

**Evaluation of the
Nursing Home Casemix
and Quality
Demonstration**

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Executive Summary

In 1989, the Health Care Financing Administration (HCFA) funded the Nursing Home Casemix and Quality (NHCMQ) demonstration to design and test a casemix-adjusted prospective payment system for Medicare and Medicaid. Building on other HCFA nursing home payment initiatives, this experiment was conducted in a demonstration implemented in six states, Kansas, Maine, Mississippi, New York, South Dakota, and Texas. Objectives of the demonstration were improvement of the quality of care, increased access to services, and equitable payment within the overall constraint of budget neutrality and unchanged nursing home benefits. Under this demonstration, the casemix classification system utilized for payment was the Resource Utilization Groups, Version 3 (RUG-III), a hierarchical classification model that categorizes nursing home residents by service, functional, cognitive, and behavioral need. The Medicare portion of the demonstration operated over three phases from 1995 to early 1998. This report focuses on Abt Associates' evaluation of that portion of the demonstration.

The evaluation design used is an elaboration of the pre-post design, sometimes termed the “nonequivalent groups design” (Trochim 2000) or the “untreated control group design with pretest and posttest” (Meyer 1995). Data on outcomes before and after the inception of the demonstration are collected both for demonstration participants and for a comparable group of nonparticipants. The underlying strategy of this approach is to compare the difference in outcomes for participating facilities from the period before to the period after the demonstration was implemented with the difference in outcomes for nonparticipating participants over the same time period.

The evaluation seeks to address three main questions about the relationship between participating interventions and outcomes.

1. Did outcomes change in different ways for facilities (or for residents of facilities) that participated in the demonstration than for facilities that did not?
2. Did outcomes change in different ways for facilities that participated in the demonstration than they would have if these same facilities had not participated?
3. How would outcomes change if *all* facilities were to be paid under policies like those used in the demonstration?

The types of “outcomes” evaluated here include clinical outcomes that would be related to decreased provision of services, such as rehospitalization. Outcomes related to facility organizational or structural issues were examined (e.g., changes to existing nurse staffing patterns under PPS), as were changes related to admitting practices and patterns of service delivery (i.e., differences between demonstration participants and nonparticipants in the provision of skilled rehabilitation).

Demonstration impacts on facility-level and person-specific outcomes were evaluated through multivariate estimation of least squares regressions (for continuous outcome measures like total Medicare expenditure) and logistic regression (for discrete measures, such as the probability of rehospitalization). Data sources include:

- The Minimum Data Set, which contains information on the health, cognitive status, physical functioning, psychosocial well-being, and treatments provided to nursing home residents;

- Medicare Part A claims data, which captures utilization and expenditure, including admissions and covered days for hospital and SNF care as well as expenditure for all care provided under Part A;
- The Medicare Enrollment Database which captures Medicare eligibility dates, managed care enrollment, and dates of birth and death;
- The Denominator file which identifies dually-eligible (Medicare/Medicaid) beneficiaries;
- The Provider of Service (POS) file which characterizes nursing homes according to type of control/affiliation (freestanding, hospital-based, government); and
- The Online Survey and Certification Reporting (OSCAR) database which provides staffing data for Medicare-certified nursing homes.

A description of analytic file construction may be found in Chapter 2.4.2.

Expected Outcomes of the NHCMQ Demonstration

At the outset of the evaluation, the project team agreed on several expected outcomes of the demonstration. These are described below, followed by a summary of evaluation findings.

- Facilities that chose to participate in the NHCMQ demonstration would attempt to increase their Medicare admissions if possible, as they would likely find prospective payment rates attractive, relative to former cost-reimbursement interim rates.
- The financial incentives associated with prospective payment would reduce the provision of services relative to what would otherwise have been provided. Under PPS, Medicare pays nursing homes a prospective daily rate. Thus, other things equal, we expect providers who want to maximize net revenues to reduce the intensity of services provided per day and to increase the number of days per resident stay. Nursing homes are at risk for *per diem* cost above the daily rate, but not for total days.
- This reduction in services could be expected to produce at least slightly poorer outcomes, such as increased rates of rehospitalization. Total Medicare expenditures for hospital and other non-SNF care both during and after a SNF stay may increase, if PPS leads to reduced quality of care and poorer health outcomes among Medicare residents. Unlike the direct substitution effect of prospective payment on utilization, this indirect effect may lead to higher utilization over a period well beyond the end of the Medicare SNF stay. In addition, PPS may encourage nursing homes to shift high-cost cases to other providers.
- The provision of therapy services, on the other hand, would increase among participating facilities, due to the incentive to provide enough minutes of therapy to qualify Medicare beneficiaries for higher-paying RUG-III groups.
- Finally, facilities participating in the NHCMQ demonstration would utilize more physical, occupational and speech therapy staff and more contract therapy staff in response to Phase 3 of

the demonstration. In order to provide more rehabilitation to more admissions, participating facilities may have to modify existing staffing patterns to indeed furnish more rehabilitation service.

Findings in Brief

- Medicare admissions did not increase, counter to our original assumption. However, participating admissions did exhibit higher levels of acuity, and more need for rehabilitation in the phase of the demonstration where incentives for therapy were offered (Phase 3).
- Analysis of claims and other data do not support predictions of increased Medicare utilization and expenditure.
- Adjusted for resident characteristics, estimates of demonstration effects on length of stay were statistically significant only for New York facilities. Even in New York, effects were mixed and often counterintuitive in direction.
- Adjusted estimates showed no demonstration effects on hospitalization rates.
- Findings on provision of therapies varied among the six states.

Implications for Medicare Payment Policy

As HCFA moved forward with national Medicare PPS implementation, there were some modifications to the reimbursement system and to its operational components. Studies have already been completed on the ability of RUG-III to predict medical ancillary service costs, and monitoring mechanisms are being put into place by HCFA to ensure accurate reporting of patient assessment and payment-related data. The major implication of this evaluation of the NHCMQ demonstration is that these monitoring mechanisms should include ongoing evaluation of the provision and appropriateness of rehabilitation services provided by nursing homes.

1.0 Introduction and Overview of the Nursing Home Casemix and Quality Demonstration

1.1 Background Information

In 1989, the Health Care Financing Administration (HCFA) funded the Nursing Home Casemix and Quality (NHCMQ) demonstration to design and test a casemix-adjusted prospective payment and quality monitoring system for Medicare and Medicaid. Building on other HCFA nursing home payment initiatives, this experiment was conducted in six states, Kansas, Maine, Mississippi, , New York, South Dakota, and Texas. Objectives of the demonstration were improvement of the quality of care, increased access to services, and equitable payment within the overall constraint of budget neutrality and unchanged nursing home benefits.

The NHCMQ demonstration represented an effort by HCFA to gather data concerning the viability and administrative practicality of implementing a casemix-adjusted prospective payment system for nursing homes based on standard assessments and utilization guidelines, and to test such a system in the Medicare and Medicaid programs in a sample of states.

This report summarizes Abt Associates' evaluation of the NHCMQ demonstration. The evaluation design (described further in Chapter 2) estimates impacts of the demonstration on the following: SNF admitting patterns; staffing patterns; Medicare utilization; therapy utilization; and the association of cost and quality in participating facilities. Quality outcomes related to the demonstration are further studied by Abt subcontractor the University of Colorado Health Sciences Center and are reported elsewhere (see Kramer et. al. 2000). In order to understand how these various dimensions of nursing home behavior and operations might be affected by Medicare PPS, it is important to have an historical perspective regarding the context in which the NHCMQ demonstration took place, and the incentives inherent in the demonstration (and now national) payment system.

1.1.1 Impetus for SNF Payment Changes to be Introduced

Medicare nursing home reimbursements were historically made on a cost-reimbursement basis. State Medicaid programs were using flat rates or “ceilings on costs”, sometimes with casemix adjustment. Flat rate payment systems sought to address inappropriate incentives of cost-reimbursement by assigning fixed rates to reimbursable services. This was expected to have the effect of making reimbursable services more affordable for Medicaid and Medicare, in part by forcing nursing homes to become more efficient and less inclined to “over-provide” certain services. Like cost-reimbursement systems, though, flat rate reimbursement created a number of adverse (and unintended) incentives. Because reimbursable rates on some services were reduced to levels near or below facility cost, nursing homes' new profit maximization strategies necessarily revolved around restricting access to heavy care patients — i.e., those patients contributing the most to high costs. As W.G. Weissert and M.C. Musliner explain:

Flat rate payment systems... encourage nursing homes to avoid patients who require more than average nursing and aide care because they bring no more revenue than patients who require average or less than average care. Similarly, these payment systems encourage provision of minimal care because the costs of extra care may not be reimbursed. (Weissert & Musliner, 1992).

In order to decrease the degree of burden and inefficiency imposed by these cost-reimbursement system features, HCFA and others turned to alternative payment systems. By the mid-1970's, industry leaders and policy makers determined that a system needed to be instituted that would, as Helen Smits states, "...make the most dependent patients more attractive to nursing homes and ... ensure that these patients receive adequate amounts of care once admitted." (Smits, 1984).

In addition to concern about existing incentives for nursing homes to admit heavy care patients and concerns regarding the quality of care received by Medicare beneficiaries once admitted to nursing homes, HCFA and the states became increasingly concerned with significant increases in Medicare and Medicaid nursing home expenditures following the implementation of the hospital diagnosis related group (DRG) system. Costs of nursing home care increased from \$10.1 billion in 1975 to \$35.2 billion in 1985 (Rosko, Broyles and Aaronson 1987). During this period nursing home expenditures increased at an average annual rate of 22.6 percent, an amount that exceeded the inflation rate in all other sectors of the health care industry (Waldo, Levit, and Lazenby 1986). In 1995, spending for nursing home care climbed to \$77.9 billion (HCFA 1996). Medicaid bore the cost of 46.5 percent of this care, with Medicare's portion increasing to 9.4 percent that year (compared with 3.3 percent in 1990) (HCFA 1996). In response, HCFA and individual states investigated alternative mechanisms with which to reimburse nursing home care.

Introduction of Prospective Payment Systems

Nursing home casemix systems. Nursing home casemix classification systems must recognize the unique resource needs of users of nursing home care. For instance, while the DRGs are designed to explain the cost of an entire hospital stay, in nursing homes, the variability of length of stay — and thereby episode cost — is too great to practically implement an episode-based prospective pricing mechanism (Rosko, Broyles and Aaronson 1987). Thus, nursing home casemix systems developed to date have generally focused on explaining *daily* resource use. However, measuring actual *per diem* resource use at the level of the individual resident adds significantly to the complexity of deriving these systems. As in any health care system, residents' clinical and functional status change over time. With a *per diem* system used for payment determination, residents need to be reassessed; and as in any casemix-adjusted payment system, there are intrinsic opportunities for "gaming." Nursing homes may manipulate those resident characteristics that define casemix, both appropriately (e.g., admitting high-cost residents in response to policy incentives) and inappropriately (e.g., upcoding residents from low- to high-payment categories).

In addition, unlike acute hospital care where the patient's clinical diagnosis is an important determinant of resource use, residents' functional status and major health conditions are more important determinants of resource use in nursing homes. A number of studies have emphasized the importance of functional abilities in explaining the cost of care. Virtually all studies have found that Katz's indexes based on measures of Activities of Daily Living (ability to dress, bathe, eat, toilet, transfer and walk) are critical determinants of the time and cost of caring for nursing home residents (Katz, 1963; Fries and Cooney, 1985).

A series of HCFA and state-funded efforts resulted in the development of a nursing home casemix classification system known as Resource Utilization Groups (RUGs). These have achieved substantial use and a variety of applications in the U.S. and abroad. The goal of RUGs is to group nursing home residents into mutually exclusive groups through the clinical and functional characteristics that explain their use of nursing home resources. The version of RUGs utilized in the NHCMQ demonstration is described in the next section. This evaluation did not seek to assess the RUG classification system or to determine whether a *per diem* classification system was the best model for SNF care, though others have addressed this issue (see Morrison et al). Rather, this evaluation seeks to understand how SNFs responded to its use for Medicare reimbursement.

1.2 Demonstration Overview

1.2.1 Overview of the Nursing Home Casemix and Quality Demonstration

In the late 1980s, the Centers for Medicare and Medicaid Services, formerly known as the Health Care Financing Administration (HCFA), began planning for a demonstration aimed at designing, implementing and evaluating a combined Medicare and Medicaid nursing home prospective payment and quality monitoring system. The Multistate Nursing Home Casemix Payment and Quality (NHCMQ) demonstration was funded by HCFA's Office of Research and Demonstrations.

The major goals of demonstration were:

- to improve access to care, particularly for nursing home residents with heavy care needs;
- to improve the equity and predictability of payments across all providers;
- to streamline the payment and quality assurance processes; and
- to maintain or improve quality of care for all residents.

The potential for realization of these objectives was to be tested while maintaining budget neutrality and without changing the benefit structure of the Medicare and Medicaid programs in participating states.

Several vital components were required in order to implement such a payment demonstration. These included a uniform patient assessment tool, a mechanism to classify or group patients based upon health, functioning and service needs identified in that assessment, a payment method to translate casemix groups into payment rates, and a quality monitoring system. A brief description of these components follows.

Role of the MDS Resident Assessment Instrument

An important element of the NHCMQ demonstration was the utilization of the Minimum Data Set (MDS) for Nursing Home Resident Assessment and Care Screening instrument. The development of this uniform, comprehensive resident assessment instrument was mandated by the Omnibus Budget Reconciliation Act (OBRA) of 1987, a far-reaching legislative revision to the quality standards, inspection process and enforcement system for long-term care facilities. The MDS was intended both to guide the clinical care planning process by systematically documenting residents' needs, and to support external and internal quality assurance and improvement. Developed under contract with HCFA by researchers at the Research Triangle Institute, Brown University, the University of Michigan, and the Hebrew Rehabilitation Center for Aged, the MDS covers such domains as "physical functioning in the activities of daily living (ADLs), cognition, continence, mood, behaviors, nutritional status, vision and communication, activities, and psychosocial well-being" (Hawes et al., 1997). By October 1990, all nursing homes participating in the Medicare and Medicaid programs were required by HCFA to

implement the MDS on a federally mandated schedule. A copy of the MDS instrument is attached as Appendix A-1.

The NHCMQ demonstration developmental phase began in September 1989. At that time there was only a working draft of a nursing home minimum data set (MDS). For the 1990 staff time measurement (STM) and concurrent resident status measurement (RSM), a research version of a minimum data set, referred to as the RSM, was put together to include items proposed by the States' staffs (KS, ME, MS, NE, SD, and TX). In fall 1990, the first HCFA MDS was made official; the official MDS did not include some items from the RSM already found to help explain staff costs. Since these items were used in the developing resource utilization group version III (RUGs III) classification, approval was given for the use of extra items for the NHCMQ demonstration (the MDS+). Based on input from the States' nursing coordinators (who met quarterly) and national clinical workgroups such as nurses, dietitians, therapists, and physicians, the MDS+ was modified in 1992. This revised version was used in Kansas and Texas during the later phases of the NHCMQ demonstration.

It is important to underscore the fact that the NHCMQ demonstration was the first effort to coordinate assessment of resident status, measurement of resource utilization, and quality monitoring through the use of one standard instrument, for both Medicaid and Medicare residents.

Resident Classification System

The developmental work on RUGs III was carried out under the NHCMQ demonstration contracts. Much research had been conducted during the 1980s, including RUG I at Yale, RUG II for New York state, RUG T18 by Fries and the Texas Index of Level of Effort (TILE). Dr. Fries and his associates were leaders in all these projects. In the late 1980s, Brown University, under contract to HCFA, used the data from New York and Texas plus their own research to determine whether a national casemix system could be developed. In December 1986, a conference was held in Baltimore, where the information from the data sets and findings from the projects were reviewed by researchers and it was decided to go forward with the development of RUG-III and demonstrate a combined Medicare and Medicaid casemix classification which could be used for quality monitoring and payment systems.

The 1990-91 STM/RSM study collected data from 203 nursing units in 176 nursing homes to determine using the "augogrp" program, the characteristics that predicted different levels of resource use for the over 7,500 residents in the database. This analysis resulted in the first version of the 44-group RUG-III classification. RUG-III improved upon the earlier versions by incorporating better cognitive measures, additional ADLs, and a category of "high tech" residents such as those parenterally fed or on ventilators. It was derived for RSM data paired with the staff time measurement data. Staff time accounts for a large portion of the resources expended for resident care. The STM/RSM studies aimed to connect characteristics of residents with the actual time devoted to caring for the residents. A collapsed 36-group RUG-III classification was designed in 1992 for the Medicaid portion of the demonstration based on the fact that rehabilitation services are usually paid for by Medicare, even if the resident is a long-term resident and having most of their care paid by Medicaid. The rehabilitation intensity sub-categories were dropped and the category broken into four groups based on late loss ADL only. South Dakota and Mississippi used this collapsed version when they implemented their Medicaid systems in July 1993.

A second staff time study was conducted in 1995 on Medicare units in 77 nursing homes using the official MDS2.0 (see Appendix A-1). This study was conducted to update the classifications based on possible changes in care patterns resulting from the implementation of OBRA 1987, and the revisions in the resident assessment instrument made in 1994. The result of this research was still a 44-group

Medicare RUG-III classification. This study added an additional rehabilitation subcategory titled “Ultra High”, with three groups based on the ADL split. To maintain the 44 groups for the payment system, one ADL split was dropped from the “High” rehabilitation subcategory, and one ADL split (6 through 12) was eliminated from the Clinically Complex category. This changed the Medicaid collapsed version to a 34-group classification.

The RUG-III system incorporates up to three dimensions in describing residents (see Fries et al, 1994). The first dimension classifies residents in seven major groups, such as “extensive care”, “rehab”, “clinically complex”, etc. These then subdivide or “split” into categories defined by the second and third dimensions. The second dimension is usually an ADL index, produced by combining four late-loss ADL measures (toileting, eating, transfer, and bed mobility). Although ADLs are the most effective measures in explaining resource use, they demonstrate even greater statistical power within defined major types of residents. Also, it was determined that four ADLs are sufficient; additional ADLs provide little marginal information about resource use (Williams et al, 1994). The final dimension of RUG-III uses particular nursing rehabilitation and signs of depression to make splits beyond the ADLs.

The classification system used in the NHCMQ demonstration has seven hierarchy categories describing types of residents (Special Rehabilitation, Extensive Care, Special Care, Clinically Complex, Cognitively Impaired, Behavioral Problems, and Reduced Physical Functions), in decreasing order of resource use. Assignment to the Special Rehabilitation category is based on the amount of therapy resources (measured by staff time) provided to the resident, with further splits based on ADL scores. For the next most intensive resource groups, Extensive Service and Special Care, resident assignment is based on the receipt of certain significant services (parenteral feeding, tracheotomy, suctioning, or ventilator/respirator care), or the presence of certain clinical conditions (e.g., quadriplegia, stage 3 or 4 pressure ulcers, coma). Additional splits of these categories are based on the number of extensive treatments or ADL level, respectively. Assignment to the Clinically Complex category is based on the presence of conditions such as aphasia, hemiplegia, terminal illness or services such as dialysis or chemotherapy. The rare resident in the Extensive or Special Care categories with almost complete ADL functioning (an ADL index score of less than 7) is also included here. The Clinically Complex category has secondary splits based on ADL and a tertiary split according to the presence of signs and symptoms of depression or sad mood. Residents manifesting characteristics of cognitive impairment, and residents without such characteristics but who daily have behavior problems including wandering, physical or verbal abuse, regressive behavior, or hallucinations are assigned to the Cognitively Impaired and Behavior categories, respectively. These two categories are restricted to residents with ADL index scores of 10 or less. Residents who do not meet the criteria of any of the earlier categories are assigned to the Reduced Physical Functions category. The three categories — Cognitive Impairment, Behavior Problems, and Reduced Physical Functions — are split by ADL and finally by the presence of nursing rehabilitation activities.

During the final stages of the NHCMQ demonstration, some modifications to the RUG-III system were instituted based upon the results of the 1995 Staff Time Measurement studies. Revisions included the addition of a fourth rehabilitation group known as “Ultra-High Rehabilitation,” and changes to some of the classification factors for resident placement into RUG-III groups. The addition of Ultra-High Rehabilitation subcategory was precipitated by the research findings that many patients are receiving high levels of therapy not accurately reflected in the demonstration payment rates.

Other revisions to RUG-III were also made. Selected treatment factors (i.e., pneumonia, tube feeding, ventilator, etc.) used in grouping residents into the Extensive, Special Care, Clinically Complex, Impaired

Cognition, Behavior, and Physical Function groups were tested against the 1995 data. This was done by measuring average costs for residents with these treatment factors within each group, and comparing them to the average costs of residents within each group who *lacked* the treatment factors included in the original RUG-III grouping. In addition, the potential removal of each factor was tested by looking at the number of residents dropping out of the group when the factor was removed and comparing their average costs with those of other types of residents in their resultant groupings; this was done to ensure that residents with each of the potential factors were placed in the group most consistent with their average costs. This process resulted in several shifts for particular conditions among categories for the final phase of the demonstration.

A summary of the RUG-III system, along with corresponding revenue codes utilized by participating facilities, may be found in Appendix A-2.

Quality Monitoring System

The NHCMQ demonstration also responded to OBRA 1987's new focus on quality of care delivery in nursing homes by incorporating an MDS+-based quality monitoring component. "Quality indicators" derived from data elements on the MDS+ were to be developed under the demonstration to fulfill two functions: first, to provide a foundation for external quality assurance (the survey process) in participating states, and second, to assess the impact of demonstration interventions on the quality of care in participating facilities (Allied Technology, 1999).

The quality-monitoring component of the demonstration was developed by researchers from the Center for Health Systems Research and Analysis (CHSRA) at the University of Wisconsin-Madison through a four-phase process:

- development of quality indicators (QIs) based on standard resident assessment data;
- development of a system to incorporate the QIs into the nursing home survey process;
- pilot testing of the use of the QIs in the survey process; and
- ongoing analyses of the reliability and validity of the QIs.

Medicare Prospective Payment System

The Medicare prospective payment system was designed within a set of specific parameters. The goals in developing the system were that a casemix-adjusted payment rate should:

- be price-based reflecting casemix rate setting;
- be price-based on facility cost reports;
- have rates based on wage-adjusted costs;
- have capital and rehabilitation payments included within the rate; and
- be non-disruptive in the transition from a cost-based payment system to a prospective payment system.

1.2.2 State Participation in the Demonstration

States were invited to participate in the demonstration. In return, they would receive assistance in moving toward casemix-adjusted Medicaid nursing home reimbursement systems. Kansas, Maine, Mississippi, and South Dakota agreed to participate. Concerned that this sample of states would lead to underrepresentation of urban areas in the project, HCFA asked two additional states that had not originally been solicited — New York and Texas, both of which had already implemented RUG-type Medicaid

prospective casemix payment systems for nursing homes — to participate in the Medicare portion of the demonstration. Both agreed, resulting in the six-state demonstration.

Payment Systems Before and After Implementation of the Demonstration

Prior to the start of the demonstration, all of the participating states were paying nursing homes prospectively under Medicaid. With the exception of New York and Texas, however, these prospective rates were not adjusted for differences in casemix. Kansas, Mississippi, and South Dakota all used *per diem* rates plus additions for ancillary services, while Maine used all-inclusive *per diem* rates except for rehabilitation services. Because Medicaid programs in New York and Texas were already paying facilities casemix-adjusted rates, these states were not required to develop new payment systems for the demonstration. Appendix A-3 describes each state’s reimbursement system in detail.

1.2.3 Timeframe of Demonstration Implementation Phases

The implementation phase for Medicaid prospective casemix payment systems began July 1, 1993 in Mississippi and South Dakota, October 1, 1993 in Maine, and January of 1994 in Kansas. The Medicare component of the demonstration was implemented in a three-phase process. Participating facilities entering the demonstration did so as of the start of their Medicare fiscal year following the operational date for the applicable phase:

- Phase 1:** June 1, 1995 through November 30, 1996
- Phase 2:** January 1, 1996 through November 30, 1997
- Phase 3, Stage I:** June 1, 1996 through December 31, 1996
- Phase 3, Stage II:** January 1, 1997 through the end of the demonstration.

The phases overlap due to the requirement that facilities had to enter each phase at the beginning of their fiscal year. As a result, facilities within the same state might have been simultaneously operating in different phases of the demonstration.

During the course of implementing the demonstration, a decision was made by HCFA to split the third phase into two stages in order to allow for the incorporation of changes to the RUG-III classification system and payment rates, based on new data from the 1995 Staff Time Measurement studies (see “Resident Classification Systems” above). Providers entering Phase 3 on January 1, 1997 or later entered into Stage II. Providers that had been enrolled in Phase 3, Stage I prior to January 1, 1997 continued in Stage I through the end of their fiscal year, then transitioned to Stage II for the duration of the demonstration. Table 1.1 indicates the percentage of facilities by state that entered Phase 3 on January 1, 1997:

Table 1.1	
Percentage of Facilities Entering Phase 3 on January 1, 1997	
Kansas	22.7%
Maine	84.8%
Mississippi	100%
New York	99.2%
South Dakota	69.2%
Texas	39.1%

Source: Abt Associates Inc. Demonstration Data.

Facility Participation Requirements

The “Supplementary Provider Manual” published for each phase of the demonstration contains specific criteria that facilities had to meet in order to participate in the demonstration. For example, participants had to be Medicare-certified skilled nursing homes that completed the MDS+, and had to be capable of electronically submitting MDS+ forms, billing forms (UB92) and cost reports.

Participation Experience by State in the Three Phases of the Demonstration

Table 1.2 illustrates facility participation in each phase of the demonstration, on a state-by state basis.

While many facilities did not choose to participate until the later phases of the project, once facilities entered the demonstration, the rates of withdrawal were not very high (Allied Technology, 1999). A brief study of facility participation is also included as Appendix A-4.

Table 1.2**Number of Participating Facilities, by State and Phase**

	Total in Phase 1	Total in Phase 2	Total in Phase 3	Total No. Facilities in State 1995*
Kansas	16	11	26	390
Maine	10	19	35	115
Mississippi	1	2	2	199
New York	228	357	486	547
South Dakota	9	13	13	111
Texas	29	28	70	1,190
Total	293	430	632	2,552

Source: Allied Technology Group, December 8, 1997.

1.2.4 Demonstration Mechanics

Use and Submission of MDS Forms

As mentioned earlier, facilities that elected to participate in the demonstration were required to complete MDS+ assessments for all residents on a predetermined schedule. Under the demonstration, residents on a Medicare Part A stay had to be assessed more frequently than non-Medicare residents, and their assessments had to be submitted electronically to the state.

The standard schedule for MDS assessments, mandated by the federal government for all facilities nationwide in 1990, was an initial assessment within 14 days of an admission and follow-up assessments every 90 days. The accelerated demonstration assessment schedule for residents on a Part A stay was as follows: an initial assessment within five days of admission, a 14-day assessment, regular 30-day assessments, and “significant change” assessments, to be implemented after a resident had experienced a significant change in his or her status. This more frequent schedule allowed payment rates to vary several times throughout the SNF stay, according to resident condition and service needs.

Most NHCMQ participating states used the MDS+ Version 1990B throughout the demonstration. However, Kansas in 1994 switched from MDS+ version 1990B to MDS+ version 1992. An exception to the MDS requirement was initially made for Texas, which prior to the demonstration had already developed a Medicaid casemix classification system for nursing homes, which required the use of a different instrument, the Texas Index for Level of Effort (TILE).

In April of 1995, a new version of the MDS, the MDS Version 2.0, was completed (see Appendix A-1 for a copy of this assessment form). Version 2.0 has items that describe new groups of people, for example individuals receiving skilled services related to post-hospital care. There are also items that improve links with the MDS-based Quality Indicators and the RUG-III casemix system (Morris et al. 1997). Version 2.0 was also modified to facilitate computerization and data entry. Across the country, most states implemented Version 2.0 in January 1996. Demonstration states were allowed to continue using the

MDS+ until April 1998, at which time all facilities and states nationwide had to convert to MDS Version 2.0.

Table 1.3 indicates the dates when participating states began using each version of the MDS form.

Table 1.3

Usage of MDS+ 1990B, MDS+ 1992, and MDS Version 2.0, by State

State	Dates of MDS+1990b Usage	Dates of MDS+1992 Usage	Dates of MDS Version 2.0 Usage
Kansas	Jan. 1992 – Dec. 1994	Jan. 1994 – Jun. 1997	July 1, 1997
Maine	Jan. 1992 – Mar. 1998	N/A	April 1, 1998
Mississippi	Jan. 1992 – Jun. 1996	N/A	July 1, 1996
New York	Oct. 1992 – Mar. 1998	N/A	April 1, 1998
South Dakota	Jan. 1992 – Mar. 1998	N/A	April 1, 1998
Texas	N/A	Apr. 1994 – Mar. 1996	April 1, 1996

Source: Allied Technology Group, 1999.

In 1992, a Federal Register Notice of Proposed Rulemaking announced that regular electronic submittal of the MDS would be required of all facilities at some point in the future. A final rule made nationwide facility computerization of the MDS 2.0 mandatory and effective by June 22, 1998. Facilities were required to transmit MDS data to the state, which would clean and aggregate the data prior to sending it to a central HCFA repository. Participating states were required to follow the federal electronic submittal requirements as of June 1998, as well.

Calculation of Medicare Demonstration Payment Rates

The demonstration payment rates were established by first developing a measure of the relative differences in resource utilization between casemix groups based on nursing staff time (resulting in the RUG-III and M³PI systems). Then, total average facility costs computed from all available full 1990 cost reports for providers in the six participating states were measured across all casemix groups and distributed across the groups according to resource use to set a price for each payment classification group. Only costs from SNF distinct-part units were used in the calculations. At the time of the development of the rates, it was decided that setting national rates for all facilities across the participating states was not a feasible option, due to different historical patterns of the nursing home industry in the participating states. However, there was enough homogeneity to group the states into three regions for purposes of payment rates: (1) New York and Maine, (2) Kansas and South Dakota, and (3) Mississippi and Texas, (Burke et al., 1994).

The payment rates were subsequently updated in 1996 on the basis of the latest settled cost report file available at that time (PPS9), for freestanding facilities with fiscal years beginning after October 1, 1991. The majority of these cost reports were from calendar year 1992.

The rates were split into several components: the inpatient component, the general service component, a therapy add-on (in Phase 3) and augmentations to reflect additional staff time for MDS+ and rehabilitation assessments (four minutes RN time and four minutes therapy time per day, per resident).

Payment Procedures by Demonstration Phase

For each phase of the demonstration, different Medicare payment procedures were in place and different services were included in the prospective payment rate. During Phase 1, facilities continued to receive their standard interim payment from their Medicare fiscal intermediaries, and HCFA issued periodic supplemental payments based on casemix indices. Each facility received a periodic Payment Report, outlining the number of resident days in each RUG-III group by billing period. The supplemental payments were equal to the casemix rate (based on M³PI, or the Medicare/Medicaid payment indices) less the interim payment amount already received from the FI. During this phase, HCFA provided both the facilities and the FIs with statistics and documentation of supplemental payments made under the demonstration. During Phases 2 and 3, facilities began receiving a single, casemix based payment directly from the FIs, in accord with the M³PI revenue codes submitted by the facilities to cover all services included in the prospective rate. The services included in the casemix-adjusted prospective rate and how they differed between Phases 1, 2, and 3 are described below.

Table 1.4

Services Included/Excluded in PPS rate, by Phase

Phases	Services Included in the PPS rate	Services NOT included in the PPS rate
Phases 1 and 2	<ul style="list-style-type: none">• inpatient routine services (casemix-adjusted). This category includes nursing staff salaries, social work costs, and employee benefits• general services (not casemix-adjusted). This category includes food, supplies, plant, and administration	therapies; other ancillary services; and capital costs.
Phase 3	<ul style="list-style-type: none">• inpatient routine services (casemix-adjusted)• general services (not casemix-adjusted)• therapies (casemix-adjusted)	

1.3 Structure of this Report

The remainder of this report describes the findings of this evaluation of the NHCMQ demonstration and supporting analyses. The evaluation in total consisted of several components, both qualitative and quantitative. Site visits were conducted over the course of two years; findings from the case study resulting from these visits were submitted to HCFA in the form of the “Facility Adaptation Report” in November 1998. Several aspects of provider behavior and operations summarized in that document helped to guide the analyses contained in this final evaluation report. It should also be noted that our subcontractor in the effort, the University of Colorado Health Science Center on Aging, conducted two studies, submitted under separate cover. One study examined the affect of prospective payment on quality of care; the other evaluated of the use of the quality indicators by surveyors in the NHCMQ demonstration states.

The evaluation design used here, and described further in Chapter 2, is an elaboration of the pre-post design. Data on outcomes before and after the inception of the demonstration are collected both for demonstration participants and for a comparable group of nonparticipants in five of the six participating states (Kansas, Maine, New York, South Dakota and Texas). Mississippi, in which only two facilities chose to participate, is excluded from analyses of the evaluation. The underlying strategy of this approach is to compare the difference in outcomes for participating facilities from the period before to the period after the demonstration was implemented with the difference in outcomes for nonparticipating facilities over the same time period.

There are several types of demonstration “outcomes” evaluated and subsequently addressed in this report. Chapter 3 contains findings regarding modifications to admitting patterns under the demonstration. Chapter 4 discusses staffing patterns. Chapters 5 and 6 contain findings regarding Medicare and rehabilitation utilization under the demonstration.

2.0 Evaluation Design

2.1 Introduction

Nursing home administrators are likely to behave differently when they are paid prospectively for each day of nursing home care than when they are reimbursed for costs incurred. They may seek to admit different individuals, perhaps more recovering from hip fractures and fewer recovering from strokes. They may hire more or fewer workers, or different kinds of workers. They may provide more or fewer ancillary services and may be more or less inclined to send residents to the hospital for treatment of fever, illness, or exacerbation of an existing condition. These alterations in facility behavior and staffing may, in turn, bring about changes in the health and functioning of residents. Their trajectory of improvement or decline may be altered. Their utilization of other health care services and the level of Medicare expenditures for this care may rise or fall. They may be more or less likely to die within 30, 60, or 90 days of admission.

For the time being, we shall refer to all such responses by providers and the effects of these responses on residents as “outcomes” associated with the NHCMQ demonstration. The evaluation seeks to address three increasingly difficult questions about the relationship between demonstration interventions and outcomes.

1. Did outcomes change in different ways for facilities (or for residents of facilities) that participated in the demonstration than for facilities that did not?
2. Did outcomes change in different ways for facilities that participated in the demonstration than they would have if these same facilities had not participated?
3. How would outcomes change if *all* facilities were to be paid under policies like those used in the demonstration?

Question 1 is easily answered because it requires only that we construct measures for outcomes of interest and compare their change over time for participating and nonparticipating facilities. Question 2 is far more difficult because we cannot observe the behavior that participating facilities *would have exhibited* had they not entered the demonstration. To answer Question 2, we shall be forced to specify a set of assumptions under which we can infer this counterfactual behavior of participating facilities from the observed behavior of nonparticipating facilities. Question 3 is probably of greatest policy interest since it bears directly on the institution of a nationwide prospective payment system for Medicare SNF care. Under fairly heroic assumptions, the answers to Question 2 might be used to answer Question 3. For the most part, however, Question 3 cannot be answered reliably using data generated by the demonstration. The inferential problem for Question 3 stems not from the design of the demonstration but rather from changes in the market itself that occur when *all* providers are subject to PPS. Suppose, for example, that prospective payment were found to encourage participating providers to admit more stroke patients than they otherwise would have. What can we conclude about the behavior of providers when prospective payment for SNF care is universally adopted? Surely not that all providers will tend to admit more stroke patients. The number of stroke patients per year is more or less fixed. Hence, we can conclude that stroke patients are likely to be more desirable to providers under prospective payment, but can only speculate how this change is likely to affect provider behavior and the structure of care.

At the outset, it is worth considering how the demonstration may alter outcomes for facilities and beneficiaries. The chief intervention, of course, was the replacement of cost-based reimbursement with *per diem* prospective payment adjusted for casemix using the RUG-III system, and the consequent assumption of financial risk by providers. A secondary intervention, not implemented in legislation mandating prospective payment for all Medicare-covered SNF care, was automatic Medicare coverage of all stays by beneficiaries assigned to RUG-III groups CC1 and higher.

The financial incentives associated with prospective payment would ordinarily be expected to reduce the provision of services relative to what would otherwise have been provided. This reduction in services could be expected to produce at least slightly poorer outcomes, such as increased rates of rehospitalization and death. The outcomes might not be observed, however, for two reasons. First, the reduction in services may turn out to be inconsequential. Many RUG-III categories are defined in terms of particular services that are or are not received. The most notable of these, of course, are physical, occupational, and speech therapy services, required for assignment to RUG-III groups in the Rehabilitation domain. Other services, such as oxygen, dialysis, and ventilator care are sometimes sufficient to place a patient in the Extensive Services, Special Care, or Clinically Complex domains. The requirement of particular services as a condition of assignment to the group clearly mitigates incentives to reduce care. Second, because cost reimbursement is generally thought to encourage overprovision of services, patient outcomes may not be seen to worsen even if some services are reduced.

Effects on the volume and composition of admissions to SNF care will depend on the revenue and cost associated with Medicare stays compared to stays covered by other payers and by the relative profitability of patient days in distinct RUG-III groups. Lacking detailed information on the cost structure of nursing homes, we can only guess at the likely effects of prospective payment on admitting patterns.¹ It is reasonable to suppose, however, that facilities that chose to participate were especially likely to find prospective payment attractive and that these facilities would attempt to increase their Medicare admissions if possible.

2.2 The Design Framework

2.2.1 Design Alternatives

Like most large-scale demonstration projects, the NHCMQ demonstration presented serious problems for evaluation design. The volume and characteristics of Medicare SNF admissions, expenditures and the rates of certain outcomes such as rehospitalization and death can be computed for participating facilities with relative ease. Measuring the effect of the demonstration, however, requires a counterfactual — a means of estimating what values these quantities *would have been* in the absence of the demonstration.

Nearly all studies of the response of nursing homes to changes in payment policy have relied on "pre-post" comparisons — comparisons of the mean of a selected outcome measure for a period immediately after the payment change with the mean for the same measure computed for a period just before the

¹ In principle, one could estimate a facility cost function that treated nursing home days in each of the RUG-III groups as distinct outputs. This would permit one to approximate the marginal cost (and hence marginal profit) associated with a day of care for any RUG-III group. The estimation procedure, however, would be an enormous undertaking, requiring wage information for each category of facility employee and complete data on the number of days provided by RUG-III category for all residents, regardless of payor for a large sample of facilities.

change. The pre-post design thus uses the pre-intervention behavior of facilities as a counterfactual for their post-intervention behavior. Investigations of casemix payment in Maryland (Feder and Scanlon 1989), New York (Thorpe, Gertler, and Goldman 1991), and Kentucky (Davis, Freeman and Kirby 1998) have all employed this method.² The pre-post design leads to estimates of intervention effects that are based on the difference in outcome variables from a specified time before the intervention to a specified time after it. The simplest of these is just the difference in means. If \bar{y}_0 is the mean of some outcome variable such as length of stay, measured over a specified period before the payment change and \bar{y}_1 is the mean over a period *after* the change, then a simple pre-post estimate of the effect of a change in payment method on mean length of stay, \bar{y} , and its variance are given by

$$[2.1] \quad D\bar{y} = \bar{y}_1 - \bar{y}_0; \quad Var(D\bar{y}) = \sigma_y^2 \left(\frac{1}{n_0} + \frac{1}{n_1} \right)$$

where n_0 and n_1 are the number of stays before and after the payment change occurred and where the variance of length of stay, σ_y^2 , is assumed the same in the two periods for simplicity. The pre-post design is often used because the available data permit nothing else. Nonetheless it has some important advantages. Pre-post estimators like [2.1] are simple to compute and may be quite accurate if the effects of changes other than payment on y are minor over the period under study. The chief drawback of this design is widely understood. Effects of other changes can easily be confounded with the effect of changes in payment policy. Because no environment is static, changes in payment policy inevitably occur in a world in which market forces, regulation, technological change, and consumer preferences are also changing in ways that sometimes cannot be well understood or measured. Hence the risk of biased estimation is always present.

The design used here is an elaboration of the pre-post design, sometimes termed the “nonequivalent groups design” (Trochim 2000) or the “untreated control group design with pretest and posttest” (Meyer 1995). Data on outcomes before and after the inception of the demonstration are collected both for demonstration participants and for a comparable group of nonparticipants. The underlying strategy of this approach is to compare the difference in outcomes for participating facilities from the period before to the period after the demonstration was implemented with the difference in outcomes for nonparticipating facilities over the same time period. This leads to a variant of [2.1] known as the “difference-in-differences” estimator. The difference-in-differences (DID) estimator is equal to the pre-post difference in means for of the outcome variable for the treatment (participating) group minus the pre-post difference in means of the comparison (nonparticipating) group.³ If \bar{y}_{T1} represents the mean value of the outcome variable y (length of stay, for example), for beneficiaries admitted to participating facilities in the post-implementation period and \bar{y}_{T0} represents the mean for beneficiaries admitted to those same facilities in the pre-implementation period (with \bar{y}_{C1} and \bar{y}_{C0} defined in the same way for the comparison group), then the DID estimate of the demonstration effect on y and its variance are

² One exception is Meiners et al. (1985) who were able to randomize participants in a study of nursing home payment in San Diego.

³ The term DID and the notation DID(y) in equation [2.2] are used by some authors (for example by Mullahy (1999) but are not standard terminology.

$$[2.2] \quad DID(\bar{y}) = (\bar{y}_{T1} - \bar{y}_{T0}) - (\bar{y}_{C1} - \bar{y}_{C0}); \quad Var(DID(\bar{y})) = \sigma_y^2 \left(\frac{1}{n_{T0}} + \frac{1}{n_{T1}} + \frac{1}{n_{T0}} + \frac{1}{n_{T1}} \right)$$

The DID estimator employs the assumption that the change in the mean value of y in the absence of the demonstration would have been the same for those facilities that participated and those that did not. Under this maintained assumption, the hypothesis of no participating effect on y implies that the expected value of $DID(\bar{y})$ is zero.

On intuitive grounds, the nonequivalent groups design and the associated DID estimator seems more appealing than does the pre-post design and estimator. It is in most cases easier to believe that influences *other than prospective payment*, whatever they were, probably affected participating and nonparticipating facilities about equally over the period than it is to believe that *no* influences other than prospective payment caused outcomes to change between the pre and post periods. Nonetheless, there are two potential drawbacks of the approach that must be borne in mind. The most obvious is the imprecision of the DID estimator relative to the pre-post estimator, as evidenced by its greater variance. If the demonstration and comparison groups are the same size, then the variance of the DID estimator is twice that of the pre-post estimator. The DID estimator sacrifices this variance in return for greater presumed protection against bias. This tradeoff reduces the power of the DID estimator to reject the null hypothesis of no demonstration effect relative to that of the pre-post estimator.

The second potential problem of nonequivalent groups design is that the protection against bias rests on an assumption of wholly unknown accuracy — that influences other than those associated with the demonstration affected both participating and nonparticipating facilities in the same way. For many of the influences that one can imagine, such as general economic conditions or regulatory changes, this assumption seems reasonable. Nevertheless, participants decided to enter the demonstration and nonparticipants decided to decline for *some* reason. If these reasons are themselves correlated with the change in an outcome variable, then the DID estimator of the effect of the demonstration on that outcome variable is likely to be biased.⁴

2.2.2 The Comparison Group

The analytic framework presented later in this chapter was designed to estimate the separate effects of Phase 2 and Phase 3 of the demonstration on admissions, lengths of stay, use of therapy services, and staffing.⁵ To construct a comparison group of skilled nursing homes that resembled those who entered the demonstration as closely as possible, a subset of facilities that declined the offer to participate in the demonstration was chosen in each state. This subset was constructed by removing certain categories of facility from the group of nonparticipants.⁶

⁴ Consider the following “worst case” situation. Let us suppose that in fact the demonstration has no effect on the propensity of facilities to admit beneficiaries to Medicare SNF stays so that the true effect of the demonstration on the number of SNF stays per year is zero. But suppose also that facilities that had previously made plans to increase their admission of Medicare patients were more likely to join the demonstration than facilities that had no plans to increase Medicare stays. Then the DID estimator will tend to find a positive effect of the demonstration on the number of SNF admissions per facility even though this effect is absent.

⁵ Chapter 7 reports findings from a comparison of cost/quality trade-offs between participating and nonparticipating states. The design for this analysis is described in Sections 7.2 through 7.6.

⁶ In some instances, comparability to Phase 3 providers was preferred over comparability to Phase 2 providers.

- *Acute-care facilities that contained only swing beds.* Such facilities were not eligible to join the demonstration and so were not included in the comparison group.
- *Government facilities and hospital-based facilities.* Only in New York did government and hospital-based facilities join the demonstration in meaningful numbers. In New York therefore separate analytic strata were constructed for freestanding, hospital-based, and government facilities. No hospital-based or government facilities were included in the comparison group for other states.
- *Facilities with exceptions or exemptions from the routine cost limits.* Facilities with exceptions or exemptions from the cost limits were required to give them up in order to enter the demonstration. Hence they were eliminated from the comparison group.
- *Facilities with especially high or low Medicare volume.* Earlier analyses found that the distribution of facility size, as measured by the number of Medicare SNF admissions in the year prior to inception of the demonstration, was more compressed for participants than for the population of facilities in each state. Very large and very small facilities were less likely than middle-sized facilities to join the demonstration. The comparison group of facilities in each state was therefore selected to include facilities no larger than the largest participating facility and no smaller than the smallest participating facility.
- *Facilities that admitted no patients to a Medicare-covered SNF stay during the 12 months prior to the inception of Phase 3 of the demonstration.* All providers participating in the demonstration had admitted at least one beneficiary to a Medicare-covered SNF stay in the year prior to Phase 3. To ensure comparability between demonstration and comparison groups, all facilities included in the comparison group were required to have admitted at least one person to a Medicare SNF stay in the year prior to the Phase 3 reference date.⁷
- *Facilities that entered Phase 2 of the demonstration but did not continue to Phase 3.* Facilities that dropped out of the demonstration after Phase 2 were exposed to early influences of the demonstration and so may be considered at least partially “contaminated.” To eliminate possible bias arising from these influences, they were removed from the comparison group.
- *Facilities listed as Phase 3 participants by Allied Technologies, but who submitted only standard SNF claims and never used participating (i.e. 9000-level) revenue codes.* A few facilities were listed as participants in Phase 3 by the database maintained by Allied Technologies, the implementation contractor, but never submitted participating claims. The status of these facilities was never ascertained satisfactorily and hence they were not included as members of the comparison group.

Facilities in Mississippi. As displayed in Table 1.2, only two of 199 Mississippi facilities elected to participate in the NHCMQ demonstration. We, therefore, excluded Mississippi from these analyses. The number of facilities in the resulting participating and comparison groups in each of the participating states is displayed in Table 2.1. The table also shows the number of facilities removed as a result of the exclusions noted just above.

⁷ The Phase 3 reference date is defined in Section 2.4.

Table 2.1

Distribution of Demonstration, Comparison and Other Medicare Skilled Nursing homes, by State							
	Kansas	Maine	NY free-standing	NY hospital-based	NY government	S Dakota	Texas
Demonstration	19	31	427	14	21	13	62
Comparison	79	49	22	23	22	36	585
Other facilities							
Exceptions/exemptions	18	4	29	3	1	1	154
Phase 2 only	4	1	0	1	0	4	8
No 9000 claims	0	0	2	0	0	0	2
Too big/too small	124	26	12	25	1	17	191
Government	2	4	-	-	-	1	9
No SNF admissions in year prior to Phase 3	2	0	0	0	0	0	1

Source: Abt Associates analysis of OSCAR and National Claims History files 1995-97.

New York nursing homes clearly dominate the total six-state sample in numbers, and so a word about the design implications of this fact is clearly in order. Participating New York nursing homes are different from participants in the other states. As reported in Appendix A-4, not only did more New York nursing homes join the demonstration, but also the average rate of Medicare admissions per New York facility in the 12 months before Phase 2 was highest of the six demonstration states. In addition, expected financial gain may not have been as important a determinant of which New York facilities chose to participate as it was in other states. In New York, participation would have been a sound financial decision for all nursing homes. Our estimates show that calculated demonstration payments were higher than actual pre-demonstration payments in New York, but that this ratio was the same for both participating and nonparticipating nursing homes. For all other demonstration states, however, participants probably had more to gain than nonparticipants. In these states, we found that the ratios of demonstration to pre-demonstration payments were higher for participating nursing homes. Thus while facility self-selection clearly occurs across the demonstration, the behavioral basis for selection seems quite different for New York. To control for the size and unique characteristics of the New York sample, as well as for differences in structures and processes of the demonstration across all the states, we estimate separate demonstration effects for each state separately (though data were pooled for Kansas and South Dakota).

2.3 Empirical Methods

The empirical approach used here is rooted firmly in the methods commonly associated with ‘natural experiments’ in preference to structural estimation, as these terms are defined by Heckman (2000). Estimation based on a defined comparison group of nonparticipating facilities using the method of differences-in-differences has been used with increasing frequency to estimate effects of policy interventions. Examples include Card and Krueger’s (1994) analysis of the effects of state-specific changes in minimum wages and Currie and Gruber’s (1996) study of effects of expansion of Medicaid coverage to specific groups.

While the pre-post and non-equivalent groups designs are widely used, equations [2.1] and [2.2] as written here are rarely employed to estimate demonstration effects. If other variables that are believed to affect y are available, then accounting for differences in these variables across observations will ordinarily improve the accuracy with which demonstration effects are estimated. Regression models have proved to be the best way to adjust for variation in other variables that affect y while without losing substantial degrees of freedom.

2.3.1 Facility-level outcomes

If the indicator variable I_j is set to one for facilities that participated in the demonstration and is set to zero otherwise and the variable T_t is set to one for time periods after the demonstration was implemented and is set to zero otherwise, then the regression counterpart to (2.2) for a continuous outcome y is

$$[2.3] \quad y_{jt} = \gamma_0 + \gamma_1 I_j + \gamma_2 T_t + \gamma_3 I_j T_t + \varepsilon_{jt}$$

The least-squares estimate of γ_3 will be numerically identical to $DID(\bar{y})$ in [2.2]. The estimation model for this report is a modification of [2.3] that replaces the constant term γ_0 with a provider-specific constant term, γ_j . This term captures the effects of all provider-specific influences that are constant over the period of analysis. Thus variables measuring such characteristics as for-profit/not for-profit status, urban/rural location, and chain/independent organization are unnecessary and in fact redundant. The basic estimation model for provider-level estimates therefore takes a compact form:

$$[2.4] \quad y_{jt} = \gamma_j + \gamma_2 T_t + \gamma_3 I_j T_t + \varepsilon_{jt}$$

The term $\gamma_1 I_j$ drops out of the model because demonstration status, I_j , is fixed at the provider level for all time periods. The quantity $\gamma_1 I_j$ is subsumed into the provider-specific constant term γ_j .

2.3.2 Person-specific Outcomes

Continuous measures. The analysis of person-specific outcomes such as total Medicare expenditure that are measured as continuous variables is carried out via least squares regression in a way that closely resembles [2.4]. Because each SNF stay for beneficiary i is associated with one and only one facility, the dependent variable for each person-specific measure is written as y_{ijt} , and the facility-level intercept, γ_0 , is retained. To control for variations in individual characteristics at the time of SNF admission, measures of prior use and health and functional status are drawn from the Medicare claims and from the Minimum Data set and included as regressors, represented by the observation matrix X_{ijt} . Hence the model for continuous person-level outcomes is given by

$$[2.5] \quad y_{ijt} = \gamma_j + \gamma_2 T_t + \gamma_3 I_j T_t + X_{ijt} \beta + \varepsilon_{ijt}$$

Discrete measures. Many important participating outcomes, such as death, rehospitalization, and RUG-III group assignment, are discrete at the individual level. Analysis of these outcomes is carried out using logistic regression. Inclusion of fixed facility-level effects in a logistic regression model is known to result in inconsistent estimates. Therefore, the model used here is the ‘conditional logistic’ model

(McFadden 1973; Chamberlain 1980). The probability of an event (say, rehospitalization within 120 days of admission) for person i at facility j in time period t (p_{ijt}) is written as

$$[2.6] \quad p_{ijt} = \exp(\gamma_j + \gamma_2 T_t + \gamma_3 I_j T_t + X_{ijt} \beta) / (1 + \exp(\gamma_j + \gamma_2 T_t + \gamma_3 I_j T_t + X_{ijt} \beta))$$

where all terms are interpreted as before. The estimated probability of the event is conditioned on the total number of events observed at a given facility. Therefore, facilities for which every patient or no patient experiences the event being analyzed drop out of the sample. Estimation of the conditional logistic model becomes computationally intractable as the number of observations per facility increases. Therefore a random sample of 1,000 admissions was drawn from every facility that admitted more than 1,000 beneficiaries over the period under analysis.

The measures of personal characteristics, X_{ijt} , raise a complication that should be addressed at this point. The richest source of individual data is of course the set of MDS assessments conducted by facilities upon resident admission. The MDS data allow us to construct scales that measure general health, physical functioning, and cognitive status. Measures such as these provide a more precise gauge of independence in functioning and needs for service than do measures available from claims alone. Medicare claims contain information on prior Medicare expenditure and diagnoses from previous hospital stays but little else. The problem arises because not all SNF claims can be matched to MDS assessments and because the proportion that are matched appears to be higher for participating than for nonparticipating facilities. We cannot be sure that MDS data are randomly missing and therefore will estimate most outcome equations twice — once using the smaller sample of matched MDS and claims data which include measures of health and functioning drawn from the MDS, and once using the larger sample of all stays which include only measures constructed from Medicare claims and administrative data.

Model specification. The models presented in [2.5] and [2.6] are designed to estimate demonstration effects via the interaction of demonstration status, I_j , and time periods after the inception of the demonstration, T_t . We employ here an expanded model designed to estimate the distinct effects of Phase 2 and Phase 3 of the demonstration. The variables DEMO2 and DEMO3 are defined to equal one for providers who participated in Phase 2 and Phase 3 of the demonstration respectively, and are set to zero otherwise. In similar fashion, the variables POST2 and POST3 are set to one for periods after the start of Phase 2 and Phase 3, respectively. The demonstration effect of Phase 2 is therefore estimated by the coefficient of the interaction term DEMO2•POST2. The incremental effect of Phase 3 is analogously estimated by the coefficient of DEMO3•POST3.

Variables measuring health and functional status, prior use, and Medicaid enrollment, designated generically as X_{ijt} in [2.5] and [2.6], are shown in Table 2.2 below. The Cognitive Performance Scale (CPS), Barthel Index (BARTHEL) and Nursing Severity Index (NSISUM) are each constructed using data elements drawn from the MDS. They are intended to capture variation in cognitive status, physical functioning, and nursing needs of beneficiaries near the time of SNF admission. Prior Medicare expenditure (PRIOR PART A) is a far cruder measure of individual health and need for care. However, it can be constructed even in the absence of MDS data. Finally, dual eligible status at enrollment (DUAL) is often alleged to impinge on the decision to admit a potential resident to a facility. The variable used here is an imperfect measure of Medicaid enrollment because it indicates only whether the beneficiary's Medicare Part B premium was paid by the State. States do pay the premium for most dual eligibles. Some beneficiaries, however, pay the Part B premium themselves in order to "spend down" their incomes and

establish medical necessity for Medicaid. Therefore, an unknown proportion of dual eligibles will not be correctly classified by the DUAL indicator.

Table 2.2

Variable Definitions

Variable	Definition	Source
DUAL	= 1 if beneficiary's Part B premium is paid by state; = 0 otherwise	HCFA Denominator File
PRIOR PART A	Total Medicare Part A expenditure for 180 days prior to admission	National Claims History File
CPS	Cognitive Performance Scale. Higher values indicate greater disability. ^a	MDS
BARTHEL	Barthel Functional Status Scale. Lower values indicate greater disability. ^a	MDS
NSISUM	Nursing Severity Index. Higher values indicate greater acuity. ^a	MDS

a. See Appendix A-5.

Each regression equation is estimated separately by state for facilities in Maine and Texas. In New York, separate estimates were computed for freestanding, hospital-based, and government facilities. Due to very small sample sizes, data from facilities in Kansas and South Dakota were pooled prior to estimation. Models are first estimated using the sample of claims merged to MDS data. These models employ all covariates listed in Table 2.2, in addition to the DEMO and POST interaction terms. The models are then re-estimated using claims data only. These latter models include only the variables DUAL and PRIOR PART A, together with the DEMO and POST interactions.

In two chapters, we report findings from analyses based on designs or datasets that deviate from the model described in this section. In Chapter 4, we used the Online Survey Certification and Reporting (OSCAR) data to assess demonstration effects on nursing home staffing levels. OSCAR data are reported at the facility level and provide a snapshot of staffing patterns at the time of the survey, which may or may not capture behavior modeled by resident-level variables computed from Medicare claims and MDS assessments.

In Chapter 7, we applied an assumption about the nature of demonstration effects that differs entirely from the model used in Chapters 3 through 6. That is, rather than affecting the behavior only of facilities participating in the demonstration, the NHCMQ demonstration might be expected to change behavior statewide, among participants and nonparticipants. Therefore, in Chapter 7's analysis of the tradeoff between cost and quality in nursing homes and how it might be changed by prospective payment, we contrasted participating and nonparticipating *states*, rather than providers. Data came from cost reports and OSCAR. Also, instead of the relatively simple nonequivalent group design model estimated in our other analyses, we estimated a structural model of cost and quality, based on a translog cost function.

2.4 Data

2.4.1 Data Sources

Medicare National Claims History File. Medicare Part A utilization and expenditure, including admissions and covered days for hospital and SNF care as well as expenditure for all care provided under

Part A was extracted from the National Claims History File. Data were accessed through the Decision Support Access Facility (DSAF) at HCFA.

Medicare Enrollment Data Base (EDB). Beneficiary identifiers (HICs) drawn from SNF claims were used to ascertain periods of Medicare eligibility, dates of enrollment in managed care plans (when claims would not be observed) and dates of birth and death.

Denominator File. The Denominator File was used to identify beneficiaries whose Part B premium was paid by a State Medicaid program. These individuals are said to have a “Part B buy-in” and are in all cases Medicaid recipients, dually eligible for Medicare and Medicaid. Absence of a buy-in indicator in the Denominator File, unfortunately, does not necessarily mean that a beneficiary is not enrolled in Medicaid. Some beneficiaries pay the Part B premium themselves each month as way of satisfying their State’s “spend-down” provision for medically-needy status. As a result, the number of dually-eligible beneficiaries identified using the Denominator File probably understates the true number by a small amount.

Nursing Home Minimum Data Set (MDS). Current law requires that nursing homes assess new residents upon admission and periodically thereafter. The Minimum Data Set contains information on the health, cognitive status, physical functioning, and treatments provided to residents. During this period, facilities in participating states used the MDS-Plus, the precursor to MDS Version 2.0 now submitted electronically by all U.S. nursing homes. MDS data for facilities in participating states were passed to a RUG-III grouper program so that each resident’s RUG-III assignment was available as well. A copy of the MDS assessment tool is included as Appendix A-2.

On-line Survey Certification Reporting (OSCAR) System. This system is used by state long-term care survey and certification staff to report data from the annual facility inspection. Data include detailed description of facility staffing and resident census information at the time of annual survey.

Medicare Provider of Service File (POS). The Provider of Service File, an extract of OSCAR, contains information describing the for-profit/not for-profit status, chain affiliation, number of beds, and staffing configuration of certified nursing homes. Data from the POS were extracted for each participating and comparison group facility for each year from 1994 through 1998.

2.4.2 Analytic File Construction

Stay definitions. Medicare SNF claims with contiguous dates of service were assembled to create one observation for each Medicare-covered SNF stay. To avoid defining multiple stays for individuals who are discharged to a hospital and subsequently return to the facility under Medicare, a new stay was created for a beneficiary only if the admission date for the stay was not preceded within the previous 90 days by a “through date” of any Medicare SNF claim.⁸ We have termed stays that satisfy this criterion “initial SNF stays.” The resulting stay-level file contained information on covered length of stay, total accommodation charges, total charges by revenue center (including supplies, pharmacy, physical, occupational, and speech therapy, durable medical equipment, IV therapy) and total Medicare

⁸ The term “stay” is not so well-defined as it first appears. Residents who leave for a short hospital stay and subsequently re-enter the facility are discharged by some providers and readmitted (with a new admission claim) when they return. Other providers simply resume billing under the claim filed for the stay that began prior to the rehospitalization.

reimbursement. Information from the qualifying hospital stay (defined as the most recent stay of three days or more preceding SNF admission) such as primary DRG, hospital length of stay, and hospital payment, were drawn from the HCFA Inpatient Standard Analytic File (SAF) and merged to the stay record. Similarly, Medicare Part A expenditures for the beneficiary in the six months prior to SNF admission were extracted from the Inpatient, Home Health, SNF, Hospice, and Outpatient SAFs and merged to the stay record as well.

Each Medicare SNF stay as defined here was matched whenever possible to the earliest available MDS assessment for the stay. Data from the MDS were used to assign a RUG-III category to each stay. At this point, it was not possible to apportion distinct parts of the full stay to two or more RUG-III groups. Hence only the first RUG-III group was retained for each stay. Table 2.3 shows the number of facilities, Medicare stays, and Medicare stays for which at least one MDS assessment was available. The ability to match MDS assessments to SNF claims is limited by the accuracy of identifying information on the assessment forms. During the participating period, these forms were not subject to the same edit checks for accuracy and completeness as are carried out on SNF claims. Hence a perfect match between assessments and claims is not possible. As the table shows, variations in the proportion matched are more successfully accounted for by state rather than by participant/nonparticipant status.

Of particular concern is the very low match of MDS assessments to SNF stays in Texas. Prior to the first demonstration year, the proportion of SNF stays matched to an assessment was far lower in Texas than in any other state.

The Phase 2 and Phase 3 reference dates. The majority of participating facilities entered Phase 3 of the demonstration on January 1 1997. A facility's entry to Phase 3 created a sharp pre-post boundary that did not exist for comparison group providers because their operations and payment were not directly affected by the demonstration. A Phase 3 reference date was therefore defined for each facility in the sample. The reference date was set equal to the date of Phase 3 entry for all participating facilities. For nonparticipating facilities, the fiscal year start date closest to January 1 1997 (start dates between July 1 1996 and June 30 1997) was defined to be the Phase 3 reference date. The Phase 2 reference date for nonparticipating facilities was set equal to the fiscal year start date closest to January 1 1996.

Design and data threats to the evaluation. This evaluation was subject to the standard threats to evaluations of non-experimental demonstration designs due to selection bias. It is likely that the nursing homes that joined the demonstration were systematically different from their nonparticipating counterparts. A clear example was in nurse staffing levels, which were lower for participating than nonparticipating facilities at baseline.

Data issues also posed challenges. We had to address several of these for the Minimum Data Set, including:

- Different states used different versions of the MDS, Texas did not submit the MDS at all until late 1996, and all states converted to MDS Version 2.0 at some point during the evaluation.
- Efforts to enforce completion of the MDS by nonparticipating facilities were not consistent or rigorous;
- Identifying fields on the dataset were often inaccurate, making longitudinal linking of assessments and of matching MDS assessments to SNF claims difficult.

Medicare claims data posed their own challenges. For example, many New York facilities used an all-inclusive charge structure during the demonstration period. Thus, we could not separately measure Medicare charges for therapy or other services in that state. Charge data are also limited in the use to which we put them (assessing effects on the volume of utilization) because charge setting behavior varies widely among facilities.

Time limitations on the demonstration could have hindered our ability to find significant effects. Provider behavior may be slow to change. Phases 2 and 3 of the demonstration lasted little more than one year each, and all providers transitioned to national PPS consistent with the timing of their fiscal years, after July 1998. Any delayed effects, had we observed them, would have been impossible to disentangle from the early effects of national SNF PPS.

Table 2.3

Number of Medicare Initial SNF Stays and Number of Initial Stays Matched to MDS Assessment by Demonstration Status and Time Period

Demonstration Arm	Second year prior to implementation (t=-2)		Year prior to implementation (t=-1)		First implementation year (t=0)	
	Initial Stays ^a	Initial Stays Matched to MDS ^b	Initial Stays ^a	Initial Stays Matched to MDS ^b	Initial Stays ^a	Initial Stays Matched to MDS ^b
Kansas						
Phase 2/Phase 3	329	262	266	201	263	220
Phase 3 only	298	239	298	223	299	273
Non-participant	2,125	1,568	2,341	1,470	2,004	897
Maine						
Phase 2/Phase 3	832	765	946	917	1,038	797
Phase 3 only	1,008	926	1,253	1,150	1,419	1,154
Non-participant	2,384	2,189	3,081	2,799	3,443	2,503
New York - Freestanding						
Phase 2/Phase 3	28,341	21,557	35,972	34,756	36,798	34,664
Phase 3 only	7,084	5,241	8,309	6,252	10,524	9,841
Non-participant	2,061	1,372	2,543	1,681	2,859	1,674
New York - Government						
Phase 2/Phase 3	1,329	1,013	1,742	1,712	1,610	1,573
Phase 3 only	427	293	469	359	536	514
Non-participant	948	632	1,044	663	1,027	664
New York – Hospital-based						
Phase 2/Phase 3	131	117	222	219	233	225
Phase 3 only	1,272	963	1,353	1,043	1,718	1,618
Non-participant	1,320	877	1,974	1,313	2,262	1,430
South Dakota						
Phase 2/Phase 3	406	381	421	405	447	401
Phase 3 only	139	133	170	167	204	198
Non-participant	1,121	1,024	1,404	1,291	1,342	1,194
Texas						
Phase 2/Phase 3	990	215	1,022	293	895	728
Phase 3 only	1,972	0	1,994	136	1,854	1,296
Non-participant	21,015	2	25,884	149	22,340	3,416
Total						
Phase 2/Phase 3	32,358	24,310	40,591	38,503	41,284	38,608
Phase 3 only	12,315	7,892	13,938	9,342	16,634	14,965
Non-participant	32,095	8,556	36,620	9,649	36,772	12,676

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission. Stays in hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, and facilities not subject to routine cost limits are omitted.

b Count of initial stays matched to MDS assessments refer to stays lasting more than 14 days.

Sources: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997; YA1A007B.

3.0 SNF Admitting Patterns Under Prospective Payment

3.1 Background

Medicare SNF stays represent a small fraction of total admissions for most nursing homes. Medicaid and private-pay residents typically account for the great majority of stays and days. Prior to national implementation of prospective payment for Medicare stays, providers generally found cost reimbursement to be an attractive feature of Medicare payment policy despite occasional disputes with fiscal intermediaries (FIs) over the proper allocation of cost to Medicare and non-Medicare days. Medicare coverage determination, however, was often a contentious matter. Clashes with intermediaries over the need for skilled services were reportedly common. The demonstration altered this state of affairs markedly. Prospective payment shifted the financial risk for most elements of the daily cost of care from the Medicare program to the provider. At the same time, the demonstration policy of automatic Medicare coverage for beneficiaries categorized in Clinically Complex or higher RUG-III categories effectively removed some risk.

Under a regime of pure cost reimbursement, providers bear no financial risk and so are generally regarded as indifferent to the characteristics of beneficiaries admitted to care. If all incurred costs are reimbursed, then even residents requiring extraordinary care are likely to find providers willing to undertake that care. The actual reimbursement environment facing SNFs prior to 1998 differed from pure cost reimbursement in three important ways that almost surely affected the admitting decisions of most facilities. First, Medicare regulations limited total reimbursement through the application of a routine *per diem* limit. Incurred cost in excess of the product of total Medicare days and the *per diem* limit were not reimbursed. The existence of the upper limit meant that facilities did have a financial reason to avoid admitting too many residents who were likely to require very costly care. By admitting a significant share of patients with relatively low care needs, a facility could help to ensure that its average *per diem* cost would not exceed the limit.

Second, incurred costs were never fully reimbursed as they were incurred, but rather at the time the facility's Medicare Cost Report was settled. Actual monthly reimbursement was carried out using an interim daily rate derived from the most recent cost report. Because most facilities could not easily borrow against revenue expected from the future settlement of their cost report, this process tended to discourage them from admitting too many patients whose expected cost exceeded the facility's historical average.

Finally, because Medicare coverage determination for a SNF stay occurred randomly and retrospectively after admission, facilities might sometimes find this coverage denied by the Medicare FI after substantial costs had already been incurred. Whether these costs could subsequently be recovered by billing the resident or the resident's family was often an open question, but the process of pursuing payment from the resident usually produced further costs. As a result, facilities were often alleged to favor admission of beneficiaries who required physical, occupational, or speech therapy because these services tended to establish the need for skilled care and thus tended to remove uncertainty about the intermediary's coverage decision.

The demonstration altered these features in important ways, especially during Phase 3. The interim *per diem* payment was replaced by a payment specific to the RUG-III group to which the resident was assigned, and this payment was made upon receipt of the facility's claim. Final payment was thus more-or-less immediate and did not require settlement of a Medicare Cost Report.⁹ Furthermore, all residents classified in RUG-III groups in the Rehabilitation, Extensive Services, Special Care, and Clinically Complex domains were automatically deemed to be Medicare covered for as long as they remained in these groups (subject to the 100-day limit for Medicare-covered SNF stays). Thus while the financial risk for *per diem* cost increased under Phase 2 and even more so under Phase 3, the risk of denial of Medicare coverage probably declined.

The assumption of financial risk by providers, combined with the changes discussed above, lead us to expect that admitting patterns will be affected in several ways. First, immediate payment of a known *per diem* rate determined by a resident's RUG-III group should encourage providers to admit beneficiaries with greater care needs than was the case under cost reimbursement. That is, so long as the expected cost of care does not exceed the prospective payment amount, the prospect of receiving a known amount rather than an interim payment combined with a future settlement of uncertain size should lead providers to be more willing to accept residents whose expected *per diem* cost is above the facility's historical average.

Second, greater certainty regarding Medicare coverage may lead to an increase in admission of residents who do not require rehabilitation therapy. As noted above, participating providers knew that residents in the Clinically Complex RUG-III group or above would be Medicare-covered and so may have felt less motivated to admit residents requiring therapy to minimize the risk that coverage would be denied. There is hence good reason to predict that admissions in the Extensive Services, Special Care and Clinically Complex domains would increase, especially during Phase 2 of the NHCMQ demonstration.

Whether or not total Medicare admissions could be expected to increase is hard to forecast. If prospective payment were implemented by law for all providers (as it was beginning in 1998), then we might expect that Medicare SNF admissions would tend to increase among providers who found the payment rates to be substantially above expected cost and to decrease among providers who found them to be lower than expected cost. The overall effect is difficult or impossible to predict. Our reasoning concerning demonstration effects is simple. Providers were free to join the demonstration at their discretion. We, therefore, presume that participants found the payment rates and other aspects of the demonstration to be attractive and would attempt to capitalize by doing their best to increase Medicare SNF admissions.

3.2 Data and Methods

Data sources used for the analysis were described in Chapter 2. Analysis of changes in the number of initial stays was carried out using all initial stays for participating and nonparticipating providers in the final analytic sample.

Medicare Part A expenditure over the six months prior to SNF admission was used as a measure of resident acuity upon admission. Residents with higher expenditures were assumed to be in poorer health, on average, and to require greater levels of care. We are well aware that the measure is crude and subject

⁹ Under Phase 2, physical, occupational, and speech therapy were reimbursed at cost. Final payment for these services did require settlement of the cost report.

to substantial error. It tends to approximate the resources used to treat health conditions rather than the severity of the conditions themselves. It does possess one important advantage over other measures, in particular over measures drawn from the MDS — it is completely independent of provider behavior. Thus using prior expenditure as a proxy for the care needs of newly-admitted residents is not contaminated by the possible efforts of providers to increase payment by overstating health problems or other conditions on the MDS assessment.

The statistical significance of Phase 2 and Phase 3 effects is best assessed by means of the simple difference-in differences model of equation [2.5] with individual characteristics omitted. The coefficients of DEMO2•POST2 and DEMO3•POST3 (as defined in Chapter 2) are estimates of the Phase 2 and Phase 3 demonstration effects on acuity at admission, as proxied by Part A spending in the six months prior to admission.

The probability of assignment to specified categories of RUG-III groups was estimated by conditional logistic regression as outlined in Chapter 2.¹⁰ RUG-III groups were aggregated to six broad categories as shown in Table 3.1 below. There was insufficient variation in assignment to the Default (BC1) category across providers to permit conditional logistic estimation for this group.

Table 3.1

RUG-III Categories Used for Analysis of Admitting Patterns

Analytic Category	RUG-III Groups in Category
High rehabilitation	RVA, RVB, RVC, RUA, RUB, RUC
Low rehabilitation	RLA, RLB, RMA, RMB, RMC, RHA, RHB, RHC, RHD
Extensive services	SE1, SE2, SE3
Special care	SSA, SSB, SSC
Clinically complex	CA1, CA2, CB1, CB2, CC1, CC2
Impaired cognition, physical functioning, behavior	IA1, IA2, IB1, IB2, BA1, BA2, BB1, BB2, PA1, PA2, PB1, PB2, PC1, PC2, PD1, PD2, PE1, PE2

3.3 Results

Total Medicare SNF admissions for participating and nonparticipating facilities were shown in Table 2.3 of Chapter 2. Table 3.2 shows the percentage increase in Medicare SNF admissions between the second year prior to the Phase 3 reference date and the first year of Phase 3 for participating and nonparticipating facilities. In most instances, SNF admissions to Phase 3 facilities grew more slowly (or declined more rapidly) than did admissions to facilities in the comparison group. In states other than New York, the discrepancy in admissions growth was striking.

¹⁰ These estimates are known to be inefficient because they fail to impose the “adding-up” restriction that the sum of the probabilities of assignment must equal one for each individual. Imposing this restriction, however, would force us to sacrifice the fixed-effect specification, which we believe to be important in this context.

Table 3.2**Percentage Increase in Initial SNF Stays Between Second Year Prior to Phase 3 and First Year of Phase 3 for Participating and Nonparticipating Facilities**

Demonstration Arm	Percentage Increase
Kansas	
Phase2/Phase3	-22.4%
Phase 3 only	0.3%
Nonparticipant	-5.9%
Maine	
Phase2/Phase3	22.1%
Phase 3 only	34.2%
Nonparticipant	36.8%
New York- Freestanding	
Phase2/Phase3	26.1%
Phase 3 only	39.6%
Nonparticipant	32.7%
New York - Government	
Phase2/Phase3	19.2%
Phase 3 only	22.7%
Nonparticipant	8.0%
New York – Hospital based	
Phase2/Phase3	57.6%
Phase 3 only	30.1%
Nonparticipant	53.9%
South Dakota	
Phase2/Phase3	9.6%
Phase 3 only	38.4%
Nonparticipant	18.0%
Texas	
Phase2/Phase3	-10.1%
Phase 3 only	-6.2%
Nonparticipant	6.1%

Sources: Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997.

Mean Part A outlays for beneficiaries admitted to SNF care in both participating and nonparticipating facilities are displayed in Table 3.3. In nearly every case, the percentage increase in pre-admission expenditures between the second year prior to the Phase 3 reference date and the year after the Phase 3 reference date was higher – sometime substantially higher – for participating facilities compared to nonparticipating facilities.

Table 3.3**Mean Part A Expenditures for 6 Months Prior to Initial SNF Stays, by Demonstration Status and Time Period**

Demonstration Arm	Second year prior to implementation (t = -2)	Year prior to implementation (t = -1)	First implementation year (t = 0)	% change from t = -2 to t = 0
Kansas				
Phase 2/Phase 3	\$10,121	\$10,061	\$10,722	5.8%
Phase 3 only	10,139	11,289	14,937	38.7
Nonparticipant	11,050	11,270	12,046	8.6
Maine				
Phase 2/Phase 3	11,152	12,509	12,577	12.0
Phase 3 only	10,958	11,646	13,154	18.3
Nonparticipant	12,067	12,141	12,534	3.8
New York- Freestanding				
Phase 2/Phase 3	15,902	16,195	17,536	9.8
Phase 3 only	15,831	16,873	17,279	8.8
Nonparticipant	13,560	13,151	13,926	2.7
New York Hospital-based				
Phase 2/Phase 3	8,804	10,694	10,877	21.1
Phase 3 only	16,447	17,451	19,869	18.9
Nonparticipant	16,245	16,858	17,012	4.6
New York Government				
Phase 2/Phase 3	11,956	12,694	12,847	7.2
Phase 3 only	12,693	15,652	13,530	6.4
Nonparticipant	12,567	11,959	11,618	-7.9
South Dakota				
Phase 2/Phase 3	10,642	11,155	12,089	12.7
Phase 3 only	9,453	6,834	9,258	-2.1
Nonparticipant	10,141	9,562	10,030	-1.1
Texas				
Phase 2/Phase 3	12,964	12,342	16,553	24.4
Phase 3 only	13,259	15,213	15,912	18.2
Nonparticipant	14,136	14,898	15,714	10.6

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, and facilities not subject to routine cost limits are omitted.

Sources: Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997.

Difference-in-differences regression estimates are shown in Table 3.4. The estimated coefficients of the DEMO2•POST2 and DEMO3•POST3 interaction terms are estimates of the incremental increase in mean prior Part A expenditures of residents admitted to Medicare SNF stays in participating facilities during Phase 2 and Phase 3 respectively. Although Phase 2 of the demonstration was not associated with statistically significant increases in resident acuity, providers participating in Phase 3 did appear to admit beneficiaries with greater prior expenditure, on average, than they otherwise would have. This difference was statistically significant at the 0.10 level or higher for every state/provider type grouping except for government facilities in New York.

The conditional logistic regression estimates of participating effects on RUG-III group assignment are shown in Tables 3.5 to 3.10. Generally speaking, Phase 2 of the demonstration appeared to discourage admission of residents to rehabilitation RUG-III groups and to encourage admission in most other groups. Of the 12 estimated values of the DEMO2•POST2 coefficient in Tables 3.5 to 3.10, seven are negative and statistically significant. Only in Texas did Phase 2 appear to lead to increases in the admission of beneficiaries in the Rehabilitation groups. Generally speaking, admission to other RUG-III groups tended to increase during Phase 2, especially for New York facilities. In Texas, admissions to the clinically complex groups declined, contrary to hypothesis.

Phase 3 effects were sharply different as gauged by the estimated coefficients of the DEMO3•POST3 interaction. With the exception of Texas providers, admissions to the upper rehabilitation groups increased markedly. Admissions to lower rehabilitation groups declined in Maine and among hospital-based providers in New York. With the exception of New York government and Texas providers, admissions to the Clinically Complex groups declined under Phase 3.

Table 3.4

Part A Outlays for 6 Months Prior to SNF Admission: Fixed-effect Regression Estimates

	Texas	Maine	Kansas/ South Dakota	New York		
				Hospital- based	Freestanding	Government
DEMO2•POST2	-232.8 (-0.32)	158.2 (0.24)	-829.2 (-1.36)	-360.9 (-0.19)	51.4 (0.17)	512.8 (0.59)
DEMO3•POST3	773.6 * (1.75)	803.9 * (1.69)	1,168.7 ** (2.31)	1,755.0 ** (2.29)	1,180.2 ** (2.25)	1,337.5 (1.50)
POST2	904.9 *** (5.63)	803.0 ** (2.59)	241.9 (0.94)	988.5 ** (2.02)	314.0 (1.14)	356.3 (0.55)
POST3	1036.8 *** (6.38)	-26.2 (-0.08)	661.7 ** (2.47)	783.2 (1.39)	-34.9 (-0.68)	-837.8 (1.12)
N	74,951	15,404	13,877	10,485	129,026	9,132
R ²	0.001	0.001	0.002	0.004	0.001	0.001

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Source: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.

Table 3.5

**Determinants of Assignment to “Upper” Rehabilitation RUG-III Group
Conditional Logistic Regression Estimates**

				New York		
	Texas	Maine	Kansas/ South Dakota	Hospital- based	Freestanding	Government
DEMO2•POST2	-0.43 (-0.72)	-0.91 (-4.72)	*** 0.05 (0.24)	-3.77 (-7.63)	*** -1.10 (-8.93)	-0.24 (-0.23)
DEMO3•POST3	0.05 (0.13)	1.15 (8.53)	*** 0.29 (1.65)	* 1.74 (6.45)	*** 1.67 (10.44)	*** -3.67 (-3.09)
POST2	1.13 (2.08)	* 0.62 (6.76)	*** 0.14 (1.27)	1.39 (6.02)	*** 1.31 (11.78)	-0.24 (-0.28)
POST3	-0.41 (-1.09)	0.54 (5.67)	*** 0.61 (5.13)	*** -0.01 (-0.06)	-0.30 (-1.92)	* 4.75 (4.25)
DUAL	-0.24 (-2.24)	** -0.32 (-3.98)	** -0.27 (-2.91)	*** -0.29 (-1.76)	* -0.37 (-6.90)	*** -0.54 (-1.20)
PRIOR PART A	7.54 (3.34)	*** -4.43 (-1.87)	* 7.86 (2.75)	*** 9.69 (3.02)	*** 7.56 (10.65)	*** 19.15 (3.39)
CPS	-0.06 (-1.89)	* -0.77 (-3.36)	*** -0.07 (-2.48)	** -0.27 (-6.35)	*** -0.23 (-18.25)	*** -0.06 (-0.57)
BARTHEL	-0.004 (-0.28)	-0.016 (-1.57)	-0.04 (-3.22)	*** 0.002 (0.10)	-0.02 (-3.38)	*** -0.0002 (-0.00)
NSISUM	-0.04 (-1.78)	* -0.09 (-6.77)	*** -0.07 (-3.99)	*** -0.10 (-3.77)	*** -0.16 (-18.96)	*** -0.40 (-4.68)
N	3,586	10,515	7,859	5,249	76,870	2,162
R ²	0.014	0.090	0.030	0.133	0.118	0.302

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Source: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.

Table 3.6

**Determinants of Assignment to “Lower” Rehabilitation RUG-III Group
Conditional Logistic Regression Estimates**

	Texas		Maine		Kansas/ South Dakota		New York					
						Hospital- based	Freestanding	Government				
DEMO2•POST2	0.79	**	0.10		-0.57	***	-0.75	***	-0.46	***	-0.47	***
	(2.27)		(0.95)		(-4.24)		(-3.00)		(-11.37)		(-3.12)	
DEMO3•POST3	1.11	*	-0.47	***	0.11		-0.52	***	-0.004		-0.14	
	(2.37)		(-5.54)		(0.95)		(-4.34)		(0.05)		(0.86)	
POST2	-0.73	**	-0.21	***	0.20	***	0.11		-0.17	***	0.13	
	(-2.30)		(-3.99)		(3.07)		(1.40)		(-4.57)		(1.08)	
POST3	-0.20		0.38	***	-0.01		0.26	***	0.29	***	0.48	***
	(-0.45)		(6.13)		(-0.10)		(2.81)		(3.74)		(3.20)	
DUAL	-0.44	***	-0.09	*	-0.27	***	-0.33	***	-0.11	***	-0.26	***
	(-5.27)		(-1.80)		(-4.54)		(-4.09)		(-5.51)		(-2.98)	
PRIOR PART A	5.39	**	-0.93		6.27	***	0.31		3.40	***	6.97	***
	(2.77)		(-0.62)		(3.09)		(0.19)		(9.75)		(3.77)	
CPS	-0.14	***	-0.12	***	-0.09	***	-0.25	***	-0.25	***	-0.21	***
	(-5.84)		(-8.67)		(-5.51)		(-12.87)		(-52.29)		(-10.10)	
BARTHEL	0.01		-0.01		-0.03	***	0.01		-0.03	***	-0.02	**
	(1.42)		(-1.35)		(-4.62)		(1.18)		(-11.46)		(-2.18)	
NSISUM	-0.003		-0.06	***	-0.05	***	-0.13	***	-0.12	***	-0.14	***
	(-0.18)		(-7.68)		(-5.01)		(-10.03)		(-37.46)		(-9.87)	
N	4,041		12,576		9,838		7,541		109,411		6,989	
R ²	0.042		0.017		0.012		0.084		0.061		0.056	

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Source: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.

Table 3.7

**Determinants of Assignment to Extensive Care RUG-III Group
Conditional Logistic Regression Estimates**

	Texas	Maine	Kansas/ South Dakota	New York					
				Hospital- based	Freestanding	Government			
DEMO2•POST2	-0.05 (-0.07)	0.32 (0.65)	-0.57 (-1.31)	1.92 (2.41)	**	0.30 (2.19)	**	0.66 (1.91)	*
DEMO3•POST3	0.11 (0.09)	* -0.26 (-0.83)	-0.24 (-0.70)	0.57 (1.43)		1.00 (3.07)	***	0.67 (1.65)	*
POST2	0.14 (0.21)	0.40 (2.04)	** 0.72 (3.29)	*** 0.02 (0.06)		1.19 (9.24)	***	0.34 (1.22)	
POST3	0.18 (0.15)	0.12 (0.51)	-0.02 (-0.11)	-0.19 (-0.55)		-0.99 (-3.04)	***	-0.26 (-0.64)	
DUAL	0.29 (2.11)	** 0.09 (0.52)	0.24 (1.52)	0.18 (0.78)		0.17 (2.12)	**	-0.02 (-0.17)	
PRIOR PART A	-6.68 (-1.55)	*** 20.99 (7.46)	*** 13.59 (2.86)	*** 18.02 (5.91)	***	9.82 (19.89)	***	18.62 (8.21)	***
CPS	0.10 (2.25)	** 0.11 (2.36)	** 0.06 (1.22)	0.17 (3.15)	***	0.18 (21.48)	***	0.14 (4.49)	***
BARTHEL	-0.12 (-5.73)	*** -0.17 (-6.97)	*** -0.17 (-7.01)	*** -0.15 (-4.27)	***	-0.05 (-11.29)	***	-0.07 (-3.81)	***
NSISUM	0.20 (6.88)	*** 0.24 (7.96)	*** 0.28 (8.80)	0.33 (8.82)	***	0.31 (55.46)	***	0.38 (16.43)	***
N	2,767	10,445	7,325	7,246		104,837		6,794	
R ²	0.162	0.211	0.221	0.277		0.210		0.259	

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Source: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.

Table 3.8

**Determinants of Assignment to Special Care RUG-III Group
Conditional Logistic Regression Estimates**

	New York								
	Texas	Maine	Kansas/ South Dakota	Hospital- based	Freestanding	Government			
DEMO2•POST2	0.41 (0.83)	0.11 (0.54)	0.14 (0.73)	0.79 * (1.92)	0.15 ** (2.40)	0.59 *** (3.43)			
DEMO3•POST3	-0.04 * (-0.07)	0.32 * (1.83)	-0.11 (-0.74)	0.74 *** (3.80)	0.20 (1.45)	0.36 * (1.91)			
POST2	-0.81 (-1.82)	0.01 (0.12)	0.04 (0.52)	0.17 (1.30)	0.21 *** (3.70)	-0.10 (-0.79)			
POST3	-0.22 (-0.40)	-0.29 (-2.36)	** -0.03 (-0.30)	-0.37 ** (-2.27)	-0.27 ** (-2.03)	-0.31 * (-1.78)			
DUAL	0.26 ** (2.06)	-0.02 (-0.25)	0.35 *** (5.00)	0.15 (1.18)	0.02 (0.66)	0.12 (1.33)			
PRIOR PART A	-4.92 (-1.32)	8.68 *** (3.97)	1.81 (0.64)	-4.41 * (-1.66)	-6.95 *** (-14.37)	-6.63 *** (-3.28)			
CPS	0.07 * (1.91)	-0.04 (-1.59)	-0.05 ** (-2.57)	0.23 *** (8.06)	0.13 *** (22.64)	0.01 (0.50)			
BARTHEL	-0.07 *** (-3.92)	-0.16 *** (-12.74)	-0.15 *** (-14.88)	-0.17 *** (-10.39)	-0.16 *** (-47.45)	-0.17 *** (-14.44)			
NSISUM	0.06 ** (2.50)	0.18 *** (11.78)	0.12 *** (9.26)	0.18 *** (9.24)	0.11 *** (27.62)	0.14 *** (9.74)			
N	3,327	12,576	9719	7,545	109,444	7,054			
R ²	0.061	0.125	0.103	0.236	0.138	0.134			

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Source: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.

Table 3.9

**Determinants of Assignment to Clinically Complex RUG-III Group
Conditional Logistic Regression Estimates**

	Texas		Maine		Kansas/ South Dakota		New York					
							Hospital- based	Freestanding	Government			
DEMO2•POST2	-1.40 (-2.81)	***	0.17 (1.41)		0.28 (2.07)	**	0.29 (1.13)	0.28 (6.05)	***	-0.16 (-1.26)		
DEMO3•POST3	-0.98 (-1.60)		-0.24 (-2.41)	**	-0.66 (-5.48)	***	-0.33 (-2.25)	**	-0.41 (-4.63)	***	-0.09 (-0.63)	
POST2	0.82 (1.79)	*	-0.09 (-1.56)		-0.25 (-4.09)	***	-0.35 (-3.84)	***	-0.27 (-6.54)	***	-0.10 (-0.96)	
POST3	-0.10 (-0.18)		-0.44 (-6.39)	***	-0.07 (-1.04)		-0.16 (-1.42)		-0.05 (-0.57)		-0.25 (-2.07)	**
DUAL	0.48 (4.20)	***	0.26 (4.94)	***	0.12 (2.27)	**	0.30 (3.35)	***	0.15 (6.92)	***	0.13 (1.89)	*
PRIOR PART A	-5.02 (-1.53)		-3.14 (-1.75)	*	-9.59 (-4.24)	***	-4.20 (-1.91)	*	-7.82 (-15.35)	***	-10.70 (-5.28)	***
CPS	0.08 (2.31)	**	0.07 (4.46)	***	0.04 (2.35)	**	0.10 (4.19)	***	0.02 (4.45)	***	-0.02 (-1.15)	
BARTHEL	0.07 (4.38)	***	0.07 (9.91)	***	0.10 (14.13)	***	0.05 (4.67)	***	0.10 (39.14)	***	0.06 (7.38)	***
NSISUM	0.05 (2.13)	**	0.12 (12.80)	***	0.08 (7.81)	***	0.08 (5.06)	***	0.07 (20.45)	***	0.03 (2.55)	**
N	3,314		12,576		9,983		7,545		109,742		7,054	
R ²	0.038		0.030		0.031		0.023		0.029		0.022	

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Source: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.

Table 3.10

**Determinants of Assignment to Impaired Cognition, Behavior, or Physical Functioning RUG-III Group
Conditional Logistic Regression Estimates**

	New York										
	Texas	Maine	Kansas/ South Dakota	Hospital- based	Freestanding	Government					
DEMO2•POST2	-1.30 (-1.45)	0.28 (1.53)	0.20 (0.77)	1.68 (2.60)	***	0.32 (4.88)	***	-0.13 (-0.69)			
DEMO3•POST3	-1.46 (-2.30)	** -0.44 (-2.73)	*** -0.14 (-0.56)	-0.21 (-0.75)		-0.51 (-4.07)	***	0.09 (0.44)			
POST2	1.23 (1.43)	-0.09 (-1.01)	-0.31 (-2.46)	-0.46 (-2.83)	***	-0.29 (-4.86)	***	0.07 (0.47)			
POST3	0.57 (0.096)	-0.36 (-3.44)	*** 0.06 (0.42)	-0.14 (-0.68)		0.02 (0.20)		-0.32 (-1.75)	*		
DUAL	0.17 (1.32)	0.05 (0.63)	-0.12 (-1.01)	0.11 (0.65)		0.06 (1.87)	*	-0.05 (-0.50)			
PRIOR PART A	-17.14 (-3.53)	*** -24.60 (-5.92)	*** -33.26 (-5.06)	*** -20.01 (-3.62)	***	-16.14 (-15.86)	***	-23.22 (-5.41)	***		***
CPS	0.14 (3.41)	** 0.22 (9.42)	*** 0.21 (6.14)	0.31 (7.13)	***	0.19 (23.40)	***	0.13 (4.80)	***		***
BARTHEL	0.03 (1.73)	* 0.04 (4.08)	*** 0.09 (6.09)	0.05 (2.53)	**	0.06 (15.91)	***	0.05 (3.96)	***		***
NSISUM	-0.25 (-8.41)	*** -0.23 (-14.79)	*** -0.28 (-12.09)	-0.27 (-7.34)	***	-0.33 (-49.63)	***	-0.36 (-16.40)	***		***
N	3,079	12,576	6,563	7,153		108,139		7,052			
R ²	0.096	0.074	0.113	0.085		0.117		0.143			

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Source: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.

3.4 Discussion

Prospective payment did not lead to an increase in Medicare SNF admissions as was hypothesized. Medicare SNF admissions to participating facilities grew less rapidly in nearly every state than did admissions to nonparticipating facilities. While we can only speculate about the cause of the decline, it is possible that acceptance of financial risk for routine and therapy cost led providers to become more cautious and deliberate in their admitting procedures. This might be especially likely to occur if many facilities joined the demonstration primarily to gain experience with prospective payment prior to its expected implementation. It is notable in this respect that the smallest discrepancy between participating and nonparticipating providers was observed in New York, where the so-called “Medicare maximization” program gave all providers additional financial incentives to increase the admission of Medicare SNF patients.¹¹

Phase 3 of the demonstration appeared encourage providers to admit beneficiaries with more acute conditions and higher needs for care, at least to the extent that these are captured by Medicare expenditure prior to admission. The increases attributable to participating effects ranged from \$773 in Texas to \$1,755 for hospital-based facilities in New York, amounts ranging from 6 to 11 percent of their pre-demonstration level. Although we had hypothesized that this would occur, it is not clear that our reasoning was correct. We had argued that immediate payment for care without the necessity of waiting for settlement of a cost report and without the possibility that *per diem* costs might exceed the routine cost limits would remove some of the financial barriers to admission of high-care beneficiaries. However, these elements were in place in Phase 2, but the predicted outcome did not occur until Phase 3. An obvious possibility is that increased admission of residents with higher pre-admission spending was brought about not by the absence of cost report settlement and *per diem* limits, but was instead a by-product of efforts to admit beneficiaries who could be placed in Very High and Ultra High Rehabilitation groups.

Both phases of the demonstration exhibited clear effects on the composition of admissions by RUG-III group, though these effects were not always uniform across states. Broadly speaking, Phase 2 produced a clear decline in admissions in the Rehabilitation domain and a corresponding increase in admissions to the Extensive Services, Special Care, and Clinically Complex domains. During Phase 3, participating providers sharply increased their admission of patients to the Very High and Ultra High Rehabilitation groups, while reducing admissions to the Clinically Complex groups and to the Impaired Cognition, Behavior, and Reduced Physical Functioning groups. This behavior is generally consistent with the hypothesis that Phase 2 providers a) reduced some therapy that had previously been provided in order to improve the chances for Medicare coverage of a stay, and b) felt no special need to place residents in rehabilitation groups; therapy, if provided later in the stay, would be reimbursed at cost. Phase 3 behavior was broadly consistent with simple maximization of revenue since the Ultra High and Very High RUG-III groups carried the highest payment under Phase 3.

¹¹ Under the Medicare maximization policy, facilities that failed to achieve a specified rate of increase in Medicare admissions received a reduction in their Medicaid *per diem* payment. Hence nearly all facilities in New York were given strong incentives to do what they could to establish Medicare coverage for residents.

Forecasting the effects on admitting patterns of national implementation of Medicare prospective payment for SNF care is difficult because the market environment changes significantly when *all* providers, rather than just a set of participating participants, are subject to the new system. Moreover, the policy of deemed Medicare coverage for residents assigned to RUG-III groups of Clinically Complex and higher was not implemented as part of the SNF prospective payment system instituted in response to the Balanced Budget Act. So while we might reasonably predict that implementing a Medicare prospective payment system similar to that employed by the demonstration would tend to increase access to SNF for those with more complex conditions (based on the observed tendency of participating providers to admit beneficiaries with higher pre-admission expenditure) and provision of intensive therapy might increase (based on the strong rise in Very High and Ultra High RUG-III assignment), these predictions must be treated with some caution.

4.0 Staffing Patterns Under Prospective Payment

4.1 Background

The transition from retrospective to prospective payment under the NHCMQ demonstration would be expected to increase facility efforts to manage, control and predict costs. Under Phase 3 of the demonstration, one could imagine that facilities would place an increased reliance on therapy staff, but on less costly staff members (physical therapy aides, restorative nursing aides), thus creating a shift downward in the numbers of highly trained and more expensive staff, such as physical therapists (PTs), occupational therapists (OTs), and speech/language pathologists (STs). It is also conceivable that facilities would reexamine contractual arrangements with therapy staff, to better control and monitor costs and possibly shift therapy staff from contract to facility employees. The effect of the demonstration on these and other staffing patterns are examined in this chapter.

This section begins with a review of the usual staffing patterns in nursing homes and the influence of state and federal regulations on these patterns. It continues with a brief review of the literature on the relationship between staffing and quality of care and resident outcomes. This background is provided as a way to place demonstration staffing patterns in context with the issue of nursing home staffing in general. The issue of nursing home staffing has been broadly researched and publicized in the last several years, due to a nursing shortage and nursing home quality concerns. Concerns about the adequacy of staffing have been raised in the context of SNF PPS implementation, as well.

A description of the staffing analyses completed and their results are discussed in the remaining sections (Sections 4.2 and 4.3) of this chapter.

Typical Nursing home Staffing Patterns

Over 1.6 million residents are cared for in U.S. nursing homes by 1,200,000 full-time staff equivalents (FTEs) each day, of which 700,000 provide some form of nursing or personal care (Harrington, 1997; Maas et al., 1996). The remainder of the nursing home staff is comprised of therapy staff (physical therapy, occupational therapy, speech and language pathology), administration, recreational staff, social services, housekeeping, laundry, dietary and maintenance workers. Nursing staff in a nursing home are primarily Registered Nurses (RN), Licensed Practical or Vocational Nurses (LPN/LVN) and Certified Nurse Aides (CNAs) (Johnson, 1996). Nurse aides and orderlies account for over 40 percent of a facility's total FTEs; RNs make up less than seven percent of a facility's FTEs and less than 20 percent of a facility's total nursing staff (Maas et al, 1995). In 1998, nursing homes supplied an average of 3.4 total nursing hours per patient day. This total is based upon the following components: 2.3 CNA hours per patient day, 0.7 LPN hours per patient day, and 0.4 RN hours per patient day (AHCA, 1999).

Regulatory Oversight of Nursing home Staffing

Since the passage of OBRA 1987, which mandated staffing to "meet the needs of the residents", nursing home advocates have pushed for legislatures to provide a more definitive structure to this statement. Citing the Institute of Medicine (1996) study which claimed that a positive relationship between nurse staffing and quality of nursing home care could be demonstrated, advocates have stated that average staffing levels in nursing homes are too low to provide high quality of care. They recommend setting minimum staffing standards for nursing administration, nursing supervision, and direct caregiver and licensed nurse to resident ratios by shift (Harrington et al., 1996).

HCFA has been evaluating the appropriateness of establishing minimum caregiver-to-resident ratios. As part of an on-going study, Abt Associates analyzed data from 2,700 facilities, representing information on 240,000 residents. The study examined whether staffing ratios improve care, whether minimum nurse staffing ratio requirements are appropriate and the potential cost and budgetary implication of minimum ratio requirements (HCFA, 1999). Phase 1 of this study found that there are critical nurse to resident ratios below which residents are at a substantially increased risk of quality problems. These critical ratios exist for certified nurse assistants, total licensed staff and registered nurses. The analysis, based largely on three states, found that the strongest minimum thresholds were at 2.0, 0.75 and 0.2 hours per resident day for nurse assistants, licensed staff and RNs respectively. Using a simulation method, the nurse assistant's time to provide optimal care was found to be 2.9 hours per resident day.

The Relationship Between Staffing and Quality

Those who advocate for the federal government to set minimum nursing home staffing standards argue that higher staffing ratios lead to improved resident outcomes. Improved outcomes and the required level or quality of care to produce those outcomes are believed to be related to multiple factors. One of the factors cited most often as having a direct influence on quality outcomes is the ratio of nursing (licensed and unlicensed) staff to residents. It seems logical that with more staff to provide care, more care would be provided with resulting better outcomes. Numerous studies have examined staffing levels, ratios, continuity and turnover rates and their collective and individual influences on resident outcomes. The influence of RNs on resident outcomes is cited frequently. Higher RN to patient ratios is associated with decreased mortality (Zinn & Mor, 1998; Linn et al., 1977; Braun, 1991; Cohen & Spector, 1996), improved physical functioning (Zinn & Mor, 1998; Linn et al., 1977), greater likelihood of discharge home (Zinn & Mor, 1998; Linn et al., 1977) and decreased unnecessary hospitalizations (Zinn & Mor, 1998). Decreased RN turnover is associated with functional improvement (Spector and Takada, 1991) and higher RN to LPN ratios have been linked to improvement in nursing home quality (Monroe, 1990). Higher LPN to patient ratios are associated with improved functional status (Cohen and Sector, 1996). Although CNAs are recognized as the primary caregivers, providing 80-100 percent of the direct care to nursing home residents (Bowers & Becker, 1992), studies have yet to find a relationship between CNA hours, training or experience and resident outcomes (Cohen and Sector, 1996; Zinn & Mor, 1998). Continuity of staff is noted to have a positive effect on resident satisfaction and improved physical functioning (Zinn & Mor, 1998; Spector & Takada, 1991).

Evidence on the influence of therapy staffing on resident outcomes is mixed, as some studies point to improved outcomes associated with the provision of rehabilitation services, while others note no difference in functional outcomes. "There is a lack of consensus about the usefulness of rehabilitation therapy for certain types of nursing home patients and about the nursing home personnel who should provided these services" (Murtaugh et al., 1988). Recent studies, like that of Mulrow et al. (1994), support this notion. In Mulrow's study, elderly patients receiving physical therapy¹² seemed to show only "modest improvements in mobility," and "no significant improvements in other areas of physical performance, self perceived function, or ADL [function]" (Mulrow et al., 1994).

¹² Patients were classified as "frail elderly" if they were dependent in at least two activities of daily living, and had been in the nursing home for at least three months.

In contrast to the Mulrow study, Kramer et al. (1997) and Przybylski et al. (1996) support the positive benefits of rehabilitation in enhancing functional outcomes. Przybylski et al. conclude that enhanced physical and occupational therapy provided in the nursing home

...produced greater benefits in terms of functional status and costs for residents in a long-term care setting compared to a level that allows primarily consultation and limited treatment only...[A]ny effort to limit functional decline promotes resident choices, autonomy, independence, environmental freedom, and thus, quality of life. It also reduces the need for caregiver involvement and care delivery costs. The results suggest that, with proper incentives, client status can be improved to reduce cost (Przybylski et al., 1996).

Though therapy outcomes in the nursing home setting have not been extensively studied, Kramer et al. found no differences in outcomes for hip fracture patients across provider settings and suggested that hip fracture patients can be treated in SNFs as effectively as in rehabilitation hospitals. The Przybylski study supports the use of therapy in the nursing home, indicating that decline can be prevented and outcomes improved.

4.2 Data and Methods

The Online Survey Certification and Reporting (OSCAR) data were utilized in these analyses. Variables from the HCFA Form 671 (Long Term Care Facility Application For Medicare and Medicaid) were evaluated. This form, completed by facility staff during the annual Medicare/Medicaid certification survey, provides a description of facility characteristics and staffing patterns. A detailed description of staffing is generated through the recording of the number of hours worked for all nursing home employees and contract staff in the 14-day period prior to the beginning of the survey. The information is recorded by facility staff and given to state surveyors, who then pass it to their state agency where it is eventually data entered into HCFA's OSCAR system.

4.2.1 Sample States

The sample includes nursing homes in the demonstration states of Kansas, Maine, New York, South Dakota, and Texas. The initial sample of providers from these states is identical to that used in Chapter 3. The reader is directed to Section 3.2.2 of that chapter for details. For purposes of cleaning and comparability, not all providers included in the original sample are used in this chapter's analysis. A discussion of why certain providers are dropped is given below.

4.2.2 Data Cleaning

Facility-years are the unit of observation for the analyses. That is, an observation is one facility for one year, so if a facility reports data for five years it contributed five observations to the sample. The final sample consisted of 871 facilities, or 4,355 facility-year observations (1,840 participating facilities and 2,515 nonparticipating facilities).

Tables 4.1 and 4.2 display the development of this sample for the participating (4.1) and nonparticipating (4.2) facilities in each state. The initial sample size, the numbers of dropped observations, and the resultant sample size are listed across the top of the table. Column 4 shows the number of facility-years used in the analyses. The rows represent the different states and provide

totals. The bottom row of Table 4.2 shows the total number of observations dropped and the total sample size.

Providers were eliminated from the analysis if OSCAR data were not available in all study years (1994 – 1998). This was done to remove any possible confounding effects arising from comparing means composed from different groups of facilities in different years. In total, 871 of the 1,468 providers had data available in all study years.

A review of the total staffing data for the facilities with complete data revealed some facilities with high variation in staffing across years. Many of these facilities reported staffing levels that were relatively stable in all but one year, a pattern that suggested data entry or reporting errors. To reduce the prevalence of such errors, the top 2.5 percent of facilities with the largest one-year percentile change in nursing staff based on per-resident days were removed from the analysis. We also eliminated facilities with large, unexpected changes in total residents taking the total number of beds as given. Facilities with an actual and unexpected change of more than 50 residents across any two years were eliminated. Finally, facilities with total per-resident-day nursing staff levels less than 0.5 and greater than 12 and facilities with total number of residents greater than the total number of beds were eliminated since these were believed to be aberrant data. In total, six percent of facilities were dropped due to these restrictions.

Table 4.1

Development of Sample for Participating Facilities¹³

State	Original number of observations (1)	Dropped (missing data or other edits) (2)	Number of observations used for analysis (3)	Number of facility-year observations used for analysis (4)
Kansas/South Dakota	19	4	15	75
Maine	31	11	20	100
New York	462	175	287	1435
South Dakota	13	6	7	35
Texas	62	23	39	195
TOTAL	587	219	368	1840

¹³ The numbers in this table are the number of observations. An observation is a facility in one year. If data exists for six years for a facility, this is represented above as six observations.

Table 4.2**Development of Sample for Nonparticipating Facilities**

State	Original number of observations (1)	Dropped (missing data or other edits) (2)	Number of observations used for analysis (3)	Number of facility-year observations used for analysis (4)
Kansas/South Dakota	79	35	44	220
Maine	49	21	28	140
New York	99	42	57	285
South Dakota	36	12	24	120
Texas	585	235	350	1750
TOTAL	848	345	503	2515
TOTAL (Participating and Nonparticipating)	1435	548	871	4355

4.2.3 Empirical Approach

We use descriptive statistics and multivariate difference-in-differences analysis to examine whether participating facilities responded to the incentives of the demonstration. The set of outcome measures encompass three general staffing categories: nursing staff (RNs, LPNs, CNAs, RN director of nurses, and RNs with administrative duties), therapy staff (OT, PT, ST), and other staff (social workers, activities professionals, therapeutic recreation specialists, administration, and housekeeping). Nursing and therapy staffing levels are measured in terms of hours per resident day. Other staffing levels are measured in terms of total full-time equivalents (FTEs) per 100 beds.

In addition to staffing levels, we examine two measures of therapy staff composition. The first is the ratio of therapy assistants and aides to total therapy staff, separately for occupational and physical therapy. The second is the proportion of contract therapy staff relative to all therapy staff, again separately for occupational and physical therapy.

We begin our analysis with a state-by-state pre/post-Phase 3 comparison of the key nursing and therapy staff outcome variables. We also provide in Appendix Table A-6 a complete listing of descriptive statistics for all outcome measures pooled across each survey year and disaggregated by state and participating status.

The descriptive analysis is followed by a multivariate difference in differences approach resembling the analytic strategy presented in Chapters 3, 5 and 6. The model specification is as follows:

$$[4.1] \quad y_{jt} = \beta_1 + \sum_{S_i=S_1}^{S_5} \left(\sum_{\phi=2}^3 (\beta_{2\phi S_i} POST\phi_t * S_{i_j} + \beta_{3\phi S_i} DEMO\phi_j * POST\phi_t * S_{i_j}) \right) + v_j + \varepsilon_{jt}$$

y_{jt} is a staffing outcome measure for provider j and time t . S_i is a state indicator. POST2 and POST3 are dichotomous indicators set equal to one if the OSCAR survey date took place during or after

Phase 2 and Phase 3 of the demonstration, respectively. DEMO2 and DEMO3 are also dichotomous indicators and are equal to one if a provider took part in Phase 2 or Phase 3 of the demonstration. v_j is a provider-specific fixed effect. Additional independent variables, such as rural status, for-profit status, and/or hospital-based facility status, are not included in the model because there is insufficient intertemporal variation in these characteristics at the provider level over the time period of the analysis.

Coefficients in equation [4.1] are estimated using ordinary least squares regression with provider-specific fixed effects using a sample of providers pooled across the five states and across five years (1994-1998). Participating effects for Phase 2 and Phase 3 are captured by the coefficients on the DEMO2*POST2 and DEMO3*POST3 interaction terms, respectively.

4.3 Results

This section offers some descriptive information on staffing patterns prior to and following the NHCMQ demonstration, and presents results from the multivariate regressions for the participating/nonparticipating comparisons in each participating state. These state-by-state comparisons address the question of whether participation in the NHCMQ demonstration led providers to change their staffing patterns.

4.3.1 Descriptive Results

In order to determine whether participating facilities responded to the incentives of the demonstration to admit and care for residents in the higher casemix groups by increasing nurse staffing, we reviewed RN, LPN and CNA average hours per resident day for each participating state (Kansas, Maine, New York, South Dakota and Texas) individually and together over the period from 1994 to 1998. Several issues were examined. First, did the number of licensed nursing staff (RN or LPN) hours per patient day increase over the course of the demonstration and how did that compare to staffing patterns in nonparticipating facilities? Secondly, was there a shift from more costly (RN) services to less costly (LPN and nurse assistant) services in efforts to control costs, or did the shift actually occur in the opposite direction in response to increased resident acuity?

RN and LPN Staffing

Generally, participating facilities had fewer RN and LPN staff per resident day than nonparticipating facilities during the pre-demonstration year, with the exception of South Dakota and Texas. Increases in RN staffing between 1994 and 1998 in participating facilities were seen in Kansas, Maine and South Dakota, while a decrease was noted in New York and Texas. Levels of LPN staff remained relatively stable in all facilities and all states.

In general, for both participating and nonparticipating facilities in Kansas, New York and Texas, RN staffing ratios were considerably less than LPN staffing ratios at the beginning of the demonstration and remained so throughout (Tables 4.3 and 4.4). In South Dakota, the opposite was true, with RN ratios considerably greater than LPN ratios over the demonstration years. In Maine, RN and LPN staffing ratios at the beginning of the study were comparable, but by the end of the demonstration period, RN staffing for both participating and nonparticipating facilities exceeded LPN staffing by about 0.2 hours per resident day. These trends could be reflective of the demographics of each area, with some states having a general abundance of RN over LPNs or vice versa. It does not appear that

in the case of Maine, for example, that the increase represents participating facilities efforts to increase RN staffing to meet the needs of the medically complex patient, as increases are seen in nonparticipating facilities over the period as well.

Table 4.3

RN Mean Hours per Resident Day in Participating and Nonparticipating Facilities, 1994 and 1998

State	Participating Facilities (n=368)		Nonparticipating Facilities (n=503)	
	1994	1998	1994	1998
Kansas	.244	.348	.290	.290
Maine	.432	.600	.447	.567
New York	.382	.312	.457	.347
South Dakota	.500	.563	.457	.422
Texas	.170	.154	.155	.147

Source: Abt Associates analysis of OSCAR data 1994-1998; beakman_descriptives_oscar.log

Table 4.4

LPN Mean Hours per Resident Day in Participating and Nonparticipating Facilities, 1994 and 1998

State	Participating Facilities (n=368)		Nonparticipating Facilities (n=503)	
	1994	1998	1994	1998
Kansas	.432	.451	.535	.527
Maine	.380	.404	.467	.401
New York	.587	.608	.781	.760
South Dakota	.293	.321	.328	.384
Texas	.686	.727	.744	.736

Source: Abt Associates analysis of OSCAR data 1994-1998; beakman_descriptives_oscar.log

Nurse Assistant Staffing

Declines in nurse assistant staffing in participating and nonparticipating facilities were noted between 1994 and 1998 (see Table 4.5), with the exception of South Dakota, which achieved a small increase in CNA staffing among both participants and nonparticipants.

Table 4.5**Nursing Assistant Mean Hours per Resident Day in Participating and Nonparticipating Facilities, 1994 and 1998**

State	Participating Facilities (n=368)		Nonparticipating Facilities (n=503)	
	1994	1998	1994	1998
Kansas	1.60	1.55	1.92	1.54
Maine	2.70	2.54	2.72	2.54
New York	1.90	1.93	2.19	2.18
South Dakota	1.85	2.01	1.84	1.86
Texas	1.82	1.69	1.91	1.66

Source: Abt Associates' analysis of OSCAR data 1994-1998; *beakman_descriptives_oscar.log*

In general, CNA staffing for both participating and nonparticipating facilities slightly decreased over the demonstration years. Except in New York, where staffing remained relatively stable for both groups, CNA staffing showed much larger decreases than RN or LPN staffing. This behavior may have represented generalized facility attempts to control costs. Additionally, it is important to note that occupancy rates in most states, including participating states, were declining during this period. Such declines may well be accompanied by fewer direct care staff.

Therapy Staff

One expected outcome of the demonstration was that participating facilities would increase the rehabilitation services (i.e., PT, OT and ST) available to meet the needs of higher acuity, rehabilitation-intensive residents. In all states, in participating facilities, all licensed therapy hours did experience an overall net increase between 1994 and 1998, with only one exception (South Dakota) (see Tables 4.6 through 4.10). In nonparticipating facilities, with the exception of Kansas and New York, licensed PT, OT and ST also experienced a net increase from 1994 to 1998. Only in Maine, however, were these increases greater than 0.05 hours (for PT and OT).

Physical Therapy Assistant (PTA) and Aide (PT Aide) hours were examined for all facilities to determine if participant facilities had increased their use of skilled therapist extenders. No major differences were seen between participating and nonparticipating facilities, as all states, with the exception of South Dakota, displayed an increase in PTAs/PT Aides from 1994 to 1998.

Table 4.6**Physical Therapy Mean Hours per Resident Day in Participating and Nonparticipating Facilities, 1994 and 1998**

State	Participating Facilities (n=368)		Nonparticipating Facilities (n=503)	
	1994	1998	1994	1998
Kansas	.027	.039	.055	.028
Maine	.017	.098	.026	.068
New York	.028	.041	.033	.041
South Dakota	.026	.065	.017	.055
Texas	.046	.061	.037	.051

Source: Abt Associates analysis of OSCAR data 1994-1998; beakman_descriptives_oscar.log

Table 4.7**PT Aides/Assistants Mean Hours per Resident Day in Participating and Nonparticipating Facilities, 1994 and 1998**

State	Participating Facilities (n=368)		Nonparticipating Facilities (n=503)	
	1994	1998	1994	1998
Kansas	.050	.092	.053	.084
Maine	.021	.038	.011	.040
New York	.058	.068	.070	.073
South Dakota	.075	.059	.070	.054
Texas	.058	.075	.041	.070

Source: Abt Associates analysis of OSCAR data 1994-1998; beakman_descriptives_oscar.log

Table 4.8**Occupational Therapy Mean Hours per Resident Day in Participating and Nonparticipating Facilities in 1994 and 1998**

State	Participating Facilities (n=368)		Nonparticipating Facilities (n=503)	
	1994	1998	1994	1998
Kansas	.013	.051	.029	.033
Maine	.013	.071	.014	.054
New York	.014	.026	.020	.020
South Dakota	.054	.051	.009	.031
Texas	.038	.049	.031	.050

Source: Abt Associates analysis of OSCAR data 1994-1998; beakman_descriptives_oscar.log

Table 4.9**OT Aides/Assistants Mean Hours per Resident Day in Participating and Nonparticipating Facilities in 1994 and 1998**

State	Participating Facilities (n=368)		Nonparticipating Facilities (n=503)	
	1994	1998	1994	1998
Kansas	.024	.041	.006	.037
Maine	.003	.031	.010	.025
New York	.021	.040	.025	.027
South Dakota	.033	.011	.004	.017
Texas	.011	.041	.017	.040

Source: Abt Associates analysis of OSCAR data 1994-1998; beakman_descriptives_oscar.log

Table 4.10**Speech Therapy Mean Hours per Resident Day in Participating and Nonparticipating Facilities in 1994 and 1998**

State	Participating Facilities (n=368)		Nonparticipating Facilities (n=503)	
	1994	1998	1994	1998
Kansas	.018	.047	.024	.032
Maine	.011	.026	.014	.024
New York	.005	.011	.011	.009
South Dakota	.051	.034	.012	.023
Texas	.030	.043	.028	.042

Source: Abt Associates analysis of OSCAR data 1994-1998; beakman_descriptives_oscar.log

4.3.2 Difference in Differences

Tables 4.11 through 4.18 display the results of the multivariate regression difference in differences models estimated for the nursing, therapy and other staff outcomes. Generally speaking, the multivariate analysis shows that there were no statistically significant demonstration effects among the nursing and therapy staffing measures.

Tables 4.13 and 4.14 examine nursing staffing levels, using the DEMO2*POST2 and DEMO3*POST3 interaction terms for each state to identify demonstration effects in Phase 2 and Phase 3, respectively. Although there is no consistent pattern across any specific nursing staff outcome measure or for any state across category, there are some scattered findings. For the Kansas sample, we find a statistically significant increase in the number of RNs, CNAs, and total nurses per resident day post Phase 2, but the increased levels for CNAs and total nurses appear to be largely offset by a decrease post Phase 3. Significant differences in Phase 2 and 3 for the number of CNAs in Texas are also found to offset each other.

Occupational therapy staff outcome measures are presented in Table 4.15. Here, we find a slight indication of possible demonstration impacts post Phase 2 among occupational therapy aides, although the significance of these changes does not persist when examining the composition of therapy staffing. There are no statistically significant impacts for occupational therapy aides post Phase 3. Table 4.16 reveals no demonstration impact on the percentage of occupational therapist assistants and aides that are contract staff, while two states, Maine and Texas, had statistically significant reductions in the percentage of contract occupational therapists.

Again, we only find scattered significance among the physical therapy staff outcome measures, and no persistent pattern of a demonstration effect for any particular state or for any given outcome measure. Results for physical therapy outcomes are presented in Table 4.17. Contract physical therapy staff are examined in Table 4.18, and here we did find some evidence of a reduction in the percentage of contract physical therapy staff in Kansas, South Dakota, and Texas, mostly taking place post Phase 2. There is also some evidence of a reduction in contract licensed physical therapy staff in Maine.

Staffing levels for speech therapists are examined in Table 4.19. Marginally-significant reductions in staffing levels for speech therapists post Phase 2 were found in South Dakota and Texas. In Texas, this was followed by a statistically significant increase post Phase 3.

Results for the remaining staffing outcomes, measured in terms of FTEs per 100 beds, are presented in Tables 4.19 and 4.20. Only three instances of statistical significance were found for the entire set of outcome measures, which is less than random chance would allow.

Overall, there is no consistent demonstration effect across the set of staffing measures examined in this chapter nor are differences clustered within any particular state. Based on the difference in differences analysis, we conclude that nursing and therapy staffing levels, therapy staff composition, and other staffing levels do not appear to be impacted significantly by the demonstration.

4.4 Discussion

This chapter reported no consistent pattern of statistically-significant effects of PPS on the staffing decisions made by Skilled Nursing homes (SNFs).

In addition to overall staffing levels, we searched for possible changes in the composition of therapy staffing by testing whether the proportions of contract therapists or proportion of non-licensed therapists were affected by participation in the demonstration. We found no significant changes in the proportion of contract therapy staff and we found no statistically-significant level of substitution from highly paid to lower paid workers.

While the design of the demonstration and the quality of the data imposed limitations on our analysis, we conclude that any effects of the demonstration on staffing, if they existed at all, are small relative to the fears expressed by providers and advocates. There are many important differences between the new SNF PPS and the demonstration, and it is possible that staffing changes will occur only over time as facilities come to better understand the incentives inherent in the system. Nevertheless, the results from the demonstration may help alleviate concerns about the short-term impact of PPS on facility staffing levels.

The most important limitation to our analysis is the reduction in sample size associated with the use of OSCAR data, which was used in order to avoid reliability problems with POS data. This decision produced a one-third reduction in sample size. As a result, it is possible that demonstration effects might be clouded if there are differences in the types of participating/nonparticipating facilities reporting data in all study years.

Another limitation is that a large state in the demonstration, New York, had an unusual regulatory environment prior to the demonstration, leading the vast majority of New York facilities to join the demonstration. As a consequence, the comparison between participating and nonparticipating facilities in New York may be less than ideal.

Finally, sample sizes in New York and Texas were much larger than those in the other participating states. These two states accounted for 85 percent of the total sample. In addition, participating and nonparticipating facilities were not evenly distributed within each state; rather, most (83 percent) of the New York-based facilities were in the demonstration, while most (90 percent) of the Texas-based facilities were not. This could be problematic if the pooled regression results are driven by the number of observations in each of these states, especially since Texas facilities are contributing a disproportionate number of nonparticipants. Of course, the difference-in-differences approach attempts to address this issue by capturing any provider-specific effects.

Table 4.11

**Nursing Staff Outcome Measures: Least Squares Regression Results
All States**

	RNs		LPNs		CNAs		All Nursing Staff
Kansas							
POST2*KS	-0.07 (-3.25)	***	0.0013 (.03)		-0.2895 (-4.23)	***	-0.3582 (-3.87)
POST3*KS	0.0515 (2.53)	**	0.0113 (.30)		0.0223 (0.34)		0.085 (0.97)
DEMOPST2*KS	0.1335 (3.12)	**	0.0656 (.84)		0.3496 (2.57)	**	0.5487 (2.98)
DEMOPST3*KS	-0.0046 (-0.120)		-0.0487 (-0.67)		-0.2557 (-2.03)	**	-0.3090 (-1.81)
Maine							
POST2*ME	0.0326 (1.21)		-0.0087 (-0.18)		-0.0808 (-.094)		-0.0569 (-0.49)
POST3*ME	0.0789 (3.06)	***	-0.0491 (-1.04)		-0.0096 (-0.12)		0.0203 (0.18)
DEMOPST2*ME	-0.0209 (-0.50)		0.0057 (0.07)		-0.04842 (-0.37)		-0.0636 (-0.35)
DEMOPST3*ME	0.0172 (.043)		0.0398 (0.55)		0.0325597 (0.26)		0.0895 (0.53)
New York							
POST2*NY	-0.0953 (-5.11)	***	-0.0076 (-1.22)		-0.0472 (-0.8)		-0.1501 (-1.87)
POST3*NY	0.0098 (.052)		-0.0153 (-0.45)		0.015 (0.25)		0.0095 (0.12)
DEMOPST2*NY	0.0259 (1.27)		0.0247 (0.66)		0.0047 (0.07)		0.0553 (0.63)
DEMOPST3*NY	0.0086 (4.42)	***	0.008 (0.21)		0.0468 (0.72)		0.0634 (0.72)
South Dakota							
POST2*SD	0.0118 (0.41)		0.0246 (0.47)		-0.0088 (-1.10)		0.0276 (0.22)
POST3*SD	-0.0317 (-1.13)		-0.0084 (-0.16)		-0.0452 (-0.51)		-0.0853 (-0.71)
DEMOPST2*SD	0.0195 (0.32)		-0.0235 (-0.21)		0.2148 (1.12)		0.2101 (0.81)
DEMOPST3*SD	0.1554 (2.42)	**	0.0299 (0.27)		0.0446 (0.23)		0.2199 (0.85)
Texas							
POST2*TX	-0.0128 (-1.71)	*	-0.0218 (-1.58)		-1.887 (-7.89)	***	-0.2234 (-6.90)
POST3*TX	0.0059 (0.80)		0.0079 (0.58)		-0.0069 (-0.29)		0.0069 (0.22)
DEMOPST2*TX	-0.0055 (-0.23)		-0.0291 (-0.68)		-0.1224 (-1.64)	*	-0.157 (-1.55)
DEMOPST3*TX	-0.0057 (-0.24)		0.0765 (1.80)	*	0.1505 (2.04)	**	0.2213 (2.21)
R²	0.0064		0.004		0.0444		0.0307
N	4355		4355		4355		4355

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Source: Abt Associates' analysis of OSCAR data, 1994 – 1998.

Table 4.12

**Other Nursing Staff Outcome Measures: Least Squares Regression Results
All States**

	RN Director of Nurses	RNs w/ Administrative Duties	
Kansas			
POST2*KS	0.0363 (0.62)	0.0646 (3.24)	***
POST3*KS	0.0077 (0.19)	0.0167 (1.21)	
DEMOPST2*KS	0.0175 (0.14)	0.0015 (0.03)	
DEMOPST3*KS	0.005 (-0.06)	0.0049 (0.18)	
Maine			
POST2*ME	0.0332 (0.46)	0.1142 (4.65)	***
POST3*ME	0.0045 (0.09)	-0.0029 (-0.17)	
DEMOPST2*ME	0.013 (0.11)	-0.0867 (-2.26) **	
DEMOPST3*ME	-0.0321 (-0.41)	0.0697 (2.59)	***
New York			
POST2*NY	0.0148 (0.30)	0.0704 (4.16)	***
POST3*NY	0.0002 (0.01)	-0.0259 (-2.12) **	
DEMOPST3*NY	-0.0285 (-0.72)	0.0381 (2.86)	***
South Dakota			
POST2*SD	0.0291 (0.35)	0.0542 (1.94) *	
POST3*SD	0.0016 (0.03)	0.0079 (0.42)	
DEMOPST2*SD	-0.006 (-0.03)	0.0037 (0.06)	
DEMOPST3*SD	0.0338 (0.29)	0.0018 (0.05)	
Texas			
POST2*TX	0.0119 (0.59)	0.036 (5.27)	***
POST3*TX	0.0198 (1.38)	0.0083 (1.70)	*
DEMOPST2*TX	0.0212 (0.32)	0.0008 (0.04)	
DEMOPST3*TX	-0.0182 (-0.40)	0.0162 (1.05)	
R²	0.0055	0.0469	
N	3168	3168	

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Source: Abt Associates' analysis of OSCAR data, 1994 – 1998.

Table 4.13

Occupational Therapy Staff Outcome Measures: Least Squares Regression Results
All States

	Occupation Therapists		OT Assistants	OT Aides	OT Asst & Aides / All Staff	
Kansas						
POST2*KS	0.126 (1.67)		0.0089 (0.65)	-0.0000 (-0.01)	0.0488 (0.77)	
POST3*KS	0.0023 (0.33)		0.0158 (1.67)	0.0037 (1.33)	0.1632 (2.91)	***
DEMOPST2*KS	0.0126 (0.84)		-0.0033 (-0.11)	-0.0171 (-1.93)	-0.2096 (-1.78)	*
DEMOPST3*KS	0.0138 (0.99)		-0.0046 (-0.24)	-0.0031 (-0.56)	-0.094 (-0.89)	
Maine						
POST2*ME	0.0202 (2.15)	**	0.0001 (0.01)	0.001 (0.20)	-0.0251 (-0.29)	
POST3*ME	0.0159 (1.77)	*	0.0044 (0.37)	0.0004 (0.12)	-0.0477 (-0.64)	
DEMOPST2*ME	0.0017 (0.12)		0.0138 (0.52)	-0.0096 (-1.23)	-0.1369 (-0.99)	
DEMOPST3*ME	0.0182 (1.32)		0.0016 (0.08)	-0.0017 (-0.30)	0.0549 (0.48)	
New York						
POST2*NY	-0.0008 (-0.12)		-0.0001 (-0.01)	-0.0087 (-2.51)	-0.0682 (-1.24)	
POST3*NY	-0.0019 (-0.29)		0.0022 (0.26)	0.0018 (0.74)	0.0457 (0.85)	
DEMOPST2*NY	0.0032 (0.44)		0.0082 (0.65)	0.0062 (1.67)	0.077 (1.30)	
DEMOPST3*NY	0.0082 (1.15)		0.0053 (0.58)	-0.00017 (-0.62)	-0.0319 (-0.54)	
South Dakota						
POST2*SD	0.0221 (2.20)	**	-0.0006 (-0.03)	-0.0000 (-0.00)	-0.3317 (-3.07)	***
POST3*SD	0.0015 (0.16)		0.0038 (0.30)	0.0001 (0.01)	0.0961 (0.99)	
DEMOPST2*SD	-0.0106 (-0.50)		-0.0373 (-0.88)	-0.0132 (-1.05)	-0.0335 (-0.19)	
DEMOPST3*SD	0.0003 (0.01)		-0.002 (-0.07)	-0.0001 (-0.01)	-0.152 (-0.91)	
Texas						
POST2*TX	0.0132 (5.03)	***	0.0054 (1.14)	-0.0000 (-0.03)	-0.0129 (-0.59)	
POST3*TX	0.0023 (0.91)		0.0022 (0.67)	0.0009 (0.90)	0.0248 (1.20)	
DEMOPST2*TX	-0.0124 (-1.51)		-0.0074 (-0.48)	0.0098 (2.16)	-0.05 (-0.73)	
DEMOPST3*TX	0.0227 (2.79)	***	0.0116 (1.09)	-0.0006 (-0.18)	0.0617 (0.93)	
R²	0.0459		0.0049	0.0026	0.0115	
N	4355		3168	3168	3688	

Note: t-statistics appear in parentheses

*** Statistically significant at the 0.01 level

** Statistically significant at the 0.05 level

* Statistically significant at the 0.10 level

Sources: Source: Abt Associates, Inc. analysis of OSCAR data 1994-1998; \Beakman OSCAR PostDemo FE ONLY.log

Table 4.14

**Occupational Therapy Staff Composition: Least Squares Regression Results
All States**

	Contract OTs / All OTs	Contract OT Asst / All OT Assts	Contract OT Aides / All OT Aides
Kansas			
POST2*KS	-0.01798 (-0.26)	-0.1241 (-0.92)	dropped dropped
POST3*KS	-0.0507 (-0.87)	-0.0201 (-0.21)	dropped dropped
DEMOPST2*KS	-0.1125 (-0.88)	-0.2988 (-1.47)	dropped dropped
DEMOPST3*KS	-0.0589 (-0.55)	0.0596 (0.39)	dropped dropped
Maine			
POST2*ME	0.0569 (0.58)	-0.0337 (-.02)	7.06E-29 (0.000)
POST3*ME	-0.0547 (-0.72)	-0.106 (-0.85)	-4.43E-29 (-0.000)
DEMOPST2*ME	-0.3693 (-2.39) **	0.2361 (0.86)	dropped dropped
DEMOPST3*ME	0.0015 (0.01)	0.062 (0.34)	dropped dropped
New York			
POST2*NY	0.002 (0.03)	0.0169 (0.17)	-6.68E-16 (-0.000)
POST3*NY	0.014 (0.25)	0.0738 (1.04)	2.58E-16 (0.000)
DEMOPST2*NY	-0.0361 (-0.56)	-0.0301 (-0.29)	-0.0156 (-0.10)
DEMOPST3*NY	-0.0648 (-1.08)	-0.0598 (-0.80)	0.0076 (0.07)
South Dakota			
POST2*SD	-0.4379 (-3.55) ***	-1 (-2.94) **	dropped dropped
POST3*SD	-0.0265 (-0.27)	-0.5714 (-2.57) **	dropped dropped
DEMOPST2*SD	0.1458 (0.74)	dropped dropped	dropped dropped
DEMOPST3*SD	-0.1622 (-0.95)	8.22E-16 (0.000)	dropped dropped
Texas			
POST2*TX	-0.0051 (-0.21)	0.0548 (1.27)	0.0043 (0.07)
POST3*TX	0.019 (0.88)	-0.0121 (-0.43)	0.076 (1.89) *
DEMOPST2*TX	-0.1417 (-1.91) *	0.069 (0.49)	-0.1369 (-0.72)
DEMOPST3*TX	0.0204 (0.30)	-0.1254 (-1.25)	-0.0658 (-.44)
R²	0.112	0.0001	0.114
N	3,337	1,482	599

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Sources: Source: Abt Associates, Inc. analysis of 1994-1998 OSCAR data;
 \Beakman OSCAR PostDemo FE ONLY.log

Table 4.15

**Physical Therapy Staff Outcome Measures: Least Squares Regression Results
All States**

	Physical Therapists		PT Assistants		PT Aides		PT Asst & Aides / All PT Staff		
Kansas									
POST2*KS	-0.0115 (-1.23)		0.0009 (0.07)		0.0075 (0.19)		0.0469 (0.94)		
POST3*KS	-0.0009 (-0.10)		0.0183 (2.10)		-0.0093 (-0.34)		0.0112 (0.24)		
DEMOPST2*KS	0.0163 (0.88)		0.0085 (0.31)		-0.0204 (-0.23)		-0.0889 (-0.92)		
DEMOPST3*KS	0.0098 (0.57)		-0.0089 (-0.51)		-0.0006 (-0.01)		0.0686 (0.77)		
Maine									
POST2*ME	0.0278 (2.37)	***	0.013 (0.84)		.0051 (0.10)		0.112 (1.62)		
POST3*ME	0.0134 (1.19)		-0.0007 (-0.06)		-0.009 (-0.03)		-0.0587 (-0.96)		
DEMOPST2*ME	0.011 (0.61)		-0.0048 (-0.20)		0.0057 (0.07)		-0.1041 (-0.97)		
DEMOPST3*ME	0.0111 (0.64)		-0.0116 (-0.68)		-0.0148 (-0.28)		0.0058 (0.06)		
New York									
POST2*NY	-0.0105 (-1.29)		0.0018 (0.17)		.1787 (5.26)	***	0.0349 (0.82)		
POST3*NY	0.0074 (0.91)		0.0003 (0.03)		-.1418 (-5.81)	***	-0.0506 (-1.19)		
DEMOPST2*NY	0.0141 (1.58)		-0.0098 (-0.84)		-0.1891 (-5.12)	***	-0.0583 (-1.25)		
DEMOPST3*NY	0.0004 (0.05)		0.0096 (1.14)		0.1422 (5.32)	***	0.0513 (1.10)		
South Dakota									
POST2*SD	0.0098 (0.79)		0.0002 (0.01)		0.0091 (0.16)		-0.0017 (-0.03)		
POST3*SD	0.0201 (1.65)	*	0.0129 (1.10)		-0.0252 (-0.67)		-0.0971 (-1.48)		
DEMOPST2*SD	0.0268 (1.02)		0.0101 (0.26)		-0.0554 (-0.45)		-0.279 (-2.02)	**	
DEMOPST3*SD	0.016 (0.61)		-0.0057 (-0.23)		0.0451 (0.57)		0.227 (1.66)	*	
Texas									
POST2*TX	0.012 (3.65)	***	0.0005 (0.12)		0.005 (0.36)		0.0427 (2.34)	**	
POST3*TX	-0.0011 (-0.34)		0.0082 (2.66)	***	-0.0017 (-0.17)		0.0313 (1.77)	*	
DEMOPST2*TX	-0.008 (-0.78)		-0.0017 (-0.12)		0.0014 (0.03)		-0.0065 (-0.12)		
DEMOPST3*TX	0.0241 (2.38)	**	0.0004 (0.04)		-0.0109 (-0.35)		-0.0218 (-0.41)		
R²	0.019		0.0124		0.0156		0.0156		
N	4355		3168		3168		3168		

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Sources: Source: Abt Associates, Inc. analysis of 1994-1998 OSCAR data;
 \Beakman OSCAR PostDemo FE ONLY.log

Table 4.16

**Physical Therapy Staff Composition: Least Squares Regression Results
All States**

	Contract OTs / All OTs	Contract OT Asst / All OT Assts	Contract OT Aides / All OT Aides
Kansas			
POST2*KS	-0.0639 (-1.02)	0.3135 (3.47)	-0.0094 (-0.10)
POST3*KS	0.0931 (1.59)	0.0066 (0.11)	0.0746 (0.96)
DEMOPST2*KS	-0.0281 (-0.23)	-0.3711 (-2.11)	-0.8521 (-3.52)
DEMOPST3*KS	-0.213 (-1.95)	-0.1178 (-1.92)	0.0727 (0.41)
Maine			
POST2*ME	-0.0218 (-0.26)	-0.085 (-0.45)	-2.41e-27 (-0.00)
POST3*ME	0.0293 (0.38)	0.1534 (1.29)	1.81e-27 (0.00)
DEMOPST2*ME	-0.334 (-2.53)	-0.0777 (-0.28)	8.36e-27 (0.00)
DEMOPST3*ME	-0.0095 (-0.08)	-0.1492 (-0.85)	-5.14e-27 (-0.00)
New York			
POST2*NY	-0.0146 (-0.28)	-0.0059 (-0.06)	-.0282 (-0.37)
POST3*NY	-0.0329 (-0.64)	0.0032 (0.05)	.0196 (0.39)
DEMOPST2*NY	-0.0214 (-0.38)	0.0672 (0.68)	0.034 (0.41)
DEMOPST3*NY	-0.0228 (-0.40)	-0.0334 (-0.45)	-0.0312 (-0.56)
South Dakota			
POST2*SD	-0.145 (-1.71)	1.429 (4.07)	0.2662 (1.32)
POST3*SD	-0.1126 (-1.40)	-0.4286 (-1.67)	0.0342 (0.34)
DEMOPST2*SD	0.0695 (0.41)	-1.43 (-2.40)	0.1338 (0.39)
DEMOPST3*SD	0.1126 (0.68)	.4286 (1.01)	-0.5199 (-2.16)
Texas			
POST2*TX	0.0146 (0.65)	0.2506 (6.13)	0.1692 (4.40)
POST3*TX	0.0436 (2.00)	0.0148 (0.53)	0.0623 (2.29)
DEMOPST2*TX	-0.0725 (-1.05)	-0.3035 (-2.35)	-0.219 (-2.09)
DEMOPST3*TX	0.067 (1.05)	0.0652 (0.71)	-0.1127 (-1.54)
R²	0.0191	0.0974	0.0828
N	3924	1742	1772

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Sources: Source: Abt Associates, Inc. analysis of 1994-1998 OSCAR data;
 \Beakman OSCAR PostDemo FE ONLY.log

Table 4.17

**Speech Therapy Staff and Other Staff Outcome Measures: Least Squares Regression Results
All States**

	Speech Therapists	Social Workers	Activities Professionals	Therapeutic Recr. Spec.
Kansas				
POST2*KS	0.0082 (1.29)	-0.0381 (-0.35)	-0.1834 (-0.98)	-0.0046 (-0.07)
POST3*KS	0.0044 (0.73)	-0.0762 (-0.74)	0.1512 (1.16)	0.0394 (0.82)
DEMOPST2*KS	0.0031 (0.24)	-0.3503 (-1.63)	-0.5126 (-1.25)	0.0384 (0.25)
DEMOPST3*KS	0.002	0.3743 (-1.95) *	0.1707 (-1.92) *	0.0727 (0.41)
Maine				
POST2*ME	0.003 (0.37)	0.0753 (0.56)	.1532 (0.66)	0.1293 (1.52)
POST3*ME	0.0087 (1.14)	-0.0298 (-0.23)	-.0719 (-0.44)	-0.0369 (-0.62)
DEMOPST2*ME	0.0041 (0.33)	0.2534 (1.21)	-.194 (-0.54)	-0.1054 (-0.79)
DEMOPST3*ME	0.0005 (0.04)	-0.1237 (-0.62)	.2761 (1.09) (0.01)	0.0807 (0.87) (0.34)
New York				
POST2*NY	0.0035 (0.63)	-0.2141 (-2.28) **	-.3098 (-1.95) *	0.0791 (1.35)
POST3*NY	-0.0039 (-0.70)	-0.0038 (-0.04)	-.2286 (-2.00) **	0.064 (1.52)
DEMOPST2*NY	-0.0024 (-0.40)	0.0147 (0.14)	-.1767 (-1.02)	0.0052 (0.08)
DEMOPST3*NY	0.0076 (1.26)	0.0909 (0.89)	.2346 (1.87) *	-0.0461 (-1.00)
South Dakota				
POST2*SD	0.0266 (3.12) ***	-0.2596 (-1.80) *	-0.1675 (-0.64)	0.0279 (0.29)
POST3*SD	-0.01273 (-1.53)	-0.0944 (-0.67)	0.1523 (0.87)	-0.0427 (-0.66)
DEMOPST2*SD	-0.0314 (-1.75) *	-0.4434 (-1.46)	-0.4919 (-0.85)	-0.0453 (-0.21)
DEMOPST3*SD	0.0055 (0.31)	.4705 (1.56)	-0.1721 (-0.46)	0.0687 (0.50)
Texas				
POST2*TX	0.0129 (5.76) ***	0.032 (0.84)	-0.0304 (-0.47)	0.015 (0.64)
POST3*TX	-0.0026 (-1.18)	-0.023 (-0.62)	0.0003 (0.01)	-0.0011 (-0.07)
DEMOPST2*TX	-0.0129 (-1.86) *	0.0556 (0.47)	-0.0639 (-0.30)	-0.022 (-0.28)
DEMOPST3*TX	0.0278 (4.03) ***	-0.0019 (-0.02)	0.1914 (1.32)	0.0584 (1.09)
R²	0.0576	0.0005	0.0418	0.0296
N	4355	4355	3168	3168

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Sources: Source: Abt Associates, Inc. analysis of 1994-1998 OSCAR data;
 Beakman OSCAR PostDemo FE ONLY.log

Table 4.18

**Other Staff Outcome Measures (continued): Least Squares
Regression Results
All States**

	Administration	Housekeeping	
Kansas			
POST2*KS	-0.2891 (-0.16)	-0.0337 (-0.01)	
POST3*KS	0.3407 (0.20)	0.6664 (0.20)	
DEMOPST2*KS	-0.3625 (-0.10)	1.166 (0.17)	
DEMOPST3*KS	-0.2268 (-0.07)	-1.011 (-0.16)	
Maine			
POST2*ME	-0.566 (-0.25)	1.0256 (0.23)	
POST3*ME	0.27 (0.13)	-0.1329 (-0.23)	
DEMOPST2*ME	0.2959 (0.09)	0.123 (0.02)	
DEMOPST3*ME	0.348 (0.11)	-0.656 (-0.10)	
New York			
POST2*NY	-1.559 (-1.01)	-9.057 (-2.99)	***
POST3*NY	-0.122 (-0.08)	-1.325 (-0.44)	
DEMOPST2*NY	1.078 (0.64)	8.771 (2.64)	***
DEMOPST3*NY	0.8178 (0.49)	1.717 (0.52)	
South Dakota			
POST2*SD	-0.4069 (-0.17)	-0.475 (-0.10)	
POST3*SD	0.1517 (0.07)	-0.0328 (-0.01)	
DEMOPST2*SD	-1.016 (-0.20)	0.9571 (0.10)	
DEMOPST3*SD	1.312 (0.26)	-0.9301 (-0.10)	
Texas			
POST2*TX	-0.7862 (-1.27)	-0.3949 (-0.32)	
POST3*TX	-0.0506 (-0.08)	-0.0889 (-0.07)	
DEMOPST2*TX	-0.0305 (-0.02)	-0.1508 (-0.04)	
DEMOPST3*TX	-0.044 (-0.02)	0.421 (0.11)	
R²	0.0022	0.0005	
N	4355	4355	

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Sources: Source: Abt Associates, Inc. analysis of 1994-1998 OSCAR data;
 \Beakman OSCAR PostDemo FE ONLY.log

5.0 Utilization and Medicare Expenditures

5.1 Background

PPS creates incentives for nursing homes to increase revenue and decrease cost wherever possible, subject to whatever external and self-imposed constraints on quality of care are operative. Revenue can be increased by admitting more residents, increasing the lengths of stay or both. Costs can be reduced by changing the compensation, number and skill mix of staff and, to the extent possible, by shifting cost from areas for which providers are at risk to areas where they are not.

Under PPS, Medicare pays nursing homes a prospective daily rate. Thus, other things equal, we expect providers who want to maximize net revenues to reduce the intensity of services provided per day and to increase the number of days per resident stay. Nursing homes are at risk for *per diem* cost above the daily rate, but not for total days. Chapter 3 found no evidence of a disproportionate increase in admissions among participating facilities, but discovered a substantial increase in the number of admissions in highly-paid Rehabilitation groups and a corresponding decline in the lower-paid Clinically Complex groups. If it is profitable under PPS for a provider to admit a given individual at all, then it will generally turn out to be profitable to extend the individual's stay by an additional day.

Total Medicare expenditures for hospital and other non-SNF care both during and after a SNF stay may increase, if PPS leads to reduced quality of care and poorer health outcomes among Medicare residents. Unlike the direct substitution effect of prospective payment on utilization, this indirect effect may lead to higher utilization over a period well beyond the end of the Medicare SNF stay. In addition, PPS may encourage nursing homes to shift high-cost cases to other providers.

Decisions to redesign or reduce the intensity of care that are driven by cost reductions under PPS can give rise to poorer outcomes for residents. A full investigation of resident outcomes under the NHCMQ demonstration is carried out in a companion document authored by the Center on Health Sciences at the University of Colorado. In this chapter, we investigate the effects of the demonstration on SNF length of stay, the probability of hospitalization after SNF admission and total Medicare Part A expenditures for non-SNF care.

5.2 Data and Methods

The data file used for the analysis is identical to that used for the analyses contained in Chapter 3. The reader is directed to Section 3.3 of that chapter for details. The analyses in this chapter use three variables not treated in Chapter 3. These are discussed below.

Medicare SNF length of stay. We computed the number of Medicare -covered days per SNF stay.¹⁴ Stays were considered to be terminated by a Medicare-covered inpatient hospital admission, regardless of whether the provider discharged the resident.

¹⁴ Initial stays are defined as Medicare-covered SNF stays that are not preceded within the previous 90 days by a “through date” for any Medicare SNF claim. See Section 2.3.

Probability of hospitalization within 120 days of SNF admission. We searched MedPAR inpatient records to determine the date of admission for the first Medicare hospital inpatient stay following each SNF admission date from January 1994 through December 1997. We used these dates to compute the probability of hospital admission within 120 days of SNF admission for each of three provider-years: the first through fourth quarter following the Phase 3 reference date, the first through fourth quarter preceding the Phase 3 reference date, and the fifth through eighth quarter preceding the Phase 3 reference date.¹⁵

Medicare Part A non-SNF expenditures for 180 days following SNF admission. We extracted Medicare Part A expenditures for each resident for the six months after the SNF admission date from the Inpatient, Home Health, Hospice, and Outpatient Standard Analytic Files (SAFs).

We first inspected trends in the means of each utilization measure, by state, from before to after implementation of Phase 3 of the demonstration. Then, we used multivariate techniques to estimate demonstration effects, comparing participating and nonparticipating providers in the two years preceding and the one year following the inception of Phase 3 of the demonstration. Adjusting for potential confounding factors, we assessed the statistical significance of being in the demonstration using the “difference-in-differences” approach outlined in Chapter 3.

In regression and logit estimates, we pooled data from Kansas and South Dakota, and generated separate estimates for hospital-based, freestanding, and government facilities in New York. We used ordinary least-squares regression with facility-specific fixed effects to analyze SNF length of stay and non-SNF expenditure.

$$[5.1] \quad y_{ijt} = \beta_j + \beta_2 POST_t + \beta_3 DEMO_j \bullet POST_t + X_{ijt} \delta + \varepsilon_{ijt}$$

We separated POST and DEMO*POST into two measures each. POST2 and POST3 identified an admission happening after the Phase 2 and 3 reference dates respectively. DEMO2 and DEMO3 flagged facilities that participated in Phase 2 and Phase 3 (these variables were omitted in the fixed effects models). The estimated coefficient of DEMO*POST captures participating effects. In this specification, coefficients of DEMO*POST2 and DEMO*POST3 measure the estimated Phase 2 and incremental Phase 3 effects respectively. Independent variables were summarized by X. These included an indicator of beneficiary Medicaid enrollment at admission (DUAL), the resident's Barthel Index score computed from MDS data (BARTHEL), Nursing Severity Index (NSI) score (NSISUM), Cognitive Performance Scale (CPS), and total Medicare Part A expenditure for the six months prior to admission (PRIOR PART A).

To analyze demonstration effects on the probability of hospitalization, we used minimum logit chi-square, again estimated with facility-specific effects. We used the same independent variable specifications in logit as in linear regression estimates.

¹⁵ See Section 2.3 for a discussion of the Phase 3 reference date.

5.3 Results

Medicare SNF length of stay. In general, participating facilities entered the demonstration with longer average stays than nonparticipating facilities. Over the study period, stays increased more or decreased less for most participating facilities, relative to nonparticipating facilities. Table 5.1 shows that participating facility stays were shorter than nonparticipating facility stays in the second year before implementation only for Phase 3 hospital-based facilities in New York and Phase 3 Texas facilities. Also, only for Maine Phase 3, Phase 3 government facilities in New York, and Phase 2/3 facilities in South Dakota were relative increases in days per stay smaller in participating facilities. Pre-existing differences in mean lengths of stay seem to have widened under prospective payment. In most cases, the largest relative increases are for providers that entered Phase 3 without having previously participated in Phase 2.

Adjusted for resident characteristics, estimates of demonstration effects on length of stay were statistically significant only for New York facilities. Even in New York, effects were mixed and often counterintuitive in direction. For example, in hospital-based facilities, though the Phase 2 impact was estimated to add about 10 days, the incremental impact of Phase 3 produced a five-day reduction in length of stay (Table 5.2). Effects were highly significant but negative among freestanding facilities in New York.

Other variables behave largely as one might predict. The Barthel, NSI and cognitive indicators of function and severity (measured at admission) suggest that higher levels of disability are associated with shorter stays, typical of a resident cohort with intensive skilled nursing needs and favorable rehabilitation potential.

Probability of hospitalization within 120 days of SNF admission. The overall rate of post-admission hospitalization among SNF residents increased over the period. However, relative changes in hospitalization rates varied among the states (Table 5.3). Decreases were rare, and occurred for participating facilities only in New York (Phase 2/3 and Phase 3 government, and Phase 2/3 hospital-based facilities), and for nonparticipating facilities in South Dakota. In states or facility groups for which rates increased, increases were generally larger among participating facilities – exceptions included Phase 2/3 facilities in Maine, all freestanding New York facilities and Phase 2/3 facilities in South Dakota.

Adjusted estimates showed no participating effects on hospitalization rates. We present minimum logit chi-square estimates of the log-odds of hospitalization at the facility level in Table 5.4. The demonstration effect was statistically insignificant in every case. Only the NSI measure produced consistently significant coefficients, suggesting that greater severity leads to increased odds of hospitalization.

Medicare Part A non-SNF expenditures for 180 days following SNF admission. Except for government and hospital-based Phase 2/3 facilities in New York, residents in participating facilities incurred higher post-admission Part A expenditures than residents in nonparticipating facilities (Table 5.5). Because hospital expenditures are the largest component of Part A spending, and because post-admission hospitalization rates increased more often in demonstration states (Table 5.3) one might expect to see higher relative increases in expenditures in participating facilities as well. This turned out not to be the case, except in Kansas and Texas. The rate of growth in Part A non-SNF

expenditures for beneficiaries admitted to participating facilities was neither consistently higher nor lower than for those admitted to nonparticipating facilities. Expenditures in New York freestanding participating facilities increased, but at a slower rate than in nonparticipating facilities. Results were mixed for New York hospital-based and government facilities, and for South Dakota.

Not surprisingly, the fixed-effects regression estimates presented in Table 5.6 showed no significant demonstration effects, with one exception. Phase 2 impacts in New York hospital-based facilities were estimated to reduce Part A spending by about \$2,500, while the incremental effect of Phase 3 increased expenditure by about \$1,100. Signs on most, but not all, demonstration coefficients were positive but not statistically significant.

Barthel and NSI indicators suggest that increased disability and severity lead to increased Part A spending. Controlling for these measures, increased cognitive dysfunction appears to correlate with lower Part A spending. As one would expect, higher pre-admission Part A spending tend to correlate with higher expenditure after admission.

5.4 Discussion

Analyses of claims and other data from the NHCMQ demonstration do not support predictions of increased utilization and expenditure made in Section 5.1. These predictions rested on the behavioral proposition that providers would attempt to substitute types of care for which they were not at financial risk, including days of SNF care, hospital care and other non-SNF Part A services, in place of services for which they were at risk (i.e., resources expended per covered SNF day). We did not find statistically significant increases in utilization in any state. Statistical significance for some New York facility groupings has little meaning for the demonstration, because coefficient signs were inconsistent and often counterintuitive across groupings and phases.

The failure to find an increase in utilization is all the more surprising in light of the evidence from Chapter 3 that participating providers appeared to admit individuals in a slightly higher state of acuity after Phase 3 began, at least insofar as one credits pre-admission Medicare expenditures as a marker for acuity. This failure to support any of our predictions implies of course that the underlying predictions are themselves not supported by evidence. We were unable to reject the null hypothesis that SNF length of stay, hospitalization, and non-SNF spending grew at identical rates, on average, for residents of participating and nonparticipating facilities. Hence we cannot conclude that participating providers made any systematic attempts to substitute across types of care.

Table 5.1

**Mean Length of Stay for Initial SNF Stays
by Demonstration Status and Time Period**

Demonstration Arm	Second Year prior to implementation (t = -2)	Year prior to implementation (t = -1)	First implementation year (t = 1)	% change from implementation t = -2 to t = 1
Kansas				
Phase 2/Phase 3	33.8 days	37.9 days	33.4 days	(1.2) %
Phase 3 Only	33.9	32.1	32.3	(4.8)
Non-participant	32.2	28.4	28.8	(11.2)
Maine				
Phase 2/Phase 3	35.3	31.3	31.9	(10.1)
Phase 3 Only	37.7	33.3	30.2	(22.2)
Non-participant	33.2	31.1	28.6	(14.9)
New York-Freestanding				
Phase 2/Phase 3	52.6	55.3	49.1	(6.9)
Phase 3 Only	50.4	50.0	51.0	1.2
Non-participant	45.0	41.6	41.1	(9.1)
New York-Government				
Phase 2/Phase 3	59.5	62.9	61.1	2.7
Phase 3 Only	55.0	55.4	55.1	0.2
Non-participant	44.7	46.3	46.8	4.6
New York-Hospital-based				
Phase 2/Phase 3	53.7	61.4	56.4	4.9
Phase 3 Only	45.9	42.0	41.2	(10.8)
Non-participant	46.5	39.0	34.6	(29.6)
South Dakota				
Phase 2/Phase 3	42.9	44.4	38.0	(12.1)
Phase 3 Only	36.2	42.6	46.5	25.0
Non-participant	34.6	33.5	31.9	(8.1)
Texas				
Phase 2/Phase 3	44.8	44.1	46.5	3.7
Phase 3 Only	32.5	35.3	41.1	23.5
Non-participant	35.6	36.0	33.6	(5.8)

Sources: Abt Associates analysis of Medicare National Claims History and MDS Files, 1995 – 1997

Table 5.2**Length of Stay for Initial SNF Stays: Least-Squares Regression Estimates – All Initial Stays^a**

	Texas	Maine	Kansas/ South Dakota	New York							
				Hospital- based	Freestanding	Government					
DEMO*POST2	5.052 (1.08)	0.130 (0.10)	1.536 (0.95)	10.390 (3.23)	***	-2.609 (-4.20)	***	-3.775 (-1.84)	*		
DEMO*POST3	4.586 (0.89)	-0.257 (-0.25)	-1.862 (-1.35)	-5.495 (-3.87)	***	-4.095 (-3.48)	***	-2.580 (-1.20)			
POST2	0.234 (0.06)	-3.065 (-4.85)	***	-1.131 (-1.54)	***	-4.598 (-4.88)	***	-0.499 (-0.88)	0.394 (0.25)		
POST3	-4.075 (-0.84)	-1.338 (-1.82)	*	-0.479 (-0.59)		-0.772 (-0.69)		-1.102 (-0.95)	0.588 (0.31)		
DUAL	0.941 (0.90)	2.136 (3.71)	***	2.301 (3.52)	***	3.991 (4.07)	***	2.472 (8.47)	0.322 (0.30)		
BARTHEL	-1.168 (-8.84)	***	-1.469 (-19.48)	***	-1.235 (-14.50)	***	-1.399 (-12.37)	***	-1.123 (-33.34)	***	-0.890 (-7.06)
NSISUM	-0.547 (-2.67)	***	-0.305 (-3.09)	***	-0.513 (-4.28)	***	-0.833 (-5.18)	***	-1.605 (-33.45)	***	-1.772 (-10.03)
CPS	-0.418 (-1.34)	0.166 (0.86)		-0.763 (-3.90)		-0.594 (-2.46)	***	-0.746 (-10.67)	***	-1.322 (-5.05)	***
PRIOR PART A	6.652 (0.27)	95.476 (5.35)	***	81.866 (3.31)	***	37.775 (1.98)	**	-72.368 (-13.50)	***	-80.130 (-3.20)	***
R ²	0.032	0.056	0.020	0.067		0.024		0.008			
N	4,564	12,576	9,983	7,546		109,742		7,054			

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission. Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses.

*** Statistically significant at 0.01 level

** Statistically significant at 0.05 level.

* Statistically significant at 0.10 level.

Sources: Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997. YA1A005V (16:32 12/29/99) YA1A005MV (15:24 12/9/99).

Table 5.3

**Percent of Residents Hospitalized within 120 Days of SNF Admission
by Demonstration Status and Time Period**

Demonstration Arm	Second Year prior to implementation (t = -2)	Year prior to implementation (t = -1)	First implementation year (t = 1)	% change from implementation t = -2 to t = 1
Kansas				
Phase 2/Phase 3	31.9 %	28.9 %	38.8 %	19.6 %
Phase 3 Only	31.2	36.6	36.5	15.7
Non-participant	28.9	32.0	30.5	5.4
Maine				
Phase 2/Phase 3	29.4	32.3	31.7	7.5
Phase 3 Only	26.1	26.8	29.2	11.2
Non-participant	28.7	29.5	31.2	8.4
New York-Freestanding				
Phase 2/Phase 3	32.4	33.4	34.0	4.8
Phase 3 Only	29.4	29.5	32.5	10.0
Non-participant	28.4	30.0	32.4	13.2
New York-Government				
Phase 2/Phase 3	25.6	29.2	24.2	(5.6)
Phase 3 Only	30.4	29.9	25.7	(16.8)
Non-participant	27.5	27.5	26.1	(5.2)
New York-Hospital-based				
Phase 2/Phase 3	21.4	23.0	18.9	(12.4)
Phase 3 Only	32.2	33.6	37.4	15.0
Non-participant	28.0	30.6	30.0	6.9
South Dakota				
Phase 2/Phase 3	26.4	26.4	28.4	7.3
Phase 3 Only	22.3	25.9	28.4	24.2
Non-participant	27.5	27.8	26.2	(4.8)
Texas				
Phase 2/Phase 3	35.8	40.1	39.4	9.6
Phase 3 Only	34.4	35.2	37.5	8.6
Non-participant	36.1	35.9	37.1	2.7

Source: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.

Table 5.4
Log Odds of Hospitalization Within 120 Days of SNF Admission: All Initial Stays^a

	Texas		Maine		Kansas/ South Dakota		New York					
							Hospital- based	Freestanding	Government			
DEMO*POST2	0.055 (0.07)		0.184 (0.77)		-0.136 (-0.50)		-0.273 (-0.51)	-0.002 (-0.02)		0.236 (0.82)		
DEMO*POST3	-0.416 (-0.56)		-0.010 (-0.06)		0.024 (0.10)		0.110 (0.51)	-0.126 (-0.78)		0.029 (0.09)		
POST2	-0.311 (-0.44)		0.015 (0.13)		0.194 * (1.63)		0.154 (1.10)	0.075 (1.02)		0.182 (0.81)		
POST3	0.626 (0.90)		0.585 (0.46)		-0.078 (-0.55)		0.065 (0.38)	0.246 (1.55)		-0.309 (-1.08)		
DUAL	-0.058 (-0.37)		-0.046 (-0.46)		-0.133 (-1.25)		-0.093 (-0.64)	0.054 (1.41)		-0.011 (-0.07)		
BARTHEL	0.293 (1.42)		-0.001 (-0.08)		0.011 (0.76)		-0.005 (-0.27)	-0.010 ** (-2.23)		-0.020 (-1.12)		
NSISUM	0.064 *** (2.06)		0.043 *** (2.40)		0.103 *** (5.08)		0.085 *** (3.47)	0.089 *** (13.62)		0.083 *** (3.25)		
CPS	0.087 * (1.76)		0.394 (1.25)		-0.009 (-0.28)		-0.017 (-0.46)	0.025 *** (2.72)		-0.017 (-0.46)		
PRIOR PART A	5.745 (1.50)		5.259 (1.61)		4.231 (1.07)		3.484 (1.16)	5.705 *** (7.25)		8.376 ** (1.96)		
R ²	0.011		0.004		0.013		0.011	0.015		0.020		
N	1,395		4,251		3,398		2,627	40,980		2,088		

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission. Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses.

- *** Statistically significant at 0.01 level
- ** Statistically significant at 0.05 level.
- * Statistically significant at 0.10 level.

Sources: Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997. YA1A005V (16:32 12/29/99) YA1A005MV (15:24 12/9/99).

Table 5.5

**Mean Value of Medicare Part A Non-SNF Expenditures within 180 Days of SNF Admission
by Demonstration Status and Time Period**

Demonstration Arm	Second Year prior to implementation (t = -2)	Year prior to implementation (t = -1)	First implementation year (t = 1)	% change from implementation t = -2 to t = 1
Kansas				
Phase 2/Phase 3	\$ 4,659.00	\$ 4,682.70	\$ 5,333.30	13.5 %
Phase 3 Only	4,744.1	4,984.3	6,218.4	27.1
Non-participant	4,494.7	4,784.9	4,867.4	8.0
Maine				
Phase 2/Phase 3	4,387.4	5,112.8	5,163.7	16.3
Phase 3 Only	4,444.8	4,833.3	5,161.2	14.9
Non-participant	4,377.3	4,940.6	5,350.9	20.1
New York-Freestanding				
Phase 2/Phase 3	6,112.7	7,048.3	7,437.0	19.6
Phase 3 Only	5,539.5	6,140.6	7,174.3	25.9
Non-participant	4,297.4	4,999.9	5,578.7	26.1
New York-Government				
Phase 2/Phase 3	3,843.8	4,822.5	4,618.1	18.4
Phase 3 Only	4,807.5	6,541.6	3,769.7	(24.3)
Non-participant	3,953.9	3,774.6	3,803.5	(3.9)
New York-Hospital-based				
Phase 2/Phase 3	2,746.4	2,469.6	2,355.0	(15.4)
Phase 3 Only	7,189.3	8,259.5	8,978.2	22.2
Non-participant	5,445.4	6,826.2	6,538.2	18.3
South Dakota				
Phase 2/Phase 3	3,670.4	3,629.1	4,117.5	11.5
Phase 3 Only	3,943.8	3,384.2	3,345.5	(16.5)
Non-participant	3,302.3	3,691.8	3,529.6	6.7
Texas				
Phase 2/Phase 3	5,698.9	6,423.4	6,253.7	9.3
Phase 3 Only	6,731.6	6,838.9	7,559.4	11.6
Non-participant	6,525.8	6,775.2	7,078.2	8.1

Sources: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997

Table 5.6

Part A Non-SNF Expenditure for 180-Day Period After SNF Admission: Least-Squares Regression, All Initial Stays^a

	Texas	Maine	Kansas/ South Dakota	New York			
				Hospital- based	Freestanding	Government	
DEMO*POST2	-517.172 (-0.32)	301.508 (0.84)	-182.543 (-0.45)	-2,538.336 (-1.98)	** 343.371 (1.48)	936.723 (1.65)	*
DEMO*POST3	759.972 (0.42)	-380.213 (-1.35)	266.141 (0.78)	1,143.070 (2.01)	** 591.936 (1.34)	290.488 (0.49)	
POST2	466.851 (0.32)	366.109 (2.14)	** 266.728 (1.46)	1,169.306 (3.11)	*** 772.802 (3.64)	200.021 (0.46)	***
POST3	-760.395 (-0.45)	435.588 (2.18)	** -50.316 (-0.25)	-37.815 (-0.08)	-89.858 (-0.21)	-377.909 (-0.71)	
DUAL	467.393 (1.29)	280.561 (1.80)	* 184.051 (1.13)	-65.747 (-0.17)	182.865 (1.67)	388.343 (1.30)	*
BARTHEL	93.861 (2.04)	** 156.685 (7.66)	*** 53.417 (2.52)	** 22.319 (0.62)	16.494 (1.31)	18.963 (0.54)	
NSISUM	242.340 (3.40)	*** 123.312 (4.61)	*** 66.083 (2.21)	** 260.687 (4.06)	*** 319.209 (17.76)	234.966 (4.80)	***
CPS	-357.438 (-3.29)	*** -482.856 (-10.71)	*** -369.181 (-7.57)	*** -364.700 (-3.79)	*** -200.519 (-7.65)	-101.445 (-1.40)	***
PRIOR PART A	65,890.971 (7.81)	*** 82,020.990 (16.94)	*** 89,339.000 (14.50)	*** 57,582.39 (7.55)	*** 66,064.310 (32.90)	44,508.580 (6.43)	***
R ²	0.026	0.057	0.040	0.032	0.027	0.015	
N	4,564	12,576	9,983	7,546	109,742	7,054	

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission. Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses.

*** Statistically significant at 0.01 level

** Statistically significant at 0.05 level.

* Statistically significant at 0.10 level.

Sources: Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997. YA1A005V (16:32 12/29/99) YA1A005MV (15:24 12/9/99).

6.0 Provision of Skilled Therapy Under Prospective Payment

Few would question the importance of rehabilitation services to post-acute SNF residents' functional recovery, restoration to pre-illness/injury status, and discharge to home (Kramer et al., 1997, Przybylski et al., 1996). However, in the decade leading up to the implementation of national SNF PPS, the skyrocketing cost of Medicare-reimbursed skilled rehabilitation services, driven in part by increased utilization, came under close scrutiny. As a result, several attempts were made to examine and rationalize therapy service utilization (U.S.GAO, 1995, U.S. DHHS, 1994). The NHCMQ demonstration, in particular the payment system launched under Phase 3, was one such effort. This chapter explores the effects of the NHCMQ demonstration on the utilization of skilled rehabilitation services.

6.1 Background

Medicare Coverage Requirements for Skilled Therapy Services Prior to National PPS

Under Medicare's cost-reimbursement system, skilled therapy in SNFs was generally covered under Part A if certain criteria were met. Part B also covered therapy for individuals who were ineligible for, or had exhausted, Part A coverage. Criteria for services to be "reasonable and necessary" were defined to mean that

The [therapy] services must be considered under acceptable standards of practice to be a specific and effective treatment for the patient's condition; and the services must be of such a level of complexity and sophistication, or the patient's condition must be such that the services required can be safely and effectively performed only by or under the supervision of a qualified [therapist].

Further,

There must be an expectation that the condition will improve significantly in a reasonable (and generally predictable) period of time based on the assessment made by the physician of the patient's restoration potential after any needed consultation with the qualified physical therapist or the services must be necessary to the establishment of a safe and effective maintenance program required in connection with a specific disease state, and the amount, frequency, and duration of the services must be reasonable (DHHS, 1995).

Medicare also covered restorative therapy services, which had to meet different criteria than skilled therapy services. Terms describing this type of service vary from "routine restorative services" to "nursing rehabilitation" to "nursing rehabilitation/restorative" care. Section 230.3 of the SNF Manual refers to "... procedures which are routine in nature in the sense that they can be rendered by supportive personnel, e.g., aides or nursing personnel, without the supervision of a qualified physical therapist". Such services might include range of motion activities, splint or brace assistance,

amputation care, or training in: dressing and grooming; locomotion or mobility; and transfer or communication (HCFA, 1995). Under cost-reimbursement, these services could have been reimbursed through the physical therapy cost center if they met criteria such as medical necessity, being ordered by a physician, and if charges are equally imposed on all patients.

Critics charged that the “reasonable and necessary” criteria were subjective and open to differences of interpretation among providers and fiscal intermediaries (FIs). And, though it is the responsibility of the therapists/care provider to be knowledgeable in the approved documentation needed to support therapy claims, there were complaints that “documentation requirements are burdensome, costly, and frustrating as rules for reimbursement continue to change” (Peteet, 1993).

Therapy Provision Under the NHCMQ Demonstration

The NHCMQ demonstration changed therapy incentives for participating providers in two ways, first, by introducing resident payment categories tied to therapy use, and second, by deeming select RUG-III groups to be Medicare-covered.

In the Resource Utilization Groups, Version III (RUG-III) classification system used in Phase 3 of the NHCMQ demonstration, the classification groups form a hierarchy with the services at the top of the hierarchy consuming the highest average resources. The first category of services presented in the hierarchy is labeled Rehabilitation and includes any combination of physical, occupational, or speech therapy, as well as restorative nursing. There are two primary reasons for Rehabilitation being at the top of the hierarchy: 1) these services were found to be predictive of higher staff time costs during RUG refinement modeling (Fries et al., 1989 and 1994); and 2) one goal in RUG-III development was to create incentives for therapy services to be provided (Fries et al., 1994). The Phase 3 payment system bundled ancillary rehabilitation services into the casemix-adjusted *per diem* payment, so that all therapy services provided to a Medicare Part A patient were reimbursed via the RUG-III group into which that resident classified.

In addition, under the NHCMQ demonstration, Medicare coverage guidelines were maintained for participating providers, but care was also considered Medicare-covered if classified into one of the top 26 RUG-III groups, which were deemed to be Medicare-covered for SNF care under Part A. This provision reduced administrative burden for both HCFA’s contractors and the providers. FIs did not have to conduct their customary post-payment medical review of claims submitted by participating facilities. Participating nursing homes did not have to incur the expense of documenting and submitting justification for the necessity of the therapy services delivered.

Under the demonstration, while eliminating some restrictive rules may have encouraged decisions to provide therapy based on need, the payment classification system itself may also have created incentives for providers to tailor the timing of therapies to fit the system. On the one hand, for therapy providers, deemed coverage meant that, contingent on a physician’s order, clinical and functional evaluation findings that a resident required rehabilitative services were enough to justify providing services. On the other hand, rehabilitation services were now grouped by the RUG-III classification system into revenue groups, which classified residents based on set amounts of therapy minutes per week. The Ultra High Rehabilitation subcategory required residents to receive a

minimum of 720 minutes per week of which one discipline must have provided service five days a week and a second discipline at least three days; the Very High subcategory a minimum of 500 minutes per week of at least one therapy discipline, and so on. The Low Rehabilitation subcategory classified residents by their need for a combination of two or more nursing rehabilitation services six days per week and 45 minutes or more of any combination of therapy disciplines at least three days per week. These timing rules might have affected how providers bundled therapy services across the weeks of a resident's stay.

The NHCMQ demonstration provided incentives for participating nursing homes to increase net revenue largely by increasing utilization, through

- 1) expanding capacity and admitting more RUGs-defined Rehabilitation residents, and
- 2) providing more therapy minutes per week (to shift Rehabilitation residents into higher-payment RUGs categories) – this might be seen in increased total minutes or charges by discipline, or by increased provision of multiple therapies.

Even though participating facilities might try to move residents into higher paying Rehabilitation categories by providing more therapy minutes, once this shift has occurred, the facilities' incentives may change. The behavioral implications are unclear. Payment is fixed, once a resident has been assigned to a RUG-III group until the next scheduled MDS assessment. On the one hand, if, at the next assessment, it is expected that the resident will be discharged soon or will enter a non-therapy group, then the provider may limit therapy minutes. The provider is at risk, and there would be no financial advantage for providing more services. On the other hand, if there appears to be a good chance that the resident will stay in the Rehabilitation RUG domain, then the incentive may be to provide more minutes because this therapy will push the resident into a higher-paid Rehabilitation group.

Facilities might also respond by trying to reduce costs. We have available charge data from claims, but no data to support tests of hypotheses about true cost reductions. Because we had no data on therapy minutes from some states, we used charges from claims as an alternative measure of utilization. To explore cost effects fully, we would need therapy-specific information on changes in contract provisions, for facilities that outsourced to therapy providers, and on “make or buy” decisions associated with entering the demonstration, perhaps to bring therapy staff in-house. Absent such information, we focus in this chapter on revenue-increasing behavior.

Under the demonstration, we expected to see additional therapists and therapy aides/assistants hired, and increased emphasis on admitting heavy rehabilitation residents. Indeed, evaluation findings (see Chapter 3) do suggest an increase in rehabilitation admissions to NHCMQ participating facilities under Phase 3, and a very slight increase in the use of therapy aides and assistants among select participating facilities (see Chapter 4). In this chapter, we explore hypothesized effects of the demonstration on therapy volume, measured by minutes and charges.

6.2 Data and Methods

We assessed the effect of prospective payment on the provision of physical (PT), occupational (OT), and speech therapy (ST) using two sources of data:

- 1) reported minutes of therapy drawn from the first MDS assessment from each initial SNF stay, and
- 2) therapy charges for each of the three disciplines aggregated from the therapy revenue center charges appearing on Medicare SNF claims for each initial stay.

Because we could not link claims to MDS data for all initial stays, we estimated effects on charges using two samples of resident stays: all initial stays linked to MDS and all initial stays, linked and unlinked.

MDS measures of receipt of therapy and therapy time. Section N of the MDS+ and Section P of the MDS 2.0 report total minutes of therapy by discipline for the previous seven days. It is possible that some of this therapy was provided prior to SNF admission and therefore reflects service provision by providers other than the SNF. Nevertheless, it is commonly accepted that the vast majority of therapy reported on the MDS was provided by the facility completing the MDS. For this analysis, therapy minutes were aggregated across disciplines to create a measure of total minutes over the seven-day assessment period. We also used these data to compute the proportion of Medicare SNF residents that received therapy in more than one discipline during the initial observation period of their stay.

Part A therapy charges. Although participating providers were paid a prospective rate that covered physical, occupational, and speech therapy, all providers were required to continue to submit therapy charges on Medicare SNF claims as they had prior to the inception of Phase 3. Total charges for these three therapies were aggregated from Medicare claims to the SNF stay level for the two years prior to the start of Phase 3 and for the year following the Phase 3 reference date.¹⁶ Most Medicare providers in New York were subject to an all-inclusive rate for Medicare-covered SNF days for the period prior to Phase 3, which appears to have led many providers to omit therapy charges from claims. Examination of claims data shows much higher frequency of zero charges than in any other state. Therefore, we excluded New York nursing homes from the analyses of therapy charges, but not from analyses of therapy minutes.

Analyses were carried out using a comparison of mean therapy times and charges by demonstration status and time period and by use of the “difference-in-differences” approach of Chapters 3 and 5.

$$[6.1] \quad y_{ijt} = \beta_j + \beta_2 POST_t + \beta_3 DEMO_j \bullet POST_t + X_{ijt} \delta + \varepsilon_{ijt}$$

We measured all charge variables and a multiple therapy use variable in log form. Ordinary least squares fixed effects regressions were used to estimate demonstration effects on total minutes and

¹⁶ See Chapter 2 for a definition of the Phase 3 reference date.

charges. To estimate effects on use of multiple therapies, we applied conditional fixed effects logistic regression. We separated POST and DEMO*POST into two measures each. POST2 and POST3 identified a stay happening after the Phase 2 and 3 reference dates respectively. DEMO2 and DEMO3 flagged facilities that participated in Phase 2 and Phase 3 (these variables were omitted in the fixed effects models). The estimated coefficients of DEMO*POST capture participating effects. In this specification, DEMO*POST2 and DEMO*POST3 capture the Phase 2 and Phase 3 effects. For therapies, because the relevant RUG-III system was in effect only after the beginning of Phase 3, DEMO*POST3 is the appropriate measure of effects.

Independent variables are summarized by X. These included an indicator of beneficiary Medicaid enrollment at admission (DUAL), the resident's Barthel Index score computed from MDS data (BARTHEL), Nursing Severity Index (NSI) score (NSISUM), cognitive performance score (CPS), and total Medicare Part A expenditure for the six months prior to admission (PRIOR PART A).

Where noted, we report estimates for only those initial stays that could be linked to MDS data. Substantial missing MDS data in Texas facilities led to the decision to drop Texas from all analyses of initial stays created from linked claims/MDS data. For all stays, we had to drop all independent variables in the X vector except Medicaid eligibility that we created from Denominator File data.

We estimated models for each of the three therapy disciplines for initial stays in the participating states, pooling data from Kansas and South Dakota. In models that included New York, we separated New York facilities into hospital-based, government and freestanding. Models were also estimated separately for residents classified into three broad RUG-III groups based on the admission MDS: 1) Ultra High and Very High Rehabilitation, 2) High, Medium and Low Rehabilitation, and 3) all non-rehabilitation groups. Because of the high incidence of missing MDS data for Texas, Texas (and New York, for lack of claims data) were not included in the models based on RUG-III groups.

6.3 Results

In this section, we present both unadjusted trends in therapy utilization and regression-based estimates of effects of the demonstration. While trend data suggest fairly substantial growth in therapy use over the study period, estimated effects of the demonstration on therapy minutes, multiple therapies and charges vary among the states.

Trends in therapy utilization. With the exception of New York Phase 2/3 hospital-based facilities, both participating and nonparticipating facilities experienced rapid growth in total therapy minutes over the study period (Table 6.1). There appeared to be some tendency for groups with relatively low total minutes two years before implementation to have increased more rapidly than their counterparts, regardless of demonstration status: examples include nonparticipants in Kansas and South Dakota, and Phase 3 New York hospital-based facilities. In most states, the proportion of residents receiving more than one therapy was generally higher in Phase 3 facilities than in nonparticipating facilities (Table 6.2).

Adjusted estimates of demonstration effects on time and multiple therapies. The demonstration was associated with an increase in therapy minutes during the assessment period in three of the six groups

shown in Table 6.3. Estimates based on DEMO*POST3 show increases (significant at the 0.01 level) of 59 minutes (Maine), 31 minutes (New York hospital-based) and 55 minutes (New York freestanding). However, this table also reports significant decreases based on DEMO*POST3 of 144 minutes (Texas) and 35 minutes (New York government). Findings on use of multiple therapies are shown in Table 6.4. The odds of receiving at least two types of therapy are positive and significant in Maine. No significant effects were found for Kansas/South Dakota or for Texas.

Trends in charges for physical, occupational and speech therapy. Patterns in therapy charges (Tables 6.5 – 6.7) show little consistency. For example, physical therapy charges increased for non-participants in Kansas, South Dakota and Texas more rapidly than charges for Phase 2/3 participants, while non-participant charges increased less than Phase 2/3 participants' changes (though more than Phase 3 participants only).

Adjusted estimates of effects on therapy charges – all initial stays. In a differences-in-differences model of demonstration effects, there is no evidence that the demonstration increased therapy charges, commensurate with estimated increases in minutes (Tables 6.8 through 6.10). Data limitation confined the estimates to Texas, Maine and Kansas/South Dakota, and to a model that used only variables available from Medicare claims data.

Adjusted estimates of effects on therapy charges – stays matched to MDS assessments and grouped by RUG-III category. Grouping residents into two Rehabilitation categories (Ultra High/Very High and High/Medium/Low) and a non-Rehabilitation group, we estimate that the demonstration was associated with relative decreases in therapy charges in Maine (Tables 6.11 through 6.13) and Kansas/South Dakota (Tables 6.14 through 6.16) in most RUG groups and therapies. Of the 18 coefficients of DEMO*POST3 estimated across the three therapies, 16 are negative. In Maine, decreases in charges tend to be larger for the Ultra/Very High residents, compared to the other two groups. Most estimates in Maine are predictably negative.

Table 6.1**The Average of Provider Mean OT, PT, and ST Total Therapy Minutes, by Demonstration Status and Time Period, Initial Stays Matched to MDS Assessments^a**

Demonstration Arm	Second year prior to implementation (t = -2)	Year prior to implementation (t = -1)	First implementation year (t = 0)	% change from t = -2 to t = 0
Kansas				
Phase 2/Phase 3	286 minutes	345 minutes	377 minutes	31.8 %
Phase 3 only	261	319	356	36.4
Non-participant	236	256	361	53.0
Maine				
Phase 2/Phase 3	161	181	339	110.6
Phase 3 only	211	279	339	60.1
Non-participant	166	200	267	60.1
New York-Freestanding				
Phase 2/Phase 3	111	96	147	32.4
Phase 3 only	97	110	150	54.6
Non-participant	82	109	113	37.8
New York-Government				
Phase 2/Phase 3	80	65	91	13.8
Phase 3 only	49	82	78	59.2
Non-participant	45	56	108	140.0
New York-Hospital-based				
Phase 2/Phase 3	162	133	139	-14.2
Phase 3 only	145	169	217	49.7
Non-participant	163	178	202	23.9
South Dakota				
Phase 2/Phase 3	158	143	217	37.3
Phase 3 only	139	129	165	18.7
Non-participant	82	116	160	95.1
Texas				
Phase 2/Phase 3	250	220	252	0.8
Phase 3 only	-	353	268	NA
Non-participant	30	430	427	1323.3

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, and facilities not subject to routine cost limits are omitted.

Sources: Abt Associates' analysis of MDS Files, 1995 – 1997. YA1A006N, p. 69-74.

Table 6.2**Proportion of Facilities With More Than One Therapy Discipline (MDS), By Demonstration Status and Time Period, Initial Stays Matched to MDS Assessments^a**

Demonstration Arm	Second year prior to implementation (t = -2)	Year prior to implementation (t = -1)	First implementation year (t = 0)	% change from t = -2 to t = 0
Kansas				
Phase 2/Phase 3	50 %	51 %	57 %	14.0 %
Phase 3 only	43	48	65	51.2
Non-participant	35	40	48	37.1
Maine				
Phase 2/Phase 3	32	45	71	121.9
Phase 3 only	45	51	66	46.7
Non-participant	39	48	58	48.7
New York-Freestanding				
Phase 2/Phase 3	22	22	34	54.5
Phase 3 only	19	21	32	68.4
Non-participant	13	19	21	61.5
New York-Government				
Phase 2/Phase 3	12	12	17	41.7
Phase 3 only	8	12	13	62.5
Non-participant	4	9	17	325.0
New York-Hospital-based				
Phase 2/Phase 3	47	44	41	-12.8
Phase 3 only	39	51	51	30.8
Non-participant	46	52	56	21.7
South Dakota				
Phase 2/Phase 3	49	47	46	-6.1
Phase 3 only	36	42	46	27.8
Non-participant	20	35	39	95.0
Texas				
Phase 2/Phase 3	29	32	41	41.4
Phase 3 only	-	49	51	NA
Non-participant	-	52	49	NA

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, and facilities not subject to routine cost limits are omitted.

*Data not available.

Sources: *Abt Associates' analysis of MDS Files, 1995 – 1997*. YA1A006N, p93-98

Table 6.3

Total Minutes of Therapy During 7-Day Observation Period: Least Squares Regression: Initial Stays Matched to MDS Assessment^a

	Texas		Maine		Kansas/ South Dakota		New York					
							Hospital- based	Freestanding		Government		
DEMO*POST2	97.221 (1.57)		-21.353 (-2.29)	**	27.038 (1.98)	**	-65.561 (-4.80)	***	-49.278 (-22.47)	***	-18.302 (-3.48)	***
DEMO*POST3	-144.226 (-2.88)	***	59.436 (8.33)	***	-15.495 (-1.33)		31.300 (5.22)	***	55.448 (12.87)	***	-35.282 (-6.41)	***
POST2	33.612 (0.60)		44.841 (10.12)	***	22.453 (3.63)	***	21.286 (5.37)	***	35.127 (17.65)	***	6.968 (1.71)	*
POST3	148.348 (3.42)	***	49.572 (10.02)	***	58.773 (8.50)	***	13.230 (2.81)	***	-0.260 (-0.06)		49.194 (10.01)	***
DUAL	-64.699 (-5.35)	***	-25.229 (-6.33)	***	-47.094 (-8.55)	***	-19.674 (-4.75)	***	-13.173 (-12.25)	***	-7.594 (-2.74)	***
BARTHEL	-1.793 (-1.17)		-3.136 (-5.99)	***	-3.804 (-5.30)	***	0.165 (0.35)		-1.775 (-14.36)	***	-1.261 (-3.88)	***
NSISUM	-5.294 (-2.21)	**	-9.629 (-14.11)	***	-7.953 (-7.85)	***	-9.198 (-13.66)	***	-8.322 (-47.77)	***	-5.764 (-12.68)	***
CPS	-15.388 (-4.33)	***	-11.205 (-9.74)	***	-8.423 (-5.10)	***	-19.528 (-19.27)	***	-17.683 (-69.16)	***	-8.200 (-12.19)	***
R ²	0.065		0.072		0.021		0.153		0.162		0.070	
N	6,070		13,040		10,313		7,662		115,137		7,138	

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission. Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses

*** Statistically significant at the 0.01 level

** Statistically significant at the 0.05 level

* Statistically significant at the 0.10 level

Sources: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997. YA1A006N, p.3-8

Table 6.4**Log Odds of Receiving Therapy in More Than One Discipline During 7-Day Observation Period: Initial Stays Matched to MDS Assessments^a**

	Texas		Maine		Kansas/ South Dakota	
DEMO*POST2	0.106 (0.31)		0.137 (1.21)		-0.258 (-2.06)	**
DEMO*POST3	-0.090 (-0.32)		0.464 (4.90)	***	-0.170 (-1.56)	
POST2	0.562 (1.82)	*	0.419 (7.53)	***	0.420 (6.72)	***
POST3	0.295 (1.18)		0.486 (7.79)	***	0.332 (4.79)	***
DUAL	-0.399 (-5.94)	***	-0.247 (-4.95)	***	-0.473 (-8.65)	***
BARTHEL	-0.008 (-0.94)		-0.022 (-3.32)	***	-0.038 (-5.41)	***
NSISUM	-0.018 (-1.35)		-0.075 (-8.79)	***	-0.047 (-4.73)	***
CPS	-0.156 (-7.79)		-0.175 (-12.13)	***	-0.126 (-7.67)	***
R ²	0.028		0.045		0.026	
N	5,070		13,183		10,256	

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses

*** Statistically significant at the 0.01 level

** Statistically significant at the 0.05 level

* Statistically significant at the 0.10 level

Sources: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997. YA1A006N, p.3-8

Table 6.5**Median Part A Covered Physical Therapy Charges Per SNF Stay, By Demonstration Status and Time Period, All Initial Stays^a**

Demonstration Arm	Second year prior to implementation (t = -2)	Year prior to implementation (t = -1)	First implementation year (t = 0)	% change from t = -2 to t = 0
Kansas				
Phase 2/Phase 3	\$1,736	\$1,920	\$1,939	11.2 %
Phase 3 only	934	1100	804	-13.9
Non-participant	779	1,003	1,224	57.1
Maine				
Phase 2/Phase 3	1,006	1,447	2,068	105.6
Phase 3 only	1,576	2,144	1,906	20.9
Non-participant	630	847	1,062	68.6
South Dakota				
Phase 2/Phase 3	984	1400	1379	40.1
Phase 3 only	1,634	929	1,212	-25.8
Non-participant	529	754	873	65.0
Texas				
Phase 2/Phase 3	1,446	1,723	1,614	11.2
Phase 3 only	1,392	1,784	2,197	57.8
Non-participant	1,141	1,219	1,371	20.2

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Sources: *Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997*. YA1A006N, p. 9-20.

Table 6.6**Median Part A Covered Occupational Therapy Charges Per SNF Stay, By Demonstration Status and Time Period, All Initial Stays^a**

Demonstration Arm	Second year prior to implementation (t = -2)	Year prior to implementation (t = -1)	First implementation year (t = 0)	% change from t = -2 to t = 0
Kansas				
Phase 2/Phase 3	\$1,458	\$1,816	\$2,158	48.0 %
Phase 3 only	1,381	,718	1,652	19.6
Non-participant	934	1,258	1,343	43.8
Maine				
Phase 2/Phase 3	394	1,126	1,863	372.8
Phase 3 only	1,355	1,830	1,450	7.0
Non-participant	738	794	1,112	50.7
South Dakota				
Phase 2/Phase 3	1,885	1,536	1,096	-41.9
Phase 3 only	598	757	790	32.1
Non-participant	143	654	811	467.1
Texas				
Phase 2/Phase 3	2,081	1,997	2,562	23.1
Phase 3 only	1,468	1,294	1,505	2.5
Non-participant	1,445	1,670	1,854	28.3

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Sources: Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997. YA1A006N, p.3-8

Table 6.7**Median Part A Covered Speech Therapy Charges Per SNF Stay, By Demonstration Status and Time Period, All Initial Stays^a**

Demonstration Arm	Second year prior to implementation (t = -2)	Year prior to implementation (t = -1)	First implementation year (t = 0)	% change from t = -2 to t = 0
Kansas				
Phase 2/Phase 3	\$595	\$1,029	\$637	7.1 %
Phase 3 only	594	993	882	48.5
Non-participant	245	453	585	138.8
Maine				
Phase 2/Phase 3	31	124	183	490.3
Phase 3 only	245	70	236	-3.7
Non-participant	163	234	181	11.0
South Dakota				
Phase 2/Phase 3	869	505	374	-56.8
Phase 3 only	378	280	446	18.0
Non-participant	17	171	372	2088.0
Texas				
Phase 2/Phase 3	1,338	1,041	1,195	-10.7
Phase 3 only	671	463	577	-14.0
Non-participant	660	798	788	19.4

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Sources: Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997. YA1A006N, p.3-8

Table 6.8**Log of Medicare Charges for Physical Therapy: Least Squares Regression Estimates
All Initial Stays^a**

	Texas		Maine		Kansas/ South Dakota	
DEMO*POST2	-0.104 (-0.07)		0.317 (2.57)	**	0.408 (2.40)	**
DEMO*POST3	0.034 (0.39)		-0.039 (-0.43)		-0.390 (-2.76)	***
POST2	0.255 (8.04)	***	0.487 (8.25)	***	0.144 (2.00)	**
POST3	0.221 (6.90)	***	0.307 (4.95)	***	0.452 (6.05)	***
DUAL	-0.587 (-21.20)	***	-0.221 (-4.30)	***	-0.801 (-12.53)	***
R ²	0.018		0.011		0.021	
N	74,951		15,404		13,877	

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses

*** Statistically significant at the 0.01 level

** Statistically significant at the 0.05 level

* Statistically significant at the 0.10 level

Sources: *Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997*. YA1A006N, p. 9-20.

Table 6.9

Log of Medicare Charges for Occupational Therapy: Least Squares Regression Estimates
All Initial Stays^a

	Texas		Maine		Kansas/ South Dakota	
DEMO*POST2	-0.326 (-2.12)	**	1.074 (7.45)	***	-0.183 (-0.99)	
DEMO*POST3	0.027 (0.28)		0.021 (0.20)		-0.669 (-4.39)	***
POST2	0.378 (11.04)	***	0.372 (5.41)	***	0.361 (4.64)	***
POST3	0.282 (8.15)	***	0.508 (7.03)	***	0.550 (6.81)	***
DUAL	-0.456 (-15.25)	***	-0.293 (-4.88)	***	-0.649 (-9.42)	***
R ²	0.010		0.015		0.004	
N	74,951		15,404		13,877	

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses

*** Statistically significant at the 0.01 level

** Statistically significant at the 0.05 level

* Statistically significant at the 0.10 level

Sources: *Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997.* YA1A006N, p. 9-20.

Table 6.10**Log of Medicare Charges for Speech Therapy: Least Squares Regression Estimates, All Initial Stays^a**

	Texas		Maine		Kansas/ South Dakota
DEMO*POST2	-0580 (-4.10)	***	0.440 (3.57)	***	-0.187 (-1.15)
DEMO*POST3	0.115 (1.32)		0.076 (0.84)		-0.024 (-0.18)
POST2	0.298 (9.43)	***	0.098 (1.66)	*	-0.083 (1.21)
POST3	0.164 (5.13)	***	0.098 (1.59)		0.131 (1.84)
DUAL	-0.314 (-11.38)	***	-0.142 (-2.76)	***	-0.098 (-1.62)
R ²	0.004		0.001		0.0001
N	74,951		15,404		13,877

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses

*** Statistically significant at the 0.01 level

** Statistically significant at the 0.05 level

* Statistically significant at the 0.10 level

Sources: *Abt Associates' analysis of Medicare National Claims History File, 1995 – 1997*. YA1A006N, p. 9-20.

Table 6.11

Log of Medicare Charges for Physical Therapy for SNF Residents by Initial RUG-III Rehabilitation Group: Least Squares Regression Estimates, Initial Stays Matched to MDS Assessment^a

Maine	Ultra/Very High	High, Medium, Low	Non-Rehab
DEMO*POST2	0.391 ** (2.21)	0.184 ** (1.96)	0.211 (0.96)
DEMO*POST3	-0.275 *** (-2.63)	-0.233 *** (-3.07)	-0.247 (-1.36)
POST2	0.072 (0.95)	0.192 *** (4.16)	0.796 *** (7.70)
POST3	0.020 (0.26)	0.124 ** (2.41)	-0.043 (-0.35)
DUAL	-0.009 (-0.16)	0.158 (0.38)	-0.241 *** (-2.62)
BARTHEL	-0.060 *** (-7.28)	-0.756 *** (-13.22)	-0.390 *** (-3.36)
NSISUM	-0.032 *** (-3.11)	-0.040 *** (-5.60)	-0.107 *** (-6.75)
CPS	-0.010 (-0.59)	-0.071 *** (-5.70)	-0.280 *** (-10.86)
R ²	0.012	0.016	0.035
N	1,752	5,448	5,854

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.
Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Sources: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997. YA1A006N, p. 9-20.

Table 6.12**Log of Medicare Charges for Occupational Therapy for SNF Residents by Initial RUG-III Rehabilitation Group: Least Squares Regression Estimates, Initial Stays Matched to MDS Assessment^a**

Maine	Ultra/Very High		High, Medium, Low		Non-Rehab	
DEMO*POST2	0.514 (3.22)	***	1.537 (8.86)	***	0.726 (3.09)	***
DEMO*POST3	-0.399 (-4.21)	***	-0.217 (-1.55)		-0.352 (-1.81)	*
POST2	0.053 (0.78)		0.206 (2.42)	**	0.447 (4.04)	***
POST3	0.128 (1.83)	*	0.146 (1.55)		0.224 (1.72)	*
DUAL	-0.048 (-0.89)		-0.022 (-0.28)		-0.283 (-2.88)	***
BARTHEL	-0.070 (-9.35)		-0.088 (-8.33)	***	-0.033 (-2.63)	***
NSISUM	-0.019 (-2.01)	**	-0.055 (-4.16)	***	-0.089 (-5.23)	***
CPS	0.008 (0.51)		-0.146 (-6.28)	***	-0.290 (-10.54)	***
R ²	0.022		0.010		0.029	
N	1,752		5,448		5,854	

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses

*** Statistically significant at the 0.01 level

** Statistically significant at the 0.05 level

* Statistically significant at the 0.10 level

Sources: *Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.* YA1A006N, p. 9-20.

Table 6.13**Log of Medicare Charges for Speech Therapy for SNF Residents by Initial RUG-III Rehabilitation Group: Least Squares Regression Estimates, Initial Stays Matched to MDS Assessment^a**

Maine	Ultra/Very High	High, Medium, Low	Non-Rehab
DEMO*POST2	0.291 (0.52)	0.787 (3.96)	0.037 (0.24)
DEMO*POST3	-0.765 (-2.31)	0.203 (1.26)	-0.052 (-0.41)
POST2	0.438 (1.83)	0.151 (1.54)	0.134 (1.87)
POST3	0.089 (0.36)	-0.168 (-1.54)	0.148 (1.75)
DUAL	-0.413 (-2.19)	-0.164 (-1.87)	-0.010 (-0.15)
BARTHEL	-0.150 (-6.12)	-0.142 (-11.73)	-0.056 (-6.91)
NSISUM	-0.093 (-2.89)	-0.193 (-1.27)	-0.018 (-1.63)
CPS	0.866 (15.69)	0.437 (16.44)	0.147 (8.24)
R ²	0.236	0.133	0.046
N	1,752	5,448	5,854

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses

*** Statistically significant at the 0.01 level

** Statistically significant at the 0.05 level

* Statistically significant at the 0.10 level

Sources: *Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.* YA1A006N, p. 9-20.

Table 6.14

Log of Medicare Charges for Physical Therapy for SNF Residents by Initial RUG-III Rehabilitation Group: Least Squares Regression Estimates, Initial Stays Matched to MDS Assessment^a

Kansas/South Dakota	Ultra/Very High	High, Medium, Low	Non-Rehab	
DEMO*POST2	0.278 (0.95)	-0.123 (-0.64)		1.301 (5.22) ***
DEMO*POST3	-0.239 (-1.11)	-0.422 (-2.50)	**	-0.695 (-3.25) ***
POST2	-0.172 (-1.33)	0.241 (2.59)	***	-0.125 (-1.16)
POST3	0.159 (1.14)	0.206 (2.01)	**	0.470 (3.83) ***
DUAL	-0.169 (-1.55)	-0.235 (-2.74)	***	-0.713 (-7.54) ***
BARTHEL	-0.039 (-2.72) ***	-0.075 (-6.65)	***	-0.089 (-7.23) ***
NSISUM	-0.030 (-1.50)	-0.044 (-2.96)	***	-0.099 (-5.57) ***
CPS	-0.086 (-2.66) ***	-0.190 (-7.57)	***	-0.353 (-12.33) ***
R ²	0.026	0.013		0.044
N	1,053	2,918		6,364

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Sources: *Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997.* YA1A006N, p. 9-20.

Table 6.15

Log of Medicare Charges for Occupational Therapy for SNF Residents by Initial RUG-III Rehabilitation Group: Least Squares Regression Estimates, Initial Stays Matched to MDS Assessment^a

Kansas/South Dakota	Ultra/Very High	High, Medium, Low	Non-Rehab
DEMO*POST2	0.466 (1.30)	-0.297 (-1.04)	0.136 (0.54)
DEMO*POST3	-0.348 (-1.31)	-0.676 (-2.71)	-0.983 (-4.56)
POST2	-0.025 (-0.16)	0.151 (1.10)	0.256 (2.36)
POST3	-0.040 (-0.23)	0.250 (1.64)	0.408 (3.30)
DUAL	-0.195 (-1.45)	-0.475 (-3.75)	-0.535 (-5.61)
BARTHEL	-0.055 (-3.06)	-0.067 (-4.04)	-0.103 (-8.29)
NSISUM	0.001 (0.03)	-0.037 (-1.70)	-0.074 (-4.09)
CPS	-0.065 (-1.62)	-0.092 (-2.48)	-0.262 (-9.06)
R ²	0.012	0.000	0.016
N	1,053	2,919	6,364

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Sources: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997. YA1A006N, p. 9-20.

Table 6.16

Log of Medicare Charges for Speech Therapy for SNF Residents by Initial RUG-III Rehabilitation Group: Least Squares Regression Estimates, Initial Stays Matched to MDS Assessment^a

Kansas/South Dakota	Ultra/Very High	High, Medium, Low	Non-Rehab	
DEMO*POST2	-1.181 (-1.59)	-0.039 (-0.11)	0.084 (0.43)	
DEMO*POST3	0.977 * (1.78)	-0.105 (-0.34)	-0.400 (-2.37)	
POST2	0.013 (0.04)	-0.083 (-0.49)	0.547 (0.64)	
POST3	-0.578 (-1.63)	0.246 (1.32)	0.992 (1.02)	
DUAL	0.408 (1.47)	-0.457 (-2.94)	-0.175 (-2.34)	**
BARTHEL	-0.164 (-4.45)	-0.062 (-3.06)	-0.017 (-1.78)	*
NSISUM	-0.288 (-0.57)	-0.054 (-1.98)	-0.014 (-1.01)	
CPS	0.608 *** (7.37)	0.625 (13.71)	0.236 (10.41)	***
R ²	0.138	0.095	0.033	
N	1,053	2,919	6,364	

a Initial stays are defined as SNF stays not preceded by any Medicare-covered SNF days within the 90 days prior to admission.

Stays in government facilities, hospital swing beds, facilities that participated in Phase 2 but not Phase 3 of the demonstration, New York facilities, and facilities not subject to routine cost limits are omitted.

Note: t-statistics appear in parentheses
 *** Statistically significant at the 0.01 level
 ** Statistically significant at the 0.05 level
 * Statistically significant at the 0.10 level

Sources: Abt Associates' analysis of Medicare National Claims History and MDS Files, 1995 – 1997. YA1A006N, p. 9-20.

7.0 Summary and Conclusions

In most of the analyses reported in this document, we found no systematic effects of the NHCMQ demonstration on nursing home behavior. Under both Phases 2 and 3 of the demonstration, there were no clear patterns of statistically significant effects on levels of admissions, levels and composition of staffing, days per resident stay, the probability of rehospitalization, total Medicare expenditure per resident, and therapy charges.

The absence of measurable effects is both comforting and misleading to observers looking for hints about the implications of a national program. Some of the expected facility responses to the demonstration (like increased Medicare expenditure and longer stays) are not desirable from a policy perspective. “No effect” is a favorable outcome in these instances. But both effects and absence of effects were partly determined by the particular configuration of payments and other conditions in the NHCMQ demonstration and by the characteristics of the self-selected sample of participating facilities. As we said earlier, the implications of a national program that is not voluntary may be quite different.

It seems reasonable to assume that those facilities attracted to the NHCMQ demonstration believed that, given the specific parameters of the demonstration, they would likely succeed and perhaps thrive. If they later found themselves not able to succeed, they could always leave and resume business as usual. Faced with no pressing need to change in order to succeed or survive, participating facilities would be expected to respond as we observed, making minor adjustments to maximize Medicare revenue under the new payment system but rejecting longer term structural changes (in staffing levels, for example).

In a national program, PPS applies to all certified facilities. There are winners and losers, but the downside risk of losing has more serious consequences in a national “permanent” payment program than under the demonstration. The vast majority of facilities, winners and losers alike, will be able to adapt with only minor changes in practice. In fact, some of these may take significant steps to increase efficiency, in order not only to succeed within the new payment system but also to thrive. However, there are bound to be some facilities that are poorly positioned to succeed. Of these, some will adapt but others may not. Those facilities that respond nimbly to new challenges in the environment will make the structural and procedural changes (new staffing configurations, new organizational models) needed to be successful. Those that do not may fail.¹⁷

Thus, the NHCMQ demonstration showed that a particular model of PPS could operate successfully without encouraging many of the adverse behaviors feared by some stakeholders. In fact, the NHCMQ demonstration produced evidence that PPS could encourage better access for more complex cases. However, national PPS may generate responses that we did not observe in the demonstration, among facilities that have more to gain and more to lose than the participating SNFs. Uncovering the responses of the industry to national PPS is a task for future research.

¹⁷ The fact that few facilities withdrew from the demonstration does not tell us much about facility failure rates under national PPS, since, as we noted, facilities in the demonstration were voluntary participants, most of which apparently guessed correctly that they were well-suited to operate under the demonstration.

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Appendix A-1

The Minimum Data Set Instrument

Appendix A-2
The RUG-III System

Appendix A-3

State Medicaid Casemix Payment Systems

Appendix A-4

NHCMQ Nursing Home Participation

Appendix A-5

Creating NSI, Barthel and CPS Categories Using the MDS

Appendix A-6

Descriptive Staffing Statistics

Appendix B

Creating NSI Categories Using the MDS: The NSI/MDS+ 90b and 92 Crosswalk