices such as diet and exercise as interacting with the use of formal health services to influence health outcomes (Evans and Stodart, 1990). It also acknowledges physical, political and economic components as well. Health status outcomes were explicitly added in this phase which considers effective and efficient access. This is the model which appears the most in the literature. A fourth variation of the model has been emerging over the last decade which includes feedback loops showing that outcomes affect subsequent predisposing factors, perceived need for services and health behavior (Andersen, 1995). The fifth and last phase of the model stresses the understanding that health services use is influenced by both contextual and individual determinants. This phase also added the process of medical care as a type of health behavior (Andersen, 2008).

Model Components

Andersen's model suggests that the health care system or health policy influences population characteristics, which in turn influence health services use and subsequent outcomes. Both the problems of under-use as well as overuse of services can be viewed as issues associated with both efficient and effective access. The opportunity to understand outcomes can be framed in terms of contextual and individual variables, both including predisposing, enabling, and need components (Andersen, 1995).

Predisposing Characteristics

The initial Behavioral Model of the 1960s included demographic, social structure and health belief variables in the category of Predisposing Characteristics. Social structure is measured by an array of factors that determine the status of a person in the community, his or her ability to cope and how healthy the environment is likely to be. Traditional measures used to assess social structure include education, occupation and ethnicity . Health beliefs are attitudes, values and knowledge that people have about health and health services that might influence their subsequent perception of need and use of health services (Andersen, 1995).

If we examine beliefs about a particular disease, measure the need associated with that disease and observe the services received to deal with the disease, the relationship will probably be much stronger. The predisposing characteristics of the population at risk for re-hospitalization (patients with heart failure) include those that describe the propensity of these individuals to access services such as hospitalization to include age and gender, race, educational levels, employment status and general beliefs about the value of continued home care services versus hospitalization and knowledge of their disease (Phillips, Morrison, Andersen & Aday, 2000). Andersen (1995) suggests that age and gender represent biological imperatives implying the likelihood that people will need services.

Enabling Factors

Enabling resources include the means individuals have available to them for the use of services. Financial resources, such as family income or insurance coverage, as well as organizational resource (i.e., access to a regular source of care) are required. Both community and personal enabling resources must be present for use to take place. Health personnel and

facilities need to be available where people live and work. People must have both the means and the knowledge to use services. In addition to income, health insurance, a regular source of care, access to transportation and wait times are some of the measures that can be important here (Andersen, 1995).

Need Factors

Need refers to health status or illness as a prediction of health service use such as hospitalization (Aday, L., 1993). The need for care may either be perceived by the individual or evaluated by a provider and reflected in a diagnosis. Evaluated need represents a professional's judgment about someone's health status and their need for medical care (Andersen, 1995), and is the concept of need included in the model in this study. Need has consistently been shown to be the best predictor of health services utilization (Andersen & Aday, 1978; Madigan, Tullai-McGuiness & Neff, 2002; Madigan et al, 2012). Krumholz, Chen, Wang, Vaccarro, Radford, and Horwitz, (2000) found four main need level factors to be associated with readmissions to a hospital within six months of discharge. These factors were: having a) a prior admission within the last year, b) prior heart failure, c) a co-morbid condition of diabetes, and d) a creatinine level greater than 2.5 mg/dl at discharge. Their study found that those patients with three or four predictors had up to a 59% readmission rate. Schwarz (2000) examined whether low social support and low satisfaction with social support were predictive of hospital readmissions for older adults. This study found that the receipt of tangible goods such as care from caregivers was negatively associated with re-hospitalization. The need variables being used in this study are evaluated needs and include the level of dyspnea being reported upon admission, limitations in mobility, the capacity to manage medications, a diagnosis of heart failure and relevant

comorbidities.

Outcomes

According to Andersen (1995) outcome measures fall into these categories: mortality, morbidity, and health status. The health outcomes of perceived health status, evaluated health status, and patient satisfaction are the specific outcomes associated with these categories. In its most recent versions (Andersen, 1995; Madigan, 2002), the model has been expanded to include environmental characteristics, health behaviors, and outcomes while retaining the population characteristics. Acute Care hospitalizations during a Medicare home health episode is a major adverse outcome, but little has been published about patient level risk factors for hospitalization (Fortinsky et al., 2014). This study incorporates hospitalization at the individual level as an outcome variable, reflecting the addition of patient outcomes to the most recent version of the Andersen model (Fortinsky et al, 2006).

Mutability

Mutability refers to those variables which can be modified to affect utilization. Variables may have high, moderate, or low mutability (Andersen & Newman, 1973).

Demographic variables have low mutability as do social structure variables. Health beliefs are believed to have medium mutability while enabling variables are considered high and can be strongly associated with utilization (Andersen, 1995). Need was originally considered not to be a mutable variable but rather the immediate reason for use to take place. However, people's perceived use for care may be increased or decreased through health education programs, changing their financial incentives to seek service, etc. Similarly, evaluated needs or those

identified by the health care provider might be altered to influence use.

Criticisms of the Andersen Model

Both Mechanic (1979) and Rundall (1981) questioned whether the model was intended to predict use or explain it. Andersen (1995) intended it to do both. The model has also been criticized for not paying enough attention to social networks, interaction and culture (Portes, Kyle & Eaton, 1992). Social psychologists have been concerned that health beliefs have not been appropriately conceptualized although they do provide one means of explaining how social structure might influence enabling resources, perceived need and subsequent use (Mechanic, 1979). Bradley et al (1998), expressed concern about the role of psycho-social factors in long term care as health beliefs have not been examined in the context of older adults and the belief concerns behind the need to access assistance for activities of daily living. Bradley et al (1998) also noted that the interrelationship between the predisposing, enabling, and need variables also needed to be considered in evaluating how these factors affected health services use.

Another concern found in the literature about enabling factors is that organizational factors are not given enough attention (Gilbert, Branch, & Longmate, 1993). Knowing more about the various types of medical providers and how care is organized could improve our ability to explain and predict its use. Another expressed concern is that the more precise measures of health insurance benefit that have been used with the model are actually critical to do justice to the potential importance of the personal enabling resources (Mechanic, 1979).

Critics of the model have also been concerned that it overemphasizes the importance of need at the expense of health beliefs and social structures (Mechanic, 1979; Wolinsky & Johnson, 1991). But according to Andersen (1995) perceived need is largely a social

phenomenon which, when appropriately modeled should itself be largely explained by social structure and health belief. However, within broad limits established by predisposing and enabling factors there is a biological imperative that accounts for some people's consumption of health services (Hulka & Wheat, 1985). The biological imperative of need is perhaps better represented by the evaluated component of need (Andersen, 1995). Evaluated need represents professional judgment about people's health status and their need for medical care. Logical expectations of the model are that perceived need will better help us to understand care seeking and adherence to a medical regimen, while evaluated need will be more closely related to the kind and amount of treatment that will be provided after a patient has presented to a medical care provider (Andersen, 1995). Finally, there is concern over the extent to which the quality of social relationship plays a role (Pescosolido, 1992).

The original model was criticized for being too vague and general. More specific measures should relate to a particular condition, type of service or practitioner, or should be linked in an episode of illness. Acknowledging the benefit of more discreet measures to link particular measures to specific practitioners or to an episode of illness, Andersen (1995) argues that the more global measures do have a role to play, i.e. to affect health policy. When the model was developed increased utilization was a major policy goal as compared to present day where cost containment has become the major goal.

Application to Home Healthcare

The goal of this paper was to present the Andersen Behavioral Model as a comprehensive framework for a study of factors associated with the re-hospitalization of patients enrolled in an episode of home health care. The Andersen model offers a theoretical context within which to

view the variables found in the OASIS instrument within tested categories of variables common to most health care delivery sites as they relate to affecting re-hospitalization. This research will examine the variables that could influence a readmission with 60 days of enrollment into a home health episode of care. The health service utilization indicator, "re-hospitalization within 60 days" will be the dependent variable.

Theoretically, potentially preventable hospitalizations are a group of hospital episodes that could have been treated in a non-acute care environment at the appropriate time, if the appropriate care is presented and the patient responds. In general, the Andersen framework suggests that those predisposing, enabling and need characteristics that are inversely associated with the utilization of hospital care are expected to be associated with an increased likelihood of experiencing an avoidable admission (Culler, Parchman & Przybylski, 1998).

By determining the relationship between certain variables and the outcome of admissions to the hospital, home care managers and clinicians may be able to target resources to appropriate patients upon admission to an episode of home health. When viewed as an environmental variable according to the Andersen (1995) model, improved clinical prognostic capability among admitting staff can lead home care agencies to refine communication among home care team members with the goal of minimizing re-hospitalization and thereby improving the quality of care for Medicare patients (Fortinsky, et al, 2006).

The Andersen Model has been used in home health research looking at health services use by older persons in rural areas (Dansky, Brannon, Shea, Vasey & Divani, 1998), resource consumption and the relation to outcome (Fortinsky & Madigan, 1997), the variables associated with home health care utilization (Kadushin, 2004 ;Wong, Chow, Chung, Cheng, Chan, & Lee, et al., 2008, Riggs, Madigan & Fortinsky, 2011; Madigan, Gordon, Fortinsky, Koroukian, Pina &

Riggs, 2012), the relationship of ethnicity to long-term care use (Mui & Burnette, 1994), to describe re-admissions before and after implementation of prospective payment for home health (Anderson, Clarke, Helms & Foreman, 2005), and predictors of hospital readmission for all patients enrolled in an episode of home health care (Rosati, et al, 2003; Fortinsky, Madigan, Sheehan, Tullai-McGuinness & Fenster, 2006).

Gaps in the Research

This review of the home health outcome literature synthesizes the findings of 150 empirical research reports and 18 government reports into categories pertaining to the state of outcomes research today with an emphasis on chronic disease and heart failure and its relationship to re-hospitalization rates in home health agencies. It includes a description of how the home health industry gathers and reports clinical outcome data and provides background on the significance re-hospitalization plays in this work.

A significant portion of the home health outcomes literature addresses utilization and its effects on outcomes of care as a result of the CMS-led implementation of the Outcomes Based Quality Improvement initiative in 1998 in tandem with the first major reimbursement methodology change in the Medicare reimbursement of home health services in over 20 years. Most of these studies compared reported outcomes pre- and post-payment system design changes out of concern for quality declines as a result of financial changes. Another major area of research in the outcomes literature was on the psychometric properties of the OASIS instrument. These studies will be discussed in the methods section. The remainder of the literature looks at improving and measuring outcomes. The overwhelming majority of the studies used data gleaned from the OASIS instrument. A few used data from other instruments including the

Probability of Readmission instrument, the MDS for Home Care and the Hospital Readmissions Inventory. All but 6 of the studies used regional or state level databases for their studies.

While the OASIS-derived databases are considered the most representative samples of home health outcomes in existence, studies using data gathered by non-researcher clinicians prior to 2004 should be examined closely due to interrater reliability problems which are well documented in the literature. Most of the studies published on outcomes post-PPS address data obtained from the first few years of PPS. National training efforts organized and funded by CMS did not begin until 2002 and include the scope of work for CMS-funded quality improvement organizations (QIOs) focused on training home health agency staff in using OASIS-derived outcome reports to improve outcomes.

It is concerning that few if any studies from the outcomes literature look specifically at clinical outcomes for home health patients with chronic disease who get hospitalized (Madigan et al., 2008; Madigan, 2012). Consideration should be given to conducting analysis of predictions within specific diagnoses such as CHF. The growth of the telehealth industry has begun to fuel new studies, which are predominately focused at this time on patients with congestive heart failure. Most of the published material to date about these studies is found in the trade literature as informational pieces. Consequently, until this initiative generates sufficient interest to researchers around large data sets and other chronic disease groups and/or those patients living in the community with one or more chronic conditions and limitation in ADLs or IADLs, the literature will grow slowly.

The literature was absent any studies comparing the functional changes of chronic, long-term home health patients and acute, short-term patients. Few studies publish results that explain more than 50% of the variance which was seen. Most studies are small, or used data that would

be considered old (>7 years). Only the work being done at the Visiting Nurse Service of New York stands out as robust enough work on which to build future studies of use to clinicians who plan for the care needs of high risk patients in home health agencies.

There is limited current research on using home health care specific data like the OASIS and other patient information in predicting the risk of hospitalization. The ability to predict the risk of hospitalizations can help clinicians identify appropriate interventions for patients to potentially prevent hospitalizations. What literature that is available is consistent as to the value of enhanced care planning to differentiate between those who may need more intense services and those who may require less.

Significant contributions have been made in recent years in relation to re-hospitalizations being a key outcome. These studies look at whether or not predictive models can be built for use by clinicians when admitting patients to a home health episode of care to identify those patients at risk of re-hospitalization. These studies have begun to build on the work looking at re-hospitalizations from the acute care perspective concluding that targeted efforts on key predictors of risk which include the presence of one of four chronic disease diagnoses such as congestive heart failure upon admission. Results revealed that a combination of demographic, financial, clinical, and health status factors could accurately predict patients' likelihood for hospitalization (Fortinsky, et al., 2014).

The existing literature also suggests that possible predictors of the risk of hospitalization include demographic characteristics, severity of illness, the quality and quantity of home health services provided, the presence of one or more chronic conditions, complex medication regimes, and deficits in ADLs and IADLs.

Preventing re-hospitalization is identified throughout the literature as a major objective of

home health care. Accomplishing this goal is dependent on being able to identify patients at risk for hospitalization and intervening appropriately. Risk models can be developed to help home health providers focus on patients at risk and to intervene appropriately. Although risk models are most effective when all the weighted factors are combined for individual patients, general trends do emerge from the OASIS information readily available at intake which can be used in the development of care plans.

Perhaps more problematic in the existing literature is the lack of identifications of clear and useful policy strategies that might be useful in advocacy efforts to assure access by home and community-based older adults to home health services designed to help them independently manage chronic conditions in the home. Additional areas of study recommended throughout the body of research include evaluating the impact of disease management on re-hospitalization, the effect of clinical pathways on re-hospitalization and other clinically actionable interventions, and the effect of advanced practice nurses in the home setting on the avoidance of re-hospitalization.

Home health industry stakeholders such as state and national trade associations could develop tool kits of successful strategies for improving OASIS data reliability in the field. Stakeholders from all relevant clinical disciplines should be invited to work with the home health care industry to develop evidence-based quality improvements that reflect the process of home health care from specific medical conditions (Fortinsky & Madigan, 2004).

Many stakeholders in the home health care quality arena are state-level organizations. Opportunities exist to develop collaboration amongst these departments (QIO's, trade associations, clinical specialty sub-groups, surveying agencies and consumer groups).

Despite its criticisms, the structure and relationship of the variables in Andersen's model and their validity for use with home health recipients make this model a good choice for this

study (Fortinsky et al., 2014). All variables studied are accessible from the OASIS instrument and are pertinent to study within this framework. The variables are discussed as they are presented in the model for study (see Appendix "A").

Gaining a better understanding within this framework might also lead to suggestions for changing negative patterns of access (Ashton, 2008). The Andersen Behavioral Model, although developed to study determinants of acute care health services has been used frequently in studies of predisposing factors such as long-term care, age and ethnicity (Andersen, 1995; Bradley, McGraw, Curry, Buckser, King, Kasl & Andersen, 1998; Madigan, 2012; Fortinsky et al., 2014)

Enabling factors, such as family support and type of insurance may encourage or inhibit service use once illness has begun. Need factors which are now considered potentially mutable, refer to illness-related variables that may influence service use, such as the severity of clinical symptoms and functional disability (Aday & Andersen, 1974; Fortinsky, Madigan, Sheehan, Tullai-McGuiness, Fenster, 2006; Fortinsky et al, 2014).

This proposed study intends to build upon the existing body of science on factors affecting resource use/re-hospitalizations in home care and to address opportunities for application of the learning's and for future studies needed to address remaining gaps in our knowledge about preventing re-hospitalizations. As an overarching framework, the Andersen model and its dimensions of pre-disposing characteristics, enabling resources, and need provides direction for this work and a theoretical foundation for articulating the factors available within the OASIS document which may be predictive of the risk of re-hospitalization.

Vinson et al (1990), found that CHF precipitated by an acute myocardial infarction, uncontrolled hypertension, or a previous history of heart failure and previous admissions were significant predictors of readmission. They also found that patients who used multiple

medications were more likely to be admitted. The predisposing characteristics selected for this study are supported in the literature. They include age and gender (Fortinsky et al, 2006; Rosati, Huang, Navaie-Waliser & Feldman, 2003; Rosati & Huang, 2007; Anderson, Helms, Hansen & DeVilder, 1999; Rabiner, 1995; Wolinsky & Johnson, 1991; Soeken, Prescott, Herron & Creasia, 1991; Solomon, Wagner, Marenburg, Acampora, Cooney & Inouye, 1993) and residence (Fortinsky et al., 2014)

The enabling resources selected for study include type of caregiver who the patient lives with, and degree of dependence on others to manage medications. These measures have been found to be predictive of re-hospitalization in the home health literature on re-hospitalization (Fortinsky et al, 2006; Rosati et al, 2003; Andersen et al, 1996; Anderson et al, 1999; Bowles & Cater, 2003; Fortinsky et al., 2014).

The needs variables selected for inclusion into the model are well documented in both the home health literature on re-hospitalization as well as in the general literature. They include life expectancy, key diagnostic conditions, the presence of pain, functional impairments, and utilization of home health services (Madigan et al, 2002; Fortinsky et al, 2006; Hallerbach et al, 2008; Krumholtz et al, 2000; Rosati & Huang, 2007; Anderson, Levsen, Dusio, Bryant, Brown, Burr & Brown-Benn, 2006; Hoskins et al, 1999). The remaining need variables are primarily supported in the literature on home health re-admissions and include dyspnea, home health resource group (HHRG) and overall prognosis (Fortinsky et al, 2006; Rosati et al, 2003; Rosati & Huang, 2007; Bowles & Cater, 2003; Madigan et al, 2002) . Although functional disability and shortness of breath are well researched (Soeken et al, 1991; Culler et al, 1998; Madigan et al, 2002), life expectancy as gleaned from the OASIS instrument at Start of Care has not been studied and/or been determined as yet to be predictive of re-hospitalization.

The health behavior section of the model lists the health behaviors and resource use believed to be predictive of hospitalization. The variables of interest in this study are those reflective of resource use and will not address specific health behaviors as described by Andersen (1995).

Conclusion

Preventing re-hospitalization is one of the major objectives of home healthcare. Although hospitalization may be an unavoidable consequence due to declining health, the variation in the rates of home health agency risk adjusted rates for re-hospitalization across the country suggest a significant opportunity to prevent avoidable admissions (Rosati & Huang, 2007). Increasingly scarce resources of both human and financial capital and the impending advent of Pay for Performance or the bundling of post acute care payments (Mor, Intrator, Feng & Grabowski, 2010), make it imperative that home health agencies better manage high cost and quality sensitive patients such as those at risk for re-hospitalization. Improved clinical prognostic capability among admitting clinicians is essential to the creation of focused care plans and better communication among home care team members with the goal of minimizing re-hospitalizations in high risk patients (Fortinsky et al, 2006), and improving the quality of home care for Medicare patients.

CHAPTER 3: RESEARCH DESIGN AND METHODS

Research Design and Method

To address each of the study aims, a secondary analysis of administrative data was conducted utilizing a cross-sectional study design. The data for this non-experimental, descriptive correlational research study came from a large home health agency on the Central Coast of California that provides traditional intermittent home health care services to approximately 7,000 new patients per year. Approximately 60% of this agency's patient base are Medicare beneficiaries. Data was derived from the Outcomes and Assessment Information Set (OASIS), which is a compilation of assessment data, gathered at specific time points upon a patient enrolling into an episode of home health care. This assessment data was then linked to claims data available within the home health agency's claims history files.

Study Sample

The dataset received from the agency files included 100% of patients admitted and discharged or transferred from the home health agency between 2005 and 2008 (n= 8,940). To ascertain the sample for this dissertation study, the distribution of individuals for each OASIS item was examined with a specific focus on the descriptive statistics for the key predictor variable (re-hospitalization). The study sample was initially captured using the first start of care assessment data within the specified time frame. This parameter was further refined to consist of the first start of care assessment with either a transfer or discharge within a 60-day period.

Patients admitted less than 60 days from the end of the data period (12/31/08) were not counted (57) as it could not be assumed that a 60-day period had transpired. The sample was again reduced to exclude all patients with non-Medicare FFS as a payor (2602). An additional 42 were eliminated during the process of deleting the few variables with high correlations (> .60). Thus, the final study sample included 6,249 Medicare beneficiaries of whom 740 had a transfer (re-hospitalization) within 60 days of enrollment into home health. All patients included in the final sample resided in a private home or assisted living facility and had non-missing OASIS transfer data, the primary predictor variable of interest.

This next section will discuss the data sources and variables used in the proposed study.

Data Source

Research Aim #1 and #2

1) Describe the prevalence of re-hospitalizations by a population of patients in a large home health agency in California who are enrolled in an episode of home health care.
2) Examine the home health care recipient's sociodemographic and health-related characteristics that are associated with hospitalization and specifically determine how the risk of hospitalization varies by presence and severity of factors identified on the OASIS instrument completed upon admission to home health care.

The Outcomes and Assessment Information Set (OASIS) data based was used to address the proposed research aims #1 and #2.

Research Aim #3

3) Examine whether the risk of rehospitalization varies by the number and frequency of skilled nursing visits the patient received.

The Allscripts claims database will be used to address the proposed research aim #3.

OASIS Data Set

The OASIS data set is a comprehensive standardized assessment instrument in use since 1999. It is required for completion on all Medicare and Medicaid patients enrolled into a home health agency upon admission to the agency and upon discharge, renewal of a new 60 day plan of care and upon transfer to a facility while a patient of the home health agency (Bowles & Cater, 2003; Fortinsky, Madigan & Tullai-McGuinness, 2000). This federally mandated instrument must be completed within five days of enrollment to a Medicare episode of home health care. The OASIS was used to obtain the following patient level data for four years beginning January, 2005 through October, 2008: sociodemographics, cognitive status, evidence of depression, co-morbid conditions, ADL/IADL dependence, caregiver support, pain, presence of other medical conditions such as pressure ulcers, difficulty breathing, incontinence, capacity to manage meds, need for rehab and pain.

Variables under study: Study Aims #1, #2 & #3

Dependent Variable – Acute Care Hospitalization

OASIS data were used to determine which patients in the sample experienced a transfer within 60 days of enrollment to a home health episode of care. Dummy variables were used to identify those patients who had a hospitalization (coded Y = Yes hospital admission) and those patients without a hospitalization (coded O = No hospitalization).

Independent Variables

This study examined several patient level variables, many of which have been used in previous studies examining predictors of re-hospitalizations (Soeken, Prescott, Herron & Creasia, 1991; Anderson, Helms, Hanson & DeVilder, 1999; Hoskins, Walton-Moss, Clark, Schroeder & Thiel, 1999; Rosati & Huang, 2007; Madigan, Schott & Matthews, 2001).

The initial model included 75 predictor variables; each with 1-5 sub-level predictors. Several were excluded after examining the correlation metrics (omitted if 0.6+) and cross tabs where others were combined to create tighter categorical variables in order to create a cleaner model.

Table 3.1 lists the final 41 patient level predisposing, enabling, and need-related variables studied and includes the predicted direction of influence on re-hospitalization, the type of measure (i.e., categorical or continuous) and the source of data.

Table 3.1: Hypothesized relationships between the dependent variable, "re-hospitalization" and independent variables

POTENTIAL EXPLANATORY VARIABLES	TYPE OF MEASURE	SOURCE(S)	
Predisposing	**Type of Measure**	**Source**	**Direction of Prediction on Hospitalization**
Age Age 21-64 Age 65-75 Age >76+	Categorical	OASIS	 +/- + +
Gender Female Male	Categorical	OASIS	 - +
Ethnicity White Non-White	Categorical	OASIS	 - +
Enabling Variables	**Type of Measure**	**Source**	**Direction of Prediction on Hospitalization**
Caregiver Spouse or significant other Other	Categorical	OASIS	 - +
Lives with Alone Other	Categorical	OASIS	 + -
Residence Patient's Own Other	Categorical	OASIS	 - +
Med Management Independent Dependent	Categorical	OASIS	 - +

Table 3.1: Hypothesized relationships between the dependent variable, "re-hospitalization" and independent variables, cont.

POTENTIAL EXPLANATORY VARIABLES	TYPE OF MEASURE	SOURCE(S)	
Needs Characteristics	**Type of Measure**	**Source**	**Direction of Prediction on Hospitalization**
Anxiety Yes No	Caregiver	OASIS	+ -
Depression Yes No	Caregiver	OASIS	+ -
Vision Yes No	Continuous	OASIS	+ -
Speech Yes No	Continuous	OASIS	+ -
Hearing Yes No	Continuous	OASIS	+ -
Pain Interfering Activity Yes No	Categorical	OASIS	+ -
Intractable Pain Yes No	Categorical	OASIS	+ -
Dyspnea Yes No	Continuous	OASIS	+ -
Pressure Ulcer Yes No	Categorical	OASIS	+ -
UTI Yes No	Categorical	OASIS	+ -
Catheter Yes No	Categorical	OASIS	+ -
Bowel Incontinence Yes No	Continuous	OASIS	+ -
Skin Lesion Yes No	Categorical	OASIS	+ -
Cognitive Function Requires Assistance Alert and Oriented	Categorical	OASIS	+ -

Table 3.1: Hypothesized relationships between the dependent variable, "re-hospitalization" and independent variables, cont.

POTENTIAL EXPLANATORY VARIABLES	TYPE OF MEASURE	SOURCE(S)	
Needs Characteristics	**Type of Measure**	**Source**	**Direction of Prediction on Hospitalization**
Cardiovascular Yes No	Categorical	OASIS	+ -
Pulmonary Yes No	Categorical	OASIS	+ -
Gastro Intestinal Yes No	Categorical	OASIS	+ -
Skeletal Yes No	Categorical	OASIS	+ -
Cancer Yes No	Categorical	OASIS	+ -
Diabetes Yes No	Categorical	OASIS	+ -
Skin Yes No	Categorical	OASIS	+ -
CNS Yes No	Categorical	OASIS	+ -
Metabolic Yes No	Categorical	OASIS	+ -
Genito Urinary Yes No	Categorical	OASIS	+ -
Sub Dem Psych Yes No	Categorical	OASIS	+ -
Cerebrovascular Yes No	Categorical	OASIS	+ -
ADL > 2 < 2	Continuous	OASIS	+ -
IADL > 2 < 2	Continuous	OASIS	+ -
HHRG > 19 Therapy vs. < 19 vs.	Continuous	OASIS	+ -

Table 3.1: Hypothesized relationships between the dependent variable, "re-hospitalization" and independent variables, cont.

POTENTIAL EXPLANATORY VARIABLES	TYPE OF MEASURE	SOURCE(S)	
Utilization Characteristics	**Type of Measure**	**Source**	**Direction of Prediction on Hospitalization**
Life Expectancy < 6 Months > 6 Months	Categorical	OASIS	+ -
Respiratory Therapy Yes – On Oxygen No – Not on Oxygen	Categorical	OASIS	+ -
All Nurse Visit (14d) 0-3 4-6 7-9 10-33	Interval	Agency Level Claims Files	- - +/- +
All Non-Nurse Visit (14d) 0-3 4-6 7-9 10-33	Interval	Agency Level Claims Files	- - +/- +

Predisposing Characteristics

Predisposing factors are attributes that exist prior to the onset of illness but may still influence service use. The predisposing characteristics selected for this study are supported in the literature. They include age and gender (Fortinsky et al., 2006; Rosati et al., 2003; Rosati & Huang, 2007; Anderson et al., 1999; Soeken, Prescott, Herron & Creasia, 1991; Solomon, Wagner, Marenbrg, Acampora, Cooney & Inouye, 1993) and ethnicity (Mui & Burnet, 1994).

Enabling Factors

Enabling resources include the means individuals have available to them for the use of services. Financial resources, such as family income or insurance coverage, as well as organizational (i.e., access to a regular source of care) are required. Both community and personal enabling resources must be present for use to take place. Health personnel and facilities

need to be available where people live and work. People must have both the means and the knowledge to use services. In addition to income, health insurance, a regular source of care, access to transportation and wait times are some of the measures that can be important, although most are not on the OASIS instrument (Andersen, 1995). The enabling resource items used in this study are type of caregiver, the type of residence and whether the patient lives alone, and the capacity to manage medications.

The initial Andersen Behavioral Model included just the patient level predisposing, enabling and need characteristics categories. Categories for environmental variables such as those reflecting health system contextual variables were added after the initial research (Andersen & Newman, 1973). Healthcare system characteristics are factors such as the policies of the organization, which influence accessibility, and the utilization of services. Community-level enabling variables include those attributes such as accessibility of the medical community after hours that enable the individual to access the most appropriate level of service (Anderson & Davidson, 1996). Provider level variables, although not specifically called out in the original model, are similar to environmental variables in that they measure the context within which utilization occurs such as provider auspice which could affect utilization (Phillips, Morrison, Andersen & Aday, 1998; Madigan, Schott & Matthews, 2001). Provider level variables and environmental variables were not included in the model used in this study.

The inclusion of contextual variables has implications relative to setting up the research study. First, environmental variables are often measured at the aggregate level when patient level characteristics are measured at the individual level. Second, the components of the model should vary depending on the type of utilization being studied; i.e., provider level variables may inform more about how care is provided as compared to explaining why individuals seek care

(Andersen, 1995). Third, contextual variables tend to have complex relationships with other variables as well as direct associations with utilization making the choice of analytical model more complicated (Phillips et al, 1998). The same tends to be true when the model includes the feedback loops. According to Phillips, Morrison, Andersen and Aday (1998), the choice to use the environmental and provider level variables in the research model depends on the research question and the availability of data. The independent variables of concern in this study are dependent on OASIS and Medicare claims data and can best be studied using the initial Behavioral model without contextual variables or feedback loops.

Need Characteristics

Need factors are typically disease related such as clinical severity and functional disability. Environmental factors may include factors such as a patient's rehabilitative prognosis or a healthcare facility's organizational structure (Fortinsky et al., 2006; Andersen, 1995). Need refers to health status or illness as a predictor of health service use such as hospitalization (Aday, 1993; Terry, 2004). Evaluated need represents a professional's judgment about someone's health status and their need for medical care (Andersen, 1995), and is the concept of need included in the model for this study. Need has consistently been shown to be the best predictor of health services utilization (Andersen & Aday, 1978).

Krumholz, Chen, Wang, Vaccarro, Radford, and Horwitz (2000) found four main need level factors to be associated with readmissions to a hospital within six months of discharge. These factors were: having a) a prior admission within the last year, b) prior heart failure, c) a co-morbid condition of diabetes, and d) a creatine level greater than 2.5mg/dl at discharge. Their study found that those patients with three or four predictors had up to a 59% readmission rate.

The needs variables selected for inclusion into the model are well documented in both the home health literature on re-hospitalization as well as in the general literature. They also include the presence of multiple chronic conditions (Madigan et al., 2002; Fortinsky et al., 2006) including chronic renal insufficiency (Hallerbach, Francoeur, Pomerantz, Oliner, Morris, Eiger, Cohn & Goldfinger, 2008; Krumholtz et al., 2000; Rosati & Huang, 2007; Anderson et al., 2006; Hoskins et al., 1999), pain interfering with activity, the capacity to manage medications and deficits in speech, hearing or vision. The remaining need variables are primarily supported in the literature on home health re-admissions and include functional disability, dyspnea, home health resource group (HHRG), the number and type of home health visits provided and overall prognosis (Fortinsky et al., 2006; Rosati et al., 2003; Rosati & Huang, 2007; Bowles & Cater, 2003; Madigan et al., 2002). Although functional disability and shortness of breath are well researched (Soeken et al., 1991; Culler et al., 1998; Madigan et al., 2002), life expectancy as gleaned from the OASIS instrument at start of care has not been studied and/or been determined as yet to be predictive of re-hospitalization.

Data Analysis

To accomplish the aims of the study, assessments and administrative claims data were obtained for the home health agency first and a database with the variables was constructed. Data were cleaned and codes were labeled to align with the OASIS nomenclature.

Descriptive statistics were used to describe the study sample and logistic regression was used to estimate the dichotomous dependent variables. Logistic model results are presented as adjusted odds ratios with 95% confidence intervals (CIs).

Missing Data

Files received from the agency were examined for missing data. Those records with missing data in regard to the dependent variable were excluded from analysis. Records were then examined for missing independent variables and a decision was made to input or omit the variable or use alternate approaches.

Missing data for dichotomous independent variables such as diagnoses, prognosis, etc. were labeled as "O" assuming that the condition or variable was not present if it was not marked. Lastly, there was a fair amount of missing data from embedded scripting in the OASIS assessment. Missing data for this reason was determined not to be missing. Logistic model results are presented as adjusted odds ratios with 95% confidence intervals.

Analytic Methods

The risk models used to report quality measures for the CMS Home Health Compare website take into account patient health status and other patient characteristics measured at admission to home health care that may affect patient outcomes. They provide the means to predict the probability that an individual patient will experience a specific outcome and to calculate an expected outcome rate for a home health agency. The logistic regression coefficient and corresponding odds ratio listed next to each risk factor indicate the strength and the direction of the relationship between the risk factor and the outcome, controlling for the effects of other risk factors. When the odds ratio exceeds one, the presence of that risk factor (or a higher scale value for that risk factor) increases the likelihood of the outcome occurring. (See Appendix "A").

Descriptive statistics were utilized to describe the population of home health patients who experienced a re-hospitalization during the first 60 day episode of home health care between the

years 2005 and 2008 inclusive, and those who did not experience a re-hospitalization. Frequency, percent, and measures of central tendency were employed to summarize the characteristics of the sample and evaluate the data.

A multivariate logistic regression analyses was conducted to determine the risk of hospitalization associated with each patient-level variable. The extent of multicollinearity among independent variables was evaluated prior to testing the logistic regression model. Dummy variables were constructed for all categorical independent variables and the full model was tested using all patient-level independent variables.

Simple logistic regressions were run to identify the independent variables having a significant association with the dependent variable, re-hospitalization. Those with a statistically significant univariate relationship were used in the multivariate regression model. The strength of the relationship between each independent variable and the dependent variable is expressed by the correlation coefficient that is produced by the odds ratio by simple logistic regression.

A multiple linear logistic regression analyses was estimated to identify risk factors related to the likelihood of hospitalization within the 60 days of home care admission. The mathematic equation related to the logistic regression model was formulated and has the general form:

$$yi = \beta o + \beta_1 \chi_1 + \beta_2 \chi_2 + \beta_3 \chi_3$$

Where:

yi = risk of re-hospitalization

χ_1 = variables representing home health patient predisposing variable/ characteristics

χ_2 = variables representing home health patient enabling variables/characteristics

χ_3 = variables representing home health patient need characteristics

Hypotheses:

The following directional hypotheses will be evaluated in this study:

H_1: There will be a lower re-hospitalization rate for this study's population as compared to the national average of 25%.

H_2: There will be differences in the presence and severity of risk factors identified on the OASIS instrument for patients with and, without a re-hospitalization.

H_3: There will be a lower rate of re-hospitalization for patients with higher Nursing visits/episodes.

Research Aim # 1

Describe the prevalence of re-hospitalizations by a population of patients in a large home health agency in California who are enrolled in an episode of home health care.

Descriptive statistics were used to characterize the sample of home health patients who were hospitalized. Frequency, percent and measures of central tendency were used to summarize the characteristics of the sample and to evaluate the data. Frequency counts, chi-square and p-values tests were calculated to compare the proportion of patients who were hospitalized and who did not experience a hospitalization.

Research Aim # 2

Examine the home health care recipient's sociodemographic and health-related characteristics that are associated with hospitalization and specifically determine how the risk of hospitalization varies by presence and severity of factors identified on the OASIS instrument completed upon admission to home health care.

Multivariable logistic regression analysis was performed to estimate the effect of home health patient sociodemographic and health related characteristics or the likelihood of hospital readmission.

According to LaPlante (2010), differential item functioning (DIF) occurs when population groups have significantly different probabilities of responding to an item such as when responding to IADL and ADL scales based on measured levels of disability. Age and gender-related DIF may occur with IADL/ADL scaling and controversy now exists about the unidimentionality of IADL/ADLs. According to LaPlante (2010), a greater use of combined ADL/IADL measures in age-related research such as research looking at variables affecting hospitalization in Medicare eligible populations, should be used. This study creates combined variables useful for describing disability in light of the large numbers of need variables taken from the OASIS instrument found in Appendix B.

Based on the study hypothesis, it was expected that the study sample re-hospitalization rate would be at or below the national average of 25%. In addition, it was anticipated that there would be differences in home health recipient sociodemographic and health-related characteristics between those admitted and not admitted to the hospital.

Research Aim #3:

Examine whether the risk of re-hospitalization varies by the number and frequency of skilled nursing visits the patient received.

The Allscripts patient claims database will be added to the OASIS database in order to examine the relationship between the number and frequency of skilled nursing visits and re-hospitalization. Logistic regression analysis will be conducted to estimate the effect of nursing

visits on total readmissions and avoidable readmissions. Based on the study's hypothesis, it was anticipated that there would be higher rates of hospitalization among home health recipients who received fewer nursing visits than those who received more.

Protection of Human Subjects

The proposed study involves secondary data analysis of de-identified Medicare OASIS data, therefore there will be no contact with subjects and no risk to the privacy of individual beneficiaries. This data meets the requirements for "exempt categories" of research. Category 4 exception was obtained from the Committee on Human Research (CHR) at the University of California, San Francisco.

CHAPTER 4: RESULTS

Study Overview

A review of the literature revealed numerous hospitalization studies about risk assessment. Forty-four articles were found in a new study published by Monsen, Swanberg, Oancea and Westra (2012) to include reference to patient risk of hospitalization of home health recipients.

This chapter will present the findings of this study. The discussion that follows provides descriptive information about the study's sample characteristics. Descriptive statistics display dichotomous variables as percents, and means and standard deviations for the continuous variables. Age is presented as a categorical variable. Fisher's Exact was used to compare those patients who were readmitted to the hospital to those who were not. A Chi-square analysis was performed to confirm the integrity of the entire model. Finally, the findings of the logistic regression on the dependent variable, readmission, is presented within the conceptual framework of the Andersen model (predisposing, enabling, need and utilization variables). Logistic model results are presented as odds ratios (AOR) with 95% confidence intervals (CI).

The overarching aim of this study was to examine the relationship of routinely available OASIS admission data on patient level acute care hospitalization outcomes in patients receiving Medicare Home Health services. The specific aims included: 1) Describe the prevalence of re-hospitalizations by a population of patients in a large home health agency in California who are enrolled in an episode of home health care; 2) Examine the home health care recipients

sociodemographic and health-related characteristics that are associated with hospitalization and specifically determine how the risk of hospitalization varies by presence and severity of factors identified on the OASIS instrument completed upon admission to home health care and 3) Examine whether the risk of re-hospitalization varies by the number and frequency of skilled nursing visits the patient received.

This non-experimental, correlational, cross-sectional study used data from a large home health agency on the Central Coast of California which was able to provide a large enough secondary dataset (N = 6,249) for study. Table 2.1 presents the descriptive table and presents the percentages in the context of the Andersen Behavioral Model framework.

Descriptive Results

Sample

Table 4.1 shows the number and percentage of the variables used in this study. The initial sample was 8,880 patients. Almost three quarters of the original sample had a payment source of traditional Medicare, followed by commercial insurance (11.58%), Medicare Health Maintenance Organization (HMO) coverage (11.3%). The remainder was state Medi-Cal and Managed Medi-Cal (6.8%). After removing those who did not meet study criteria, 6,249 remained. Study exclusion criteria included: a) patients who only had an initial assessment without any follow-up visits, b) patients with more than one 60-day episode of care, and c) patients with other than Medicare as their primary insurance. In the final study sample, all patients have a payor source of Medicare fee for service.

Table 4.1: Descriptive Tabulations of Variables Used in Logistic Regression

RowVar	RowVal	No		Yes		Total		Statistic	P-VALUE
GENDER	Male	2206	(86.6%)	340	(13.4%)	2546	(40.7%)	Fisher's exact	0.0024
	Female	3303	(89.2%)	400	(10.8%)	3703	(59.3%)		
ETHNICITY	Non-White	851	(86.5%)	133	(13.5%)	984	(15.7%)	Fisher's exact	0.0850
	White	4658	(88.5%)	607	(11.5%)	5265	(84.3%)		
RESIDENCE	Patients own or rented residence	4400	(88.1%)	593	(11.9%)	4993	(79.9%)	Fisher's exact	0.8800
	Other	1109	(88.3%)	147	(11.7%)	1256	(20.1%)		
LIVEWITH	Alone	1298	(89.9%)	146	(10.1%)	1444	(23.1%)	Fisher's exact	0.0200
	Other	4211	(87.6%)	594	(12.4%)	4805	(76.9%)		
CAREGIVER	Spouse or S/O	2060	(88.1%)	278	(11.9%)	2338	(37.4%)	Fisher's exact	0.9400
	Other	3449	(88.2%)	462	(11.8%)	3911	(62.6%)		
LIFEEXPECTANCY	Greater than 6 months	4779	(89.1%)	585	(10.9%)	5364	(85.8%)	Fisher's exact	<.0001
	6 months or fewer	730	(82.5%)	155	(17.5%)	885	(14.2%)		
COGNITIVEFUNCTION	Requires assistance	1668	(86.3%)	265	(13.7%)	1933	(30.9%)	Fisher's exact	0.0026
(Cognitive	Alert and oreinted	3841	(89.0%)	475	(11.0%)	4316	(69.1%)		
functioning)									
ANXIETY	None	3551	(89.3%)	426	(10.7%)	3977	(63.6%)	Fisher's exact	0.0003
	Less than daily to daily	1958	(86.2%)	314	(13.8%)	2272	(36.4%)		
DEPRESSION	None	4406	(89.2%)	534	(10.8%)	4940	(79.1%)	Fisher's exact	<.0001
	Depressed mood	1103	(84.3%)	206	(15.7%)	1309	(20.9%)		
VISION	Normal	4759	(88.7%)	608	(11.3%)	5367	(85.9%)	Fisher's exact	0.0028
(Vision impairment)	Some impairment	750	(85.0%)	132	(15.0%)	882	(14.1%)		
SPEECH	No impairment	4235	(88.7%)	539	(11.3%)	4774	(76.4%)	Fisher's exact	0.0160
(Speech/language	Mild to severe	1274	(86.4%)	201	(13.6%)	1475	(23.6%)		
impairment)									
HEARING	No impairment	3877	(88.7%)	492	(11.3%)	4369	(69.9%)	Fisher's exact	0.0330
(Hearing impairment)	Demonstrates some impairment	1632	(86.8%)	248	(13.2%)	1880	(30.1%)		
PAININTERFERING	None	1999	(88.4%)	263	(11.6%)	2262	(36.2%)	Fisher's exact	0.7100
(Pain that	Infrequent to constant	3510	(88.0%)	477	(12.0%)	3987	(63.8%)		
interferes with									
activity)									
INTRACTABLEPAIN	No	4928	(88.4%)	644	(11.6%)	5572	(89.2%)	Fisher's exact	0.0510
(Intractable pain)	Yes	581	(85.8%)	96	(14.2%)	677	(10.8%)		
DYSPNEA	No	2973	(91.2%)	286	(8.8%)	3259	(52.2%)	Fisher's exact	<.0001
	with ambulation and ADL	2536	(84.8%)	454	(15.2%)	2990	(47.8%)		

Table 4.1: Descriptive Tabulations of Variables Used in Logistic Regression, cont.

RowVar	RowVal	No		Yes		Total		Statistic	P-VALUE
PRESSUREULCER	No	3349	(89.6%)	389	(10.4%)	3738	(59.8%)	Fisher's exact	<.0001
(Pressure ulcer)	Yes	200	(80.0%)	50	(20.0%)	250	(4.0%)		
	N/A	1960	(86.7%)	301	(13.3%)	2261	(36.2%)		
UTI	No	5005	(88.2%)	667	(11.8%)	5672	(90.8%)	Fisher's exact	0.5400
(Urinary tract	Yes	504	(87.3%)	73	(12.7%)	577	(9.2%)		
infection									
CATHETER	No	3395	(89.2%)	412	(10.8%)	3807	(60.9%)	Fisher's exact	0.0020
	Incontinent/incontinent with cathe	2114	(86.6%)	328	(13.4%)	2442	(39.1%)		
BOWELINCONTINENC	No	4970	(88.8%)	628	(11.2%)	5598	(89.6%)	Fisher's exact	<.0001
(Bowel incontinence)	Yes	539	(82.8%)	112	(17.2%)	651	(10.4%)		
MEDMANAGEMENT	Independent or N/A	2270	(91.0%)	224	(9.0%)	2494	(39.9%)	Fisher's exact	<.0001
	Dependent	3239	(86.3%)	516	(13.7%)	3755	(60.1%)		
RESPIRATORYTHERAP	Yes, on oxygen or other supplemen	737	(80.6%)	177	(19.4%)	914	(14.6%)	Fisher's exact	<.0001
(Respiratory	No oxygen	4772	(89.4%)	563	(10.6%)	5335	(85.4%)		
treatments)									
CARDIOVASCULAR	No	3321	(89.5%)	390	(10.5%)	3711	(59.4%)	Fisher's exact	<.0001
	Yes	2188	(86.2%)	350	(13.8%)	2538	(40.6%)		
PULMONARY	No	4446	(89.2%)	540	(10.8%)	4986	(79.8%)	Fisher's exact	<.0001
	Yes	1063	(84.2%)	200	(15.8%)	1263	(20.2%)		
GATROINTESTINAL	No	5015	(88.4%)	657	(11.6%)	5672	(90.8%)	Fisher's exact	0.0500
	Yes	494	(85.6%)	83	(14.4%)	577	(9.2%)		
SKELETAL	No	3315	(85.9%)	543	(14.1%)	3858	(61.7%)	Fisher's exact	<.0001
	Yes	2194	(91.8%)	197	(8.2%)	2391	(38.3%)		
CANCER	No	4982	(89.3%)	598	(10.7%)	5580	(89.3%)	Fisher's exact	<.0001
	Yes	527	(78.8%)	142	(21.2%)	669	(10.7%)		
DIABETES	No	4569	(88.9%)	569	(11.1%)	5138	(82.2%)	Fisher's exact	<.0001
	Yes	940	(84.6%)	171	(15.4%)	1111	(17.8%)		
SKIN	No	5006	(89.1%)	610	(10.9%)	5616	(89.9%)	Fisher's exact	<.0001
	Yes	503	(79.5%)	130	(20.5%)	633	(10.1%)		
CNS	No	5018	(88.1%)	676	(11.9%)	5694	(91.1%)	Fisher's exact	0.8900
	Yes	491	(88.5%)	64	(11.5%)	555	(8.9%)		
METABOLIC	No	5078	(88.3%)	673	(11.7%)	5751	(92.0%)	Fisher's exact	0.2500
	Yes	431	(86.5%)	67	(13.5%)	498	(8.0%)		
GENITOURINARY	No	4916	(88.4%)	644	(11.6%)	5560	(89.0%)	Fisher's exact	0.0800
	Yes	593	(86.1%)	96	(13.9%)	689	(11.0%)		
SUBDEMENTIAPSYCH	No	5181	(88.1%)	698	(11.9%)	5879	(94.1%)	Fisher's exact	0.8700
	Yes	328	(88.6%)	42	(11.4%)	370	(5.9%)		
CEREBROVASCULAR	No	5065	(87.7%)	711	(12.3%)	5776	(92.4%)	Fisher's exact	<.0001
	Yes	444	(93.9%)	29	(6.1%)	473	(7.6%)		

Table 4.1: Descriptive Tabulations of Variables Used in Logistic Regression, cont.

RowVar	RowVal	No		Yes		Total		Statistic	P-VALUE
ADL	< 2	4751	(89.1%)	579	(10.9%)	5330	(85.3%)	Fisher's exact	<.0001
(Mean ADL	2+	758	(82.5%)	161	(17.5%)	919	(14.7%)		
dichotomized)									
IADL	< 2	4025	(89.2%)	489	(10.8%)	4514	(72.2%)	Fisher's exact	<.0001
(Mean IADL	2+	1484	(85.5%)	251	(14.5%)	1735	(27.8%)		
dicotomized)									
HHRG3	< 13 rehab visits	4256	(87.7%)	595	(12.3%)	4851	(77.6%)	Fisher's exact	0.1600
	> 13 rehab visits	1211	(89.6%)	141	(10.4%)	1352	(21.6%)		
	> 19 rehab visits	42	(91.3%)	4	(8.7%)	46	(0.7%)		
AGEGROUP	21-64	527	(85.6%)	89	(14.4%)	616	(9.9%)	Fisher's exact	0.0880
	65-75	1632	(88.9%)	204	(11.1%)	1836	(29.4%)		
	76+	3350	(88.2%)	447	(11.8%)	3797	(60.8%)		
ALL NON-NURSE	0-3	2647	(83.0%)	543	(17.0%)	3190	(51.0%)		<.0001
VISITS	4-6	1597	(92.5%)	129	(7.5%)	1726	(27.5%)		
	7-9	956	(95.4%)	46	(4.6%)	1002	(16.0%)		
	10-33	312	(93.4%)	22	(6.6%)	334	(5.5%)		
ALL NURSE VISITS	0-3	3199	(89.1%)	390	(10.9%)	3589	(57.4%)		<.0009
	4-6	1900	(88.2%)	254	(11.8%)	2154	(34.5%)		
	7-9	268	(83.8%)	52	(16.2%)	320	(5.1%)		
	10-33	142	(76.3%)	44	(23.7%)	186	(3.0%)		

The sample was somewhat disproportionate based on gender (59.3% females). Ethnicity was predominantly white (84.3%). 79.9% were found to live in their own homes. There were 740 readmissions in this sample within the first 60 days of admission to the home health agency.

Table 4.2 organizes the descriptive characteristics by predisposing, enabling, and need variables. The utilization variable, “visits” will be discussed later in the chapter.

Table 4.2: Predisposing, Enabling, and Need Variables

VARIABLE	VALUE	TOTAL		P-VALUE
PREDISPOSING				
GENDER	Male	2546	(40.7%)	0.0024
	Female	3703	(59.3%)	
ETHNICITY	Non-White	984	(15.7%)	0.0850
	White	5265	(84.3%)	
AGEGROUP	21-64	616	(9.9%)	0.0880
	65-75	1836	(29.4%)	
	76+	3797	(60.8%)	
ENABLING				
LIVEWITH	Alone	1444	(23.1%)	0.0200
	Other	4805	(76.9%)	
CAREGIVER	Spouse or S/O	2338	(37.4%)	0.9400
	Other	3911	(62.6%)	
MEDMANAGEMENT	Independent or N/A	2494	(39.9%)	<.0001
	Dependent	3755	(60.1%)	
RESIDENCE	Patients own or rented residence	4993	(79.9%)	0.8800
	Other	1256	(20.1%)	
NEED				
LIFEEXPECTANCY	Greater than 6 months	5364	(85.8%)	<.0001
	6 months or fewer	885	(14.2%)	
COGNITIVEFUNCTION	Requires assistance	1933	(30.9%)	0.0026
(Cognitive functioning)	Alert and oreinted	4316	(69.1%)	
ANXIETY	None	3977	(63.6%)	0.0003
	Less than daily to daily	2272	(36.4%)	
DEPRESSION	None	4940	(79.1%)	<.0001
	Depressed mood	1309	(20.9%)	
VISION	Normal	5367	(85.9%)	0.0028
(Vision impairment)	Some impairment	882	(14.1%)	

Table 4.2: Predisposing, Enabling, and Need Variables, cont.

VARIABLE	VALUE	TOTAL		P-VALUE
NEED, cont.				
SPEECH	No impairment	4774	(76.4%)	0.0160
(Speech/language impairment)	Mild to severe	1475	(23.6%)	
HEARING	No impairment	4369	(69.9%)	0.0330
(Hearing impairment)	Demonstrates some impairment	1880	(30.1%)	
PAININTERFERING	None	2262	(36.2%)	0.7100
(Pain that interferes with activity)	Infrequent to constant	3987	(63.8%)	
INTRACTABLEPAIN	No	5572	(89.2%)	0.0510
(Intractable pain)	Yes	677	(10.8%)	
DYSPNEA	No	3259	(52.2%)	<.0001
	with ambulation and ADL	2990	(47.8%)	
PRESSUREULCER	No	3738	(59.8%)	<.0001
(Pressure ulcer)	Yes	250	(4.0%)	
	N/A	2261	(36.2%)	
UTI	No	5672	(90.8%)	0.5400
(Urinary tract infection)	Yes	577	(9.2%)	
CATHETER	No	3807	(60.9%)	0.0020
	Incontinent/incontinent with cathe	2442	(39.1%)	
BOWELINCONTINENCE	No	5598	(89.6%)	<.0001
(Bowel incontinence)	Yes	651	(10.4%)	
THERAPYREFERRAL	No	5018	(80.3%)	0.0140
(Therapy referral)	Yes	1231	(19.7%)	
RESPIRATORYTHERAPY	Yes, on oxygen or other supplemen	914	(14.6%)	<.0001
(Respiratory treatments)	No oxygen	5335	(85.4%)	
CARDIOVASCULAR	No	3711	(59.4%)	<.0001
	Yes	2538	(40.6%)	
PULMONARY	No	4986	(79.8%)	<.0001
	Yes	1263	(20.2%)	
GATROINTESTINAL	No	5672	(90.8%)	0.0500
	Yes	577	(9.2%)	

Table 4.2: Predisposing, Enabling, and Need Variables, cont.

VARIABLE	VALUE	TOTAL		P-VALUE
PREDISPOSING				
SKELETAL	No	3858	(61.7%)	<.0001
	Yes	2391	(38.3%)	
CANCER	No	5580	(89.3%)	<.0001
	Yes	669	(10.7%)	
DIABETES	No	5138	(82.2%)	<.0001
	Yes	1111	(17.8%)	
SKIN	No	5616	(89.9%)	<.0001
	Yes	633	(10.1%)	
CNS	No	5694	(91.1%)	0.8900
	Yes	555	(8.9%)	
METABOLIC	No	5751	(92.0%)	0.2500
	Yes	498	(8.0%)	
GENITOURINARY	No	5560	(89.0%)	0.0800
	Yes	689	(11.0%)	
SUBDEMENTIAPSYCH	No	5879	(94.1%)	0.8700
	Yes	370	(5.9%)	
CEREBROVASCULAR	No	5776	(92.4%)	<.0001
	Yes	473	(7.6%)	
ADL	< 2	5330	(85.3%)	<.0001
(Mean ADL dichotomized)	2+	919	(14.7%)	
IADL	< 2	4514	(72.2%)	<.0001
(Mean IADL dicotomized)	2+	1735	(27.8%)	
HHRG3	< 13 rehab visits	4851	(77.6%)	0.1600
	> 13 rehab visits	1352	(21.6%)	
	> 19 rehab visits	46	(0.7%)	
ALL NURSE VISITS	0-3	3589	(52.4%)	<.0090
	4-6	2154	(34.5%)	
	7-9	320	(5.1%)	
	10-33	186	(2.9%)	

The sample characteristics in Table 4.2 are presented using Fisher's Exact. A detailed description of the variable scoring depicted in Table 4.1 and 4.2 is included in Appendix B, "OASIS".

Predisposing Variables

Of those that were hospitalized (740) 13.4% were male and 10.8% were female. There did not appear to be much difference in ethnicity with 11.5% of white and 13.5% non-white experiencing a re-hospitalization. 23.1% lived alone and of those who had caregivers, only 37.4% received care or support from a spouse or significant other. 90.1% of the sample were 65 years of age or older as the sample was of Medicare beneficiaries. 9.9% were under the age of 65. A higher percentage of the younger group were hospitalized, although the difference did not prove to be significant (0.08%).

Enabling Variables

Medication Management is frequently cited in the literature as being strongly correlated to risk of readmission (Kripilani, Theobald, Anctil & Vasilevskis, 2013). 60.1% of the sample were assessed as having some dependence on someone's support consisting of cueing or direct administration of medication over 70% of those hospitalized were dependent in medication management.

79.9% were found to live in their own or rented home, with at least one other person. 2.3% more of those who lived with others experienced a re-hospitalization than those who lived alone, a difference that was found to be significant. ($p=0.02$). 62.6% relied on someone other than their

spouse or significant other as caregiver and of those, 11.8% experienced a re-hospitalization. This variable was not found to be significant (p = 0.39)

Need Variables

There were 30 need variables, including 12 diagnostic categories. These are typically the most significant in studies examining the factors associated with the risk of readmission and are discussed in more detail as follows:

Pain interfering with activity and intractable pain: 63.8% of patients were assessed as having infrequent to constant pain that interfered with activity, but the difference in those who experienced a re-hospitalization was not found to be significant. Almost 11% (10.8%) reported pain as intractable. Of those, 14.2% experienced a hospitalization although neither variable addressing pain were found to be significant.

Dyspnea: 47.8% reported some shortness of breath or difficulty breathing with ambulation and with activities of daily living (ADL's). 15.2% of those experienced a re-hospitalization (as compared to 8.8% for those who did not were found to have dyspnea with ambulation and/or activities of daily living (p=<.0001).

Incontinence/UTI: 39.1% of the patients in the sample reported some urinary incontinence with 9.2% reporting a urinary tract infection at some time within 14 days of being admitted to a home health episode of care. 10.4% have some incontinence of stool. Neither of these incontinence variables were significant.

Diagnostic categories: All diagnoses coded on the OASIS assessments in the sample were included in the dataset. The numbers of co-morbidities by patient was not examined. Cardiovascular (40.6%), pulmonary (20.2%), and skeletal (38.3%) were reported the most.

Substance abuse, dementia and psychiatric disorders were collapsed into one variable called "subdemtiapsych" which still represented only 5.9% of the sample. Diabetes was surprisingly low at 17.8%, as well as cancer at 10.7%. Cerebrovascular conditions represented only 7.6% of the sample. Cardiovascular (13.8%; p=<.0001), Pulmonary (15.8%; p=<.0001%), Cancer (21.2%; p=<.0001%), Diabetes (15.4%; =<.0001%), and Skin (20.5%; p =<.0001%) conditions were sginficant for risk of readmission. The presence of a cerebrovascular condition was shown in this sample to have an inverse relationship on re-hospitalization (cerebrovascular 6.1%; p=<.0059%). The most likely explanation for this finding may be that the diagnostic category is broad and/or that these patients may be less acute and at risk of hospitalization by the time they start rehab at home.

Life expectancy, cognitive function, anxiety and depression: 85.8% of patients were assessed by the admitting clinician as having a life expectancy of greater than six months. 30.9% experience some cognitive deficit defined in the study as requiring assistance ranging from cueing and reminding to completely dependent on others.

36.4% were noted to experience some degree of anxiety, although this was not found to be significant (p = 0.49). A significant number of those in the sample (20.9%) and of those hospitalized (15.7%; p = .01) noted some depression. 27.8% of those who experienced a hospitalization were assessed as exhibiting some degree of depression ranging from a depressed mood to suicidal ideation, making this a significant variable.

Vision, speech and hearing: Deficits in vision, speech and hearing were examined. 14.1% of the sample were noted to have some impairment in vision. 23.6% of the sample had mild-severe speech impairment. 30.1% of the sample was found to have some hearing impairment. None of these variables were found to be significant.

Activities of Daily Living (ADL) were measured; ability to dress upper body, ability to dress lower body, bathing, toileting, transferring, ambulation, and feeding/eating. Each individual patient scores were added and averaged to create a scale of <2 and 2 or greater representing the number of ADL's the patient required assistance with. 14.7% of the sample had difficulty with two or more ADL's. Instrumental Activities of Daily Living (IADL) were treated the same. Planning and Preparing Light Meals, Transportation, Laundry, Housekeeping, Shopping, and the ability to use the telephone, were added and averaged to create a scale of <2 and 2 or greater. Only ADL (17.5%) was found to be significant ($p = .019$).

Home Health Resource Group (HHRG): This variable reflects a summary of the scores assigned in the OASIS instrument in clinical, functional and resource use domains. These 3 domains are reflected as a code called a Home Health Resource Group (HHRG) and is directly tied to Medicare reimbursement for the home health agency. Because of the multi-collinearity between the HHRG and the clinical and functional domains already captured as independent variables in the model, the HHRG as presented in this model indicates resource use only in terms of the need for therapy (physical, occupational or speech therapies). Surprisingly, this variable was not found to be significant.

Utilization: Table 4.3 depicts the mean and SD of "All Nursing" and "All Other Visits" on the sample N of 6,249. "All Other Visits" refers to all visits made by physical, occupational and speech therapists, social workers and home health aides. A total of 42,241 visits were made to the sample populations within the first 14 days of care, 21,099 of these visits were made by nurses.

Table 4.3 Sample Characteristics of Visit Utilization (N = 6,249)

VARIABLES	N	MEAN	SD	LOWER QUARTILE	MEDIAN	UPPER QUARTILE	MIN	MAX
All Visits	6249	6.76	3.89	4.0	6.0	9.0	0.0	33
All Nurse Visits	6249	3.11	2.88	0.0	3.0	5.0	0.0	29
All Non Nurse Visits	6249	3.66	3.42	0.0	3.0	6.0	0.0	22

Logistic Regression

To determine characteristics predicting patient re-hospitalizations, logistic regressions were completed. Table 4.4 shows adjusted odds ratios (AOR) for hierarchical models of readmission characteristics including a) sociodemographics, and b) clinical factors of primary diagnoses and comorbidities.

Table 4.4: Logistic Regression

VARIABLE	VALUE	# TRANSFER60/# SUBGROUP (% TRANSFER60)		ODDS RATIO	LOWER 95% CI	UPPER 95% CI	P-VALUE
	All Observations	740/6249	(11.8%)				
Gender	Male	340/2546	(13.4%)	1.17	0.98	1.39	0.086
Ethnicity	Non-White	133/984	(13.5%)	1.06	0.85	1.32	0.630
Residence	Other	147/1256	(11.7%)	0.83	0.66	1.04	0.110
LiveWith	Other	594/4805	(12.4%)	1.23	0.97	1.56	0.094
CareGiver	Spouse or S/O	278/2338	(11.9%)	0.91	0.74	1.12	0.390
LifeExpectancy	Greater than 6 months	585/5364	(10.9%)	0.97	0.78	1.20	0.760
CognitiveFunction	Requires assistance	265/1933	(13.7%)	1.04	0.83	1.30	0.710
Anxiety	Less than daily to daily	314/2272	(13.8%)	1.06	0.89	1.27	0.490

Table 4.4: Logistic Regression, cont.

VARIABLE	VALUE	# TRANSFER60/# SUBGROUP (% TRANSFER60)		ODDS RATIO	LOWER 95% CI	UPPER 95% CI	P-VALUE
Depression	Depressed mood	206/1309	(15.7%)	1.28	1.05	1.55	0.015
Vision	Some impairment	132/882	(15.0%)	1.00	0.80	1.26	0.980
Speech	Demonstrates some impairment	201/1475	(13.6%)	0.92	0.73	1.17	0.510
Hearing	Demonstrates some impairment	248/1880	(13.2%)	0.99	0.82	1.20	0.910
PainInterfering	Infrequent to constant	477/3987	(12.0%)	1.16	0.97	1.39	0.098
IntractablePain	Yes	96/677	(14.2%)	1.03	0.80	1.34	0.800
Dyspnea	With ambulation and A	454/2990	(15.2%)	1.32	1.10	1.59	0.0034
PressureUlcer	Yes	50/250	(20.0%)	1.10	0.74	1.64	0.650
UTI	Yes	73/577	(12.7%)	1.01	0.75	1.37	0.930
Catheter	Incontinent/incontinence	328/2442	(13.4%)	1.08	0.90	1.30	0.400
BowelIncontinence	Yes	112/651	(17.2%)	1.20	0.92	1.56	0.180
MedManagement	Dependent	516/3755	(13.7%)	1.38	1.13	1.68	0.0018
RespiratoryTherapy	Yes, on oxygen or other	177/914	(19.4%)	1.43	1.14	1.80	0.0018
Cardiovascular	Yes	350/2538	(13.8%)	1.19	1.00	1.42	0.050
Pulmonary	Yes	200/1263	(15.8%)	1.07	0.87	1.32	0.540
Gastrointestinal	Yes	83/577	(14.4%)	1.10	0.85	1.43	0.470
Skeletal	Yes	197/2391	(8.2%)	0.86	0.71	1.05	0.1400
Cancer	Yes	142/669	(21.2%)	1.76	1.39	2.20	<.0001
Diabetes	Yes	171/1111	(15.4%)	1.16	0.94	1.42	0.160
Skin	Yes	130/633	(20.5%)	1.54	1.18	2.00	0.0016
CNS	Yes	64/555	(11.5%)	0.91	0.68	1.23	0.550
Metabolic	Yes	67/498	(13.5%)	0.95	0.72	1.26	0.730
Genitourinary	Yes	96/689	(13.9%)	0.94	0.71	1.22	0.630
SubDementiaPsych	Yes	42/370	(11.4%)	0.79	0.55	1.13	0.190

Table 4.4: Logistic Regression, cont.

VARIABLE	VALUE	# TRANSFER60/# SUBGROUP (% TRANSFER60)		ODDS RATIO	LOWER 95% CI	UPPER 95% CI	P-VALUE
Cerebrovascular	Yes	29/473	(6.1%)	0.57	0.38	0.85	0.0059
ADL	2+	161/919	(17.5%)	1.39	1.06	1.82	0.019
IADL	2+	251/1735	(14.5%)	1.05	0.83	1.33	0.670
hhrg3	> 13 rehab visits	141/1352	(10.4%)	0.81	0.65	0.99	0.043
hhrg3	> 19 rehab visits	4/46	(8.7%)	1.07	0.36	3.10	0.910
AgeGroup	21-64	89/616	(14.4%)	1.05	0.79	1.39	0.760
AgeGroup	65-75	204/1836	(11.1%)	0.96	0.79	1.18	0.720
AllNonNurseVisitsQ	4-6	129/1723	(7.5%)	0.49	0.40	0.61	<.0001
AllNonNurseVisitsQ	7-9	46/1002	(4.6%)	0.54	0.24	0.47	<.0001
AllNonNurseVisitsQ	10-33	22/334	(6.6%)	0.42	0.27	0.67	0.0003
AllNurseVisitsQ	4-6	254/2154	(11.8%)	0.83	0.69	0.99	0.038
AllNurseVisitsQ	7-9	52/320	(16.3%)	0.98	0.70	1.37	0.900
AllNurseVisitsQ	10-33	44/186	(23.7%)	1.79	1.22	2.60	0.0029

To assess for multicollinearity, a correlation matrix was completed. After evaluating the Spearman Correlation Matrix, several variables correlated with .7 or greater and were eliminated from the final regression and descriptive tables. Finally, Chi-Square analysis was conducted to test the overall goodness of fit of the model. The Chi-Square was large indicating the goodness of fit (Chi-Square 339.0941 with 43 df; $p<.001$).

Hypothesis

There were three hypothesis examined in this study:

H_1 There will be a lower re-hospitalization rate for this study's population as compared to the national average of 25%.

H_2 There will be differences in the presence and severity of risk factors identified on the OASIS instrument for patients with, and without a re-hospitalization.

H_3 There will be a lower rate of re-hospitalization for patients with higher nursing visit frequency within the first 14 days of enrollments into home health care.

H_1: There will be a lower re-hospitalization rate for this study's population as compared to the national average of 25%. 740 patients were readmitted out of the sample (N = 6,249). This represents 11.8%. This readmission rate was found to be lower than the national average.

H_2: There will be differences in the presence and severity of risk factors identified on the OASIS instrument for patients with, and without a re-hospitalization. There were no predisposing or enabling variables that were found to be reflective of a statistically significant enhanced risk of re-hospitalization. One enabling variable, "Med Management" was found to be significant (AOR 1.38 with 95% CI of 1.13 to 1.68; p=.0018). Need variables were the predominant significant category or variable. Depression (O.R. = 1.28; p = .015), Dyspnea (O.R. 1.32; p = 0.0034), medication management (O.R. 1.38 = p = 0.0018), dependence on oxygen (O.R. 1.43; p = 0.0018), the need for assistance with two or more ADL's (O.R. 1.39, p = 0.019), diagnoses of cardiovascular conditions (O.R. 1.19; p = 0.05), cancer (O.R.; 1.76; p = <.0001) and skin lesions (O.R. 1.54; p = < .0016) were found to be factors associated with an increased risk of re-hospitalization.

A total of 740 hospitalizations from 6,249 unique patients (11.8%) who were all Medicare beneficiaries were eligible for the analysis. Age was found not to be predictive. Neither was ethnicity.

H_3: There will be a lower rate of re-hospitalization for patients with higher nursing visit frequency within the first 14 days of enrollment into home health care.

When studying home care as it is provided by home health agencies, the relationship between outcomes and the number of visits has not been found to be linear. The lack of a positive correlation between resource use and hospitalization rates suggest several areas for further research. (Fortinsky & Madigen, 1997; Adams, Corbett & Michel, 2000). According to Rogers, Perlic and Madigan (2007) front-loading of visits can be key in producing better re-hospitalization outcomes for agencies who adopted the practice.

The visit variable was further refined to reflect the first 14 days from start of care. Refining the variable in this way aligns the results to the literature on the importance of front loading visits.

The variables *All Non-Nursing Visits* and *All Nursing Visits within 14 Days of Start of Care* were added to the model last. A log likelihood was done comparing the model prior to adding "All Nurse Visits" and "All Non-Nurse Visits". The log likelihood for the model without these variables was 4255.407. The log likelihood for the full model was 4.153.501 showing a difference of 101.906 with 6df, $p < .001$. This difference is significant and indicates that visit variables are important to the overall model.

The log likelihood was then calculated on the model without the variable HHRG (Home Health Resource Group) and on the full model. The difference was 7.626 with 2df, $p = .022$. Although less significant than the two visit variables to the explanatory value of the model, the difference is still significant and indicates that the HHRG variable still contributes to the full model.

The value of the categories were determined after an initial review of the quartile found in the descriptive data run and the reference category was determined to be 0 – 3 visits. All non-nursing visits variable levels were found to be protective of a readmission (4-6 non-nursing

visits: AOR 0.49 with CI of 0.40 to 0.61; $p < .001$; 7-9 non nursing visits :AOR 0.34 with CI of 0.24 – 0.47; $p < .0001$; and 10-33 non-nursing visits: AOR 0.42 with CI of 0.27 – 0.67). The most likely reason for these results is the composition of non-nursing visits. All of the non-nursing visits were physical, occupational speech therapies, Home Health Aide, and Social Work visits. Point biserial correlations were done and a correlation matrix was created to look at the effect of All Visits on the other variables in the model. The only variable affected was the Therapy Referral variable. It was evident that All Visits was highly correlated with the variable "Therapy Referral" (Pearson value of 0.357 with a CI of 0.335 to 0.379; $p < .0001$), negating the impact this variable might have had. The model was re-done without the variable "therapy referral" and the all non-nurse variable was found to be significant and protective of the risk of hospitalization.

The All Nursing Visits variable was set up the same way as All Non-nurse Visits. 23.7% of patients hospitalized had 10 – 33 visits within the first two weeks. This visit level was very significant for risk of re-hospitalization. (AOR 1.84 with CI of 1.26 to 2.7; $p = 0.0018$). This was the only variable level that was significant. See Table 4.5 below.

Table 4.5

Variables	Value	Odds Ratio	P Value
All Non-Nurse Visits	**0-3 vs**	**1.0**	
	4-6	**0.49**	**< .0001**
	7-9	**0.34**	**< .0001**
	10-33	**0.42**	**.0003**
All Nurse Visits	**0-3**	**1.0**	
	4-6	**0.83**	**0.038**
	7-9	**0.98**	**0.900**
	10-33	**1.79**	**0.0029**

Cross tabs were run on all variables in order to understand the influence each one had on the three levels of the variable "All Nurses Visits". See Table 4.6. The first Chi Square represents the significance of the variable for each of the four quartiles. The second represents the significance of the ordered relationship. The ordered relationship is most important. Spearman's Rho was also calculated for the variables, "HHRG", "Age Group" and "All Non-Nurse Visits". Rho is negative for each of these variables, indicating a high association between lower values on the high values of the other variables. Age group (Rho = -0.06; $p < .001$) and All non-nursing visits (Rho = -0.14; $p < .001$) are significant. HHRG is not significant. Those patients who received nursing visits received more visits in each quartile when the patient was older. 60.8% of the total nursing visits were provided to patients over the age of 76.

The variables of interest in the final model found to be significantly associated with risk of rehospitalization were Depression, Dyspnea, med management, respiratory, skin, cardiopulmonary, cancer and ADL. All of these variables with the exception of med management were significant at both levels of the cross tab done on visit quartiles as well. Med management was significant only by the specific quartile. Dependance on support with med

management did not appear to be correlated to increased nursing visits by quartile. Patients who had paid or other outside caregivers, had cognitive deficits, lived with others, experienced pain interfering with activity, had a surgical wound or stasis ulcer, were dependent on assistance with medication management and were over the age of 76 required the most nursing visits.

Table 4.6: Tabulations by Number of Nursing Visits

RowVar	RowVal	0-3	4-6	7-9	10-33	Total	Statistic	P-Value
GENDER	Male	1376 (38.3%)	916 (42.5%)	162 (50.6%)	94 (50.5%)	2548 (40.7%)	X2(3)=32.3	<.0001
	Female	2221 (61.7%)	1239 (57.5%)	158 (49.4%)	92 (49.5%)	3710 (59.3%)	KW X2(1)=27.2	<.0001
ETHNICITY	Non-White	604 (16.8%)	287 (13.3%)	61 (19.1%)	33 (17.7%)	985 (15.7%)	X2(3)=15.8	0.0013
	White	2993 (83.2%)	1868 (86.7%)	259 (80.9%)	153 (82.3%)	5273 (84.3%)	KW X2(1)=3.9	0.048
RESIDENCE	Patients own or rented residence	2805 (78.0%)	1772 (82.2%)	264 (82.5%)	159 (85.5%)	5000 (79.9%)	X2(3)=20.5	0.0001
	Other	792 (22.0%)	383 (17.8%)	56 (17.5%)	27 (14.5%)	1258 (20.1%)	KW X2(1)=19.9	<.0001
LIVEWITH	Alone	796 (22.1%)	530 (24.6%)	70 (21.9%)	49 (26.3%)	1445 (23.1%)	X2(3)=6.0	0.11
	Other	2801 (77.9%)	1625 (75.4%)	250 (78.1%)	137 (73.7%)	4813 (76.9%)	KW X2(1)=3.8	0.050
CAREGIVER	Spouse or S/O	1318 (36.6%)	803 (37.3%)	133 (41.6%)	85 (45.7%)	2339 (37.4%)	X2(3)=8.7	0.033
	Other	2279 (63.4%)	1352 (62.7%)	187 (58.4%)	101 (54.3%)	3919 (62.6%)	KW X2(1)=3.6	0.057
LIFEEXPECTANCY	Greater than 6 months	3124 (86.9%)	1806 (83.8%)	278 (86.9%)	163 (87.6%)	5371 (85.8%)	X2(3)=11.1	0.011
	6 months or fewer	473 (13.1%)	349 (16.2%)	42 (13.1%)	23 (12.4%)	887 (14.2%)	KW X2(1)=4.9	0.027
COGNITIVEFUNCTION	Requires assistance	1131 (31.4%)	686 (31.8%)	84 (26.3%)	36 (19.4%)	1937 (31.0%)	X2(3)=16.2	0.0010
(Cognitive Functioning	Alert and oriented	2466 (68.6%)	1469 (68.2%)	236 (73.8%)	150 (80.6%)	4321 (69.0%)	KW X2(1)=3.1	0.080
ANXIETY	None	2393 (66.5%)	1278 (59.3%)	194 (60.6%)	119 (64.0%)	3984 (63.7%)	X2(3)=31.7	<.0001
	Less than daily to daily	1204 (33.5%)	877 (40.7%)	126 (39.4%)	67 (36.0%)	2274 (36.3%)	KW X2(1)=26.0	<.0001
DEPRESSION	None	2895 (80.5%)	1665 (77.3%)	235 (73.4%)	153 (82.3%)	4948 (79.1%)	X2(3)=15.9	0.0012
	Depressed mood	702 (19.5%)	490 (22.7%)	85 (26.6%)	33 (17.7%)	1310 (20.9%)	KW X2(1)=9.8	0.0017
VISION	Normal	3125 (86.9%)	1826 (84.7%)	272 (85.0%)	150 (80.6%)	5373 (85.9%)	X2(3)=9.7	0.021
(Vision impairment)	Some Impairment	472 (13.1%)	329 (15.3%)	48 (15.0%)	36 (19.4%)	885 (14.1%)	KW X2(1)=8.0	0.0047
SPEECH	No Impairment	2744 (76.3%)	1616 (75.0%)	260 (81.3%)	159 (85.5%)	4779 (76.4%)	X2(3)=15.1	0.0018
(Speech/language	Mild to severe	853 (23.7%)	539 (25.0%)	60 (18.8%)	27 (14.5%)	1479 (23.6%)	KW X2(1)=1.0	0.32
impairment)								
HEARING	No impairment	2609 (72.5%)	1391 (64.5%)	231 (72.2%)	144 (77.4%)	4375 (69.9%)	X2(3)=47.0	<.0001
(Hearing impairment	Demonstrates some impairment	988 (27.5%)	764 (35.5%)	89 (27.8%)	42 (22.6%)	1883 (30.1%)	KW X2(1)=17.6	<.0001

Table 4.6: Tabulations by Number of Nursing Visits, cont.

RowVar	RowVal	0-3	4-6	7-9	10-33	Total	Statistic	P-Value
PAININTERFERING	None	1337 (37.2%)	781 (36.2%)	94 (29.4%)	53 (28.5%)	2265 (36.2%)	X2(3)=12.7	0.0053
(Pain that interferes	Infrequent to constant	2260 (62.8%)	1374 (63.8%)	226 (70.6%)	133 (71.5%)	3993 (63.8%)	KW X2(1)=6.1	0.013
with activity)								
INTRACTABLEPAIN	No	3236 (90.0%)	1906 (88.4%)	278 (86.9%)	161 (86.6%)	5581 (89.2%)	X2(3)=6.6	0.086
(Intractable pain)	Yes	361 (10.0%)	249 (11.6%)	42 (13.1%)	25 (13.4%)	677 (10.8%)	KW X2(1)=6.2	0.012
DYSPNEA	No	2106 (58.5%)	895 (41.5%)	147 (45.9%)	114 (61.3%)	3262 (52.1%)	X2(3)=167.6	<.0001
	with ambulation and ADL	1491 (41.5%)	1260 (58.5%)	173 (54.1%)	72 (38.7%)	2996 (47.9%)	KW X2(1)=112.3	<.0001
PRESSUREULCER	No	2111 (58.7%)	1258 (58.4%)	228 (71.3%)	147 (79.0%)	3744 (59.8%)	X2(6)=116.9	<.0001
(Pressure ulcer)	Yes	87 (2.4%)	138 (6.4%)	17 (5.3%)	8 (4.3%)	250 (4.0%)	KW X2(2)=76.7	<.0001
	N/A	1399 (38.9%)	759 (35.2%)	75 (23.4%)	31 (16.7%)	2264 (36.2%)		
UTI	No	3272 (91.0%)	1952 (90.6%)	283 (88.4%)	174 (93.5%)	5681 (90.8%)	X2(3)=4.1	0.26
(Urinary tract infection)	Yes	325 (9.0%)	203 (9.4%)	37 (11.6%)	12 (6.5%)	577 (9.2%)	KW X2(1)=0.3	0.57
CATHETER	No	2218 (61.7%)	1265 (58.7%)	199 (62.2%)	130 (69.9%)	3812 (60.9%)	X2(3)=11.8	0.0081
	Incontinent/incontinent with catheger	1379 (38.3%)	890 (41.3%)	121 (37.8%)	56 (30.1%)	2446 (39.1%)	KW X2(1)=0.6	0.44
BOWELINCONTINENCE	No	3249 (90.3%)	1903 (88.3%)	284 (88.8%)	170 (91.4%)	5606 (89.6%)	X2(3)=6.8	0.079
(Bowel incontinence)	Yes	348 (9.7%)	252 (11.7%)	36 (11.3%)	16 (8.6%)	652 (10.4%)	KW X2(1)=3.9	0.049
MEDMANAGEMENT	Independent or N/A	1417 (39.4%)	844 (39.2%)	136 (42.5%)	99 (53.2%)	2496 (39.9%)	X2(3)=15.5	0.0014
	Dependent	2180 (60.6%)	1311 (60.8%)	184 (57.5%)	87 (46.8%)	3762 (60.1%)	KW X2(1)=2.6	0.11
RESPIRATORYTHERAPY	Yes, on oxygen or other supplement	426 (11.8%)	416 (19.3%)	54 (16.9%)	20 (10.8%)	916 (14.6%)	X2(3)=63.6	<.0001
(Respiratory treatments)	No oxygen	3171 (88.2%)	1739 (80.7%)	266 (83.1%)	166 (89.2%)	5342 (85.4%)	KW X2(1)=42.0	<.0001
CARDIOVASCULAR	No	2319 (64.5%)	1124 (52.2%)	153 (47.8%)	122 (65.6%)	3718 (59.4%)	X2(3)=106.0	<.0001
	Yes	1278 (35.5%)	1031 (47.8%)	167 (52.2%)	64 (34.4%)	2540 (40.6%)	KW X2(1)=80.5	<.0001
PULMONARY	No	2961 (82.3%)	1598 (74.2%)	267 (83.4%)	168 (90.3%)	4994 (79.8%)	X2(3)=72.2	<.0001
	Yes	636 (17.7%)	557 (25.8%)	53 (16.6%)	18 (9.7%)	1264 (20.2%)	KW X2(1)=18.6	<.0001
GASTROINTESTINAL	No	3293 (91.5%)	1931 (89.6%)	286 (89.4%)	168 (90.3%)	5678 (90.7%)	X2(3)=6.8	0.077
	Yes	304 (8.5%)	224 (10.4%)	34 (10.6%)	18 (9.7%)	580 (9.3%)	KW X2(1)=6.3	0.012
SKELETAL	No	2029 (56.4%)	1452 (67.4%)	244 (76.3%)	139 (74.7%)	3864 (61.7%)	X2(3)=114.1	<.0001
	Yes	1568 (43.6%)	703 (32.6%)	76 (23.8%)	47 (25.3%)	2394 (38.3%)	KW X2(1)=112.3	<.0001
CANCER	No	3271 (90.9%)	1894 (87.9%)	265 (82.8%)	158 (84.9%)	5588 (89.3%)	X2(3)=32.3	<.0001
	Yes	326 (9.1%)	261 (12.1%)	55 (17.2%)	28 (15.1%)	670 (10.7%)	KW X2(1)=28.7	<.0001
DIABETES	No	3047 (84.7%)	1728 (80.2%)	226 (70.6%)	144 (77.4%)	5145 (82.2%)	X2(3)=53.7	<.0001
	Yes	550 (15.3%)	427 (19.8%)	94 (29.4%)	42 (22.6%)	1113 (17.8%)	KW X2(1)=43.8	<.0001
SKIN	No	3434 (95.5%)	1831 (85.0%)	239 (74.7%)	121 (65.1%)	5625 (89.9%)	X2(3)=388.1	<.0001
	Yes	163 (4.5%)	324 (15.0%)	81 (25.3%)	65 (34.9%)	633 (10.1%)	KW X2(1)=349.6	<.0001
CNS	No	3231 (89.8%)	2008 (93.2%)	298 (93.1%)	166 (89.2%)	5703 (91.1%)	X2(3)=21.2	<.0001
	Yes	366 (10.2%)	147 (6.8%)	22 (6.9%)	20 (10.8%)	555 (8.9%)	KW X2(1)=15.0	0.0001
METABOLIC	No	3348 (93.1%)	1944 (90.2%)	292 (91.3%)	176 (94.6%)	5760 (92.0%)	X2(3)=17.1	0.0007
	Yes	249 (6.9%)	211 (9.8%)	28 (8.8%)	10 (5.4%)	498 (8.0%)	KW X2(1)=9.2	0.0024

Table 4.6: Tabulations by Number of Nursing Visits, cont.

RowVar	RowVal	0-3	4-6	7-9	10-33	Total	Statistic	P-Value
GENITOURINARY	No	3233 (89.9%)	1895 (87.9%)	277 (86.6%)	164 (88.2%)	5569 (89.0%)	X2(3)=7.4	0.060
	Yes	364 (10.1%)	260 (12.1%)	43 (13.4%)	22 (11.8%)	689 (11.0%)	KW X2(1)=7.0	0.0080
SUBDEMENTIAPSYCH	No	3384 (94.1%)	2019 (93.7%)	309 (96.6%)	175 (94.1%)	5887 (94.1%)	X2(3)=4.1	0.25
	Yes	213 (5.9%)	136 (6.3%)	11 (3.4%)	11 (5.9%)	371 (5.9%)	KW X2(1)=0.1	0.76
CEREBROVASCULAR	No	3271 (90.9%)	2026 (94.0%)	305 (95.3%)	182 (97.8%)	5784 (92.4%)	X2(3)=30.8	<.0001
	Yes	326 (9.1%)	129 (6.0%)	15 (4.7%)	4 (2.2%)	474 (7.6%)	KW X2(1)=29.6	<.0001
ADL	<2	3105 (86.3%)	1800 (83.5%)	267 (83.4%)	164 (88.2%)	5336 (85.3%)	X2(3)=10.5	0.015
(Mean ADL dichotomized)	2+	492 (13.7%)	355 (16.5%)	53 (16.6%)	22 (11.8%)	922 (14.7%)	KW X2(1)=5.9	0.015
IADL	<2	2563 (71.3%)	1564 (72.6%)	242 (75.6%)	149 (80.1%)	4518 (72.2%)	X2(3)=9.4	0.024
(Mean IADL dicotomized)	2+	1034 (28.75)	591 (27.4%)	78 (24.4%)	37 (19.9%)	1740 (27.8%)	KW X2(1)=5.6	0.018
HHRG3	< 13 rehab visits	2786 (77.6%)	1670 (77.5%)	241 (75.3%)	154 (82.8%)	4851 (77.6%)	Rho=-0.00	0.87
	> 13 rehab visits	772 (21.5%)	473 (22.0%)	76 (23.8%)	31 (16.7%)	1352 (21.6%)		
	> 19 rehab visits	31 (0.9%)	11 (0.5%)	3 (0.9%)	1 (0.5%)	46 (0.7%)		
AGEGROUP	21-64	316 (8.8%)	204 (9.5%)	58 (18.1%)	38 (20.4%)	616 (9.8%)	Rho=-0.06	<.0001
	65-75	1040 (28.9%)	626 (29.0%	108 (33.8%)	63 (33.9%)	1837 (29.4%)		
	76+	2241 (62.3%)	1325 (61.5%)	154 (48.1%)	85 (45.7%)	3805 (60.8%)		
ALLNONNURSEVISTITSQ	0-3	1631 (45.3%)	1171 (54.3%)	237 (74.1%)	158 (84.9%)	3197 (51.1%)	Rho=-0.14	<.0001
(All non-nurse visits	4-6	1126 (31.3%)	535 (24.8%)	46 (14.4%)	18 (9.7%)	1725 (27.6%)		
within 14 days)	7-9	629 (17.5%)	341 (15.8%)	25 (7.8%)	7 (3.8%)	1002 (16.0%)		
	10-33	211 (5.9%)	108 (5.0%)	12 (3.8%)	3 (1.6%)	334 (5.3%)		

Summary

In this chapter, the results of the study were presented. Sample characteristics of Medicare patients admitted to a large home health agency during calendar years 2005 through 2008 were described. 11.8% of the sample was admitted to the hospital within 60 days of being admitted to the home health agency. The differences between those admitted and those not admitted to the hospital were described. Following an assessment of multicollinearity, variables were entered into the logistic regression equations. A chi square analysis was done to determine the model's goodness of fit. Eight variables were found to predict hospital admissions from the home health agency; Depression, Dyspnea, Med Management, Dependence on Oxygen, cardiovascular, Skin, and Cancer conditions, and the need for assistance in 2 or more ADL's. A discussion of the findings will be presented in the next chapter.

CHAPTER 5: DISCUSSION

Study Overview

As discussed earlier, the overall purpose of this study was to examine the factors associated with re-hospitalization of Medicare beneficiaries enrolled into an episode of home health care. Utilizing the Andersen Behavioral Model as a theoretical framework, the specific research aims for this study were to: 1) Describe the prevalence of re-hospitalizations by a population of patients in a large home health agency in California who are enrolled in an episode of home health care; 2) Examine the home health care recipient's sociodemographic and health-related characteristics that are associated with hospitalizations and specifically determine how the use of hospitalization varies by the presence and severity of factors identified on the OASIS instrument completed upon admission to home health care and; 3) Examine whether the risk of re-hospitalization varies by the number and frequency of skilled nursing visits the patients received.

The readmission rate for Medicare beneficiaries in this study was 11.8%. The data indicated that patients who experienced symptoms of depression, had problems with difficulty breathing, who were dependent on oxygen, and who had a cardiovascular, pulmonary, or cancer-related diagnosis were at higher risk of readmission to a hospital. Functional status at start of care was also a significant predictor of risk with the degree of deficits in the performance of Activities of Daily Living (ADL) being the most predictive, as was the dependence on others in medication management. Persons needing support with medication management, including oral,

injectable and inhaled medications may need specific interventions once discharged from the acute care hospital to the home health agency to stay out of the hospital. By far the strongest predictors of hospitalization, however, were clinical factors. This finding is consistent with much of the literature, which shows that patients with chronic conditions with multiple co-morbidities are more likely to be readmitted to a hospital (Rosati et al, 2003. Fortinsky et al, 2006; Fortinsky et al., 2014). Vinson, Rich, Sperry, Shah and MacNamara (1990) found the chronic condition of Congestive Heart Failure (CHF) to be so significantly associated with re-hospitalization and further suggested that almost 50% of the cases of re-hospitalization for CHF might have been avoided had the patients been identified at high risk for readmission upon entry to a home health episode.

The following directional hypotheses were evaluated in the study:

H_1 There will be a lower re-hospitalization rate for this study's population as compared to the national average of 25%.

H_2 There will be differences in the presence and severity of risk factors identified on the OASIS instrument for patients with, and without a re-hospitalization.

H_3 There will be a lower rate of re-hospitalization for patients with higher nursing visit frequency within the first two weeks of enrollment into home health care.

To address these study aims a secondary analysis of administrative data was conducted using a cross-sectional study design. The data for this non-experimental, descriptive correlational research study came from a provider-based not-for-profit home health agency on the Central Coast. This database contained clinical assessment and claims data by beneficiary on 100% of the Medicare home health recipients enrolled into the home health agency who had a start of care assessment between 1/1/05 and 10/1/08. This assessment data was captured and included in the

data set used for the study. The final sample included 6,249 Medicare home health patients of which 740 (11.8%) experienced a re-hospitalization (the dependent variable).

Logistic regression analysis was used to examine the effects of the explanatory variables on the odds and rates of hospitalization, separating the independent variable on the dependent variable while holding the effect of the other independent variables constant. Multivariate logistic regression was used to model the dichotomous outcome variables. Results are presented as adjusted odds ratios (AOR) with 95% confidence intervals (CI). Given the complexities of hospital utilization in this population, this regression approach was a useful analytic tool for this data analysis. Study findings revealed that the odds and rates of hospitalization varied by the presence of several key predisposing, enabling and need characteristics. The Andersen Behavioral model used in this study will be used to organize and present detailed findings later in this chapter.

Significance

Beginning in the year 2012, hospitals became subject to financial penalties as described in the CMS Hospital Readmission Reduction Program (James, J., 2013). Excess readmission ratios were measured during a performance period beginning July 1, 2009 and going through June 30, 2012. These data were used to create the readmissions adjustment factor. The readmissions adjustment factor is used to determine whether or not penalties will be applied to the at risk reimbursement related to excessive readmissions. Hospital discharges beginning in FY2013 were affected. By 2017 hospitals with excess readmission rates could lose as much as 3% of their Medicare reimbursement for services provided to patients diagnosed with Heart

Failure, Pneumonia, or Acute Myocardial Infarction. This potential revenue loss is in addition to other payment risks associated with Values Based Purchasing (2%), Inpatient quality reporting (2%), Hospital acquired conditions (1%) and meaningful use (1%) (U.S. Department of Health and Human Services, 2013). The greatest cost however, is that imposed on the patient. Hospitalization exposes vulnerable older adults to the risk of medical errors (Institute of Medicine [IOM], (2003), and is associated with impaired functional status and quality of life. (O'Connor et al., 2014).

It is a natural progression for hospitals to partner with home health agencies to minimize excessive re-hospitalization rates. However, the long-term viability of these partnerships may be driven in part by how well home health agencies identify patients at high risk of re-hospitalization and prevent its occurrence and in developing approaches to care.

The home health agency provides care where the patient lives and providers of home health care are able to see how that patient reacts to care in that environment. The greater the understanding of how the socioeconomic environment and other clinical factors interact on health outcomes, the more likely home health providers are to develop interventions and health care practices that are strategic and that will ultimately contribute to population health. Home health agencies must be instrumental in developing interventions that address social determinants of health, as well as influencing local and national health care policy related to both the clinical, functional and other sociodemographic factors that may impact hospitalizations.

The remainder of this chapter will discuss specific study findings by research aims and the hypothesis associated with each aim.

Research Aims

RESEARCH AIM #1

Describe the prevalence of re-hospitalization by a population of patients in a large home health agency in California who are enrolled in an episode of home health care.

H_1: There will be a lower hospitalization rate for this study's population as compared to the national average of 25%.

Avoiding re-hospitalizations is a goal that both improves quality and reduces healthcare costs. Among Medicare fee for service patients discharged from the hospital, 18.0% are hospitalized within 30 days (Kaiser Health News, 2013). Nationally, 16% of home health beneficiaries currently get readmitted to an acute facility within the first 60 days of care. According to Anderson, M., Helms, L., Hanson, K. and Devilder, N. (1999), most readmissions of patients from a home health episode occur in the first 2-3 weeks following a hospital discharge. The actual National Home Health readmission rate has changed since the years in which this study sample was drawn. The national CMS readmission rate for home health agencies during the year 2005 through 2008 was 25% (Centers for Medicare and Medicaid Services. *Home Health Compare*, 2010). In May of 2012, CMS changed its calculation method by relying on readmission occurrences derived from claims data versus the prior method of agency self-reporting through the use of an OASIS hospital transfer assessment. The metric now gathered and reported on the Home Care Compare Website (www.cmshomecarecompare.gov) also no longer counts all readmissions within the 60 day episode following a patient's admission to a home health agency for care, counting only a single occurrence of re-hospitalization per 60 day episodes. Further, Medicaid and Medicare Advantage patients are no longer counted, making

comparisons to prior periods for purposes of tracking improvement in rehospitalization rates difficult.

The benchmark used to address H_1 in this study is the readmission rate effective through 2008 of 25%. The readmission rate for the patients in this study was 11.8%. This rate is substantially below both the national average of 25% in 2008.

A few studies have examined the possible reasons for the difference in readmission rates amongst home health agencies in the United States (Murkofsky & Alston, 2009; Mukamel, Fortinsky, White, Harrington, White & Ngo-Metzger, 2014; Schade & Brehm, 2010). Regional differences, provider type, average length of stay, and auspice are possible causes of variance. Hospital-based agencies in general have had lower readmission rates, and tend to lead the industry in lower readmission rates (Strategic Healthcare Partners, 2014, accessed 7/10/14). The data used in this study is from a provider based, or hospital owned agency. Hospital based agencies are more fully embedded in that hospital's continuum of care and artificial barriers to effective care transitions can be mitigated such as with the use of common electronic health records.

Another possible explanation for individual agency variance may be the profit status of the agency. Murkofsky and Alston (2009) suggest that home health agencies may enter or exit the market depending on financial opportunity. Mukamel, et al (2014) looked at the cost structures of for-profit and not-for-profit home health agencies and found practice pattern differences between the two provider types. For-profit agencies, for example, tended to have higher case mix indexes. The case mix index is a measure of patient acuity and is primarily driven by the volume of rehabilitation visits versus nursing visits provided to each patient. For-profit agencies also tended to have higher lengths of stay. The biggest reason for variance

between the study readmission rates and the national average through 2008 is most likely the result of the average length of stay (ALOS) experienced in the study agency as compared to the national average.

In the United States between 2006 and 2007, ALOS was the principal determinant of risk adjusted ACH rate in home health agency patients (Schade & Brehm, 2010). These authors captured this dynamic in their study of ALOS bias in the acute care hospitalization measure for home health agencies. The ALOS bias is due to the probability that hospitalization risk increases over time following hospital discharge whether or not there is intercurrent home health care. These authors state that the acute care hospitalization rate can reliably represent avoidable inpatient care and specifically note that the measure is subject to both reporting errors and a length of stay bias. Reporting errors were described as both intentional as well as unintentional failure to code the OASIS instrument correctly. Intentional errors are errors such as failing to self-report rehospitalization and were part of the stated reason for the change to claims based reporting in 2014. The agency used in this study is a not-for-profit provider based agency whose practice pattern is to complete transfer OASIS instruments on all known hospitalizations and whose ALOS was reported by senior leadership to be 45% lower than the national average (42.6 days +/- 14.3days) reported by Schade and Brehm (2010).

The ALOS bias makes it difficult to understand the predisposing, enabling and need factors known to effect utilization of health care services by home health recipients such as hospitalization. This bias was finally removed in the January 2014 Home Health Compare update. Specifically, the Acute Care Hospitalization and Emergency Department use without hospitalization measures replaced the OASIS-based measures, using Medicare claims data as the new data source. This new measure addresses the acute care hospitalization outcome in a fixed

interval after the start of an episode of home health are regardless of the length of the home health experience (http://vnaa.org).

Future research looking at the factors associated with rehospitalization among home health recipients prior to this change need to carefully consider the effect ALOS and agency self-reporting errors may have on the data sets being used. Neither of these variables were included in this study.

The results being presented in this study suggest that the complexity and severity of illness as well as the specific conditions that could lead to a hospitalization should be considered when developing an approach to the care of a home health patient (Rosati & Huang, 2007). An important consideration in model selection is the timing and ease of data availability. A readmission risk score is most clinically useful if it is calculated early in care in order to allow time for the intervention to be selected. These findings suggest that the home health clinicians should target high-risk patients early in a plan of care who could benefit from timely interventions aimed at minimizing unplanned readmissions to the hospital (Riggs, Madigan & Fortinsky, 2011).

Coleman et al (2004) identified four “pillars” that represent evidence-based actions for successful transition from one care setting to the next, including: a) medication management, b) patient-center health record, c) follow-up with health care provider, and d) knowledge in managing warning flags associated with the chronic condition. Once patients are identified as being at risk for readmission, these are the areas where further interventions may be of help in reducing or preventing readmissions within 30 days.

RESEARCH AIM #2

Examine the home health care recipient's sociodemographic and health-related characteristics that are associated with hospitalization and specifically determine how the risk of hospitalization varies by presence and severity of factors identified on the OASIS instrument completed upon admission to home health care.

H_2: There will be differences in the presence and severity of risk factors identified on the OASIS instrument for patients with, and without a re-hospitalization.

An increasing number of studies have examined the effect of demographic variables, functional limitations (Riggs, Madigan & Fortinsky, 2011), clinical conditions, (Rosati & Huang, 2007; Rosati et al, 2003; Fortinsky et al, 2014; Manson, Swanberg, Oancea & Westra, 2012) and psychosocial issues on the risk of rehospitalization.

Of the 6,249 Medicare home health beneficiaries included in this study 59.03% were female, 60% were 76+ years old, and 15.75% were non-white. These findings are consistent with the expected demographics of home health recipients in the home health agency's geographical coverage for which it was licensed, but none of these factors were determined to be significant.

The variables associated with rehospitalization in the final model in this study included the presence of depression, the presence of dyspnea, the capacity to manage medications, dependence on the use of oxygen, and the presence of cardiovascular, skin (wounds), and most especially a diagnosis of cancer. Activities of daily living were also predictive of the dependent variable, re-hospitalization. All had a corresponding P-value at or below .05.

Risk Prediction Model

One of the next steps in continuing this research is to develop a risk prediction model useful in the home care environment. Kansagara et al. (2011) conducted a systematic review of risk prediction models for hospital readmission and concluded that most current readmission risk prediction models perform poorly, except in specific settings. Nearly all models they looked at included medical co-morbidity data and prior hospitalization as predictors. Variables such as age and gender were not found to contribute enough to be included in final models. Coleman et al. (2004) found the inclusion of variables such as functional status improved predictive models. Kripilani, Theobald, Anctil and Vasilevskis (2013) found similar results and noted that the value of risk stratification and risk prediction models depends on the degree of the model's complexity, data availability and performance and noted that ease of use was likely the most important component. Of note, very few models included clinically actionable data that could be used to triage patients to different types of interventions. Simple models that use clinically actionable data such as the Project BOOST model have been evaluated, but have not been rigorously validated (Kansagara, et al. 2011).

Hansen, Young, Hinami, Levy and Williams (2014) conducted a systematic search of literature databases and created a taxonomy of interventions to reduce 30-day rehospitalization. 43 Studies were included in their review. Using the work of Ashton and Wray (1996) and Coleman et al. (2004), these authors identified 12 intervention categories. The category entitled post discharge intervention reflects the major clinically actionable interventions for inclusion into any home health risk model (see Table 5.1).

Table 5.1 - Taxonomy of interventions to reduce 30-day hospitalization

Pre-discharge Intervention	Post-discharge Intervention
Patient Education	Timely Follow-up
Discharge Planning	Timely PCP Communication
Medication Reconciliation	Follow-up TC
Appointment Scheduled before D/C	Patient Hotline Home Visit

The home health industry is now facing a renewed interest in values-based purchasing, but more work is needed to develop readmission risk prediction models with an outcome of preventable readmission. The inclusion of clinically actionable hospital avoidance interventions into the risk prediction model could not only improve agency-based risk stratification efforts, but would also help home health agencies to better focus limited clinical and administrative resources in readmission avoidance programs.

Anderson Behavioral Model

According to Madigan, Tullai, McGuinness and Neff (2002), the Andersen Behavioral Model was found to be used the most in studies looking at health care utilization in home health recipients. The patient characteristics in this model measured upon admission to an episode of home healthcare were fit into the model's four components described as predisposing, enabling, need, and utilization variables. Previous research using this model has shown that "need" was the best predictor of health service utilization (Andersen & Aday, 1978; Gelberg, Andersen & Leake, 2000; Fortinsky et al., 2014).

Predisposing Variables

As noted earlier in this chapter, there were no Predisposing Characteristics used in the model, which were found to be significant enough to be considered predictive of re-hospitalization. Age, gender, and ethnicity were all found to be insignificant in this model. This was an unexpected result. It was expected that age and gender (males) would have been significant for a prediction risk of re-hospitalization, although as Ewe Reinhardt (2003) pointed out, aging may be too gradual a process to be considered a major driver of health care utilization. DeBoer, Wijka, and deHaes (1997) also found using the Andersen Behavioral Model as a framework for their meta analysis, that age and gender were not predictors of resource use such as hospitalization. It may also be that the study model's age stratification may have been too broad, i.e., the lack of a category for age 85 or older could have hidden a possible effect on the dependent variable by advanced age (> 85 years). It is also likely that the need to control for need variables was more important than predisposing variables such as age, gender and ethnicity. Another possible explanation for the absence of significance in predisposing variables is the type of organization from which the data was extracted. The data set used in this study was from a not-for-profit faith-based health system with a professed commitment to take all patients regardless of predisposing factors such as insurance. Future research on factors associated with risk of readmission should include more predisposing variables than were considered in this study in order to expand the understanding of the effect of variables on rehospitalization in community-based Medicare beneficiaries (Jenks, Williams & Coleman, 2009).

Enabling Variables

Depending on others to manage medications was the only enabling variable found to be significant in the model. The presence of a caregiver, who the patient lived with, and where the patient lived were not found to have significance in the model. Patients who lived alone (AOR of 1.23 with 95% CI at 0.97 – 1.56) were actually found to be hospitalized more often than those who lived with others, but the difference was not significant ($p = 0.094$). It may be that those living alone tended to have higher levels of independence in self-care and were less likely to be medically fragile. Insurance class was not examined in the model as all patients in the sample were Medicare fee for service beneficiaries.

These results are similar to those found in the literature. Both Fortinsky et al., (2009) and Madigan et al. (2012) found the status of a caregiver or where the patient lived to be insignificant. Fortinsky et al., (2014) found a very small effect on rehospitalization for patients who lived alone (AOR = 1.04; C2: 1.02 – 1.06; $p < .001$). Rosati and Huang (2007) also found living alone to be just mildly predictive of rehospitalization (AOR = 1.109; CI: 1.007 – 1.22; $p = 0.036$). It may be that the answer choices embedded in the OASIS instrument do not capture responses discrete enough for this variable to influence the model.

Medication management (all OASIS scores less than independent) were found to be very significant for risk of hospitalization (AOR = 1.38; CI: 1.13 – 1.68: $p = 0.0018$). There is much in the literature looking at medication reconciliation across care settings. Some of the most interesting work on the importance of effective medication management in the home is found in the care transitions work. Coleman, et al. (2006) conducted a randomized controlled trial in Colorado which focused on studying the benefits of care transitions coaches and the importance of patient engagement in these transitions. One of the four pillars developed by Coleman in

earlier research was that assistance with medication self-management was necessary to avoiding unplanned readmissions. Patients with chronic conditions who have difficult managing multiple medications need the support of focused interventions. Most hospitalization avoidance programs have incorporated good medication reconciliation in all health care settings in their programs. Effective interventions are those with robust interventions that cross health care settings including home health (Kripalani, Theobald, Anctil & Vasilevskis, 2013).

Needs Variables

Similar to other studies (Rosati & Huang, 2007; Madigan et al., 2011; Fortinsky et al., 2014), clinical conditions were found to be the most closely associated with a risk of re-hospitalization. Dyspnea with ambulation or activities of daily living (average score of 2 or greater); (AOR 1.35 with CI @ 95% = 1.12 – 1.62; p = .0016), depression (AOR 1.24 with CI @ 95% = 1.02 – 1.51; p = 0.028) were the most significant non-diagnoses variables associated with risk of re-hospitalization.

The Activities of Daily Living variable is comprised of sub-variables; upper body dressing (the ability to dress the upper body with or without dressing or as measured on a 4-point scale), lower body dressing (the ability to put on under garments, socks, slacks and shoes), the degree of bathing assistance, transferring (the ability of a patient to move from the bed to the chair, on and off the toilet, in and out of the tub or shower, and the ability to turn and position self in bed), ambulation (the patient's ability to safely walk once in a standing position or to use a wheelchair once in a seated position on a variety of surfaces), feeding, and preparing and taking oral medications. Scores from each of these questions were added up and averaged on

each patient. The results are reflected as those patients who had difficulties with up to 2 ADL's and those who experienced difficulties with more than 2 ADL's.

Six items were used to construct the measure for Instrumental Activities of Daily Living (IADL) status (preparing meals, doing housework, laundry, shopping, ability to use transportation and the telephone. Scores for each item were summed and averaged and presented in the same way as for the variable "ADL". Although the reliability and validity of the OASIS document has been questioned, researchers have found OASIS reliability and validity to be sufficient for IADL measures (Hittle et al., 2003: Madigan & Fortinsky, 2001; Tullai-McGuinness, Madigan & Rotinsky, 2009).

According to LaPlante (2010) a greater use of combined ADL/IADL measure in age related research such as research looking at variables affecting hospitalization in Medicare eligible populations should be used. This study was set up instead to look at each variable separately and averaged both the IADL and ADL OASIS scales separately presenting the final dichotomous variables as a score of less than 2 and a score of 2 or greater for each variable. Interestingly, IADL was not significant (AOR 1.05 with CI of 0.83 – 1.33; $p = 0.67$), suggesting that the significance of the ADL variable (AOR 1.39 with CI of 1.06 – 1.82; $p = .019$) may not have been seen in the study findings had the IADL/ADL variables been combined.

According to Rosati et al. (2003) and Rosati and Huang (2007), clinical factors were by far the strongest predictors of hospitalization. Functional status was also associated with a risk of hospitalization, although the risk was incremental depending on the number of ADL deficits. Fortinsky et al. (2014) applied the Andersen Behavioral Model and also confirmed that need variables had the highest association to rehospitalization risk, ranking from high to low: skin ulcer, rehab prognosis, Heart Failure as a primary diagnosis, depression and dyspnea. These

authors also emphasize the fact that other potentially important variables not found on the OASIS instrument such as medication accuracy and access to primary care be considered in future models. Monsen, Swanberg, Oancea and Westra (2012) also did a review of the literature on hospitalization risk and found that 28 out of 44 total articles described need variables as predictive of risk of hospitalization. Most significant need variables found in their review included skin (wounds), urinary function, circulation, respiratory compromise, mental health issues, neuro/musculoskeletal problems and cognitive deficits.

Fortinsky et al. (2006) also noted a relationship between clinical predictors and disease specific conditions (i.e., Heart Failure), finding patient level variables the strongest factors associated with hospitalization. These authors found the strongest predictor of rehospitalization to be the number of prior hospital stays and dyspnea. Jenks, Williams and Coleman (2009) found this as well. Both suggested that the variable "prior hospital stay" may be highly correlated with clinical factors and the disease trajectory of chronic disease. This study produced findings similar to those found in the literature. The diagnostic categories for cardiovascular conditions (AOR 1.25 with 95% CI @ 1.05 – 1.48; p = 0.024) and Cancer (AOR 2.1 with 95% CI @ 1.65 – 2.6; p = .0001) are perhaps the most predictive of a risk of hospitalization. The presence of dyspnea and the use of oxygen by the patient is also highly predictive of hospitalization (AOR 1.42 with 95% CI @ 1.13 – 1.78; p = 0.0023). Interestingly, the presence of a catheter or urinary tract infection and pressure ulcers was not found to be associated with hospitalization. This finding may also be attributed to agency-specific practice patterns, which included a low ALOS and the presence of a large wound/ostomy team within the agency. Life expectancy, cognitive function, anxiety, and impaired vision were also not found to be significant. This study did not attempt to isolate the number of co-morbid conditions per patient.

Finally, the unique presentation of the variable home health resource group (HHRG) was found to be significant but only at the >13 rehab visit variable level (AOR 0.81 with 95% CI at 0.65 – 0.99; p = 0.043). This variable which normally reflects a composite of the patient's acuity based on scores derived from clinical, functional and resource use domains was presented for this study as a variable representing only resource use domains; the number of therapy visits provided. The clinical and functional domain components normally found to be components of this variable were not considered, as they would have been potentially highly correlated with other variables in the model. This score is now a measure of resource use by therapy only (physical, occupational and speech therapies). This finding was not expected. One possible explanation for the 0-13 therapy visits level being found protective of the risk of rehospitalization is that the actual medical acuity of the patient population requiring that visit frequency is less likely at risk for rehospitalization. The primary conditions for which therapy visits are provided are orthopedic surgical aftercare and degenerative joint diseases. A smaller number of total therapy visits are provided for neuro (stroke) and generalized weakness or debility. The significant diagnostic variables found in this study; cardiopulmonary, cancer, diabetes, and diseases of the skin, tend to be chronic conditions and ones not typically eligible for extensive rehabilitation under the Home Health Medicare benefits. Visit frequency and intensity as the concepts apply to non-nursing visits are discussed in Research Aim #3.

RESEARCH AIM #3

Examine whether the risk of re-hospitalization varies by the number and frequency of visits the patient received.

H_3: There will be a lower rate of re-hospitalization for patients with higher nursing visit frequency within the first two weeks of enrollment into home health care.

The Home Health Agency's electronic medical record (Allscripts) patient claims database was added to the OASIS data study sample to include total nursing visits and all other visit types provided within the first 14 days of an episode of care and this variable was added to the model. Data extraction challenges prevented knowing the actual visit frequency, or intensity of visits. Only total visits by nurses and "all other" (physical, occupational and speech therapies, home health aides, social work) types of clinician visits were extracted.

The literature looking at the relationship between nursing services use and risk of hospitalization is limited, and the findings reported in the literature conflict on whether more home nursing visits are protective of the risk of re-hospitalization. Rosati and Huang (2007) and Rogers, Perlic and Madigan (2007) found that front-loading nursing visits was associated with lower re-hospitalizations. Both Fortinsky and Madigan (1997) and Vanderboom and Madigan (2008) found higher visits per patient not to be associated with lower hospitalization.

Little research exists about the relationship between skilled home nursing visits, patient characteristics and patient outcome. Empirical evidence is needed to inform policy and clinical practice (Riggs, Madigan & Fortinsky, 2011; Madigan et al, 2009). This study did not attempt to determine the intensity or actual frequency of visits which would also be an issue of interest in future research relative to how visit utilization in home health affects risk of re-hospitalization.

O'Connor, Bowles, Feldman, St. Pierre, Jarrin, Shoh and Murtough (2014) conducted an extensive review of the literature the relationship of home health nursing visits on rehospitalization, focusing on "frontloading" of visits and visit intensity among home health beneficiaries. Rogers et al. (2007) defined front loading as providing 60% of planned nursing

visits within the first two weeks of the home health episode. Riggs, Madigan and Fortinsky (2003) defined visit intensity as a response to the instability of the patient's condition and/or the inability to effectively manage their condition or self-care between visits. Riggs, Madigan and Fortinsky (2011) further expanded on their definition saying that nursing visit intensity could be considered a measure of nursing service use, and should be calculated as a ratio of total nursing visits to length of stay. This calculation would then account for the large variations of home health recipients' average lengths of stay amongst home health agencies. Front loading was noted to be equivalent to visit intensity in most studies (Brega, Jordan & Schlenker, 2003; Riggs et al., 2011; Madigan et al., 2012). The actual calculation of visit intensity however was different in all studies. Most considered only nursing visits intensity. Some included all home health visit types (physical, occupational and speech therapy, social work, and home health aide services) (Brega et al., 2003; Madigan et al., 2012). The total number of visits per episode of care was also used frequently as the measure for nursing service, although the use of this measure does not take into account the variation in home health agency lengths of stay. O'Connor et al. (2014) suggest visit intensity be used in order to better examine how care was given across all provider types.

The results in this study seem to contradict some studies while supporting others. Fortinsky and Madigan (1997) in using the Andersen model to test the relationship between resource consumption and patient outcome found that the intensity of visits per day of those admitted to the hospital from home care were significantly greater than those discharged to the community. Rogers et al. (2007) found front loading of visits to be associated with fewer hospitalizations. Rosati and Huang (2007) reported results similar to this study in their research looking at all visits and hospitalization within 60 days. These authors found more nursing visits

to be associated with rehospitalization, describing this finding as “reassuring” as it suggested clinicians were aware of the complexity of their patients and increased the number of nursing visits accordingly (40-63 Nurse Visits: AOR 1.53 with CI of 1.0 – 2.35; p = .05). This is similar to the results found in this study (All Nurse Visits: AOR 1.79 with CI of 1.22 – 2.6; p = 0.0029) and reinforce the theory that higher numbers of nursing visits may be highly correlated and potentially necessary to clinical acuity in the absence of evidence-based readmission avoidance programs.

Although these study findings were unexpected, it is likely that the patients who received the most visits were clinically most acute and as a result, more likely to be at risk of hospitalization. Neither visit intensity or acuity were addressed in this study, making it difficult to fully understand the effect of both nursing and non-nursing visit utilization on rehospitalization. The findings associated with All Non-Nurses Visits are not surprising. High numbers of therapy visits would be provided to patients with good rehab potential. These patients would be less likely to be at risk of re-hospitalization.

Twenty-five variables in the cross-tab presented in Chapter 4 were significant at both the categorical as well as ordered levels. Of those, five provide new information about the patient population who received 10-33 visits. Of those patients receiving 10-33 visits by a nurse, more lived with someone (73%), more were older (45.7% > age 76) and more experienced pain which interfered with activity (70.6%). Nurse visits also showed an ordered increase by quartile for patients who were older, who experienced pain interfering with activity, exhibited cognitive deficits, and who presented with surgical wounds or lower extremity stasis ulcers. Patients found with these need variables used more nursing resources.

According to Bliss, Westra, Savik & Hou, (2013), 34% of home health care episodes are for wounds (pressure ulcers, surgical wounds and/lower extremity venous ulcers). Skin conditions (wounds) were determined to be significant for risk of re-hospitalization for home health recipients in this study (AOR 1.54 with CI of 1.18 to 2.00; p = 0.0016). Skin conditions were also determined to be significant for utilization of higher number of nursing visits as well (34.9% of patients with skin conditions received 10-33 nurse visits).

The most likely explanation for the findings in this study which appear to show that patients use more nursing visits and still get re-hospitalized is that these patients are older, are compromised to the degree they cannot live alone, and require more nursing visits for the care of wounds consisting of surgical and stasis ulcers. These findings are aligned with the Andersen Behavioral Model indicating that patients with higher need variables drive higher utilization. Patients with a higher need for nursing visits within the first 14 days of start of care had a higher risk of utilizing greater resources use such as hospitalization. The frequency and intensity of home health visits as it relates to risk of rehospitalization is an area of study which needs to be examined (Riggs, Madigan & Fortinsky, 2011). Visit utilization by diagnosis or clinical item groupings and the efficacy of mid level practitioners in Medicare intermittent home health care are also areas in need of further study. The reimbursement model of the current Medicare home health benefit does not accommodate the routine use of Nurse Practitioners who, as an example, if employed as a regular part of the home health care team could potentially provide time sensitive interventions such as ordering wound care changes and early treatment of wound or other infections without the patient having to wait for an appointment to the primary care physician or presenting to the emergency department. Home health agencies who implement evidence-based clinical strategies which are successful in managing wounds more efficiently and

find a way to incorporate mid level practitioners into the home care interdisciplinary team will likely experience a reduction in higher utilization rates as well as lower re-hospitalization rates.

Limitations

This study adds to a slowly growing body of research using the OASIS dataset from home care agencies to examine outcomes such as re-hospitalization in home healthcare (Rosati et al., 2003; Rosati & Huang, 2007; Madigan, Schott & Matthews, 2001).

This study had several limitations. First, the patient variables were restricted to data available in the OASIS instrument, with the exception of the agency claims files from which visits were extracted. Other potentially important variables such as medications, physician orders, historical medical information and progress notes were not used. This kind of data is not available on the OASIS instrument.

Another potential limitation noted by Madigan (2012) is that as Home Health agencies are typically dependent on patient and family to report whether a hospitalization occurred, a margin of error in agency reported readmissions could occur. A patient enrolled in a 60-day episode of home health care may be scheduled to be seen by the nurse once a week. It is possible that in this scenario, a patient could experience a short hospitalization between visits made by the nurse and fail to inform the nurse. Further, individual home health agency policy may dictate how many hospitalizations get recorded within a 60-day episode of care. Home health agencies have the option of discharging a patient who readmits to the hospital before the first 60-day episode is over. The readmissions that may occur on the patients after the discharge from the agency will not be recorded in the OASIS database. This potential limitation to data accuracy was addressed in 2013 when CMS began using claims data to report re-hospitalizations.

Another significant potential limitation is that the data used is from only one home health agency. The data used in this study is from an agency on the Central Coast of California. This data may reflect the impact of greater managed care penetration, different physician practice patterns and/or other sociodemographic differences unique to California or CMS Region IX. Further, the data used in this study was intentionally gathered only from easily accessible data (OASIS) and only at the start of care. This was so that only study recommendations could be easily adopted by home health agencies. The sample itself was selected from patients that had complete assessment data at start of care. These two factors may have lead to selection bias and the results may not generalize to the broader population of home health care recipients. Lastly, since only start of care information was used in the models, the study findings may not apply when patients are re-certified for additional, contiguous 60-day episodes of care prior to being discharged from the home health agency.

Missing data may also be a limitation to this study that is worthy of note. Secondary diagnoses, for instance may have been underreported given the limitations inherent in the space allowed on the OASIS instrument and the instructions for completing the instrument. In research pertaining to home health care recipients, it is unknown whether the OASIS is a complete source of data to capture Comorbid conditions or whether it should be complimented with claims data, noting that a thorough account of comorbidities should really be considered essential for risk adjustments in outcomes research Kansagara (2014).

Research on re-hospitalization from the home health perspective is often limited by methodological issues on how long the patients are followed after an index hospitalization and critical questions about the length of time following an index hospital stay. Reasons may be patient specific (decline in health status, development of a new problem (Madigan, Tullai,

McGuinness & Neff, 2002), or as a result of the failure of the discharge planning process for hospital based patients (Ashton & Wray, 1996).

Another limitation to the study may be that it did not address the auspice or provider-based status of the home health agency from which he data was extracted. According to Decker (2011), for-profit status was associated with a greater risk of hospitalization than that associated with not-for-profit status. Schade and Brehm (2010) found that for-profit agencies have a longer length of stay need and that this variable itself had a strong association with hospitalizations after an admission to home health in that the risk of hospitalization increased over time regardless of the care a patient received. These researchers found a significant positive bivariate correlation between agency average length of stay and for-profit status.

Both interrater reliability and validity for many questions on the OASIS instrument call into question the generalizability of studies based on data derived from the instrument. O'Connor and David (2012) conducted a meta-analysis of the validity and reliability found in studies done since the instrument was put into use in 1998. These authors summarize concerns and future questions which need additional research and conclude that evidence to date is inconclusive regarding the reliability and validity of the OASIS instrument and that important gaps in knowledge still exist which have to be closed given its role in determining home health reimbursement, home health quality and future research.

Another limitation is that this model does not specifically identify hospitalizations that may be preventable. This researcher attempted to stratify re-hospitalizations in the model using the Agency for Healthcare Research and Quality (AHRQ)'s list of potentially preventable diagnosis, but found too much data missing in the sample on reason for hospitalization and the variable had to be eliminated.

Finally, research using OASIS data has also been limited by the lack of process of care items in the OASIS data set. This limitation was addressed in a later OASIS version, OASIS C as of January 1, 2010. This new version of OASIS included process of care items, which will allow future research using the OASIS data set to contain variables for process of care. (Riggs, Madigan & Fortinsky, 2011).

Implications for Nursing

The Institute for Health Care Improvement developed a framework based on three dimensions called the "Triple Aim". This framework describes an approach to optimizing health system performance. The Triple Aim dimensions are improving the health of populations, patient experiences of care and the per capita cost of healthcare (Bisognano & Kennedy, 2012). This framework has become the inspiration for much of the health care improvement work seen over the past five years. The authors of this book note that new models of care need to be based on patient centered-ness, effective information sharing, evidence-based care, and safety.

Through population care coordination, nurses are fulfilling the promise of the Institute of Medicine Report on the Future of Nursing, acting as architects and co leaders in transforming the healthcare system. Health plans, including Medicare are increasingly relying on predictive analytics to coordinate care for vulnerable populations (Christopher, 2014). As the health system adopts a more integrated approach to patient care, it becomes more necessary to identify risk factors of specific populations for high service utilization in order to achieve the Triple Aim. Research in these areas also points to the need for more community-based advance practice nurses prepared to lead the clinical management of complex populations of patients. Findings such as those presented in this study can be used to inform policy makers on the unique role of

advance practice nurses in Home Health Care, presenting a compelling case for a future reimbursement model for Medicare beneficiaries which includes these clinicians.

Home Health Care as a component of the healthcare delivery system in the U.S. has long been associated with many of the characteristics described when speaking of population health and management. Nurses in Home Care must be in an informed position to work as navigators of community-based care. Two of the most critical components of an effective readmission avoidance program include medication reconciliation and early identification of symptoms (H2H, accessed 09/01/14). The Home Health Nurse's skill sets and approach to care management is shifting. Clinical data following an acute episode of care must be included in the hand off to the admitting home health nurse and all subsequent clinical data gathered while the patient is enrolled in an episode of home health care must be timely, accessible and accurate to providers across the continuum. Nurses who do not own the accuracy and completeness of their clinical documentation (OASIS) and who do not understand the evidence based material on effective care transitions create barriers instead of pathways to a patient's capacity to remain safely on the home environment. Further, the data accuracy concerns described in this study depict real obstacles to conducting good research into the future; research which should serve to inform policy makers on the integral role of home health clinicians in preventing unplanned readmissions.

In order to function as informed navigators of community-based care, nurses in home health agencies need to be able to both complete the OASIS instrument accurately and depend on colleagues for that same accuracy. Accuracy was briefly discussed in Chapter 2 and defined by Madigan and Fortinsky (2003) as the extent of agreement of the OASIS assessment responses. The inconsistencies relative to accuracy in OASIS data was well documented. Nurses need to

own the quality of the data they use to improve care and the implications; health policy and reimbursement changes resulting from data presumed to be accurate. Staff level clinicians, supervisors, and senior leadership all must be able to assess patient needs at both the individual patient level and at the population health level and they need to be able to focus their assessments on items demonstrated to be most important (i.e., need variables) in managing risk of hospitalization.

Research in home healthcare on the factors associated with risk of hospitalization has significant implications for informing home and community-based leaders and caregivers how best to focus efforts and clinical interventions to enable patients to manage their own care in the home environment. It is imperative that nursing leadership be able to use the results of this research to select strategic, customized interventions to achieve this outcome in an environment which demands improvement in cost outcomes as well.

Future Research

This study adds to a slowly growing body of research in Home Health Care using the OASIS dataset and resource data from a Home Health Care Agency to examine outcome in this field. The use of the OASIS data set affords the opportunity for more standardization in study data and improved capacity for replicable research.

Further research should replicate these findings at other home health agencies and explain whether risk assessment can improve clinician care planning and how well planned care interventions have an impact on patient outcomes. Consideration should be given to studying predictors of re-hospitalization by diagnostic group (i.e., CHF, COPD, HTN, Diabetes). It is

evident in this study as well as others (Rosati & Huang, 2007) that it is possible to identify patients at high risk of re-hospitalization who may need customized interventions and services.

A growing body of evidence suggests that contextual factors associated with the organization and structural attributes of individual home health agencies significantly affect a home health patient's risk of hospitalization (Intrator, Castle & Mor, 1999). Further expansion of the Andersen Behavioral Model beyond home health episode level predictors of re-hospitalization is needed. Studies suggest that external environment factors such as the context in which an agency provides care influence decisions to re-hospitalization by all members of the health care delivery team. For example, evidence suggests that there is a state-to-state variation in hospital admission rates, which may be related to state level funding policies. Agencies in states with broader Medicaid programs may be able to provide care outside of the typical benefit restrictions, which can contribute to less re-hospitalization. (Intrator & Mor, 2000). It is also possible that states and organizations with better end of life practice may be associated with lower readmission rates caused by the prevalence of Advance Care Directives directing more comfort care and less aggressive treatments such as hospitalization in patients in the last stages of life identified at high risk of re-hospitalization.

In the home setting, further work is needed to understand what type and intensity of services are most needed post discharge and which level of practitioner is necessary to make sure interventions are focused and specific to avoiding unplanned readmissions. According to Kripalani, Theobald, Anctil and Vasilevskis (2013) there's no consistent evidence that home visits reduce readmission rates, suggesting that home healthcare may be more of a natural bridge in the presence of larger coordinated efforts. The results of their study could call into question the health policy position on the Medicare Home Health benefit, and additional study must be

undertaken to better demonstrate how the right intensity of care to the right population of home-based patients makes a difference in re-hospitalization.

Future study on visit utilization in Home Health Care must examine the effect visit utilization has on specific subsets of patients such as diagnostic grouping and must include control for the acuity or similar severity of illness metric in order to understand the benefit of the home health benefit on preventing re-hospitalization. Future study should also revisit the components of the Home Health Resource Group (HHRG). As currently comprised, the HHRG is disproportionately influenced by the utilization of therapy visits which can present a perverse incentive to home health agencies to increase utilization in this area. Future research should contribute to a revision of the HHRG by weighting the scoring that creates the HHRG with evidence-based medical acuity factors predictive of greater health services resource use such as rehospitalization.

Future research must also be undertaken to demonstrate the overall effectiveness of home health care on improving cost, quality, and safety. Organizations and communities that attain the Triple Aim will have healthier populations, in part as a result of better processes that identify solutions earlier in a patient's care and outside of acute healthcare.

Conclusions

In order for home health care to be considered an integral component to health system's re-design now and into the future, it needs to embody all three components of the Triple Aim. Individual organizations will need to rely on research, which provides clear direction on how to both strategically improve current care delivery processes and target efforts at outcome improvement. Research which focuses only on the identification of risk for re-hospitalization

now needs to be combined and studied with the frameworks now being developed around evidence-based approaches to care known to potentially reduce the risk of re-hospitalization once a patient has been identified. Both the Coleman Care Transition Model and the Naylor Transitional Care Model are excellent examples of rapidly expanding models being utilized by many hospitals as frameworks to guide practice aimed at achieving better care transitions between care settings and as a result, fewer acute care readmissions (California Health Care Foundation. Navigating Care Transitions in California: Two models for change, 2008). Future research studies in home health need to be done which utilize the OASIS derived dataset in these efforts to identify patients at high risk of re-hospitalization upon discharge to the community after an index hospitalization and variables found in these care transition models to examine the effectiveness of a comprehensive approach to care aimed at reducing costly acute care episodes in high risk Home Health patients.

Thus, the above evidence suggests that organizational, market and policy factors have a significant effect on hospitalization of home health recipients. Further research is needed to evaluate the effect of such external environmental and contextual factors on hospitalization in this study population, particularly among vulnerable home health recipients identified clinically and functionally at high risk of re-hospitalization.

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Appendix A

TABLE 9: Logistic Regression Model for Predicting the Outcome of Acute Care Hospitalization.

Risk Factor Measured at SOC/ROC[*†]	Coefficient[‡]	Odds Ratio[‡]	(90% CI)[‡]
Age: under 65 (0-1)	0.077	1.080	(1.059 - 1.102)
Age: 75 to 84, inclusive (0-1)	-0.051	0.950	(0.936 - 0.965)
Age: 85 or more (0-1)	-0.103	0.902	(0.886 - 0.918)
Gender: female (0-1)	-0.047	0.954	(0.942 - 0.966)
Any HMO payment source (0-1)	-0.225	0.798	(0.783 - 0.814)
Both Medicare and Medicaid payment sources (0-1)	0.162	1.176	(1.149 - 1.203)
Medicaid (not Medicare) as payment source (0-1)	0.395	1.485	(1.449 - 1.522)
Patient lives with family member (0-1)	0.066	1.068	(1.046 - 1.090)
Patient lives alone (0-1)	0.163	1.176	(1.150 - 1.204)
Caregiver provides ADL assistance (0-1)	-0.039	0.962	(0.948 - 0.977)
Caregiver provides IADL assistance (0-1)	-0.050	0.952	(0.936 - 0.968)
Inpatient discharge from hospital (0-1)	0.173	1.188	(1.171 - 1.206)
Inpatient discharge from rehabilitation facility (0-1)	0.081	1.084	(1.062 - 1.108)
Inpatient discharge from nursing home (0-1)	0.087	1.091	(1.068 - 1.115)
Medical regimen change in past 14 days (0-1)	-0.057	0.944	(0.928 - 0.961)
Overall prognosis moderate or better (0-1)	-0.098	0.907	(0.890 - 0.924)
Rehabilitative prognosis is good (0-1)	-0.270	0.764	(0.752 - 0.775)
Disability in grooming (0-3)	0.026	1.026	(1.016 - 1.036)
Disability in dressing upper body (0-3)	0.056	1.057	(1.046 - 1.069)
Disability in toileting (0-4)	0.071	1.073	(1.061 - 1.086)
Disability in ambulation (0-5)	0.064	1.067	(1.057 - 1.076)
Prior (2 weeks ago) disability in bathing (0-5)	0.043	1.044	(1.038 - 1.050)
Prior (2 weeks ago) disability in toileting (0-4)	-0.076	0.927	(0.916 - 0.938)
Disability in housekeeping (0-4)	0.027	1.028	(1.022 - 1.034)
Disability in management of oral medications (0-2)	0.136	1.146	(1.130 - 1.162)
Prior (2 weeks ago) disability in transportation (0-2)	0.149	1.160	(1.142 - 1.179)
Prior (2 weeks ago) disability in laundry (0-2)	0.079	1.083	(1.071 - 1.095)
Prior (2 weeks ago) disability in telephone use (0-5)	-0.023	0.977	(0.971 - 0.982)
Prior (2 weeks ago) disability in mgt. of oral medications (0-2)	-0.158	0.854	(0.840 - 0.869)
Dyspnea (shortness of breath) (0-4)	0.133	1.142	(1.136 - 1.149)
Vision impairment (0-2)	0.032	1.032	(1.020 - 1.044)
Speech/language impairment (0-5)	-0.046	0.955	(0.947 - 0.964)
Pain interfering with activity (0-3)	0.039	1.039	(1.033 - 1.046)
Intractable pain (0-1)	0.108	1.114	(1.094 - 1.133)
Anxiety level (0-3)	0.044	1.045	(1.037 - 1.052)
Depression symptom scale (0-5)	0.050	1.051	(1.040 - 1.062)
Confusion scale (0-4)	0.019	1.019	(1.012 - 1.027)
Stage 1-4 pressure ulcer(s) present (0-1)	-0.156	0.855	(0.800 - 0.914)
Stage 3-4 pressure ulcer(s) present (0-1)	0.182	1.200	(1.123 - 1.283)
Stage of most problematic pressure ulcer (0-4)	0.149	1.161	(1.120 - 1.203)
No observable pressure ulcer to measure stage (0-1)	0.395	1.485	(1.366 - 1.615)
Status of most problematic stasis ulcer (0-3)	0.170	1.186	(1.169 - 1.203)
Surgical wound(s) present (0-1)	-0.418	0.658	(0.633 - 0.684)
Status of surgical wound (0-3)	0.107	1.113	(1.092 - 1.135)
No observable surgical wound to measure status (0-1)	0.517	1.677	(1.573 - 1.788)
Urinary tract infection (0-1)	-0.094	0.911	(0.891 - 0.931)
Urinary catheter (0-1)	0.326	1.385	(1.340 - 1.431)
Bowel incontinence frequency (0-5)	0.032	1.033	(1.026 - 1.040)
Bowel ostomy (0-1)	0.327	1.387	(1.334 - 1.442)
Urinary catheter prior to past 2 weeks (0-1)	0.258	1.294	(1.244 - 1.346)
Memory loss requiring supervision prior to past 2 weeks (0-1)	-0.085	0.919	(0.900 - 0.938)
Obese at SOC/ROC (0-1)	-0.059	0.943	(0.928 - 0.958)
Maximum severity rating among all diagnoses (0-4)	0.081	1.084	(1.075 - 1.094)
Number of diagnoses with severity rating >= 2 (0-6)	0.072	1.074	(1.070 - 1.079)
Acute condition: mental/emotional (0-1)	0.339	1.404	(1.345 - 1.465)
Acute condition: oxygen therapy (0-1)	0.229	1.258	(1.237 - 1.278)
Acute condition: IV/infusion therapy (0-1)	0.387	1.472	(1.427 - 1.518)
Acute condition: enteral/parenteral nutrition (0-1)	0.475	1.608	(1.544 - 1.674)

TABLE 9: Logistic Regression Model for Predicting the Outcome of Acute Care Hospitalization. (cont'd)

Risk Factor Measured at SOC/ROC*†	Coefficient‡	Odds Ratio‡	(90% CI)‡
Acute condition: orthopedic (0-1)	-0.157	0.855	(0.841 - 0.870)
Acute condition: neurologic (0-1)	-0.139	0.870	(0.851 - 0.890)
Acute condition: open wound/lesion (0-1)	0.091	1.095	(1.080 - 1.111)
Acute condition: cardiac/peripheral vascular (0-1)	0.108	1.114	(1.097 - 1.131)
Chronic condition: impaired ambulation/mobility (0-1)	-0.078	0.925	(0.906 - 0.944)
Chronic condition: eating disability (0-1)	-0.090	0.914	(0.885 - 0.943)
Chronic condition: dependence in medication admin. (0-1)	0.232	1.261	(1.236 - 1.287)
Diagnosis: infectious/parasitic disease (0-1)	0.103	1.109	(1.077 - 1.142)
Diagnosis: genitourinary system diseases (0-1)	0.210	1.234	(1.212 - 1.256)
Diagnosis: skin/subcutaneous diseases (0-1)	0.147	1.158	(1.133 - 1.184)
Diagnosis: musculoskeletal system diseases (0-1)	-0.098	0.906	(0.893 - 0.920)
Diagnosis: fractures (0-1)	-0.099	0.906	(0.883 - 0.929)
Diagnosis: neoplasms (0-1)	0.345	1.412	(1.385 - 1.440)
Diagnosis: endocrine/nutritional/metabolic (0-1)	0.173	1.188	(1.174 - 1.203)
Diagnosis: blood diseases (0-1)	0.250	1.284	(1.258 - 1.310)
Diagnosis: nervous system disorder (0-1)	-0.093	0.911	(0.894 - 0.929)
Diagnosis: circulatory system diseases (0-1)	0.108	1.114	(1.097 - 1.130)
Diagnosis: digestive system diseases (0-1)	0.097	1.101	(1.082 - 1.121)
Resumption of Care with intervening in-patient stay (0-1)	0.646	1.908	(1.878 - 1.938)
Attention to artificial openings: urinary (0-1)	0.194	1.215	(1.156 - 1.277)
Aftercare following hip, joint replacement or fracture (0-1)	-0.572	0.564	(0.541 - 0.589)
Attention to artificial openings: gastro/colostomy (0-1)	-0.190	0.827	(0.776 - 0.881)
Rehabilitation procedures: physical therapy (0-1)	-0.123	0.885	(0.871 - 0.899)
Aftercare following surgery (0-1)	-0.118	0.889	(0.868 - 0.911)
Constant	-2.485		

Number of Risk Factors: 82

R²:§ Developmental R^2 = 0.146 Validation R^2 = 0.144

C:§ Developmental C-statistic = 0.734 Validation C-statistic = 0.733

* SOC = Start of Care, ROC = Resumption of Care after inpatient stay. Risk factors pertain to SOC/ROC values.

† The number of values in the measurement scale for each risk factor is in parentheses. For risk factors that take on the value 0 and 1, the value 1 denotes the presence of the attribute and 0 denotes its absence. For risk factors that pertain to health or functional status and are defined using a scale that takes on more than two values, higher values of the scale typically indicate greater impairment or severity of illness. Selective risk factors take on values that simply represent counts (typically the number of problems) -- these are clear from context. The meaning associated with specific values for each risk factor can be determined from the OASIS data set.

‡ All coefficients/odds ratios are significant at P<.0001 using the likelihood ratio test for the hypothesis that the coefficient is zero. The odds ratios and their associated 90% CIs (confidence intervals) are given. These are considered significant at P<.0001 because of the very large developmental sample used to the create the models. Using this significance level and large developmental sample results in more stable models whose performance is superior under cross validation.

§ The R^2 values are the squared correlations between predicted and observed values for all patients in the developmental (validation) sample. The developmental sample size for all outcomes is 500,000, with some variation in the number of number of valid cases in this sample for particular outcome measures. The validation sample is 1,000,000 for all models, with similar variation in the number of valid cases for different outcome measures. These sample sizes pertain to both R^2s and C-statistics. The C-statistic is the area under the Receiver Operating Characteristic curve. Intuitively, the C-statistic can be described as follows: It is the probability that two individuals who differ on the dependent variable (e.g., one achieves the outcome and one does not) also differ (in the same direction) on the predicted value calculated from the model.

Outcome and Assessment Information Set (OASIS-B1)

Items to be Used at Specific Time Points

Start of Care	Home Health Patient Tracking Sheet, M0080-M0825
Start of care—further visits planned	
Resumption of Care	M0080-M0825
Resumption of care (after inpatient stay)	
Follow-Up	M0080-M0100, M0175, M0230-M0250, M0390, M0420, M0440, M0450, M0460, M0476, M0488, M0490, M0530-M0550, M0610, M0650-M0700, M0825
Recertification (follow-up) assessment	
Other follow-up assessment	
Transfer to an Inpatient Facility	M0080-M0100, M0830-M0855, M0890-M0906
Transferred to an inpatient facility—patient not discharged from an agency	
Transferred to an inpatient facility—patient discharged from agency	
Discharge from Agency — Not to an Inpatient Facility	
Death at home	M0080-M0100, M0906
Discharge from agency	M0080-M0100, M0200-M0220, M0250, M0280-M0380, M0410-M0820, M0830-M0880, M0903-M0906

Note: For items M0640-M0800, please note special instructions at the beginning of the section.

CLINICAL RECORD ITEMS

(M0080) Discipline of Person Completing Assessment:

☐ 1-RN ☐ 2-PT ☐ 3-SLP/ST ☐ 4-OT

(M0090) Date Assessment Completed: __ __ / __ __ / __ __ __ __
month day year

(M0100) This Assessment is Currently Being Completed for the Following Reason:

Start/Resumption of Care
- ☐ 1 – Start of care—further visits planned
- ☐ 3 – Resumption of care (after inpatient stay)

Follow-Up
- ☐ 4 – Recertification (follow-up) reassessment **[Go to *M0175*]**
- ☐ 5 – Other follow-up **[Go to *M0175*]**

Transfer to an Inpatient Facility
- ☐ 6 – Transferred to an inpatient facility—patient not discharged from agency **[Go to *M0830*]**
- ☐ 7 – Transferred to an inpatient facility—patient discharged from agency **[Go to *M0830*]**

Discharge from Agency — Not to an Inpatient Facility
- ☐ 8 – Death at home **[Go to *M0906*]**
- ☐ 9 – Discharge from agency **[Go to *M0200*]**

DEMOGRAPHICS AND PATIENT HISTORY

(M0175) From which of the following **Inpatient Facilities** was the patient discharged during the past 14 days? **(Mark all that apply.)**

- ☐ 1 - Hospital
- ☐ 2 - Rehabilitation facility
- ☐ 3 - Skilled nursing facility
- ☐ 4 - Other nursing home
- ☐ 5 - Other (specify) _____
- ☐ NA - Patient was not discharged from an inpatient facility **[If NA at SOC/ROC, go to *M0200;* If NA at Follow-Up, go to *M0230*]**

(M0180) **Inpatient Discharge Date** (most recent):

__ __ / __ __ / __ __ __ __
month day year

☐ UK - Unknown

(M0190) **Inpatient Diagnoses** and ICD-9-CM code categories (three digits required; five digits optional) for only those conditions treated during an inpatient facility stay within the last 14 days (no surgical or V-codes):

Inpatient Facility Diagnosis	ICD-9-CM
a. _____	(__ __ . __ __)
b. _____	(__ __ . __ __)

Effective 10/1/2003

List each inpatient Diagnosis and ICD-9-CM code at the level of highest specificity for only those conditions treated during an inpatient stay within the last 14 days (no surgical, E-codes, or V-codes):

Inpatient Facility Diagnosis	ICD-9-CM
a. _____	(__ __ . __ __)
b. _____	(__ __ . __ __)

(M0200) **Medical or Treatment Regimen Change Within Past 14 Days:** Has this patient experienced a change in medical or treatment regimen (e.g., medication, treatment, or service change due to new or additional diagnosis, etc.) within the last 14 days?

- ☐ 0 - No **[If No, go to *M0220*]**
- ☐ 1 - Yes

(M0210) List the patient's **Medical Diagnoses** and ICD-9-CM code categories (three digits required; five digits optional) for those conditions requiring changed medical or treatment regimen (no surgical or V-codes):

Changed Medical Regimen Diagnosis	ICD-9-CM
a. _____	(__ __ . __ __)
b. _____	(__ __ . __ __)
c. _____	(__ __ . __ __)
d. _____	(__ __ . __ __)

Effective 10/1/2003

List the patient's Medical Diagnoses and ICD-9-CM codes at the level of highest specificity for those conditions requiring changed medical or treatment regimen (no surgical, E-codes, or V-codes):

Changed Medical Regimen Diagnosis	ICD-9-CM
a. _____	(__ __ . __ __)
b. _____	(__ __ . __ __)
c. _____	(__ __ . __ __)
d. _____	(__ __ . __ __)

(M0220) Conditions Prior to Medical or Treatment Regimen Change or Inpatient Stay Within Past 14 Days: If this patient experienced an inpatient facility discharge or change in medical or treatment regimen within the past 14 days, indicate any conditions which existed prior to the inpatient stay or change in medical or treatment regimen. **(Mark all that apply.)**

- ☐ 1 - Urinary incontinence
- ☐ 2 - Indwelling/suprapubic catheter
- ☐ 3 - Intractable pain
- ☐ 4 - Impaired decision-making
- ☐ 5 - Disruptive or socially inappropriate behavior
- ☐ 6 - Memory loss to the extent that supervision required
- ☐ 7 - None of the above
- ☐ NA - No inpatient facility discharge and no change in medical or treatment regimen in past 14 days
- ☐ UK - Unknown

(M0230/M0240) Diagnoses and Severity Index: List each medical diagnosis or problem for which the patient is receiving home care and ICD-9-CM code category (three digits required; five digits optional – no surgical or V-codes) and rate them using the following severity index. (Choose one value that represents the most severe rating appropriate for each diagnosis.) ICD-9-CM sequencing requirements must be followed if multiple coding is indicated for any diagnoses.

Effective 10/1/2003

List each diagnosis and ICD-9-CM code at the level of highest specificity (no surgical codes) for which the patient is receiving home care. Rate each condition using the following severity index. (Choose one value that represents the most severe rating appropriate for each diagnosis.) E-codes (for M0240 only) or V-codes (for M0230 or M0240) may be used. ICD-9-CM sequencing requirements must be followed if multiple coding is indicated for any diagnoses. If a V-code is reported in place of a case mix diagnosis, then M0245 Payment Diagnosis should be completed. Case mix diagnosis is a primary or first secondary diagnosis that determines the Medicare PPS case mix group.

Severity Rating
0 - Asymptomatic, no treatment needed at this time
1 - Symptoms well controlled with current therapy
2 - Symptoms controlled with difficulty, affecting daily functioning; patient needs ongoing monitoring
3 - Symptoms poorly controlled, patient needs frequent adjustment in treatment and dose monitoring
4 - Symptoms poorly controlled, history of rehospitalizations

	(M0230) Primary Diagnosis	ICD-9-CM	Severity Rating
a.	_____	(_ _ _ . _ _)	☐0 ☐1 ☐2 ☐3 ☐4
	(M0240) Other Diagnoses	**ICD-9-CM**	**Severity Rating**
b.	_____	(_ _ _ . _ _)	☐0 ☐1 ☐2 ☐3 ☐4
c.	_____	(_ _ _ . _ _)	☐0 ☐1 ☐2 ☐3 ☐4
d.	_____	(_ _ _ . _ _)	☐0 ☐1 ☐2 ☐3 ☐4
e.	_____	(_ _ _ . _ _)	☐0 ☐1 ☐2 ☐3 ☐4
f.	_____	(_ _ _ . _ _)	☐0 ☐1 ☐2 ☐3 ☐4

Effective 10/1/2003

(M0245) Payment Diagnosis (optional): If a V-code was reported in M0230 in place of a case mix diagnosis, list the primary diagnosis and ICD-9-CM code, determined in accordance with OASIS requirements in effect before October 1, 2003--no V-codes, E-codes, or surgical codes allowed. ICD-9-CM sequencing requirements must be followed. Complete both lines (a) and (b) if the case mix diagnosis is a manifestation code or in other situations where multiple coding is indicated for the primary diagnosis; otherwise, complete line (a) only.

	(M0245) Primary Diagnosis	ICD-9-CM
a.	_____	(___.__)
	(M0245) First Secondary Diagnosis	ICD-9-CM
b.	_____	(___.__)

(M0250) Therapies the patient receives at home: **(Mark all that apply.)**

- ☐ 1 - Intravenous or infusion therapy (excludes TPN)
- ☐ 2 - Parenteral nutrition (TPN or lipids)
- ☐ 3 - Enteral nutrition (nasogastric, gastrostomy, jejunostomy, or any other artificial entry into the alimentary canal)
- ☐ 4 - None of the above

(M0260) Overall Prognosis: BEST description of patient's overall prognosis for recovery from this episode of illness.

- ☐ 0 - Poor: little or no recovery is expected and/or further decline is imminent
- ☐ 1 - Good/Fair: partial to full recovery is expected
- ☐ UK - Unknown

(M0270) Rehabilitative Prognosis: BEST description of patient's prognosis for functional status.

- ☐ 0 - Guarded: minimal improvement in functional status is expected; decline is possible
- ☐ 1 - Good: marked improvement in functional status is expected
- ☐ UK - Unknown

(M0280) Life Expectancy: (Physician documentation is not required.)

- ☐ 0 - Life expectancy is greater than 6 months
- ☐ 1 - Life expectancy is 6 months or fewer

(M0290) High Risk Factors characterizing this patient: **(Mark all that apply.)**

- ☐ 1 - Heavy smoking
- ☐ 2 - Obesity
- ☐ 3 - Alcohol dependency
- ☐ 4 - Drug dependency
- ☐ 5 - None of the above
- ☐ UK - Unknown

LIVING ARRANGEMENTS

(M0300) Current Residence:

- ☐ 1 - Patient's owned or rented residence (house, apartment, or mobile home owned or rented by patient/couple/significant other)
- ☐ 2 - Family member's residence
- ☐ 3 - Boarding home or rented room
- ☐ 4 - Board and care or assisted living facility
- ☐ 5 - Other (specify) _____

(M0340) Patient Lives With: (Mark all that apply.)

- ☐ 1 - Lives alone
- ☐ 2 - With spouse or significant other
- ☐ 3 - With other family member
- ☐ 4 - With a friend
- ☐ 5 - With paid help (other than home care agency staff)
- ☐ 6 - With other than above

SUPPORTIVE ASSISTANCE

(M0350) Assisting Person(s) Other than Home Care Agency Staff: (Mark all that apply.)

- ☐ 1 - Relatives, friends, or neighbors living outside the home
- ☐ 2 - Person residing in the home (EXCLUDING paid help)
- ☐ 3 - Paid help
- ☐ 4 - None of the above **[If None of the above, go to *M0390*]**
- ☐ UK - Unknown **[If Unknown, go to *M0390*]**

(M0360) Primary Caregiver taking lead responsibility for providing or managing the patient's care, providing the most frequent assistance, etc. (other than home care agency staff):

- ☐ 0 - No one person **[If No one person, go to *M0390*]**
- ☐ 1 - Spouse or significant other
- ☐ 2 - Daughter or son
- ☐ 3 - Other family member
- ☐ 4 - Friend or neighbor or community or church member
- ☐ 5 - Paid help
- ☐ UK - Unknown **[If Unknown, go to *M0390*]**

(M0370) How Often does the patient receive assistance from the primary caregiver?

- ☐ 1 - Several times during day and night
- ☐ 2 - Several times during day
- ☐ 3 - Once daily
- ☐ 4 - Three or more times per week
- ☐ 5 - One to two times per week
- ☐ 6 - Less often than weekly
- ☐ UK - Unknown

(M0380) Type of Primary Caregiver Assistance: (Mark all that apply.)

- ☐ 1 - ADL assistance (e.g., bathing, dressing, toileting, bowel/bladder, eating/feeding)
- ☐ 2 - IADL assistance (e.g., meds, meals, housekeeping, laundry, telephone, shopping, finances)
- ☐ 3 - Environmental support (housing, home maintenance)
- ☐ 4 - Psychosocial support (socialization, companionship, recreation)
- ☐ 5 - Advocates or facilitates patient's participation in appropriate medical care
- ☐ 6 - Financial agent, power of attorney, or conservator of finance
- ☐ 7 - Health care agent, conservator of person, or medical power of attorney
- ☐ UK - Unknown

SENSORY STATUS

(M0390) Vision with corrective lenses if the patient usually wears them:

- ☐ 0 - Normal vision: sees adequately in most situations; can see medication labels, newsprint.
- ☐ 1 - Partially impaired: cannot see medication labels or newsprint, but can see obstacles in path, and the surrounding layout; can count fingers at arm's length.
- ☐ 2 - Severely impaired: cannot locate objects without hearing or touching them or patient nonresponsive.

(M0400) Hearing and Ability to Understand Spoken Language in patient's own language (with hearing aids if the patient usually uses them):

- ☐ 0 - No observable impairment. Able to hear and understand complex or detailed instructions and extended or abstract conversation.
- ☐ 1 - With minimal difficulty, able to hear and understand most multi-step instructions and ordinary conversation. May need occasional repetition, extra time, or louder voice.
- ☐ 2 - Has moderate difficulty hearing and understanding simple, one-step instructions and brief conversation; needs frequent prompting or assistance.
- ☐ 3 - Has severe difficulty hearing and understanding simple greetings and short comments. Requires multiple repetitions, restatements, demonstrations, additional time.
- ☐ 4 - Unable to hear and understand familiar words or common expressions consistently, or patient nonresponsive.

(M0410) Speech and Oral (Verbal) Expression of Language (in patient's own language):

- ☐ 0 - Expresses complex ideas, feelings, and needs clearly, completely, and easily in all situations with no observable impairment.
- ☐ 1 - Minimal difficulty in expressing ideas and needs (may take extra time; makes occasional errors in word choice, grammar or speech intelligibility; needs minimal prompting or assistance).
- ☐ 2 - Expresses simple ideas or needs with moderate difficulty (needs prompting or assistance, errors in word choice, organization or speech intelligibility). Speaks in phrases or short sentences.
- ☐ 3 - Has severe difficulty expressing basic ideas or needs and requires maximal assistance or guessing by listener. Speech limited to single words or short phrases.
- ☐ 4 - Unable to express basic needs even with maximal prompting or assistance but is not comatose or unresponsive (e.g., speech is nonsensical or unintelligible).
- ☐ 5 - Patient nonresponsive or unable to speak.

(M0420) Frequency of Pain interfering with patient's activity or movement:

- ☐ 0 - Patient has no pain or pain does not interfere with activity or movement
- ☐ 1 - Less often than daily
- ☐ 2 - Daily, but not constantly
- ☐ 3 - All of the time

(M0430) Intractable Pain: Is the patient experiencing pain that is not easily relieved, occurs at least daily, and affects the patient's sleep, appetite, physical or emotional energy, concentration, personal relationships, emotions, or ability or desire to perform physical activity?

- ☐ 0 - No
- ☐ 1 - Yes

INTEGUMENTARY STATUS

(M0440) Does this patient have a **Skin Lesion** or an **Open Wound**? This excludes "OSTOMIES."

- ☐ 0 - No **[If No, go to *M0490*]**
- ☐ 1 - Yes

(M0445) Does this patient have a **Pressure Ulcer**?

- ☐ 0 - No **[If No, go to *M0468*]**
- ☐ 1 - Yes

(M0450) Current Number of Pressure Ulcers at Each Stage: (Circle one response for each stage.)

Pressure Ulcer Stages		Number of Pressure Ulcers				
a)	Stage 1: Nonblanchable erythema of intact skin; the heralding of skin ulceration. In darker-pigmented skin, warmth, edema, hardness, or discolored skin may be indicators.	0	1	2	3	4 or more
b)	Stage 2: Partial thickness skin loss involving epidermis and/or dermis. The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.	0	1	2	3	4 or more
c)	Stage 3: Full-thickness skin loss involving damage or necrosis of subcutaneous tissue which may extend down to, but not through, underlying fascia. The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue.	0	1	2	3	4 or more
d)	Stage 4: Full-thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures (e.g., tendon, joint capsule, etc.)	0	1	2	3	4 or more
e)	In addition to the above, is there at least one pressure ulcer that cannot be observed due to the presence of eschar or a nonremovable dressing, including casts? ☐ 0 - No ☐ 1 - Yes					

(M0460) [At follow-up, skip this item if patient has no pressure ulcers] **Stage of Most Problematic (Observable) Pressure Ulcer:**

☐ 1 - Stage 1
☐ 2 - Stage 2
☐ 3 - Stage 3
☐ 4 - Stage 4
☐ NA - No observable pressure ulcer

(M0464) Status of Most Problematic (Observable) Pressure Ulcer:

☐ 1 - Fully granulating
☐ 2 - Early/partial granulation
☐ 3 - Not healing
☐ NA - No observable pressure ulcer

(M0468) Does this patient have a **Stasis Ulcer?**

☐ 0 - No [*If No, go to M0482*]
☐ 1 - Yes

(M0470) Current Number of Observable Stasis Ulcer(s):

☐ 0 - Zero
☐ 1 - One
☐ 2 - Two
☐ 3 - Three
☐ 4 - Four or more

(M0474) Does this patient have at least one **Stasis Ulcer that Cannot be Observed** due to the presence of a nonremovable dressing?

☐ 0 - No
☐ 1 - Yes

(M0476) [At follow-up, skip this item if patient has no stasis ulcers] **Status of Most Problematic (Observable) Stasis Ulcer:**

☐ 1 - Fully granulating
☐ 2 - Early/partial granulation
☐ 3 - Not healing
☐ NA - No observable stasis ulcer

(M0482) Does this patient have a **Surgical Wound?**

- ☐ 0 - No **[If No, go to *M0490*]**
- ☐ 1 - Yes

(M0484) Current Number of (Observable) Surgical Wounds: (If a wound is partially closed but has more than one opening, consider each opening as a separate wound.)

- ☐ 0 - Zero
- ☐ 1 - One
- ☐ 2 - Two
- ☐ 3 - Three
- ☐ 4 - Four or more

(M0486) Does this patient have at least one **Surgical Wound that Cannot be Observed** due to the presence of a nonremovable dressing?

- ☐ 0 - No
- ☐ 1 - Yes

(M0488) (At follow-up, skip this item if patient has no surgical wounds) **Status of Most Problematic (Observable) Surgical Wound:**

- ☐ 1 - Fully granulating
- ☐ 2 - Early/partial granulation
- ☐ 3 - Not healing
- ☐ NA - No observable surgical wound

RESPIRATORY STATUS

(M0490) When is the patient dyspneic or noticeably **Short of Breath?**

- ☐ 0 - Never, patient is not short of breath
- ☐ 1 - When walking more than 20 feet, climbing stairs
- ☐ 2 - With moderate exertion (e.g., while dressing, using commode or bedpan, walking distances less than 20 feet)
- ☐ 3 - With minimal exertion (e.g., while eating, talking, or performing other ADLs) or with agitation
- ☐ 4 - At rest (during day or night)

(M0500) Respiratory Treatments utilized at home: **(Mark all that apply.)**

- ☐ 1 - Oxygen (intermittent or continuous)
- ☐ 2 - Ventilator (continually or at night)
- ☐ 3 - Continuous positive airway pressure
- ☐ 4 - None of the above

ELIMINATION STATUS

(M0510) Has this patient been treated for a **Urinary Tract Infection** in the past 14 days?

- ☐ 0 - No
- ☐ 1 - Yes
- ☐ NA - Patient on prophylactic treatment
- ☐ UK - Unknown

(M0520) Urinary Incontinence or Urinary Catheter Presence:

- ☐ 0 - No incontinence or catheter (includes anuria or ostomy for urinary drainage) **[If No, go to *M0540*]**
- ☐ 1 - Patient is incontinent
- ☐ 2 - Patient requires a urinary catheter (i.e., external, indwelling, intermittent, suprapubic) **[Go to *M0540*]**

(M0530) [At follow-up, skip this item if patient has no urinary incontinence or does have a urinary catheter] **When does Urinary Incontinence occur?**

- ☐ 0 - Timed-voiding defers incontinence
- ☐ 1 - During the night only
- ☐ 2 - During the day and night

(M0540) Bowel Incontinence Frequency:

- ☐ 0 - Very rarely or never has bowel incontinence
- ☐ 1 - Less than once weekly
- ☐ 2 - One to three times weekly
- ☐ 3 - Four to six times weekly
- ☐ 4 - On a daily basis
- ☐ 5 - More often than once daily
- ☐ NA - Patient has ostomy for bowel elimination
- ☐ UK - Unknown

(M0550) Ostomy for Bowel Elimination: Does this patient have an ostomy for bowel elimination that (within the last 14 days): a) was related to an inpatient facility stay, or b) necessitated a change in medical or treatment regimen?

- ☐ 0 - Patient does not have an ostomy for bowel elimination.
- ☐ 1 - Patient's ostomy was not related to an inpatient stay and did not necessitate change in medical or treatment regimen.
- ☐ 2 - The ostomy was related to an inpatient stay or did necessitate change in medical or treatment regimen.

NEURO/EMOTIONAL/BEHAVIORAL STATUS

(M0560) Cognitive Functioning: (Patient's current level of alertness, orientation, comprehension, concentration, and immediate memory for simple commands.)

- ☐ 0 - Alert/oriented, able to focus and shift attention, comprehends and recalls task directions independently.
- ☐ 1 - Requires prompting (cuing, repetition, reminders) only under stressful or unfamiliar conditions.
- ☐ 2 - Requires assistance and some direction in specific situations (e.g., on all tasks involving shifting of attention), or consistently requires low stimulus environment due to distractibility.
- ☐ 3 - Requires considerable assistance in routine situations. Is not alert and oriented or is unable to shift attention and recall directions more than half the time.
- ☐ 4 - Totally dependent due to disturbances such as constant disorientation, coma, persistent vegetative state, or delirium.

(M0570) When Confused (Reported or Observed):

- ☐ 0 - Never
- ☐ 1 - In new or complex situations only
- ☐ 2 - On awakening or at night only
- ☐ 3 - During the day and evening, but not constantly
- ☐ 4 - Constantly
- ☐ NA - Patient nonresponsive

(M0580) When Anxious (Reported or Observed):

- ☐ 0 - None of the time
- ☐ 1 - Less often than daily
- ☐ 2 - Daily, but not constantly
- ☐ 3 - All of the time
- ☐ NA - Patient nonresponsive

(M0590) Depressive Feelings Reported or Observed in Patient: (Mark all that apply.)

- ☐ 1 - Depressed mood (e.g., feeling sad, tearful)
- ☐ 2 - Sense of failure or self reproach
- ☐ 3 - Hopelessness
- ☐ 4 - Recurrent thoughts of death
- ☐ 5 - Thoughts of suicide
- ☐ 6 - None of the above feelings observed or reported

(M0610) Behaviors Demonstrated at Least Once a Week (Reported or Observed): (Mark all that apply.)

- ☐ 1 - Memory deficit: failure to recognize familiar persons/places, inability to recall events of past 24 hours, significant memory loss so that supervision is required
- ☐ 2 - Impaired decision-making: failure to perform usual ADLs or IADLs, inability to appropriately stop activities, jeopardizes safety through actions
- ☐ 3 - Verbal disruption: yelling, threatening, excessive profanity, sexual references, etc.
- ☐ 4 - Physical aggression: aggressive or combative to self and others (e.g., hits self, throws objects, punches, dangerous maneuvers with wheelchair or other objects)
- ☐ 5 - Disruptive, infantile, or socially inappropriate behavior (excludes verbal actions)
- ☐ 6 - Delusional, hallucinatory, or paranoid behavior
- ☐ 7 - None of the above behaviors demonstrated

(M0620) Frequency of Behavior Problems (Reported or Observed) (e.g., wandering episodes, self abuse, verbal disruption, physical aggression, etc.):

- ☐ 0 - Never
- ☐ 1 - Less than once a month
- ☐ 2 - Once a month
- ☐ 3 - Several times each month
- ☐ 4 - Several times a week
- ☐ 5 - At least daily

(M0630) Is this patient receiving **Psychiatric Nursing Services** at home provided by a qualified psychiatric nurse?

- ☐ 0 - No
- ☐ 1 - Yes

ADL/IADLs

For M0640-M0800, complete the "Current" column for all patients. For these same items, complete the "Prior" column only at start of care and at resumption of care; mark the level that corresponds to the patient's condition 14 days prior to start of care date (M0030) or resumption of care date (M0032). In all cases, record what the patient is *able to do*.

(M0640) Grooming: Ability to tend to personal hygiene needs (i.e., washing face and hands, hair care, shaving or make up, teeth or denture care, fingernail care).

Prior	Current		
☐	☐	0	- Able to groom self unaided, with or without the use of assistive devices or adapted methods.
☐	☐	1	- Grooming utensils must be placed within reach before able to complete grooming activities.
☐	☐	2	- Someone must assist the patient to groom self.
☐	☐	3	- Patient depends entirely upon someone else for grooming needs.
☐		UK	- Unknown

(M0650) Ability to Dress Upper Body (with or without dressing aids) including undergarments, pullovers, front-opening shirts and blouses, managing zippers, buttons, and snaps:

Prior	Current		
☐	☐	0	- Able to get clothes out of closets and drawers, put them on and remove them from the upper body without assistance.
☐	☐	1	- Able to dress upper body without assistance if clothing is laid out or handed to the patient.
☐	☐	2	- Someone must help the patient put on upper body clothing.
☐	☐	3	- Patient depends entirely upon another person to dress the upper body.
☐		UK	- Unknown

(M0660) Ability to Dress Lower Body (with or without dressing aids) including undergarments, slacks, socks or nylons, shoes:

Prior	Current		
☐	☐	0	- Able to obtain, put on, and remove clothing and shoes without assistance.
☐	☐	1	- Able to dress lower body without assistance if clothing and shoes are laid out or handed to the patient.
☐	☐	2	- Someone must help the patient put on undergarments, slacks, socks or nylons, and shoes.
☐	☐	3	- Patient depends entirely upon another person to dress lower body.
☐		UK	- Unknown

(M0670) Bathing: Ability to wash entire body. Excludes grooming (washing face and hands only).

Prior	Current		
☐	☐	0	- Able to bathe self in shower or tub independently.
☐	☐	1	- With the use of devices, is able to bathe self in shower or tub independently.
☐	☐	2	- Able to bathe in shower or tub with the assistance of another person: (a) for intermittent supervision or encouragement or reminders, OR (b) to get in and out of the shower or tub, OR (c) for washing difficult to reach areas.
☐	☐	3	- Participates in bathing self in shower or tub, but requires presence of another person throughout the bath for assistance or supervision.
☐	☐	4	- Unable to use the shower or tub and is bathed in bed or bedside chair.
☐	☐	5	- Unable to effectively participate in bathing and is totally bathed by another person.
☐		UK	- Unknown

(M0680) Toileting: Ability to get to and from the toilet or bedside commode.

Prior	Current		
☐	☐	0	- Able to get to and from the toilet independently with or without a device.
☐	☐	1	- When reminded, assisted, or supervised by another person, able to get to and from the toilet.
☐	☐	2	- Unable to get to and from the toilet but is able to use a bedside commode (with or without assistance).
☐	☐	3	- Unable to get to and from the toilet or bedside commode but is able to use a bedpan/urinal independently.
☐	☐	4	- Is totally dependent in toileting.
☐		UK	- Unknown

(M0690) Transferring: Ability to move from bed to chair, on and off toilet or commode, into and out of tub or shower, and ability to turn and position self in bed if patient is bedfast.

Prior	Current		
☐	☐	0	- Able to independently transfer.
☐	☐	1	- Transfers with minimal human assistance or with use of an assistive device.
☐	☐	2	- Unable to transfer self but is able to bear weight and pivot during the transfer process.
☐	☐	3	- Unable to transfer self and is unable to bear weight or pivot when transferred by another person.
☐	☐	4	- Bedfast, unable to transfer but is able to turn and position self in bed.
☐	☐	5	- Bedfast, unable to transfer and is unable to turn and position self.
☐		UK	- Unknown

(M0700) Ambulation/Locomotion: Ability to SAFELY walk, once in a standing position, or use a wheelchair, once in a seated position, on a variety of surfaces.

Prior Current
- ☐ ☐ 0 - Able to independently walk on even and uneven surfaces and climb stairs with or without railings (i.e., needs no human assistance or assistive device).
- ☐ ☐ 1 - Requires use of a device (e.g., cane, walker) to walk alone or requires human supervision or assistance to negotiate stairs or steps or uneven surfaces.
- ☐ ☐ 2 - Able to walk only with the supervision or assistance of another person at all times.
- ☐ ☐ 3 - Chairfast, unable to ambulate but is able to wheel self independently.
- ☐ ☐ 4 - Chairfast, unable to ambulate and is unable to wheel self.
- ☐ ☐ 5 - Bedfast, unable to ambulate or be up in a chair.
- ☐ UK - Unknown

(M0710) Feeding or Eating: Ability to feed self meals and snacks. **Note: This refers only to the process of eating, chewing, and swallowing, not preparing the food to be eaten.**

Prior Current
- ☐ ☐ 0 - Able to independently feed self.
- ☐ ☐ 1 - Able to feed self independently but requires:
  (a) meal set-up; OR
  (b) intermittent assistance or supervision from another person; OR
  (c) a liquid, pureed or ground meat diet.
- ☐ ☐ 2 - Unable to feed self and must be assisted or supervised throughout the meal/snack.
- ☐ ☐ 3 - Able to take in nutrients orally and receives supplemental nutrients through a nasogastric tube or gastrostomy.
- ☐ ☐ 4 - Unable to take in nutrients orally and is fed nutrients through a nasogastric tube or gastrostomy.
- ☐ ☐ 5 - Unable to take in nutrients orally or by tube feeding.
- ☐ UK - Unknown

(M0720) Planning and Preparing Light Meals (e.g., cereal, sandwich) or reheat delivered meals:

Prior Current
- ☐ ☐ 0 - (a) Able to independently plan and prepare all light meals for self or reheat delivered meals; OR
  (b) is physically, cognitively, and mentally able to prepare light meals on a regular basis but has not routinely performed light meal preparation in the past (i.e., prior to this home care admission).
- ☐ ☐ 1 - Unable to prepare light meals on a regular basis due to physical, cognitive, or mental limitations.
- ☐ ☐ 2 - Unable to prepare any light meals or reheat any delivered meals.
- ☐ UK - Unknown

(M0730) Transportation: Physical and mental ability to safely use a car, taxi, or public transportation (bus, train, subway).

Prior Current
- ☐ ☐ 0 - Able to independently drive a regular or adapted car; OR uses a regular or handicap-accessible public bus.
- ☐ ☐ 1 - Able to ride in a car only when driven by another person; OR able to use a bus or handicap van only when assisted or accompanied by another person.
- ☐ ☐ 2 - Unable to ride in a car, taxi, bus, or van, and requires transportation by ambulance.
- ☐ UK - Unknown

(M0740) Laundry: Ability to do own laundry -- to carry laundry to and from washing machine, to use washer and dryer, to wash small items by hand.

Prior	Current		
☐	☐	0 -	(a) Able to independently take care of all laundry tasks; OR (b) Physically, cognitively, and mentally able to do laundry and access facilities, but has not routinely performed laundry tasks in the past (i.e., prior to this home care admission).
☐	☐	1 -	Able to do only light laundry, such as minor hand wash or light washer loads. Due to physical, cognitive, or mental limitations, needs assistance with heavy laundry such as carrying large loads of laundry.
☐	☐	2 -	Unable to do any laundry due to physical limitation or needs continual supervision and assistance due to cognitive or mental limitation.
☐		UK -	Unknown

(M0750) Housekeeping: Ability to safely and effectively perform light housekeeping and heavier cleaning tasks.

Prior	Current		
☐	☐	0 -	(a) Able to independently perform all housekeeping tasks; OR (b) Physically, cognitively, and mentally able to perform all housekeeping tasks but has not routinely participated in housekeeping tasks in the past (i.e., prior to this home care admission).
☐	☐	1 -	Able to perform only light housekeeping (e.g., dusting, wiping kitchen counters) tasks independently.
☐	☐	2 -	Able to perform housekeeping tasks with intermittent assistance or supervision from another person.
☐	☐	3 -	Unable to consistently perform any housekeeping tasks unless assisted by another person throughout the process.
☐	☐	4 -	Unable to effectively participate in any housekeeping tasks.
☐		UK -	Unknown

(M0760) Shopping: Ability to plan for, select, and purchase items in a store and to carry them home or arrange delivery.

Prior	Current		
☐	☐	0 -	(a) Able to plan for shopping needs and independently perform shopping tasks, including carrying packages; OR (b) Physically, cognitively, and mentally able to take care of shopping, but has not done shopping in the past (i.e., prior to this home care admission).
☐	☐	1 -	Able to go shopping, but needs some assistance: (a) By self is able to do only light shopping and carry small packages, but needs someone to do occasional major shopping; OR (b) Unable to go shopping alone, but can go with someone to assist.
☐	☐	2 -	Unable to go shopping, but is able to identify items needed, place orders, and arrange home delivery.
☐	☐	3 -	Needs someone to do all shopping and errands.
☐		UK -	Unknown

(M0770) Ability to Use Telephone: Ability to answer the phone, dial numbers, and effectively use the telephone to communicate.

Prior	Current		
☐	☐	0 -	Able to dial numbers and answer calls appropriately and as desired.
☐	☐	1 -	Able to use a specially adapted telephone (i.e., large numbers on the dial, teletype phone for the deaf) and call essential numbers.
☐	☐	2 -	Able to answer the telephone and carry on a normal conversation but has difficulty with placing calls.
☐	☐	3 -	Able to answer the telephone only some of the time or is able to carry on only a limited conversation.
☐	☐	4 -	Unable to answer the telephone at all but can listen if assisted with equipment.
☐	☐	5 -	Totally unable to use the telephone.
☐	☐	NA -	Patient does not have a telephone.
☐		UK -	Unknown

MEDICATIONS

(M0780) Management of Oral Medications: Patient's ability to prepare and take all prescribed oral medications reliably and safely, including administration of the correct dosage at the appropriate times/intervals. **Excludes injectable and IV medications. (NOTE: This refers to ability, not compliance or willingness.)**

Prior Current

- ☐ ☐ 0 - Able to independently take the correct oral medication(s) and proper dosage(s) at the correct times.
- ☐ ☐ 1 - Able to take medication(s) at the correct times if:
  (a) individual dosages are prepared in advance by another person; OR
  (b) given daily reminders; OR
  (c) someone develops a drug diary or chart.
- ☐ ☐ 2 - Unable to take medication unless administered by someone else.
- ☐ ☐ NA - No oral medications prescribed.
- ☐ UK - Unknown

(M0790) Management of Inhalant/Mist Medications: Patient's ability to prepare and take all prescribed inhalant/mist medications (nebulizers, metered dose devices) reliably and safely, including administration of the correct dosage at the appropriate times/intervals. **Excludes all other forms of medication (oral tablets, injectable and IV medications).**

Prior Current

- ☐ ☐ 0 - Able to independently take the correct medication and proper dosage at the correct times.
- ☐ ☐ 1 - Able to take medication at the correct times if:
  (a) individual dosages are prepared in advance by another person, OR
  (b) given daily reminders.
- ☐ ☐ 2 - Unable to take medication unless administered by someone else.
- ☐ ☐ NA - No inhalant/mist medications prescribed.
- ☐ UK - Unknown

(M0800) Management of Injectable Medications: Patient's ability to prepare and take all prescribed injectable medications reliably and safely, including administration of correct dosage at the appropriate times/intervals. **Excludes IV medications.**

Prior Current

- ☐ ☐ 0 - Able to independently take the correct medication and proper dosage at the correct times.
- ☐ ☐ 1 - Able to take injectable medication at correct times if:
  (a) individual syringes are prepared in advance by another person, OR
  (b) given daily reminders.
- ☐ ☐ 2 - Unable to take injectable medications unless administered by someone else.
- ☐ ☐ NA - No injectable medications prescribed.
- ☐ UK - Unknown

EQUIPMENT MANAGEMENT

(M0810) Patient Management of Equipment (includes ONLY oxygen, IV/infusion therapy, enteral/parenteral nutrition equipment or supplies): Patient's ability to set up, monitor and change equipment reliably and safely, add appropriate fluids or medication, clean/store/dispose of equipment or supplies using proper technique. **(NOTE: This refers to ability, not compliance or willingness.)**

- ☐ 0 - Patient manages all tasks related to equipment completely independently.
- ☐ 1 - If someone else sets up equipment (i.e., fills portable oxygen tank, provides patient with prepared solutions), patient is able to manage all other aspects of equipment.
- ☐ 2 - Patient requires considerable assistance from another person to manage equipment, but independently completes portions of the task.
- ☐ 3 - Patient is only able to monitor equipment (e.g., liter flow, fluid in bag) and must call someone else to manage the equipment.
- ☐ 4 - Patient is completely dependent on someone else to manage all equipment.
- ☐ NA - No equipment of this type used in care ***[If NA, go to M0825]***

(M0820) **Caregiver Management of Equipment (includes ONLY oxygen, IV/infusion equipment, enteral/parenteral nutrition, ventilator therapy equipment or supplies):** Caregiver's ability to set up, monitor, and change equipment reliably and safely, add appropriate fluids or medication, clean/store/dispose of equipment or supplies using proper technique. **(NOTE: This refers to ability, not compliance or willingness.)**

- ☐ 0 - Caregiver manages all tasks related to equipment completely independently.
- ☐ 1 - If someone else sets up equipment, caregiver is able to manage all other aspects.
- ☐ 2 - Caregiver requires considerable assistance from another person to manage equipment, but independently completes significant portions of task.
- ☐ 3 - Caregiver is only able to complete small portions of task (e.g., administer nebulizer treatment, clean/store/dispose of equipment or supplies).
- ☐ 4 - Caregiver is completely dependent on someone else to manage all equipment.
- ☐ NA - No caregiver
- ☐ UK - Unknown

THERAPY NEED

(M0825) **Therapy Need:** Does the care plan of the Medicare payment period for which this assessment will define a case mix group indicate a need for therapy (physical, occupational, or speech therapy) that meets the threshold for a Medicare high-therapy case mix group?

- ☐ 0 - No
- ☐ 1 - Yes
- ☐ NA - Not applicable

EMERGENT CARE

(M0830) **Emergent Care:** Since the last time OASIS data were collected, has the patient utilized any of the following services for emergent care (other than home care agency services)? **(Mark all that apply.)**

- ☐ 0 - No emergent care services **[If no emergent care, go to *M0855*]**
- ☐ 1 - Hospital emergency room (includes 23-hour holding)
- ☐ 2 - Doctor's office emergency visit/house call
- ☐ 3 - Outpatient department/clinic emergency (includes urgicenter sites)
- ☐ UK - Unknown **[If UK, go to *M0855*]**

(M0840) **Emergent Care Reason:** For what reason(s) did the patient/family seek emergent care? **(Mark all that apply.)**

- ☐ 1 - Improper medication administration, medication side effects, toxicity, anaphylaxis
- ☐ 2 - Nausea, dehydration, malnutrition, constipation, impaction
- ☐ 3 - Injury caused by fall or accident at home
- ☐ 4 - Respiratory problems (e.g., shortness of breath, respiratory infection, tracheobronchial obstruction)
- ☐ 5 - Wound infection, deteriorating wound status, new lesion/ulcer
- ☐ 6 - Cardiac problems (e.g., fluid overload, exacerbation of CHF, chest pain)
- ☐ 7 - Hypo/Hyperglycemia, diabetes out of control
- ☐ 8 - GI bleeding, obstruction
- ☐ 9 - Other than above reasons
- ☐ UK - Reason unknown

DATA ITEMS COLLECTED AT INPATIENT FACILITY ADMISSION OR AGENCY DISCHARGE ONLY

(M0855) To which **inpatient Facility** has the patient been admitted?

- ☐ 1 - Hospital **[Go to *M0890*]**
- ☐ 2 - Rehabilitation facility **[Go to *M0903*]**
- ☐ 3 - Nursing home **[Go to *M0900*]**
- ☐ 4 - Hospice **[Go to *M0903*]**
- ☐ NA - No inpatient facility admission

(M0870) **Discharge Disposition:** Where is the patient after discharge from your agency? **(Choose only one answer.)**

- ☐ 1 - Patient remained in the community (not in hospital, nursing home, or rehab facility)
- ☐ 2 - Patient transferred to a noninstitutional hospice **[Go to *M0903*]**
- ☐ 3 - Unknown because patient moved to a geographic location not served by this agency **[Go to *M0903*]**
- ☐ UK - Other unknown **[Go to *M0903*]**

(M0880) After discharge, does the patient receive health, personal, or support **Services or Assistance?** **(Mark all that apply.)**

- ☐ 1 - No assistance or services received
- ☐ 2 - Yes, assistance or services provided by family or friends
- ☐ 3 - Yes, assistance or services provided by other community resources (e.g., meals-on-wheels, home health services, homemaker assistance, transportation assistance, assisted living, board and care)

Go to *M0903*

(M0890) If the patient was admitted to an acute care **Hospital**, for what **Reason** was he/she admitted?

- ☐ 1 - Hospitalization for emergent (unscheduled) care
- ☐ 2 - Hospitalization for urgent (scheduled within 24 hours of admission) care
- ☐ 3 - Hospitalization for elective (scheduled more than 24 hours before admission) care
- ☐ UK - Unknown

(M0895) **Reason for Hospitalization: (Mark all that apply.)**

- ☐ 1 - Improper medication administration, medication side effects, toxicity, anaphylaxis
- ☐ 2 - Injury caused by fall or accident at home
- ☐ 3 - Respiratory problems (SOB, infection, obstruction)
- ☐ 4 - Wound or tube site infection, deteriorating wound status, new lesion/ulcer
- ☐ 5 - Hypo/Hyperglycemia, diabetes out of control
- ☐ 6 - GI bleeding, obstruction
- ☐ 7 - Exacerbation of CHF, fluid overload, heart failure
- ☐ 8 - Myocardial infarction, stroke
- ☐ 9 - Chemotherapy
- ☐ 10 - Scheduled surgical procedure
- ☐ 11 - Urinary tract infection
- ☐ 12 - IV catheter-related infection
- ☐ 13 - Deep vein thrombosis, pulmonary embolus
- ☐ 14 - Uncontrolled pain
- ☐ 15 - Psychotic episode
- ☐ 16 - Other than above reasons

Go to *M0903*

(M0900) For what **Reason(s)** was the patient **Admitted to a Nursing Home? (Mark all that apply.)**

- ☐ 1 - Therapy services
- ☐ 2 - Respite care
- ☐ 3 - Hospice care
- ☐ 4 - Permanent placement
- ☐ 5 - Unsafe for care at home
- ☐ 6 - Other
- ☐ UK - Unknown

(M0903) Date of Last (Most Recent) Home Visit:

__ __ / __ __ / __ __ __ __
month day year

(M0906) Discharge/Transfer/Death Date: Enter the date of the discharge, transfer, or death (at home) of the patient.

__ __ / __ __ / __ __ __ __
month day year

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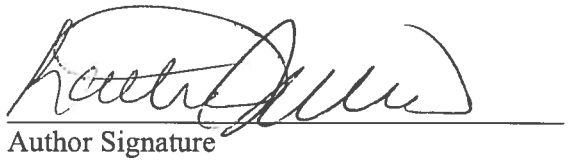

Author Signature

09/10/14

Date