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PACE Rate Work Final Report

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Executive Summary

The Program for All-Inclusive Care of the Elderly (PACE) is a voluntary program that coordinates all acute and long-term care services and coordinates multiple sources of funding (typically, Medicare and Medicaid), for elders who are deemed to be “nursing home certifiable” (NHC) under the laws of their state. In the past, Medicare has paid PACE providers a monthly **capitated** rate equal to 95% of the site’s county AAPCC multiplied by a frailty adjuster of 2.39. The Balanced Budget Act of 1997 makes PACE a permanent provider category and mandates that future Medicare payment be based upon the rate structure of the new Medicare + Choice program. This study revisits the calculation of an appropriate frailty adjuster for use in this expanded setting.

In particular, this study samples several state NHC definitions and summarizes the similarities and differences. Using data from the National Long Term Care Survey and the Medicare Current Beneficiary Survey, cost and population models are developed to explain and predict the monthly fee-for-service expenditures that Medicare would be expected to pay for these NHC individuals if they do not enroll in PACE. A capitation model assembles the results of these models, providing a tool for deriving capitation rates for an NHC population of interest over a specified rating period. Finally, we comment on the determination of an appropriate frailty adjuster for PACE.

Key results of this study include:

- Significant variation exists among states in the manner in which NHC is determined.
- The application of these various NHC definitions to available survey data indicates that there is a natural clustering of results, despite the apparent difference among the definition formats.
- From 20% to 30% of those starting a year in NHC status and surviving to the end of the year, will not continue to be NHC-eligible. This percentage varies with NHC definition and the ending health status of the individual.
- Within a NHC population, there is great variation in expected Medicare monthly FFS expenditures from individual to individual. It is likely, therefore, that PACE sites may vary significantly in average expected monthly costs.
- Marginal cost differences between NHC and non-NHC individuals decrease as we condition on (or fix) other key explanatory factors such as age, sex, functional/cognitive impairment, and the level of recent health care service utilization.
- The PACE frailty adjuster should reflect the level of risk adjustment included in the base rate to which it is applied. With no prior risk adjustment, the NLTC data suggests an average frailty adjuster of about 200%. The appropriate adjuster for a specific PACE site should be adjusted up or down from this level to reflect the expected cost profile of its enrollees. If the base rate reflects functional/cognitive impairment and prior service utilization, the NLTC data

indicates that no further **NHC** frailty adjustment may be needed,

Introduction

Background

Concerns about high health care expenditure rates have given rise to a variety of public and private initiatives to better manage both the use and costs of health care services. Several programs have been developed that use managed care strategies, to better control costs and utilization. One of the few such programs to address the needs of elders with complex and chronic care needs is HCFA's Program for All-Inclusive Care of the Elderly (PACE) Demonstration. This program coordinates all acute and long-term care services and coordinates multiple sources of funding (typically, Medicare and Medicaid), for elders who are deemed to be "nursing home certifiable" (NHC) under the laws of their state.

A key obstacle to the development of managed long-term care programs has been the lack of adequate cost models and concerns about the inadequacy of payment mechanisms. The HCFA has recognized that the acute care (Medicare) costs for the types of people who require on-going services to meet chronic care needs are likely to differ from the general population. A "frailty adjuster" of 2.39 has been applied to the average adjusted per capita cost (AAPCC) to recognize the differential in Medicare costs between the average for the general population and the average cost for PACE enrollees. With the new Medicare + Choice (M+C) program, future PACE payments are to be based upon an adjustment to the M+C rate structure.

The original development and subsequent analyses of the frailty adjuster by Gruenberg (Gruenberg et al., 1989; Gruenberg et al., 1990; Gruenberg et al., 1993; Gruenberg et al., 1997) have used data from the Social/HMO demonstration program to develop models that predict the likelihood that an individual meets NHC criteria. These predictive models are applied to a nationally representative data base (1982 NLTCs, 1984 NLTCs, 1989 NLTCs, Medicare Current Beneficiary Survey, depending on the particular study) to obtain NHC "weights" (predicted likelihoods) that are then applied to the cost ratios. The Social/HMO data are ideal for this purpose, as they provide a clinical assessment of NHC status, as well as self-report data on health and functional status that closely approximate those available from the other surveys.

The use of data from the Social/HMO also faces some important limitations, however. First, the data reflect the NHC definitions of only four states, and do not reflect the experience of all states that are home to one or more PACE programs. Analyses by Gruenberg (1990) indicate that there are differences even among these four states in the definition of NHC. While these differences appear to have little impact on the average Medicare cost ratio, they do have a significant impact on the proportion of individuals predicted to be NHC. This has important implications for the costs that one might expect, as the PACE demonstration is expanded to become a national program.

Second, data are limited to those who are members in a Social/HMO program. Because the Social/HMO is a voluntary, demonstration program, it is likely that there is some bias associated with the choice to enroll. It is difficult to assume that the Social/HMO population is representative of the general Medicare population or even of the NHC population. The use of a screening and queuing mechanism has been used to assure that

the Social/HMO population is, within broad categories, comparable to the average Medicare population in terms of impairment level (Leutz et al., 1988). However, this is a rather crude adjuster. Further, the Social/HMO population is overwhelmingly white, and not eligible for Medicaid (Harrington et al., 1993). These two factors alone distinguish the Social/HMO from the PACE programs, which serve primarily low income, and substantially non-white, populations. Both of these factors (income, race) are known to be associated with health care costs. These reasons suggest that it would be useful to explore alternative methods of modeling NHC status.

Finally, an evaluation of this relationship in 1997 by Gruenberg et al. suggested that the PACE frailty adjuster was not excessive and might indeed be inadequate to capture the costs of the PACE membership. The project is intended to address some of the challenges described here, and to provide an assessment of the appropriateness of the frailty adjuster that is independent of the original developers of that rate.

Study Design and Data Sources

The principal objective of this study is to construct a mechanism for determining the Medicare FFS costs for Nursing Home Certifiable (NHC) populations and to assess the appropriateness of the current 2.39 PACE adjuster, originally developed as an adjuster to the AAPCC, as an adjuster to the Medicare + Choice rates. So, the question is hypothetical: “What would Medicare have spent on the NHC population had it not been the subject of a special reimbursement program such as PACE?” We address this problem through a sequence of steps, which are described below.

The current PACE frailty adjuster is constant across sites and over time. In reality, however, each PACE site uses the definition of NHC that is **current** in the state where it is located. The definition of NHC status drives the calculation of the frailty adjuster. Thus, understanding the variations in the definition is key to understanding the appropriateness of any frailty adjuster. Consequently, we identify the variation in NHC definitions and their similarities, to develop a set of NHC definitions to be used throughout the remainder **of the** analyses.

For a specific NHC definition, an individual’s NHC status is expected to vary over time. Under prior PACE practice, individuals who are NHC at one point in time and subsequently cease to meet the necessary criteria would continue to be enrolled in the PACE program. For such individuals, the program continued to receive the frailty adjusted **capitation** rate, even though the individual’s expected Medicare service utilization may be well below that of NHC individuals. Recent legislation making PACE a permanent provider category, requires annual reassessment of NHC status in the future. With or without annual reassessment, it is important to understand how frequently and for what reasons individuals leave and reenter NHC status. The likelihood that an individual will drop out of NHC status will vary by the NHC definition used and the characteristics that led the individual to meet the criteria. Therefore, we assess the stability of individual NHC status over time for each of the NHC working definitions selected in the previous step.

The remaining steps are devoted to the problem of estimating Medicare FFS costs of a target NHC population, which may be defined by NHC status at admission alone (i.e., current PACE policy) or by ongoing NHC qualification (i.e., future PACE policy).

There are three key components in the analysis: a population model, a cost model and a capitation model. Together these three components allow us to:

- evaluate the stability over time of Medicare FFS costs for NHC populations,
- evaluate variation in Medicare FFS costs within NHC populations, and,
- compare Medicare FFS costs for NHC populations to costs for the entire Medicare FFS population.

For each working NHC definition, these components identify population and other characteristics which have a significant impact on expected Medicare FFS costs. Rather than model the effects of each population characteristic separately, we group individuals with similar expected costs into “cost level groups” (**CLGs**) and model migration from group to group over time. The analysis of such groups over time allows us to assess the stability (or lack thereof) of program costs across sub-populations, for new entrants versus tenured participants and for early versus later program years.

The population **model defines** these cost level groups and summarize the rates of transition between groups. The cost model provides estimates of expected Medicare FFS costs for each cost level group, by age, sex, region, time period and service type. Finally, the **capitation** model applies the population and cost models to specific target NHC populations to derive appropriate capitation rates and/or frailty adjusters.

We employ two primary data sources in this modeling effort, the Medicare Current Beneficiary Survey (MCBS) and the National Long Term Care Survey (NLTCs). Prior analyses have used data from the Social/HMO and **PACE demonstrations**. We considered both of these data sources and decided against them for similar reasons. Both are available for only select groups of individuals, who have chosen to enroll in demonstration programs. As such, they are unlikely to be representative of the national population of interest. Other concerns were related to the ready availability of the data. The Social/HMO data, in particular, were believed to be outdated and not readily available.

In general terms, the MCBS and NLTCs share similar characteristics. Both are longitudinal samples of Medicare enrollees, allowing respondents to be tracked over a period of time. This is necessary to observe cost level group transitions for use in calibrating the population model. Both surveys are linked to files containing respondent Medicare claim data, allowing us to observe the relationship between individual characteristics and Medicare costs. In each round, each survey administers questionnaires to similar numbers of Medicare enrollees (about 16,000). Finally, public use **files** for both surveys were last updated within the last few years (1996 for MCBS and 1994 for NLTCs), providing relatively current Medicare service use and cost information.

Beyond these similarities, differences between the MCBS and the NLTCs present distinct advantages and challenges in using each data source.

1. The NLTCs is limited to Medicare enrollees over the age of 65. No information is

available from this source on disabled adults below age 65. The MCBS samples from both populations.

2. The MCBS contains little information on the respondent's cognitive status. Indirect information on cognitive status can be obtained from IADL status and diagnostic codes in the linked Medicare claim files. The NLTCs community questionnaires include the SPMSQ and proxy assessments of cognitive status.

3. The MCBS Access to Care public use file only includes respondents who are enrolled throughout the interview year. This approach excludes individuals who die prior to the interview during the year. Since the use of Medicare services accelerates in the months prior to death, the exclusion of those who die during the year will bias the estimation of Medicare costs per enrollee per month.

4. The relative timing of the surveys and Medicare claim data differ between the MCBS and the NLTCs. Survey dates for the NLTCs range over the first ten months of calendar years 1982, 1984, 1989 and 1994. Continuously linked Medicare claims are available for calendar years 1981 through 1995. Since survey dates and claim service dates are available for each respondent, we may observe Medicare costs immediately following (or at other durations) each survey.

5. In the 1996 MCBS Access to Care public use file, survey dates range from September through December of 1996. These are matched against Medicare claim records for calendar year 1995. Again, the "always enrolled" nature of the file makes it unwise to relate the Medicare claims for the entire calendar year to the respondent characteristics obtained from the Fall surveys since the exclusion of deaths will significantly bias (downward) the average Medicare cost per enrollee per month. While the MCBS files exclude those who die prior to the interview date, they include individuals alive at the interview who die before the end of the year. (These records are identified and may be removed for analyses restricted to the "always enrolled" population.) So, by restricting our analysis to claims accruing after the survey date and before the end of the calendar year, including those who die after the survey, end-of-life claim costs are appropriately represented, eliminating the "always enrolled" bias.

6. The NLTCs files include an analytic file linking respondents across successive surveys. This file simplifies the process of constructing observed CLG transition matrices. Results from successive MCBS Access to Care surveys can be matched to inspect transitions from year to year, but with greater effort. The convenience of using the NLTCs is largely offset by the large time intervals between survey waves. Recent waves have been five years apart. Shorter intervals between surveys allow for more precise estimates of status transition rates. The MCBS conducts surveys every four months, with functional assessments taking place each Fall. So, we can observe changes in functional status annually. Since we are unable to identify those who withdraw or die between surveys, the MCBS Access to Care files only provide conditional transition estimates.

7. The MCBS is an ongoing survey, following an annual cycle. The NLTCs is also ongoing, but less frequent; future waves are planned for 1999 and 2004. Use of the MCBS in this study will facilitate replication of the analysis on a more frequent basis

than would be possible with the NLTCS.

It is clear that neither survey is uniformly better than the other for use in this study. We employed both throughout the analysis. The MCBS is necessary to allow analysis of Medicare enrollees below age 65. The NLTCS provides more data on functional, cognitive and environmental conditions than is available from the MCBS Access to Care files. Use of both sources allow us to compare/amplify/validate results from each source.

Nursing Home Certifiability

Overview

Eligibility for PACE programs requires that individuals meet definitions of “nursing home certifiability” or NHC. This is the definition used by each state’s Medicaid program to determine whether an individual has a level of need that warrants care in a nursing home. The criteria used to define NHC in a state vary along several dimensions, including:

- the types of needs included (e.g., medical needs, needs for functional support, psychosocial needs)
- the level of assistance required (e.g., skilled nursing, skilled rehabilitation therapy, paraprofessional services under the supervision of a skilled professional)
- whether or not the availability of **alternative** sources of support is considered
- the approach to making a determination (e.g., a scoring mechanism versus clinical judgment).

This variation in NHC means that a person eligible for PACE in one state would not necessarily be eligible in another state. Further, this variation has direct implications for cost estimates. Therefore, an important project task has been the development of a method for determining NHC status.

Under the PACE demonstration, NHC status was assessed only at initial application to the program. Regulations under the BBA specify that NHC status is to be assessed annually for all enrollees. Individuals who no longer meet the eligibility criteria, will be **disenrolled** from the program. Thus, a second important task is the development of a model to estimate the stability of NHC status from one year to the next.

In the following sections of this report, we describe:

- the method used to develop models of NHC
- findings of those models
- the stability of NHC status from **1994- 1995**, and from **1995- 1996**.

An important challenge to this analysis has been the use of data that were not developed for the purpose of assessing NHC status. This limitation has necessitate a variety of assumptions and creative approaches. The report devotes considerable attention to these data issues, and their implications.

General Approach to Defining NHC Status

As indicated, NHC definitions are set by each state. Practical limitations made it impossible to assess each state's approach to NHC. Instead, we chose a sample of states which we used to evaluate the variation among definitions. A review of states' NHC criteria conducted for the American Association for Retired Persons (AARP; Snow 1995) suggested that state NHC definitions could be classified as falling into *one* of three types, based on the types of concerns addressed. These types were "medical necessity only," "medical and functional issues," and "comprehensive" issues, which included consideration of social supports, physical environment, and other issues in addition to medical and functional concerns. States classified as "medical necessity only" emphasized need for skilled care and rehabilitation services in determining NHC eligibility. Individuals with needs for less skilled services, as may be needed to assist with functional limitations, do not meet the NHC criteria in these states. States classified as "medical/functional" were that included need for functional limitations as well as medical concerns in making NHC determinations. States using "comprehensive" definitions included medical and **functional** concerns, but also took into consideration issues such as the availability of informal caregivers, the ability of informal caregivers to continue providing needed care, the safety of the physical environment, and other such issues.

We used these types, in addition to geography, to stratify the 50 states for purposes of selecting a sample. A request was made to each state selected for a copy of all NHC-related documentation. This information was used to develop codes for determining whether individuals would meet the NHC criteria in each state sampled. Because there is no single database that would support this analysis, we used two different databases, each with different strengths and weaknesses, to conduct parallel analyses.

NHC status was determined for each individual in the database used a combination of a "criterion approach" and "proxy approach" to determine whether an individual was NHC in each state. The "criterion approach" constructs a sort of recipe for determining NHC status. An individual who meets each of the criteria specified by the recipe is considered to be NHC. The "proxy approach" uses information from other variables that are associated with being NHC to describe a group of individuals who are believed to satisfy those criteria. In this case, **all** individuals who were receiving care in nursing homes were assumed to be NHC.

Each individual in the database was coded as meeting the NHC definition for each state in the sample. A string variable was created to indicate status with respect to each individual. This variable was analyzed to identify similarities among states, and reduce the number of NHC definitions to a representative set for use in cost analyses.

Methods

Sample selection

As stated previously, it was not practical within the scope of this project to assess NHC status for all states. Eight states were originally selected for the analysis, with six of those chosen as a stratified random sample. Stratification was based on geographic region and classification by broad type of NHC status (medical necessity, medical/functional, comprehensive). Two states were specified for inclusion by the (first) HCFA Project Officer, due to their policy interest.

The NHC **type strata** was identified using information from the AARP report. That report included indication of whether or not the state was considering a change in their NHC definition. For those states with such a possibility indicated, we conducted a telephone survey to update the classification scheme. (It should be noted that few states had actually made any such change. Two states had eliminated any NHC assessment, as they assumed that nursing home case mix payment schemes created incentives that accomplished the same goal of proper placement decisions.)

On the basis of the revised list, we found the following distribution:

- 20 states that are using comprehensive definitions of NHC. Of those 20, 5 are in the south, 6 in the **midwest**, 5 in the northeast, and 4 in the west.
- 23 states using medical/functional criteria. Their geographic dispersion is 9 in the south, 5 in the **midwest**, 4 in the northeast, and 5 in the west.
- 4 states using medical necessity only. Of these, 2 are in the south and 2 are in the west.

Based on the distribution of states by geographic region and approach to determining NHC status, the following table was developed for use in sampling. The far right column shows the number of states desired with each type of approach to NHC. The rationale for these numbers has been previously described. The bottom row shows the number of states desired in each region. These numbers were calculated by multiplying 8 (the total number of states desired) by the percentage of states located in each region. Two cells have been completed, as these states were purposefully selected by the Project Officer.

NHC Approach	South	Midwest	Northeast	West	Total
Comprehensive		MN			3
Medical/Functional			MA		3
Medical Necessity					2
Total	3	2	1	2	8

States were ordered alphabetically, and numbered sequentially. Washington, DC, Michigan, and Mississippi were excluded from the sampling frame. Washington, DC was excluded at the request of the Project Officer, due to concerns that it might not be representative of states' activities. Michigan and Mississippi were excluded, as they did not have any NHC criteria in place.

States were drawn at random from the list, and were identified as falling into the appropriate cell in the grid above. Only one state was allowed to a cell so that, for instance, we did not allow there to be 2 northeast states that used medical/functional approaches to defining NHC status. When each column or row total was reached, any unfilled cells in that column or row were removed from consideration. For instance, after two states that used comprehensive definitions were selected, in addition to Minnesota, we did not allow a third to be selected from the remaining region. The midwest and northeast cells for medical necessity were empty by definition, as there are no such states.

The resulting sample selection is shown in the table below.

NHC Approach	South	Midwest	Northeast	West	Total
Comprehensive	DE	MN		MT	3
Medical/Functional	LA	KS	MA		3
Medical Necessity	MD			AK	2
Total	3	2	1	2	8

This sample was further modified. Delaware was unable to provide us with any information about their NHC process, after repeated requests. We sampled randomly from among those states that could fit the same cell in the table. As a result, Florida was chosen to replace Delaware. Concern over whether Maryland was best classified as medical necessity or medical/functional lead to the addition of Alabama, chosen randomly from medical necessity states in the south. Maryland was kept in the sample, so that the final sample was 9, rather than 8, states. The final sample configuration is shown below.

NHC Approach	South	Midwest	Northeast	West	Total
Comprehensive	FL	MN		MT	3
Medical/Functional	LA	KS	MA		3
Medical Necessity	MD, AL			AK	3
Total	4	2	1	2	9

Data

Data were drawn from two sources: the 1994 National Long-Term Care Survey (NLTCs), and the Medicare Current Beneficiary Survey (MCBS) with linked Medicare claims data. MCBS data were used from three years, 1994-1996. These two databases offered distinct advantages and disadvantages. The NLTCs asked much more detailed questions about functional status, the type and amount of help available, cognitive status, and the social environment. Data on medical condition were somewhat limited. The MCBS asked many fewer questions about functional status, and provided almost no information about the types of help available to individuals. Information was also extremely limited with regard to cognitive status, and non-existent with regard to the social environment.

Because of the limited nature of the MCBS data, extensive use was made of the linked claims data to identify NHC status. We had earlier argued against using claims data for this purpose. Specifically, we were concerned that use of claims data captures only that expressed need that is satisfied by purchased services paid for by Medicare. It does not identify individuals who are at a point where they have need for service that has not yet been met, nor does it identify individuals whose needs are currently being met by family caregivers or other sources not paid for by Medicare. However, without using the claims data, it was not possible to define NHC status from the MCBS data. We were particularly interested in using the MCBS data, as it was those data that allow us to analyze the stability of NHC status over time. We therefore used information from the home health, DME, and Part B claims data, for claims occurring within one month before or after the interview date.

Developing NHC Definitions

We reviewed the NHC definitions used by each state, and developed a comprehensive and detailed list of the specific medical, functional, or social issues included in each definition. Our challenge was to develop approaches for capturing each of these issues from the available data. There were many items included in states' definitions that did not have any reasonable counterpart in the NLTCs or MCBS. In other cases, the data provided crude approximations at best. Attachment A provides a listing of the specific data elements used by each state, and indicates whether or not that element could be defined or approximated from each database.

We next developed an operational definition for each state's NHC criteria, that attempted to apply the decision rules used by the state to the data elements available from our databases. This task was complicated by the limited availability of comparable data elements, and by the lack of specific decision rules for applying NHC criteria. In the majority of states, NHC decision criteria provided guidelines, rather than deterministic rules, for decision making. Thus, in most cases, the decision as to whether or not a person meets NHC criteria relies greatly on the clinical judgment and discretion of the person conducting the assessment. In our sample, only Kansas had explicit criteria that applied a set of scores and weights to determine eligibility. Even in that case, however, there is some room for discretion in how the underlying items are coded, particularly those that involve assessment of the available support system. Attachment B summarizes each state's NHC decision rules, and describes the way that we operationalized those rules for each of the databases available to us.

Analysis

Based on the decision rules developed, we determined each individual's NHC status with regard to each definition. A string variable summarized the individual's status with regard to all definitions in combination. Descriptive statistics show the frequency of each NHC definition, and of the combination variable.

Categorical data analyses were conducted to determine the most efficient groupings of NHC definitions, such that the nine definitions could be reduced to a concise and meaningful set of representative definitions for use in the cost analyses.

Findings

A review of Attachment A shows both the variety of elements considered by states in their NHC determinations, as well as the high degree of overlap among the state definitions. The variety is shown by the great number of data elements listed. These range from considerations of medical conditions and treatments, to functional status (ADL and IADL), cognitive status, available caregiving network, and the safety of the physical environment. The overlap is seen in the number of states using each element. Each state considers at least some medical conditions and treatments; and several states consider the same specific medical conditions and treatments. For example, all states except Kansas consider whether the individual needs treatment of extensive decubitus ulcers or other skin problems; and all states except Kansas and Florida consider whether the individual requires daily intravenous medications, or care of catheters and various types of ostomies.

Review of these elements by state also reveals some inconsistencies between the classification as to type (medical necessity, medical/functional, comprehensive) and the NHC definitions we identified. Of the three states that we initially considered to be medical necessity only, two also consider functional status. Only Alabama can truly be labeled a “medical necessity” state. Maryland includes functional status, incontinence management, cognition and orientation as part of the physician’s assessment; however, only skilled medical and rehabilitation services enter into the NHC determination. Thus, Maryland’s decision criteria are properly classified as medical necessity; but, it may be the case that functional concerns could affect the determination in subtle ways. Alaska has two levels of eligibility. The skilled care criteria only addresses issues of medical necessity, but the intermediate care criteria include consideration of functional status. Kansas, whose NHC definition was classified as medical/functional by the AARP study, is more properly thought of as using a comprehensive definition. Their NHC criteria explicitly considers issues of social support and vulnerability.

Table 1 shows the proportion of weighted sample members who met each state’s NHC definition for each of the two databases (excluding people with ESRD). For the NLTCs data, the proportion ranged from 8.4% to 20.7%; for the MCBS data, the proportion ranged from 9.9% to 16.1%. Each of the definitions includes any resident residing in an institution. So, a fixed portion of each estimate in Table 1 (5.5% for NLTCs and 6.1% for MCBS) is attributable to those residing in institutions.

The similarity (or difference) in NHC estimates from definition to definition arise from differences in the way the NHC definitions were operationalized in the two databases. There are two important sources of difference. First, different elements of the NHC definition may have been available in each of the databases. For example, there are different IADL items available in each database. Second, similar items may have been defined differently in the two databases. These differences may arise (a) because similar questions are phrased differently in the two surveys, or (b) because, where there were no simple ways to define items, we attempted to develop proxy definitions. These also varied considerably between the two databases. Most importantly, in the MCBS, some data elements were defined using claims data. For example, the NLTCs does not include any direct information about the use of feeding tubes. As a proxy, we coded any individual whose ADL information indicated that they did not eat, as using some type of feeding tube. The same data, failure to eat, was used to code three distinct data elements:

feeding by nasogastric tube, feeding by jejunostomy, and intravenous feeding. In the MCBS data, we used HCPCS codes from the claims data to identify individuals with claims related to the use of specific types of feeding approaches. Specific codes could be used to identify equipment and nutritional items related to each of these three types of feeding methods. While this allowed us to be more specific in our definitions, it did restrict us to identifying only those individuals for whom Medicare paid for feeding supplies. This introduces an important difference, in which NHC status defined in the MCBS includes consideration of receipt of Medicare services.

Table 1 also shows the type of NHC definition used by each state (medical necessity, medical and functional, comprehensive), as defined from the AARP report. One would expect that those three groups would capture different shares of the population, with “medical necessity” being the narrowest and “comprehensive” being the broadest category. In the MCBS data, the state that had the largest proportion NHC (Florida) used a comprehensive definition, and the state with the smallest proportion (Alabama) used a medical necessity definition. However, the two other states that used comprehensive definitions did not appear to differ from states using “less broad” definitions. In the NLTC database, the states that used comprehensive definitions had relatively low proportions of residents found to meet NHC criteria. This inconsistency between performance and expectation may partially reflect the imprecision of the labels used. However, Alabama, a truly “medical necessity” state, fell into the mid-range of the states in terms of the proportion of residents identified as NHC.

Table 1. Proportion of Weighted Sample Meeting State’s NHC Definition

State	NHC Type	NLTCS	MCBS
AL	Medical Necessity	11.5%	11.6%
AK	Medical Necessity	8.5%	10.5%
FL	Comprehensive	12.6%	16.1%
KS	Medical/Functional	12.8%	11.6%
LA	Medical/Functional	17.1%	13.9%
MD	Medical Necessity	20.7%	13.9%
MA	Medical/Functional	8.4%	9.9%
MN	/Comprehensive	11.4%	11.1%
MT	Comprehensive	8.7%	13.5%

Note: Data exclude cases that are ESRD and, in the MCBS, that are enrolled in HMOs.
Weights in the NLTCS were adjusted to reflect probability of being enrolled in an HMO.

A key step in this analysis was the **identification** of a reduced set of NHC definitions. Given the nine definitions available, there were 5 12 (29) possible combinations available. However, in both databases far fewer combinations were found to **actually** exist, supporting the idea of a reduced set.

NLTCS

Of the 5 12 possible combinations, only 102 were actually found in the NLTCS. Of those, fully 79 of the combinations captured 0.1% or less of the weighted population. The remaining 23 combinations described 97.2% of all individuals, including those who did not meet any state’s NHC criteria. Overall, 76.0% of individuals did not meet any

state's definition of NHC, and 6.6% were NHC in all states by virtue of being in nursing facilities. These findings suggest a high degree of clustering. To some extent, this is due to data limitations that force more similarity than might otherwise be found. However, a qualitative review of the NHC definitions used supports the idea of a high degree of clustering.

MCBS-Based Analysis

Of the 512 possible combinations, 70 were found in the data. Of those, 52 of the combinations represented 0.1% or less of the weighted population each. The remaining 18 combinations described 98.9% of the weighted individuals. Overall, 76.9% did not meet any state's definition, and 6.2% meet all states' definitions due to being in nursing facilities. These proportions are very similar to those found in the NLTCS database.

Summarizing NHC Status

There are many ways to summarize NHC status. We fit a number of models. Table 2 shows one such grouping. Individuals were classified using a hierarchical grouping. People who were NHC by virtue of being in a nursing facility were placed in the first level of the hierarchy. Of those who were NHC and in the community, they were placed in the next level of the hierarchy if they met the NHC definition of either Maryland or Alabama, two of the states using medical necessity to determine NHC status. People who were not in an institution, and who were not NHC in either Maryland or Alabama were placed in the next category, if they were NHC under Louisiana or Kansas **(medical/functional) criteria**. Finally, those who did **not** meet any of the preceding criteria were placed in a final category if they met the NHC criteria of either Florida or Montana. This scheme categorized all individuals in both databases, with only one exception in the 1996 MCBS.

Table 2 shows the distribution of individuals who met each state's criteria, by their placement in this hierarchical scheme. Obviously, individuals who met either Maryland's or Alabama's criteria could **only occur in one of the** first two categories. In the MCBS database, people who met Alaska's criteria, which was the third medical necessity state, were fully captured by these first two criteria also. That is, there was no one who was NHC in Alaska, who was not also NHC in either Maryland or Alabama (or both). While the same was not true in the NLTCS database, there were very few weighted individuals for whom this was not true. In that database, only 1.5% of the people who were NHC in Alaska were not also NHC in either Maryland or Alabama.

In the MCBS database, people who were NHC under Louisiana or Massachusetts, **two** of the medical/functional states, were fully captured by the Maryland/Alabama medical necessity category. Using NLTCS **data**, the same was true for nearly all of the people who were NHC in Massachusetts; but the finding did not hold for people who were NHC in Louisiana.

People who were NHC in states using comprehensive criteria were nearly all represented by the medical necessity or medical/functional states, using the NLTCS database. However, in the MCBS database; this was not true. Nonetheless, 80% of people who were NHC under the Florida criteria, and 15% who were NHC under Montana rules were captured by states using more restrictive definitions. These findings emphasize the high

degree of overlap among state definitions.

Table 2. Distribution of NHC-Eligible Persons Across Summary Levels

1994 NLTCs

State of Definition	NHC Type	Total NHC by Hierarchical Level				Community-Based NHC by Level			NHC Total
		Institution	AL or MD	LA or KS	FL or MT	AL or MD	LA or KS	FL or MT	
AL	Med Nec	47.8%	52.2%			100.0%			3,413,971
AK	Med Nec	64.5%	34.0%	1.5%		95.9%	4.1%		2,531,668
FL	Comp	43.6%	46.1%	9.2%	1.1%	81.9%	16.3%	1.9%	3,741,365
KS	Med/Fxn	42.8%	46.5%	10.7%		81.3%	18.7%		3,813,623
LA	Med/Fxn	32.2%	51.4%	16.4%		75.8%	24.2%		5,076,849
MD	Med Nec	26.5%	73.5%			100.0%			6,149,939
MA	Med/Fxn	65.5%	33.8%	1.7%		98.0%	2.0%		2,492,534
MN	Comp	48.4%	49.7%	12.0%		76.8%	23.2%		3,376,204
MT	Comp	63.0%	35.1%	0.7%	0.1%	97.8%	1.9%	0.3%	2,590,112

1996 MCBS

State of Definition	NHC Type	Total NHC by Hierarchical Level				Community-Based NHC by Level			NHC Total
		Institution	AL or MD	LA or KS	FL or MT	AL or MD	LA or KS	FL or MT	
AL	Med Nec	52.7%	47.3%			100.0%			3,588,171
AK	Med Nec	58.2%	41.8%			100.0%			3,250,532
FL	Comp	38.0%	20.7%	21.2%	20.1%	33.4%	34.2%	32.4%	4,978,102
KS	Med/Fxn	52.5%	17.2%	30.3%		36.2%	63.8%		3,600,237
LA	Med/Fxn	43.9%	56.1%			100.0%			4,304,467
MD	Med Nec	44.0%	56.0%			100.0%			4,295,268
MA	Med/Fxn	61.5%	38.5%			100.0%			3,077,671
MN	Comp	55.1%	34.9%	9.5%	0.5%	77.7%	21.0%	1.2%	3,434,326
MT	Comp	45.4%	33.3%	6.6%	14.8%	60.9%	12.1%	27.0%	4,170,006

Discussion

The preceding analyses lead to several important conclusions. First, the data suggest that, although states use a wide variety of approaches to determining NHC status, there is a great deal of overlap among the definitions. To some extent, this similarity is forced by our limited data; but comparison of the data elements considered in each definition support the finding of overlap.

Second, it is clear that even when using data sources designed to provide health status and care utilization information, neither source provides the detail needed to determine the NHC status of the individual, especially under the myriad of possible sets of rules that are used from state to state.

Third, even the best of data cannot fully capture the role of clinical judgment, something that is important in most states' definitions.

Fourth, both databases yield similar estimates of the total NHC population, and of the proportions that are eligible due to current nursing home residence. While this comparability lends some added credibility to the estimates, the truth is that we do not know how many individuals in the population would truly meet these definitions.

Stability of NHC Status

Any individual is likely to experience changes in their health and functional status over time that may affect their status with respect to NHC criteria. They may fall out of NHC status, or the reasons that they **qualify** for NHC status may change over time. Using the MCBS data, we can observe an individual's NHC status over time. The following table shows the percentage of individuals NHC in 1995, who remain NHC in 1996, by NHC definition type and health status. (The health status definitions are explained in more detail in the construction of Cost Level Groups later in this report.)

Health Status	Percent Remaining NHC		
	Med Nec	Med/Fxn	C o m p
Well	33%	33%	33%
IADL only or Co9 Imp	36%	43%	78%
1 ADL Impaired	53%	55%	70%
2-3 ADLs	70%	81%	92%
4-5 ADLs	79%	95%	99%
Institutional	100%	100%	100%
Total	71%	74%	79%

Overall, 70% to 80% of surviving individuals remain NHC from one year to the next, depending upon the type of NHC definition employed. It is also clear that the health status of the individual at the end of the year helps to determine the likelihood of persisting in NHC status. By definition, anyone in an institution at the end of the year will continue to be NHC. Those who start the year NHC and end up the-year without IADL, ADL or cognitive impairment are likely (67%) to no longer be NHC.

We also looked at the effect of adding information on the start-of-year health status. The impact on NHC was unclear and was not pursued further,

Medicare Fee-For-Service Cost Model

National Long Term Care Survey Data Considerations

The 1994 round of the National Long Term Care Survey (NLTCs), with linked Medicare claim records for 1994 and 1995, was a principle source of data for this study. Survey responses and linked claim records for the three calendar months prior to the interview were used to classify individuals with respect to demographic characteristics and health status. Linked claim records for the four month period starting with the calendar month of the interview were used to derive the relationship between these characteristics and expected Medicare Fee-For-Service (FFS) monthly claim payments.

Linked claim records included charges and payments by type of service for 1994 and 1995 along with the service period associated with each record. The payment amount for each claim record (or line item within a record) was prorated across the indicated service period to obtain payment amounts by calendar month of service. Average monthly claim amounts for the three month period prior to the interview month and the four month period starting with the interview month were summarized for each individual. The pre-survey claim activity was used as explanatory variables in the construction of the cost model. The post-survey claim activity served as the dependent variable in the cost model regression analyses. The four month maximum was felt to be short enough to assure that the individual's characteristics would not have drifted very far from those measured on the interview date and was long enough to provide a reasonably credible estimate of the individual's Medicare claim rate.

Since the NLTCs is not a random sample of Medicare enrollees, individual-specific weights provided with the public use files were used in the statistical analysis of the survey data. Some individuals represented a few hundred individuals in the general population while others represented several thousand.

Individuals with claim records indicating End Stage Renal Disease (ESRD) were removed from the analysis, since the Medicare costs of such individuals is not covered under the **capitation** structure.

Two limitations of the NLTCs presented problems in the analysis. First, the NLTCs did not include Medicare enrollees below the age of 65, i.e. the adult disabled population. We relied, instead, on the Medicare Current Beneficiary Survey data to provide information on this group.

The second issue concerns the identification of individuals enrolled in managed care programs such as Medicare **HMO's**. Since the objective of the analysis was to estimate NHC expected FFS expenditures, we needed to remove the managed care population from the survey data. The linked Medicare claim records only related to FFS claims, so no adjustments were needed to remove managed care expenditures from that data. The survey records, however, included a complete cross-section of elderly Medicare enrollees, some of whom were enrolled in managed care. Unfortunately, there was no explicit identifier in the survey for managed care enrollees. To overcome this shortcoming in the data, we used the MCBS data files (where managed care status was available for all records) to examine the relationship between linked FFS claim record

activity and managed care enrollment. We develop a simple predictive **model of** managed care status as a function of the presence/absence of FFS claim records and attained age. This predictor was applied to each individual in the NLTCs sample by multiplying the individual's sample weight by the estimated probability that the individual was not enrolled in managed care. The re-weighted NLTCs sample was representative of the Medicare elderly FFS population in 1994.

Medicare Current Beneficiary Survey Data Considerations

The second principal data source employed in the study was the 1994, 1995 and 1996 Access to Care rounds from the Medicare Current Beneficiary Survey (MCBS), along with the linked Medicare FFS claim records for each year. As with the linked NLTCs claim records, we grouped claim amounts by service month relative to the interview month. **Unlike** the NLTCs, however, the linked claim records were subject to discontinuities at the end of each calendar year.

The Access to Care public use files are structured on an "always-enrolled" basis within each survey year. That is, individuals must be enrolled in Medicare continuously from the start of the year through the Access to Care interview date in that year to be included in the file. Only the claim records associated with these individuals are included in the linked claim file for that year. For example, if an individual included in the 1994 survey dies in 1995 before the 1995 interview, no information about the death will be available in the 1995 survey and no 1995 FFS claim records will be available in the 1995 linked claim file. Consequently, we can only follow the post-interview FFS claim experience through the end of the interview year.

For each individual, we computed the average monthly Medicare FFS claim amount for a relatively short period of time during and following the interview month. For each individual the observation period was defined to start at the beginning of the interview month and extend through the earliest of (1) the end of the month of death, (2) the end of the interview year, or (3) the end of the third calendar month following the interview month. The four month maximum was felt to be short enough to assure that the individual's characteristics would not have drifted very far from those measured on the interview date and was long enough to provide a reasonably credible estimate of the individual's Medicare claim rate. We limited the observation period to the end of the calendar year since matching claim records for the following year were only available for those who persisted to the next Access to Care interview date. (Including these claims would have biased the calculations by giving disproportionately greater weight to survivors versus those who died or were otherwise excluded from the next round of interviews.)

So, the sampled monthly claim rates included the pre-death claim experience of individuals who die during the observation period. Using this approach, rather than dividing the individual's claims for the full year by 12, yields two significant advantages:

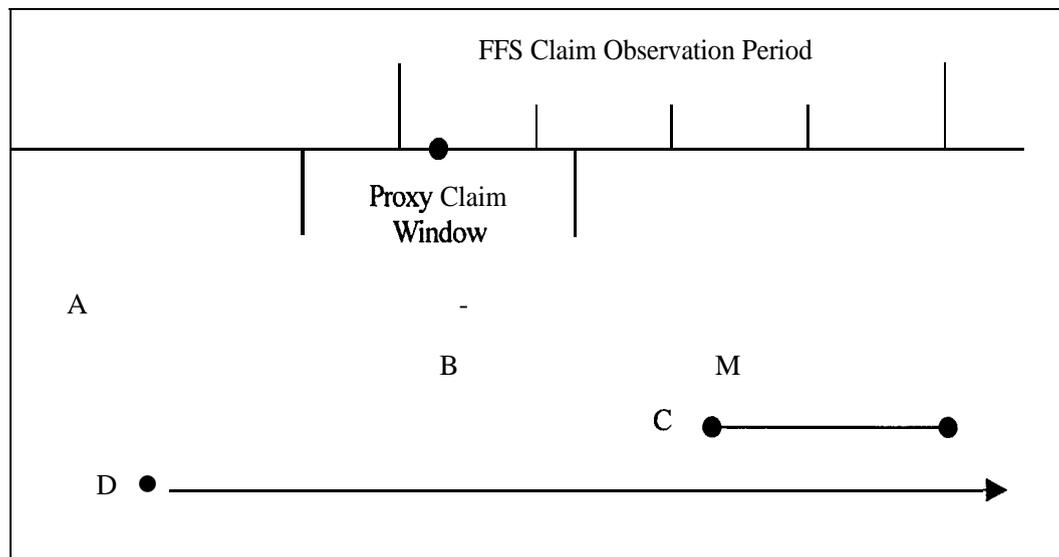
- (1) The effects of status drift are minimized, and,
- (2) End-of-life claim costs are appropriately represented.

For interviews occurring in September or earlier, this approach provided the full four

month period used in the NLTC analysis. For interviews occurring after September, the post-interview period was shorter. Regardless of the length of the observation period, however, the post-interview claim experience was expressed as a monthly average FFS expenditure. For the 1996 MCBS, the lengths of the observation periods were distributed as follows:

4 months (interviews prior to October)	28%
3 months (October interviews)	37%
2 months (November interviews)	23%
1 month (December interviews)	12%

As indicated previously, we used linked claim records to help determine the NHC status of individuals included in the MCBS. The records employed for NHC determination frequently overlapped with claim records contributing to the post-survey FFS claim experience described above. See the diagram below. The dot represents the individual's interview date. The vertical lines on top of the **timeline** indicate four calendar months, starting with the interview month. The two vertical lines below the **timeline** identify a two-month-wide period centered on the interview date. Four sample claim service periods are displayed below the time line and labeled A, B, C and D.



Any claim record with a service period which includes the interview date or begins/ends within one month of the interview date, was inspected for service or diagnosis codes that might indicate NHC status for the individual. In the diagram, this corresponds to inspecting claim records with service periods that intersect with the "Proxy Claim Window" on the timeline. In this example, claims A, B and D would be selected and reviewed for service/diagnosis codes that might indicate NHC status.

Individual FFS claim rates were computed from claims accrued during a period of up to

four months starting at the beginning of the interview month. This is shown as the “FFS Claim Observation Period” over the timeline in the diagram. Each of the four claims would contribute to the individual’s FFS claim rate value. Since claims B and C are contained completely within the observation period, the entire payment for each would be included in the numerator of the claim rate. Only the fraction of claims A and D which overlap with the observation period are included in the claim rate numerator.

So, many of the claims that make one individual’s claim rate greater than another individual’s rate, are likely to be the source of proxy status information triggering identification of that individual as NHC. In the diagram, claims A, B and D are used both to determine NHC status and in the claim rate calculation. This overlap produced a strong bias in the monthly Medicare claim rates associated with individuals identified as NHC using this technique. Consequently, we elected not to use the MCBS data to estimate the impact of NHC status on Medicare FFS expenditure rates. The MCBS data was retained, however, for calibrating other aspects of the cost and population models.

We experienced some difficulty in reading the linked claim records. Specifically, we encountered missing data bytes in a few records. Since this occurred in only 0.01% of the records, we elected to remove these records from the data without further analysis.

ESRD and managed care enrollment status were explicitly available in the MCBS data, enabling us to easily remove these groups from the analysis.

Cost Level Groups

Definitions

It was recognized early in the study that the NHC population defined by any specific definition was not a homogeneous collection of individuals. Differences in age, sex, functional, cognitive and medical status can be significant within any NHC population. As a result, expected monthly FFS expenditures can vary dramatically from one NHC individual to another. Using data available from both the NLTCs and the MCBS, cost level groups (CLG’s) were defined to identify the key factors that explain these expected cost variations within the NHC population.

Initially, the CLG structure included age group, sex, Medicaid status, institutional status, functional impairment (ADL’s and IADL’s), cognitive status and other factors represented by the level of recent FFS claim activity. The analysis of post-interview FFS claim data produced model R^2 values of 12% and 11% respectively for the 1994 NLTCs and 1994/95/96 MCBS data. Medicaid status was statistically insignificant, accounting for only 0.1% of the variation explained by the full NLTCs model and 0.003% in the MCBS model. We further found that age could be ignored beyond the distinction between the disabled adult (<65) and the elderly (65+) Medicare populations, accounting for 0.3% of explained variation in the NLTCs model and 0.1% in the MCBS model. With these variables removed, the CLG’s are formed by the intersection of the following defining dimensions:

- Sex
- Disabled adult versus Elderly

- Functional/Cognitive Status

<u>Status</u>	<u>Description</u>
0	Well, i.e. no functional/cognitive impairments
1	One or more of 6 IADL's impaired or cognitive impairment
2	One of 5 ADL's impaired
3	Two or three of 5 ADL's impaired
4	Four or five of 5 ADL's impaired
5	Institutionalized

The five ADL's considered were eating, dressing, transferring, bathing and toileting. The six IADL's included telephone use, heavy housework, light housework, meal preparation, shopping and paying bills. Cognitive impairment on the MCBS was based upon an explicit indication of mental retardation or 'Alzheimers on the survey or an indication that the interview was completed by proxy due to mental inability of the individual. Cognitive impairment on the NLTCS was based upon two or more incorrect responses to the Short Portable Mental Status Questionnaire (SPMSQ) included in the survey, or an explicit indication of mental retardation, senility or Alzheimers, or an indication that the interview was completed by proxy due to a mental/physical impairment of the individual.

- Recent Medicare FFS Claim Activity

After accounting for the effects of age, sex and functional/cognitive status, a great deal of variation in expected average monthly FFS expenditures remained from individual to individual. There are a multitude of individual characteristics that contribute to this remaining variation, not all of which are available from the survey questionnaires. Rather than attempting to itemize these lurking variables, we employed recent claim history as an aggregate proxy for these factors. Knowledge of an individual's claim activity prior to the interview proved to be a significant factor in predicting post-interview claim activity. We classified individuals based upon the average monthly FFS claims incurred in the three calendar months prior to the interview month according to the following:

<u>History</u>	<u>Description</u>
0	No Medicare claims
1	Average monthly claim < \$100
2	Average monthly claim < \$1,000

With both the NLTCs and MCBS data analyses, adding this claim history variable increased the model R^2 values from about 4% to about 11%.

While a recent claim history variable of this particular form may not be available for use in the PACE rate structure, other indications of recent claim activity may be available. The proposed Medicare + Choice risk adjustment structure includes a factor based upon the diagnosis codes for hospital stays in the year prior to the rate year. The claim history variable provides some insight into the effect on frailty adjusters of incorporating this type of prior claim information into the base rate to which the adjuster is applied.

But beyond this function, the recent claim history variable is valuable as an internal component of the capitation model, even if no such variable is directly employed in the base-rate/adjuster structure. The capitation model tracks a cohort of individuals, initially known to be NHC, over the subsequent 12 months (and beyond if necessary). Factors that influence FFS claim activity drift away from their initial values. These cost factors include those represented by the recent claim history proxy variable. By inspecting changes between consecutive MCBS surveys in this history variable, the population model provides the capitation model with the trajectory and speed of this drift. So, even if we are concerned with projecting only aggregate claim activity for a particular population of interest, breaking down the calculation by level of recent claim activity provides a more reliable basis for trending the underlying factors that explain changes in aggregate FFS costs over time.

Tables 3 and 4 below show population estimates, broken down by these CLG dimensions, from the 1994 NLTCs and the 1996 MCBS.

Table 3. Medicare Enrollment by Age and Sex

Sex	Age Group	Enrollees (000s)		Sex	Age Group	Enrollees (000s)	
		94 NLTCs	96 MCBS			94 NLTCs	96 MCBS
Male	55-59		360	Female	55-59	-	309
	60-64		472		60-64		307
	65-69	3,673	3,252		65-69	4,565	3,418
	70-74	3,429	3,183		70-74	4,616	4,152
	75-79	2,431	2,310		75-79	3,477	3,513
	80-84	1,442	1,482		80-84	2,589	2,573
	85-89	679	667		85-89	1,616	1,457
	90-94	216	242		90-94	668	698
	95-99	53	50		95-99	244	210
			11,923		12,017		
Aggregate						29,698	28,653

The entries in these tables are not survey sample counts, but are the sum of cross-sectional weights assigned to each sampled individual in the survey files. In essence, each individual sampled is deemed to represent a block of individuals in the general

Medicare population with similar characteristics. The cross-sectional weight indicates the number of such individuals represented by the surveyed individual. The individual weights generally ranged from 1,000 to 2,000 in each survey. Throughout the analyses, these weights were used in cross-tabulations and regression modeling.

Table 4. Medicare Enrollment by Health Status and Recent Claim Activity Level

Func/Cog Status	Recent Claims	Enrollees (000s)		Func/Cog Status	Recent Claims	Enrollees (000s)	
		94 NLTCS	96 MCBS			94 NLTCS	96 MCBS
Well	\$0	9,295	6,658	2-3 ADLs	\$0	240	196
	<\$100	9,153	9,483		<\$100	403	481
	<\$1000	3,362	3,838		<\$1000	299	346
	\$1000+	873	878		\$1000+	229	335
		22,683	20,856			1,171	1,358
IADL/CI	\$0	650	548	4-5 ADLs	\$0	156	100
	<\$100	897	991		<\$100	197	160
	<\$1000	374	589		<\$1000	222	199
	\$1000+	148	250		\$1000+	317	282
		2,068	2,377			892	741
1 ADL	\$0	274	317	Institutional	\$0	179	57
	<\$100	510	596		<\$100	746	806
	~\$1000	321	500		<\$1000	433	510
	\$1000+	145	230		\$1000+	275	304
		1,250	1,643			1,633	1,677

Note that the NLTCS values are restricted to ages at or above 65. The MCBS values displayed are for ages greater than or equal to 55 (the minimum age for PACE eligibility), but exclude individuals not enrolled in Medicare continuously from the start of the year through the interview date. Consequently, the MCBS values for disabled adults and for new elderly enrollees (age 65) are understated. Aside from these differences, the results from the two data sources are reasonably consistent.

NHC Status by CLG

Using the three working definitions of NHC outlined previously, i.e. Medical Necessity, Medical/Functional, and Comprehensive, we can inspect the relationship between NHC status and CLG. Table 5 below shows, broken down by health status and recent claim history grouping, the percentage of individuals classified as NHC based upon the 1994 NLTCS using the three working definitions.

Table 5. 1994 NLTCs NHC Status by Health Status and Recent Claim Activity

Health Status	Recent Claims	Total Enrollees	NHC Count (000s)			% NHC		
			Med Nec	Med/Func	Comp	Med Nec	Med/Func	Comp
Well	\$0	9,295	248	311	311	3%	3%	3%
	<\$100	9,153	508	566	566	6%	6%	6%
	<\$1000	3,362	280	296	296	8%	9%	9%
	\$1000+	873	73	76	76	8%	9%	9%
		22,683	1,109	1,248	1,249	5%	6%	6%
IADL/CI	\$0	650	202	303	315	31%	47%	48%
	<\$100	897	459	567	577	51%	63%	64%
	<\$1000	374	232	279	282	62%	75%	75%
	\$1000+	148	110	114	115	74%	77%	78%
		2,068	1,003	1,263	1,288	49%	61%	62%
1 ADL	\$0	274	127	216	216	46%	79%	79%
	<\$100	510	304	384	388	60%	75%	76%
	<\$1000	321	237	269	272	74%	84%	85%
	\$1000+	145	114	135	137	78%	93%	94%
		1,250	782	1,004	1,013	63%	80%	81%
2-3 ADLs	\$0	240	94	192	192	39%	80%	80%
	<\$100	403	276	357	359	68%	88%	89%
	<\$1000	299	246	281	281	82%	94%	94%
	\$1000+	229	203	227	227	89%	99%	99%
		1,171	819	1,057	1,059	70%	90%	90%
4-5 ADLs	\$0	156	123	151	154	78%	97%	98%
	<\$100	197	178	197	197	91%	100%	100%
	<\$1000	222	210	222	222	95%	100%	100%
	\$1000+	317	306	316	316	97%	99%	99%
		892	817	885	888	92%	99%	99%
Institutional	\$0	179	179	179	179	100%	100%	100%
	<\$100	746	746	746	746	100%	100%	100%
	<\$1000	433	433	433	433	100%	100%	100%
	\$1000+	275	275	275	275	100%	100%	100%
		1,633	1,633	1,633	1,633	100%	100%	100%
Total		29,696	6,163	7,090	7,130	21%	24%	24%

As expected the NHC percentage generally increases with increasing impairment and recent claim activity. Institutional individuals are, by definition, 100% NHC under the working definitions. There is a significant increase in NHC count going from the Medical Necessity definition to the Medical/Functional definition, with most of the increase occurring in cells associated with moderate functional/cognitive impairment and modest recent claim activity. Only a very few individuals are added to the NHC tally by moving to the Comprehensive definition.

Table 6 below shows the same results using the 1996 MCBS data and NHC coding scheme.

Table 6. 1996 MCBS NHC Status by Health Status and Recent Claim Activity

Health Status	Recent Claims	Total Enrollees	NHC Count (000s)			% NHC		
			Med Nec	Med/Func	Comp	Med Nec	Med/Func	Comp
Well	\$0	6,658	95	96	125	1%	1%	2%
	<\$100	9,483	411	411	463	4%	4%	5%
	<\$1000	3,838	397	397	440	10%	10%	11%
	\$1000+	678	212	212	222	24%	24%	25%
		20,856	1,115	1,116	1,250	5%	5%	6%
IADL/CI	\$0	548	3	51	189	1%	9%	34%
	<\$100	991	46	84	242	5%	8%	24%
	<\$1000	589	115	153	250	20%	26%	43%
	\$1000+	250	102	116	140	41%	46%	56%
		2,377	266	404	820	11%	17%	35%
1 ADL	\$0	317	18	49	97	6%	15%	30%
	<\$100	596	36	90	191	6%	15%	32%
	<\$1000	500	147	182	237	29%	36%	47%
	\$1000+	230	116	125	154	50%	55%	67%
		1,643	316	445	680	19%	27%	41%
2-3 ADLs	\$0	196	8	85	144	4%	44%	73%
	<\$100	481	47	193	323	10%	40%	67%
	<\$1000	346	125	187	271	36%	54%	78%
	\$1000+	335	260	286	316	78%	86%	95%
		1,358	440	753	1,054	32%	55%	78%
4-5 ADLs	\$0	100	11	89	96	11%	89%	95%
	<\$100	160	13	126	154	8%	79%	96%
	<\$1000	199	91	183	196	46%	92%	98%
	\$1000+	282	228	271	280	81%	96%	99%
		741	343	670	725	46%	90%	98%
Institutional	\$0	57	57	57	57	100%	100%	100%
	<\$100	806	806	806	806	100%	100%	100%
	<\$1000	510	510	510	510	100%	100%	100%
	\$1000+	304	304	304	304	100%	100%	100%
		1,677	1,677	1,677	1,677	100%	100%	100%
Total		28,653	4,158	5,065	6,207	15%	18%	22%

While we again see increasing NHC percentages with increasing impairment and recent claim activity levels, the pattern of increase is different from that obtained from the 1994 NLTCs data. In particular, the MCBS results indicate a stronger reliance on recent claim activity than is the case with the NLTCs data. This is more likely due to the differences in the types of information available in the two surveys than to tiny significant differences in the sampled populations.

Much of the information in the MCBS NHC coding scheme is derived from service identification codes on linked claim records with service periods intersecting a two-month period centered at the interview date. Individuals with little or no recent claim activity provide little evidence of NHC-triggering conditions. The NHC coding scheme used with the NLTCs data, on the other hand, is based entirely on survey items. So, NHC-triggering conditions for which no Medicare service is being received due to the availability of other funding sources or informal care, for example, would more likely be identified in the NLTCs scheme than in the MCBS scheme.

Medicare FFS Monthly Costs by CLG

The Cost Level Groups were defined to break down the NHC working definitions into subgroups that help to explain the variation Medicare FFS claim activity within and

between NHC classifications. Table 7 below shows the average monthly FFS expenditures by major CLG grouping arising from the 1994 NLTCS and from the combination of the 1994, 1995 and 1996 MCBS Access to Care files.

Table 7. Monthly Medicare FFS Costs by Health Status and Recent Claim Activity

Health Status	Recent Claims	1994 NLTCS	1994/195/196 MCBS	Health Status	Recent Claims	1994 NLTCS	1994/95/96 MCBS
Well	\$0	\$ 98	\$ 93	2-3 ADLs	\$0	\$ 445	\$ 305
	<\$100	205	178		<\$100	397	300
	<\$1000	434	362		<\$1000	555	602
	\$1,000+	1,308	1,052		\$1,000+	1,911	2,075
		238	221			819	815
IADL/CI	\$0	135	117	4-5 ADLs	\$0	620	361
	<\$100	325	311		<\$100	520	714
	<\$1,000	655	611		<\$1,000	976	1,014
	\$1,000+	969	1,598		\$1,000+	3,041	3,681
		371	469			1,548	1,875
1 ADL	\$0	186	160	Institutional	\$0	281	204
	<\$100	298	281		<\$100	388	306
	<\$1,000	622	800		<\$1,000	752	588
	\$1,000+	1,768	1,547		\$1,000+	1,863	2,288
		528	593			721	748
Total						\$ 348	\$ 365

The overall average values are consistent with published national Medicare monthly expenditures. The 1994 NLTCS average value of \$348 per month is very close to the \$343 per month average reported for aged, non-ESRD Medicare enrollees in calendar year 1994. (HCFA Review, Medicare and Medicaid Statistical Supplement, 1996, Table 14.) Likewise, the 1994/95/96 MCBS average value of \$365 per month is very close to the non-ESRD average of \$369 reported for Medicare enrollees in 1995. (HCFA Review, Medicare and Medicaid Statistical Supplement, 1996, Table 14. Please note that the \$369 average is a weighted average of the non-ESRD aged and non-ESRD disabled adult values at the end of the table.)

Within these global averages, both data sources exhibit average FFS expenditures ranging from as little as \$100 per month to more than \$3,000 per month. It is also interesting to note that the most expensive cells are not associated with individuals residing in institutions, but with heavily impaired community residents.

Finally, while there are some cell-by-cell differences between the NLTCS and MCBS values, overall the monthly average cost patterns by health status and level of recent claim activity are quite similar. So, while we have concerns about the adequacy of the MCBS data as a basis for identifying NHC individuals, it appears to yield CLG counts and average expenditures consistent with those obtained from the NLTCS. Thus, even if we completely discount the MCBS in terms of its NHC information, it remains valuable as a tool for extrapolating the relationship **between** NHC and CLG's, found by analyzing the NLTCS, to ages below 65 and using observed MCBS CLG migration from year to year to predict NHC status changes and trends in FFS costs within a NHC populations.

Medicare FFS Cost Regression Model

We next consider the marginal impact of NHC status conditional upon the information contained in the CLG structure. With the additional NHC dimension, data **sparsity** requires that we employ regression methods to estimate NHC effects within **CLG's**, rather than computing sample averages for every combination of CLG and NHC status.

Several transformations, including log and power functions, were applied to monthly average FFS claims with only limited success. While the transformations did partially stabilize the variance of the response variable, the remaining heteroscedasticity introduced significant bias when the inverse transformation was applied to obtain estimates of expected monthly FFS expenditures. Lacking a workable **variance-stabilizing** transformation, weighted least square regression was applied without a transformation to estimate cost model parameters. It is interesting to note that, when log transformations were applied, the CLG model R^2 values increased from about 11% to about 35% for both the NLTCs and MCBS data analyses. This would seem to imply that the CLG does a better job of explaining low to moderate variations in individual monthly claim costs than extreme **deviations** from the average.

Cost models were fit separately to the 1994 NLTCs and the combined 1994/95/96 MCBS data without NHC status as an explanatory variable to provide baseline costs by CLG. These models included distinct parameters for each combination of health status, claim history level and disabled/aged classification. Additional adjustment terms for the enrollee's gender varied by claim history level. The resulting model R^2 values were 11% for both data sources. Table 8 below shows the parameter estimates along with approximate standard deviations. (While these standard deviations are not precise, they provide a reasonable basis for assessing the volatility of the corresponding parameter estimates.)

With baseline cost estimates in hand, additional, simpler models were fit to the NLTCs data to estimate the impact of NHC status on expected monthly costs. Identical model forms were fit using the three **NHC** working definitions. These models included terms for each combination of health status, recent claim activity level and aged/disabled classification, plus additive NHC adjustment terms, one for health status, one for claim history level and one for aged/disabled classification. Estimated NHC costs from these models were compared to those from a simple model which excluded the NHC adjustment terms. These differences by CLG were used to adjust the baseline NLTCs cost estimates in Table 8 to obtain expected NHC monthly costs.

The resulting **NHC costs are most easily seen in the output from the capitation** model described later in this report. Table 9 below shows average monthly FFS costs generated by the capitation model using the NLTCs cost model described in this section.

Table 9 indicates that the percentage loading for NHC decreases to nearly zero as we move to more heavily impaired health statuses. When both CLG dimensions, health status and recent **claim activity, are considered together, the statistical significance of** NHC status is greatly diminished. That is, the CLG structure "explains away" a substantial portion of the higher-than-average costs observed for NHC individuals. This effect is more pronounced for the Medical/Functional and Comprehensive working definitions of NHC than for the Medical Necessity definition. While the Medical

Necessity NHC effect contributes an additional 0.2% to the model's 11.7% R² value, the two broader definitions produce increments of only 0.05%.

Table 8. Baseline Monthly Medicare FFS Cost by CLG

Health Status	Recent Claims	1994 NLTCs		94/95/96 MCBS (65+)		94/95/96 MCBS (<65)	
		Cost / Mo.	Std. Dev.	Cost / Mo.	Std. Dev.	Cost / Mo.	Std. Dev.
Well Female	\$0	96	22	92	20	96	51
	<\$100	182	21	163	16	165	52
	<\$1000	387	35	318	25	433	76
	\$1000+	1,093	68	873	51	927	131
IADL/CI Female	\$0	133	65	99	59	30	65
	<\$100	307	55	316	41	124	74
	<\$1000	618	86	599	54	281	112
	\$1000+	805	137	1,514	87	901	182
1 ADL Female	to	185	99	192	72	42	107
	<\$100	284	73	284	51	152	114
	<\$1000	593	92	805	61	412	153
	\$1000+	1,622	138	1,412	84	1,417	260
2-3 ADLs Female	\$0	444	106	365	92	60	112
	<\$100	385	81	304	58	152	135
	<\$1000	828	95	570	68	688	159
	\$1,000+	1,815	109	2,005	71	1,512	225
4-5 ADLs Female	\$0	618	131	427	139	42	173
	<\$100	503	117	766	97	154	190
	<\$1000	945	110	998	88	611	218
	\$1000+	2,887	96	3,639	77	2,701	195
Institutional Female	\$0	279	122	223	171	47	212
	<\$100	377	60	306	44	143	102
	<\$1000	723	79	566	54	472	140
	\$1000+	1,735	101	2,188	73	1,927	229
Male Adjustments	\$0	5	32	1	26	1	26
	<\$100	53	31	35	22	35	22
	<\$1000	108	48	98	32	98	32
	\$1000+	414	76	363	53	363	53

Table 9. 1994 NLTCs NHC Medicare Monthly FFS Cost by CLG

Health Status	Recent Claims	Expected FFS Cost per Month				As % of Base		
		Base	Med Nec.	Med/Func.	Comp.	Med Nec.	Med/Func.	Comp.
Well	\$0	\$98	\$61	\$103	\$95	62%	104%	96%
	<\$100	205	221	202	212	108%	99%	104%
	<\$1000	434	449	450	443	103%	104%	102%
	\$1000+	1,308	884	955	938	68%	73%	72%
		238	286	282	282	120%	119%	119%
IADL/CI	\$0	135	144	124	129	107%	91%	95%
	<\$100	325	360	316	327	111%	97%	100%
	<\$1000	655	686	656	660	105%	100%	101%
	\$1000+	969	887	892	892	91%	92%	92%
		371	450	397	402	121%	107%	108%
1 ADL	\$0	186	198	185	180	106%	99%	97%
	<\$100	298	330	295	294	111%	99%	99%
	<\$1000	622	640	621	617	103%	100%	99%
	\$1000+	1,768	1,671	1,735	1,736	94%	98%	98%
		528	598	553	552	113%	105%	105%
2-3 ADLs	\$0	445	477	520	518	107%	117%	116%
	<\$100	397	433	440	439	109%	111%	111%
	<\$1000	855	874	879	878	102%	103%	103%
	\$1000+	1,911	1,868	1,911	1,911	98%	100%	100%
		819	927	887	885	113%	108%	108%
4-5 ADLs	\$0	620	705	612	608	114%	99%	98%
	<\$100	520	564	520	520	109%	100%	100%
	<\$1000	976	999	976	976	102%	100%	100%
	\$1000+	3,041	3,043	3,038	3,035	100%	100%	100%
		1,548	1,627	1,548	1,544	105%	100%	100%

Population Model

The population model describes the distribution of Medicare enrollees by CLG cell and NHC status as well as the rates of transition among the cells and statuses. Once calibrated, the population model can be used to track the cell/status migration of a population of interest through time.

In this study, the population of interest is taken to be a cohort of Medicare enrollees recently determined to be NHC under one of the working definitions discussed earlier. Since PACE regulations now require annual recertification of NHC status, we are interested in following the progress of the group for at least one year. The cost model of the previous section provides FFS expenditure estimates for only a short period following NHC certification. The population model can be applied to estimate the month-by-month change in the CLG distribution so that the cost model can be applied appropriately several months after NHC certification. The blending of the population and cost models in this manner is the function of the capitation model described in the next section.

Cost Level Group Prevalence Rates Within a NHC Population

For use in the capitation model we are interested in the CLG distribution of individuals recently determined to satisfy NHC requirements. If a new PACE site enrolls new

members randomly from NHC individuals living in the community, the initial CLG distribution can be estimated by inspecting the NLTCS (or MCBS) NHC population. Table 10 shows the age and sex distribution of NHC community residents. Table 11 shows the breakdown by health status and level of recent claim activity.

Table 10. Age and Sex Distribution of NHC Community Residents

Sex	Age Group	1994NLTCS			1996MCBS		
		Med Nec	Med/Func	Comp	Med Nec	Med/Func	Comp
Male	55-59	0.0%	0.0%	0.0%	0.8%	1.1%	1.8%
	60-64	0.0%	0.0%	0.0%	1.2%	1.6%	2.1%
	65-69	7.4%	7.3%	7.2%	8.0%	6.8%	6.4%
	70-74	8.0%	7.8%	7.7%	7.6%	6.9%	7.0%
	75-79	8.4%	8.3%	8.3%	7.6%	7.7%	7.0%
	80-84	7.2%	7.1%	7.1%	5.4%	5.6%	5.4%
	85-89	3.3%	3.6%	3.5%	3.3%	3.4%	3.2%
	90-94	1.3%	1.3%	1.3%	1.3%	1.7%	1.5%
	95-99	0.3%	0.3%	0.3%	0.5%	0.5%	0.5%
		35.9%	35.6%	35.5%	35.8%	35.3%	34.8%
Female	55-59	0.0%	0.0%	0.0%	1.2%	1.6%	2.0%
	60-64	0.0%	0.0%	0.0%	1.2%	1.6%	2.1%
	65-69	9.7%	9.6%	9.7%	8.3%	7.8%	7.8%
	70-74	14.1%	13.5%	13.6%	12.9%	11.9%	12.0%
	75-79	12.7%	12.9%	13.0%	13.4%	11.9%	12.0%
	80-84	12.6%	12.4%	12.4%	13.4%	12.9%	13.2%
	85-89	9.1%	9.8%	9.8%	8.7%	10.0%	9.6%
	90-94	4.5%	4.5%	4.5%	3.9%	5.2%	5.1%
	95-99	1.5%	1.6%	1.6%	1.3%	1.6%	1.5%
		64.1%	64.4%	64.5%	64.2%	64.7%	65.2%

The capitation model allows the user to select any of these initial distributions, a subset of these distributions or any other user-determined distribution. The appropriate choice depends upon the type of analysis being performed. The analysis of a cohort of new enrollees would not include individuals residing in an institution, while analysis of an

Table 11. Cost Level Group Distribution of NHC Community Residents

Health Status	Recent Claims	1994 NLTCs			1996MCBS		
		Med Nec	Med/Func	Comp	Med Nec	Med/Func	Comp
Well	\$0	5.5%	5.7%	5.7%	3.8%	2.8%	2.7%
	<\$100	11.2%	10.4%	10.3%	16.6%	12.1%	10.2%
	<\$1000	6.2%	5.4%	5.4%	16.0%	11.7%	9.7%
	\$1000+	1.6%	1.4%	1.4%	8.5%	6.2%	4.9%
		24.5%	22.9%	22.7%	44.9%	32.9%	27.6%
IADL/CI	\$0	4.5%	5.5%	5.7%	0.1%	1.5%	4.2%
	<\$100	10.1%	10.4%	10.5%	1.9%	2.5%	5.3%
	<\$1000	5.1%	5.1%	5.1%	4.7%	4.5%	5.5%
	\$1000+	2.4%	2.1%	2.1%	4.1%	3.4%	3.1%
		22.1%	23.1%	23.4%	10.7%	11.9%	18.1%
1 ADL	\$0	2.8%	3.9%	3.9%	0.7%	1.4%	2.1%
	<\$100	6.7%	7.0%	7.1%	1.4%	2.6%	4.2%
	<\$1000	5.2%	4.9%	5.0%	5.9%	5.4%	5.2%
	\$1000+	2.5%	2.5%	2.5%	4.7%	3.7%	3.4%
		17.3%	18.4%	18.4%	12.7%	13.1%	15.0%
2-3 ADLs	\$0	2.1%	3.5%	3.5%	0.3%	2.5%	3.2%
	<\$100	6.1%	6.5%	6.5%	1.9%	5.7%	7.1%
	<\$1000	5.4%	5.2%	5.1%	5.1%	5.5%	6.0%
	\$1000+	4.5%	4.2%	4.1%	10.5%	8.4%	7.0%
		18.1%	19.4%	19.3%	17.7%	22.2%	23.3%
4-5 ADLs	\$0	2.7%	2.8%	2.8%	0.4%	2.6%	2.1%
	<\$100	3.9%	3.6%	3.6%	0.5%	3.7%	3.4%
	<\$1000	4.6%	4.1%	4.0%	3.7%	5.4%	4.3%
	\$1000+	6.8%	5.8%	5.7%	9.2%	8.0%	6.2%
		18.0%	16.2%	16.1%	13.8%	19.8%	16.0%

ongoing group would presumably include renewing individuals who moved into an institutional setting after their initial enrollment.

Cost Level Group Transition Rates

In order to follow the progress of a population of interest after NHC certification, it is necessary to know the rate of change in those factors that effect expected FFS costs, i.e. the CLG transition rates. Using the 1994/95/96 MCBS data, individuals can be classified by CLG in successive annual interviews and the transition rates between CLG's can be directly observed.

Unfortunately, the MCBS Access to Care files only include individuals continuously enrolled since the beginning of the interview year. Consequently, individuals who die before the interview date cannot be distinguished from those who leave the survey for other reasons (e.g. terminating panels). Thus, the observed transition rates are conditional upon survival from year to year. These rates can be used, but only in conjunction with estimates of annual survival rates.

Since we can observe the MCBS from the interview date through the end of the year, unbiased estimates of annual mortality rates, by CLG, were obtained by dividing the number of deaths prior to the end of the year by the person-years of exposure from the interview dates to the earlier of the date of death or the end of the year. Table 12 below shows the estimated annual probability of death by CLG and age group. These values have been smoothed so that the rates do not decrease by age or with increasing impairment.

Table 12. Annual Mortality Rates by Cost Level Group, Age and Sex

Health Status	Recent Claims	Male Annual Mortality				Female Annual Mortality			
		45-64	65-74	75-84	85+	45-64	65-74	75-84	85+
Well	\$0	0.7%	1.2%	1.9%	7.2%	0.5%	0.6%	1.2%	4.7%
	<\$100	0.8%	1.3%	2.1%	7.7%	0.5%	0.7%	1.2%	5.0%
	<\$1000	0.8%	1.4%	2.2%	8.0%	0.6%	0.7%	1.3%	5.2%
	\$1000+	2.4%	4.1%	6.2%	22.0%	1.6%	2.1%	3.8%	14.7%
IADL/CI	\$0	0.7%	1.2%	1.9%	7.2%	0.5%	0.6%	1.2%	4.7%
	<\$100	0.8%	1.3%	2.1%	7.7%	0.5%	0.7%	1.2%	5.0%
	<\$1000	0.8%	1.4%	2.2%	8.0%	0.6%	0.7%	1.3%	5.2%
	\$1000+	2.5%	4.1%	6.3%	22.0%	1.6%	2.1%	3.8%	14.7%
1 ADL	\$0	0.7%	1.2%	1.9%	7.2%	0.5%	0.6%	1.2%	4.7%
	<\$100	0.8%	1.3%	2.1%	7.7%	0.5%	0.7%	1.2%	5.0%
	<\$1000	0.8%	1.4%	2.2%	8.0%	0.6%	0.7%	1.3%	5.2%
	\$1000+	2.5%	4.1%	6.3%	22.0%	1.6%	2.1%	3.8%	14.7%
2-3 ADLs	\$0	1.0%	1.7%	2.6%	9.7%	0.7%	0.9%	1.6%	6.3%
	<\$100	1.1%	1.8%	2.8%	10.4%	0.7%	0.9%	1.7%	6.7%
	<\$1000	1.1%	1.9%	2.9%	10.8%	0.8%	1.0%	1.8%	7.0%
	\$1000+	3.3%	5.5%	8.4%	28.7%	2.2%	2.8%	5.1%	19.4%
4-5 ADLs	\$0	3.0%	4.9%	7.5%	26.0%	2.0%	2.5%	4.6%	17.5%
	<\$100	3.2%	5.2%	8.0%	27.6%	2.1%	2.7%	4.9%	18.6%
	<\$1000	3.3%	5.5%	8.4%	28.5%	2.2%	2.8%	5.1%	19.3%
	\$1000+	9.5%	15.3%	22.8%	63.1%	6.4%	8.1%	14.4%	47.2%
Institutional	\$0	4.1%	6.8%	10.3%	34.3%	2.8%	3.5%	6.4%	23.6%
	<\$100	4.4%	7.2%	11.0%	36.3%	3.0%	3.7%	6.8%	25.0%
	<\$1000	4.6%	7.5%	11.5%	37.5%	3.1%	3.9%	7.1%	26.0%
	\$1000+	13.0%	20.8%	30.4%	75.2%	8.9%	11.1%	19.6%	59.0%

Conditional transition probabilities, given survival, were derived by sorting the 1994 survey individuals by health status, recent claim activity level, sex and age group. For each such grouping individuals surviving to the 1995 interview were classified by new health status and claim history level. Individuals not persisting to the 1995 survey interview were removed. An identical grouping was applied to the 1995-96 transition period. So for each sex and age group, a 24-by-24 observed conditional transition matrix was available, with each row corresponding to a starting health status and recent claim history level and each column corresponding to a destination combination. The rows were expressed as percentages of the starting population.

The transition rates exhibit broad general trends by age and sex. For example, rates of transition from low impairment to high impairment generally increase with age while recovery rates decrease with age. The rate of change with age is difficult to ascertain from the available data, however. Rather than fitting a very complicated parametric model to these observed transition rates, the age/sex-specific rates were obtained as a weighted average of the observed age/sex-specific rates and the average transition rates obtained by combining all ages and sexes. The weight given the observed age/sex-specific values was positively related to the number of observations in the starting population for the group. This approach gives greater credibility to observed trends by

age/sex exhibited by groups with more observations.

The resulting transition rates are best seen in the results generated by the capitation model described in the next section. Table 13 shows sample CLG distributions at the beginning and end of a 12 month period. The “All” columns correspond to the CLG distribution exhibited by all individuals in the 1994 NLTCS. The “Med Nec” columns correspond to a starting CLG distribution taken from community-based 1994 NLTCS NHC individuals.

Table 13. Cost Level Group Migration over 12 Months

Health Status	Recent Claim Activity	Starting Distribution				Distribution After 12 Months			
		Count		%		Count		%	
		All	Med Nec	All	Med Nec	All	Med Nec	All	Med Nec
Well	\$0	9,295	248	31.3%	5.5%	7,333	378	25.7%	8.9%
	<\$100	9,153	508	30.8%	11.2%	9,717	839	34.0%	19.7%
	<\$1000	3,362	280	11.3%	6.2%	3,598	397	12.6%	9.3%
	\$1000+	873	73	2.9%	1.6%	835	111	2.9%	2.6%
		22,683	1,109	76.4%	24.5%	21,482	1,724	75.2%	40.5%
IADL/CI	\$0	650	202	2.2%	4.5%	524	123	1.8%	2.9%
	<\$100	897	459	3.0%	10.1%	868	241	3.0%	5.7%
	<\$1000	374	232	1.3%	5.1%	607	180	2.1%	4.2%
	\$1000+	148	110	0.5%	2.4%	220	61	0.8%	1.4%
		2,068	1,003	7.0%	22.1%	2,219	604	7.8%	14.2%
1 ADL	\$0	274	127	0.9%	2.8%	273	77	1.0%	1.8%
	<\$100	510	304	1.7%	6.7%	506	191	1.8%	4.5%
	<\$1000	321	237	1.1%	5.2%	369	177	1.3%	4.2%
	\$1000+	145	114	0.5%	2.5%	177	64	0.6%	1.5%
		1,250	782	4.2%	17.3%	1,325	510	4.6%	12.0%
2-3 ADLs	\$0	240	94	0.8%	2.1%	176	88	0.6%	2.1%
	<\$100	403	276	1.4%	6.1%	452	258	1.6%	6.1%
	<\$1000	299	246	1.0%	5.4%	309	171	1.1%	4.0%
	\$1000+	229	203	0.8%	4.5%	279	150	1.0%	3.5%
		1,171	819	3.9%	18.1%	1,216	667	4.3%	15.7%
4-5 ADLs	\$0	156	123	0.5%	2.7%	111	64	0.4%	1.5%
	<\$100	197	178	0.7%	3.9%	141	111	0.5%	2.6%
	<\$1000	222	210	0.7%	4.6%	213	162	0.7%	3.8%
	\$1000+	317	306	1.1%	6.8%	297	215	1.0%	5.1%
		892	817	3.0%	18.0%	762	552	2.7%	13.0%
Institutional	\$0	179	-	0.6%	0.0%	74	8	0.3%	0.2%
	<\$100	746	-	2.5%	0.0%	749	55	2.6%	1.3%
	<\$1000	433	-	1.5%	0.0%	466	67	1.6%	1.6%
	\$1000+	275	-	0.9%	0.0%	286	65	1.0%	1.5%
		1,633	-	5.5%	0.0%	1,576	195	5.5%	4.6%
Total		29,698	4,531	100.0%	100.0%	28,580	4,252	100.0%	100.0%

Note that the “All” population “ages” as expected. That is, after a year, there is a general shift in the surviving population to more impaired CLG cells. The surviving NHC population, however, becomes less impaired. Those in very impaired statuses at the start of the year are subject to higher mortality, i.e. there is a type of “natural selection” occurring that results in a regression toward a more typical distribution over time.

Capitation Model

The capitation model combines the fitted cost and population models to predict FFS costs over a specified rating period. In addition, the capitation basis (say, for example, total person-months) for the period is summarized so that appropriate capitation rates for the group can be computed. For this study, the capitation model takes the form of an

Excel spreadsheet that can be easily modified to the user’s specifications.

For this analysis, we considered the ratio of expected monthly FFS costs for a typical PACE NHC population, expressed as a percentage of the average monthly FFS cost for the general non-ESRD, non-HMO Medicare population. Table 14 shows summary values from the capitation model applied to the 1994 NLTCS data. The CLG distribution of all elderly community-based NHC individuals were tracked for 12 months from the NHC determination. Aggregate results for the 12-month period are shown in upper portion of the table. The bottom portion of the table shows the appropriate frailty adjusters, depending upon the level of risk-adjustment incorporated in the base cost estimate to which the frailty adjuster is applied.

Four levels of risk-adjustment are presented. The first level assumes no risk-adjustment in the base. The resulting frailty adjusters are about 190%. This value is the counterpart to the current 239% frailty adjuster.

The second level of risk-adjustment assumes that the age/sex-specific rates shown for the “Total” column are applied to the age/sex distribution of the NHC population of interest to obtain age/sex-adjusted base rate for the NHC population. The resulting frailty adjusters fall to about 175%.

The third level of risk-adjustment applies the “Total” population average monthly costs by health status to the health status distribution of the NHC population. The frailty adjusters applicable to these health status-adjusted base rates decrease to about 105%.

Finally, the fourth risk-adjustment level applies “Total” population rates by health status and recent claim history level to the NHC populations. The resulting frailty adjusters are very near 100%.

Other approaches to reflecting the health status of the PACE participant in the capitation rate are also possible. For example, the base to which the frailty adjuster is applied might be taken to be the unadjusted average monthly FFS cost, \$358 in this example. The frailty adjuster could then be modified to reflect information available about the individual’s health. If the health status information (IADLs/ADLs/CI) is available, we could compute adjusters by status by dividing the cost per month values in Table 14 by \$358. This would yield the following values using the Comprehensive NHC definition:

Health Status	Base cost	Comp NHC cost	Frailty Adjuster
Well	\$358	\$279	78%
IADL only or Co9 Imp	358	410	115%
1 ADL Impaired	358	552	154%
2-3 ADLs	358	883	247%
4-5 ADLs	358	1,563	437%
Institutional	358	1,000	279%

Table 14. 1994 NLTCs Sample Capitation Model Results

1994NLFCs	Year Following Certification											
	Enrollee Mnths (000s)				Cost per Month				NHC Loading			
	Total	Med Nec	Med/Func	Comp	Total	Med Nec	Med/Func	Comp	Med Nec	Med/Func	Comp	
Aggregate	I 360,225	52,537	53,743	54,212	\$355	5595	\$555	\$655	195%	183%	183%	
Male	55-59											
	60-64											
	55-59	43,555	3,984	4,705	4,727	302	513	685	667	203%	195%	194%
	70-74	40,755	4,254	6,005	6,005	34%	715	580	650	205%	196%	195%
	75-79	25,779	4,485	5,335	5,318	423	750	701	702	180%	155%	155%
	50-54	16,787	3,769	4,455	4,610	467	731	586	554	157%	147%	147%
	55-59	7,542	1,560	2,156	2,155	509	541	769	770	165%	151%	151%
	80-84	2,253	521	762	762	533	1,129	1,022	1,024	175%	152%	162%
	85-89	514	142	155	165	718	989	875	576	138%	122%	122%
	95-99											
	140,629	18,896	22,529	22,715	378	734	689	558	194%	182%	182%	
Female	55-59											
	60-64											
	65-69	54,555	6,219	6,251	5,331	260	525	590	590	241%	227%	227%
	70-74	66,106	7,501	8,755	5,874	293	569	650	550	201%	191%	191%
	75-79	41,388	6,610	8,358	5,454	349	563	520	518	187%	178%	177%
	80-84	30,410	6,579	7,933	7,987	410	586	659	650	167%	161%	161%
	85-89	18,345	4,703	5,122	5,153	499	753	597	690	153%	140%	139%
	90-94	7,212	2,222	2,723	2,723	588	875	502	801	149%	136%	136%
	95-99	2,478	707	952	955	533	673	627	525	138%	131%	130%
		209,597	33,941	41,114	41,495	344	575	539	637	196%	185%	185%
Well	\$0	100,749	3,587	4,524	4,560	99	61	103	95	51%	104%	95%
	<\$100	112,935	7,917	9,080	9,117	204	220	201	211	108%	98%	103%
	<\$1000	41,642	4,001	4,438	4,463	434	443	443	436	102%	102%	101%
	\$1000+	10,267	1,056	1,217	1,223	1,304	874	939	922	57%	72%	71%
		265,593	16,680	19,360	19,444	243	281	279	279	115%	115%	116%
IADL/CI	\$0	7,106	1,887	2,922	3,021	135	144	124	121	107%	91%	96%
	<\$100	10,606	4,311	6,332	5,414	326	360	315	326	111%	97%	100%
	<\$1000	5,758	2,500	2,998	3,030	567	583	555	558	104%	100%	100%
	\$1000+	2,169	1,047	1,138	1,146	987	879	856	886	69%	90%	90%
		25,550	9,846	12,390	12,611	403	454	406	410	113%	100%	102%
1 ADL	\$0	3,279	1,248	2,012	2,018	185	198	186	180	105%	99%	97%
	<\$100	6,100	3,029	3,845	3,061	209	330	295	294	111%	99%	99%
	<\$1000	4,120	2,619	2,597	2,925	524	541	523	619	103%	100%	sex
	\$1000+	1,917	1,094	1,301	1,319	1,757	1,871	1,732	1,735	95%	99%	99%
		15,416	7,990	10,055	10,143	543	595	554	552	110%	102%	102%
2-3 ADLs	\$0	2,528	1,094	1,931	1,936	445	477	520	518	107%	117%	116%
	<\$100	5,106	3,213	4,085	4,110	397	433	441	440	109%	111%	111%
	<\$1000	3,644	2,537	2,976	2,983	856	874	879	879	102%	103%	103%
	\$1000+	3,021	2,146	2,446	2,451	1,921	1,879	1,921	1,921	98%	100%	100%
		14,299	8,990	11,438	11,480	845	908	885	883	107%	105%	105%
4-5 ADLs	\$0	1,624	1,147	1,431	1,452	620	705	612	608	114%	99%	98%
	<\$100	2,053	1,767	1,991	1,993	519	564	519	519	109%	100%	100%
	<\$1000	2,615	2,259	2,443	2,445	975	999	976	976	102%	100%	100%
	\$1000+	3,698	3,176	3,342	3,344	3,035	3,038	3,033	3,030	100%	100%	100%
		9,989	8,349	9,207	9,235	1,586	1,642	1,567	1,563	104%	99%	99%
Institutional	\$0	1,572	44	56	57	281	281	281	281	100%	100%	100%
	<\$100	8,965	301	375	378	388	393	392	392	101%	101%	101%
	<\$1000	5,381	368	421	423	751	752	752	752	100%	100%	100%
	\$1000+	3,361	359	440	442	1,850	1,554	1,550	1,850	100%	99%	99%
		19,279	1,072	1,292	1,299	737	1,001	1,001	1,000	135%	135%	136%
Frailty Adjusters	Unadjusted Base									195%	183%	183%
	Age/Sex Adjusted Base									180%	158%	158%
	Functional/Cognitive Adjusted Base									108%	104%	104%
	Functional/Cognitive/Prior Claim Adjusted Base									91%	102%	99%

Discussion of Results

Any discussion of the results of this study should start by recognizing the limitations of the data sources employed. While both the NLTCs and the MCBS provide a wealth of information about the individuals surveyed, the accurate determination of NHC status using a state's definition usually requires specific items not directly available from the survey files. Approximations and proxies for needed values cloud subsequent analysis. On the other hand, it was also clear that the many differences in state NHC definitions did not result, when applied to the survey populations, in entirely different NHC populations. Correlations in the types of information being used to classify individuals acted to offset the apparent differences in the specific data items used. So, even though the survey data frequently did not directly provide the information called for in a state's NHC definition, the approximations and proxies that were used are probably more reliable when taken together than when considered item by item.

It appears possible to develop a reduced form NHC definition that would capture most people who would qualify under most states' definitions. This suggests that it might be feasible to develop a single, national eligibility standard. While this could offer the advantages of greater equity across the nation and of a simpler approach to determining payment adjusters, it is likely to be politically difficult to achieve. It would require states to use a different eligibility rule for PACE than for other state programs, such as Medicaid waivers and nursing home care.

This analysis does not address the impact of enrollment bias on the appropriate capitation rate for a PACE site. The sample calculation in the previous section assumed that the enrollment rate was constant by cost level group. It is possible, of course, that PACE sites may differ in their penetration of these NHC sub-groups.

We found that 20% to 30% of individuals starting a year as NHC will not be NHC at the end of the year. The NHC persistency varies by the type of definition employed as well as the ending health status of the individual. Consequently, the new requirement for annual recertification of PACE eligibility will effect a significant percentage of program participants.

An obvious result of the analysis is the lack of homogeneity of the individuals satisfying any NHC definition. Within the NHC class, expected FFS expenditures ranged from as low as \$100 per month to over \$3,000 per month. It is very likely that the enrollment process at different PACE sites could result in dramatically different expected cost profiles. Unless the payment system reflects these differences, the program may be exposed to a substantial selection risk.

A second clear result of the analysis is that ~~the~~ PACE frailty adjuster must anticipate the level of risk-adjustment in the base rate to which it is applied. If the base is a simple unadjusted average for the entire Medicare population, then the PACE frailty adjuster will be significantly greater than 100% and, in theory, should vary from site to site with differences in anticipated enrollment profiles. As more information about the site's enrolled population is incorporated into the base rate calculation, the additional rate loading shrinks and becomes less variable from site to site. In fact, the NLTCs analysis indicates that, if functional/cognitive status and recent service utilization are considered

in the base rate, then the frailty adjuster might not be needed at all.

This last result is particularly important when **considering how PACE rates will be related to the Medicare + Choice rate structure. If the PACE frailty adjuster is applied to the M+C rate before risk-adjustment, then an average adjuster value near 200% is indicated by the NLTCs analysis. Again, in theory, the frailty adjuster for a site should vary with the cost level group profile anticipated for that site. On average, we would expect that adjuster to be near 200%.**

If the adjuster is applied after the proposed M+C risk adjustments are applied, the appropriate value will be much closer to 100%. A more precise estimate is not possible without modeling the factors to be employed in the risk adjustment rate structure. As the M+C risk adjustment structure evolves, the PACE adjuster will need to be modified as well.

ATTACHMENT A

**DATA ELEMENTS USED TO CONSTRUCT NHC DEFINITIONS,
STATES USING EACH ELEMENT,
AND AVAILABILITY OF EACH ELEMENT OR A REASONABLE PROXY
IN THE NLTCS AND 1996 MCBS**

	ITEMS USED IN THE FOLLOWING STATES:									AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS*
MEDICAL CONDITIONS											
injectable medications administered daily	X	X	X	X		X	X			X	C
injections given less than daily or for which a rigid time schedule is not important						X	X			X	X, C
IV medication administered daily	X	X	X	X		X	X		X	X	C
routine administration of oral meds, eye drops, or ointment	X			X		X	X			X	X
restorative nursing procedures (e.g., gait training, b/b training) - daily (5dy/wk)	X	X	X			X	X			X	
-- gait training -daily (at least 5 days/wk)	X	X	X	X			X			X	
-- bowel bladder training -daily	X	X	X			X	X			X	
-- teaching self care, transfer, ambulation to achieve ADL independence		X	X							X	
-- use of preventive devices to slow contractures development		X	X							X	
-- assist or supervise transfers										X	
nasopharyngeal aspiration	X	X	X	X		X	X				
maintenance of tracheostomy	X	X	X	X		X	X		X	X	C
--- And, other resources are unavailable/unwilling to provide needed care							X				
maintenance of colostomy	X	X	X	X		X	X		X	X	C
--- And, other resources are unavailable/unwilling to provide needed care							X			X	
insertion, sterile irrigation, and replacement of catheters		X	X	X		X			X	X	C
maintenance of ileostomy	X	X	X	X			X		X		C
--- And, other resources are unavailable/unwilling to provide needed care							X				
maintenance of gastrostomy		X	X	X		X	X		X		C
--- And, other resources are unavailable/unwilling to provide needed care							X				
feeding by jejunostomy		X	X	X					X	X	C

	ITEMS USED IN THE FOLLOWING STATES:									AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS
/maintenance of other indwelling tubes	X	X	X			X	X				
--- And, other resources are unavailable/unwilling to provide needed care							X				
administration of feeding by nasogastric tube	X	X	X	X			X		X	X	C
intravenous feeding		X	X	X					X	X	C
care of extensive decubiti or other widespread skin disorders	X	X	X	X		X	X	X	X		C
care of decubiti that are not extensive		X				X		X	X		C
prophylactic skin care, treatment of minor skin problems		X				X			X		
observation of unstable medical condition by/under supervision of RN	X	X	X	X		X				X	C
medical condition needs 24-hour availability/observation by RN		X	X	X		X	X		X	X	
frequent monitoring of vital signs (code same as 24-hour monitoring)		X	X			X				X	
needs institutional placement with 24-hr skilled nursing available		X	X	X						X	X
Oxygen on a regular or continuing basis	X	X	X	X						X	C
Oxygen used occasionally		X	X			X				X	C
application of dressing w/Rx prescription	X	X	X			X					C
changing dressing	X		X	X		X					C
comatose with routine medical treatment	X		X								
comatose		X	X		X		X				
ventilator dependent			X				X			X	
respiratory problems needing consistent treatment/observation/monitoring by RN		X	X				X				
cognitive impairment (TBI or dementia) needing structure environment			X				X	X		X	X
--- And, other resources are unavailable/unwilling to provide needed care							X				
maintenance of tracheostomy & unable to self care/no other source help	X						X				
maintenance of colostomy & unable to self care/no other source help	X						X			X	
maintenance of ileostomy & unable to self care/no other source help	X						X				

	ITEMS USED IN THE FOLLOWING STATES:									AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS
new hip fracture		X	x							X	X
new amputation		X	X							X	X
terminal cancer		X						X		X	X
new myocardial infarction		X								X	X
uncompensated congestive heart failure		X								X	
new paraplegic/quadruplegic		X	X							X	
frequent laboratory procedures related to medications administration		X									
use of drugs need daily observation for effectiveness, side effects		X									
care required on an inpatient basis		X	X							X	
care ordered & provided under direction of an MD			X							X	
arthritis								X		X	X
diabetes								X		X	X
emphysema/COPD								X		X	X
heart problems								X		X	X
liver problems								X			
pneumonia								X		X	
stroke								X		X	X
neuromuscular diagnoses: any of the following									X		X
--- acquired hydrocephalus									X		
--- Alzheimer's disease									X	X	
--- anoxic brain damage									X		
--- bell's palsy									X		
--- cerebral ataxia									X		
--- cerebral atherosclerosis									X		

	ITEMS USED IN THE FOLLOWING STATES:										AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS	
Transferring												
--- independent					X			X		X	X	
--- supervision only		X			X			X		X	X	
--- physical assistance		X		x	x			x	x	X	X	
--- cannot do		X		x	x			x	x	X	X	
--- independent, with assistive equipment								x	x	X	X	
Mobility												
--- independent					X			X		X	X	
--- supervision only		X			X			X		X	X	
--- physical assistance		X		x	x			x	x	X	X	
--- cannot do		X		x	x			x	x	X	X	
--- needs assistance with wheelchair				X				X		X		
--- independent, with assistive equipment								X		X		
Grooming						X				X		
--- needs & gets daily help from another									X	X		
--- totally dependent for grooming									X	X		
Oral Hygiene						X						

	ITEMS USED IN THE FOLLOWING STATES:									AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS
--- cerebral degeneration									X		
--- cerebral palsy									X		
--- encephalopathy - unspecified									X		
--- epilepsy/grand mal seizures									X		
--- hemiplegia									X		
--- huntington's chorea									X		
--- multiple sclerosis									X		
--- neurogenic bladder									X		
Functional Status (ADLs)											
toileting: needs constant supervision to total human assistance			X	X				X		X	X
--- And resources are unavailable or unwilling to help as needed								X		X	
bathing: needs constant supervision to total human assistance			X	X				X		X	X
--- And resources are unavailable or unwilling to help as needed								X		X	
Eating: needs constant supervision to total human assistance			X	X				X		X	X
--- And resources are unavailable or unwilling to help as needed								X		X	
Transferring: needs constant supervision to total human assistance			X	X				X		X	X
--- And resources are unavailable or unwilling to help as needed								X		X	
Mobility: needs constant supervision to total human assistance			X	X				X		X	X
--- And resources are unavailable or unwilling to help as needed								X		X	
Dressing: needs constant supervision to total human assistance			X	X						X	X
Maintaining safety: needs constant supervision to total human assistance								X			
--- And resources are unavailable or unwilling to help as needed								X			

	ITEMS USED IN THE FOLLOWING STATES:									AVAILABLE IN:	
	AL	AK	MD-	MA	KS	LA	MT	FL	MN	NLTCS	MCBS
Dressing											
--- independent					X			X		X	X
--- supervision only		X		X	X	x		X		X	X
--- physical assistance		X		X	X	x		x	x	X	X
--- cannot do		X		X	X	x		x	x	X	X
--- independent, with assistive equipment								X		X	X
Eating											
--- independent					X			X		X	X
--- supervision only		X		X	X	x		x	x	X	X
--- physical assistance		X		X	X	x		x	x	X	X
--- cannot do		X		X	X	x		x	x	X	X
--- independent, with assistive equipment								X		X	X
Toileting											
--- independent					X			X		X	X
--- supervision only		X			X			x	x	X	X
--- physical assistance		X		x	x			x	x	X	X
--- cannot do		X			X			X		X	X
--- independent, with assistive equipment								X		X	X
Bathing											
--- independent					X			X		X	X
--- supervision only		X		X	X	x		X		X	X
--- physical assistance		X		X	X	x		x	x	X	X
--- cannot do		X		X	X	x		x	x	X	X
--- independent, with assistive equipment								X		X	X

	ITEMS USED IN THE FOLLOWING STATES:								AVAILABLE IN:		
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS
FUNCTIONAL STATUS (IADLS)											
Meal Preparation											
--- independent					X			X		X	
--- supervision only		X			X			X			X
--- physical assistance		X			X			X		X	X
--- cannot do		X			X			X		X	X
--- independent, with assistive equipment								X			
Shopping											
--- independent					X			X		X	
--- supervision only					X			X			X
--- physical assistance					X			X		X	X
--- cannot do					X			X		X	X
--- independent, with assistive equipment								X			
Money Management											
--- independent					X			X		X	
--- supervision only					X			X			X
--- physical assistance					X			X		X	X
--- cannot do					X			X		X	X
--- independent, with assistive equipment								X			

	ITEMS USED IN THE FOLLOWING STATES:									AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS
Transportation											
--- independent					X			X		X	
--- supervision only					X			X			
--- physical assistance					X			X		X	
--- cannot do					X			X		X	
--- independent, with assistive equipment								X			
Going Places Outside of Walking Distance											
--- independent										X	
--- supervision only											
--- physical assistance										X	
--- cannot do										X	
Telephone Use											
--- independent					X			X		X	
--- supervision only					X			X			X
--- physical assistance					X			X		X	X
--- cannot do					X			X		X	X
--- independent, with assistive equipment								X		X	
Laundry											
--- independent						X				X	
--- supervision only					X						
--- physical assistance					X					X	
--- cannot do					X					X	

	ITEMS USED IN THE FOLLOWING STATES:									AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS
Housekeeping, Heavy											
--- independent					X			X		X	
--- supervision only					X			X			X
--- physical assistance					X			X		X	X
--- cannot do					X			X		X	X
--- independent, with assistive equipment								X			
Housekeeping, Light											
--- independent					X			X		X	
--- supervision only					X			X			X
--- physical assistance					X			X		X	X
--- cannot do					X			X		X	X
--- independent, with assistive equipment								X			
Medications Management											
--- independent					X			X		X	
--- supervision only		X			X			X		X	
--- physical assistance			X		X			X		X	
--- cannot do			X		X			X		X	
--- independent, with assistive equipment								X			
Bladder Incontinence			X	X	X	X			X	X	X
Bowel Incontinence			X	X		X			X	X	

	ITEMS USED IN THE FOLLOWING STATES:									AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS
Social Support											
lives alone					X					X	X
lives with caregiver								X			
lives with other (not caregiver)								X		X	X
caregiver available											
--- full time					X					X	
--- part-time, routine					X					X	
--- part-time, intermittent					X					X	
--- not available					X					X	
-- any primary caregiver								X		X	
available support for short time, if needed								X			
does *not* have a confidante								X		X	
has a pet								X		X	
frequency talk w/social others on the phone, per week											
--- once a day or more								X		X	
--- 2-6 times/week								X		X	
--- once/week								X		X	
--- not at all								X		X	
--- no phone								X		X	

	ITEMS USED IN THE FOLLOWING STATES:										AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS	
frequency of social visits per week (with other than household members)												
--- once/day or more								X		X		
--- 2-6 times/week								X		X		
--- once/week								X		X		
--- not at all								X		X		
Staff intervention for specific behaviors:												
--- disrobing		X		X					X			
--- screaming		X		X					X	X		
--- physically abusive to self or others		X		X		X		x	x	X		
--- getting lost or wandering into inappropriate places		X		X				xx		x		
--- unable to avoid simple dangers				X		X			X	X		
--- need consistent staff one-to-one for reality orientation				X								
--- hallucinations									X			
--- disorientation									X			
--- withdrawn									X			
behavioral problems need supervision								X	X			
behavioral problems requiring treatment/observation by skilled professional		X		X						X		
Mild confusion or withdrawal						X			X	X		
Agitation needing physical or chemical restraint												
Protective restraints						X						
Feels safe in own home								X		X		

	ITEMS USED IN THE FOLLOWING STATES:										AVAILABLE IN:	
	AL	AK	MD	MA	KS	LA	MT	FL	MN	NLTCS	MCBS	
SP unable/unwilling to respond for self (proxy interview)								X		X	X	
Nutrition Status												
significant unplanned weight change (>10 lbs. in last 6 months)								X		X		
2-3 medicines per day								X		X		
2+ alcoholic drinks per day								X		X		
diet change due to illness								X				
eat at least 2 meals/day								X		X		
eat fruit/vegetables every day								X				
have milk products every day								X				
has problems chewing or swallowing								X				
eats alone most of the time								X		X		
usually can shop and cook for self								X		X		
usually able to eat without help								X		X		
has money to buy the food needed								X				
self-assessed health												
-- excellent								X		X	X	
-- good								X		X	X	
-- fair								X		X	X	
-- poor								X		X	X	
Environmental assessment												
barriers to access (steps, stairs)								X				

structural damage, dangerous floors								X			
electrical hazards								X			
fire hazards								X			
unsanitary conditions/odors								X			
insects or other pests								X			
poor lighting								X			
insufficient hot water/water								X			
insufficient heat/air conditioning								X			
shopping not accessible								X			
neighborhood unsafe								X			
living environment presents barriers to evacuations in emergency								X			
Caregiver Assessment											
how likely that will continue providing care to SP											
--- very likely								X			
--- somewhat likely								X			
--- unlikely								X			

* "X" indicates data available from 1996 MCBS Access to Care Surveys. "C" indicates data available from linked Medicare claims records.

ATTACHMENT B

NURSING HOME CERTIFIABILITY (NHC)

STATE-SPECIFIC OPERATIONAL DEFINITIONS

BASED ON 1994 NLTCs AND 1996 MCBS

Attachment B
Operationalization of State NHC Definitions

The following tables summarize the criteria used to determine NHC status for an individual within each state. The tables show the elements required by the definition and the decision rule that applies each of these elements. The table also shows whether each element was defined in some way within each of the databases (NLTCS and MCBS). It should be noted that the way in which each element was operationalized is likely to differ between the two databases.

Alabama

Criteria	NLTCS	MCBS
Administration of injectable or intravenous medications on a daily basis, or administration of routine oral medications, eye drops, or ointments.	X	X
Restorative nursing care (e.g., bowel/bladder retraining), at least 5 times per week	X	
Nasopharyngeal aspiration for maintenance of a clear airway		
Maintenance of tracheostomy, gastrostomy, colostomy, ileostomy, or other tubes indwelling in body cavities as an adjunct to active treatment for rehabilitation or disease for which the stoma was created.	X (colostomy only)	X
Administration of tube feedings by nasogastric tube	X	X
Care of extensive decubitus ulcers or other widespread skin disorders		X
Observation of unstable medical conditions on a regular and continuing basis, by or under the direction of an RN	X	X
Use of oxygen on a regular or continuing basis	X	X
Application of dressings involving prescription medications and aseptic techniques and/or changing of dressing in noninfected, postoperative, or chronic conditions		X
Comatose person receiving routine medical treatments		
<p>Decision rule A single page form indicating the above items, plus narrative description of diagnoses and other relevant information. Form is completed by a physician who stipulates that the person requires nursing facility care. State requires that person meet at least two of the above-specified specific services on a regular basis. To compensate for inability to define each item, we required only that an individual need at least one of the services.</p>	6.2% meet this definition	12.3% meet this definition

Alaska

There were two definitions used in Alaska, one to indicate the need for skilled care, and one to indicate a need for intermediate level care.

Criteria	NLTCS	MCBS
Skilled care criteria. Includes a need for skilled nursing, available 24 hours per day, or active rehabilitation provided at least 5 days per week. Skilled nursing involves observation, assessment, and treatment of an unstable condition. The factors listed below, in combination, often indicate the need for skilled care.		
24-hour observation and assessment by an RN or LPN	X	
Rehabilitation, provided by a PT, OT; RT, or SP 5 times per week	X	X
24-hour performance of direct services by an RN, LPN, or other personnel working under the direct supervision of an RN or LPN	X	
Drugs requiring IV or nasogastric tube administration; or frequent injections requiring RN supervision and judgment	X	X
Colostomy or ileostomy, during the stabilization period (Note: neither database could identify if this was a stabilization period)	X	X
Gastrostomy or other tube feedings requiring supervision by an RN or LPN	X	X
Oxygen therapy	X	X
Tracheostomy (when 24-hour care is needed. Note that databases could not determine level of care needed.)		X
Radiation therapy or cancer chemotherapy		
Sterile dressings		X
Decubitus ulcers, when infected or extensive (Note that databases could not determine extent or if infected)		X
Uncontrolled diabetes (databases could not determine if uncontrolled)	X	X
Medication conditions that may require skilled nursing care until stabilization occurs or maximum rehabilitation potential is reached. These include new CVA, new hip fracture, new amputation, comatose, terminal cancer, new myocardial infarction, uncompensated congestive heart failure, and new paraplegia or quadriplegia. (Note that databases cannot identify if conditions are new or acute.)	X	X
The following items are indicated as possibly justifying skilled care, if more than one is present and based on professional judgment.		
Frequent laboratory procedures when intimately related to medication administration		
Treatments requiring observation, evaluation, and assistance by skilled personnel (e.g., oxygen, hot packs, whirlpool, diathermy, etc.)		X

Behavioral problems requiring treatment or observation by skilled professional personnel	X	
Intermediate care criteria. Intermediate care requires nursing services for observation, assessment, and treatment of a chronic condition for purposes of maintenance rather than rehabilitation. Intermediate care will not be authorized solely to provide supervision, protective custody, routine medication management, or assistance with personal services. The following factors often indicate a need for intermediate care.		
Need for observation and assessment by an LPN on a 24-hour basis	X	X
Need for restorative nursing to maintain or restore maximum function, or to prevent the advancement of progressive disabilities. Such measures may include teaching self care, transfer, and ambulation activities; use of preventive measures/devices to prevent contractures; ambulation and gait training; assistance with or supervision of transfers	X	
Performance of services by an LPN or other personnel under the supervision of an LPN		
Use of medications for routine and/or maintenance therapy, requiring daily observation for effectiveness and side effects	X	X
Assistance with ADLs (bathing, eating, toileting, dressing, transfer/ambulation), including maintenance of foley catheters and ostomies, supervision of special diets, and proper skin care of incontinent patients	X	X
Colostomy/ileostomy maintenance	X	X
Oxygen therapy (temporary or intermittent)	X	X
Radiation or chemotherapy		
Skin conditions, including decubitus ulcers when not infected or extensive; and minor skin tears, abrasions, or chronic conditions requiring daily observation and/or intervention by licensed personnel		X
Diabetes, when daily observation needed for proper physiological control	X	X
Behavioral problems such as wandering, verbal disruptiveness, combativeness, verbal or physical abusiveness, and inappropriate behavior	X	

<p>Decision rules:</p> <p>The state provided guidelines and examples of types of services that would qualify an individual for skilled or intermediate levels of care. There are no deterministic rules for judging NHC status. We used the following decision rules. A person was determined to be NHC if they met at least one of the following criteria: (1) they required skilled nursing or therapy services, AND they needed at least one of the skilled services listed; (2) they required skilled nursing or therapy services, AND needed at least two of the services listed as possibly indicating need for skilled care; or (3) they needed skilled nursing, AND at least one of the services listed under intermediate care. Note that, due to data limitations, no one in the MCBS database would meet the second definition; and in the NLTCS database, only those with two or more behavioral symptoms would meet that definition.</p>		11.4% meet the definition
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Maryland

Criteria	NLTCS	MCBS
<i>Skilled nursing care and related services</i> require performance by or under the supervision of professional or technical personnel, to ensure safety and effectiveness. The following examples are representative:		
Intravenous, intramuscular or subcutaneous injections and hypodermoclysis or intravenous feedings	X	X
Levin tube and gastrostomy feedings		X
Nasopharyngeal and tracheostomy aspiration	X	X
Insertion and sterile irrigation and replacement of catheters	X	X
Application of dressings involving prescription medications and aseptic techniques		X
Treatment of decubitus ulcers or other widespread skin disorders		X
Heat treatments ordered by an MD and requiring RN supervision/observation to evaluate progress		X
Rehabilitative nursing procedures	X	
<i>Rehabilitation services</i> must be provided by a PT, LPN, or OT. The following examples are representative:		
Therapeutic exercises/activities requiring supervision by a PT or OT to ensure safety and effectiveness	X	X
Gait evaluation and training to restore function	X	
Range of motion exercises as part of an active treatment program		

Health related services provided by or under the supervision of licensed health professionals, to maintain, improve, or protect health or lessen disability or pain. The following examples are representative:		
Medication administration when required by a person's medical condition or cognitive deficits	X	X
Insertion, irrigation, and maintenance of indwelling urinary catheters and/or intermittent bladder irrigation with medications prescribed	X	X
Development, management, and evaluation of an individual care plan when the person's physical or mental condition requires the involvement of personnel on a 24-hour institutional basis	X	
Other health services requiring the performance or supervision of performance by licensed health care professionals		
<p>Decision rule: The state requires that the individual must need skilled nursing care and related services, rehabilitation services, or health related services above the level of room and board, as described above. In addition, these services 1) must be needed on a daily basis; 2) must be required to be provided on an inpatient basis; 3) must be provided by a Medicaid-certified facility, and 4) must be ordered by and provided under the direction of a physician. Additional issues of functional status, incontinence management, cognition and orientation are assessed by the physician, but do not enter into the NHC determination.</p> <p>The available data do not address these additional requirements. Our decision rule identifies an individual as being NHC eligible if the criteria are met for any one of the three types of care described (skilled nursing, rehabilitation, or health-related services).</p>		14.2% meet the definition

Kansas

Criteria	NLTCS	MCBS
Activities of daily living, including bathing, dressing , toileting, transferring, mobility, and eating. Each is scored based on the level of assistance required .	X	X

Instrumental activities of daily living, including meal preparation, shopping, money management, transportation, telephone use, laundry and housekeeping, and medication management. Each is coded for level of assistance required.	X	X (no data on transportation, laundry, or medications management)
Bladder incontinence	X	X
Cognition	X	X
Falls		
Abuse/neglect/exploitation by others		
Adequacy of support, defined by presence of a full-time caregiver	X	
<p>Decision rule</p> <p>Each item is scored and weighted by a specified multiplier. Individuals must 1) require assistance with at least two ADLs; 2) need assistance with at least 3 IADLs; 3) meet a minimum weighted score of ADLs and IADLs combined, or of IADLs and Risk Factors (incontinence, cognition, falls, abuse, and support); and 4) must have meet a minimum threshold for the grand total of the weighted items.</p> <p>We used the scoring thresholds specified by the state, despite the fact that not all items were available in our databases. This results in a conservative estimate of the number of people who would qualify as NHC under Kansas' criteria.</p>		13.7% meet this definition

Montana

Criteria	NLTCS	MCBS
<i>Section A</i> includes the following items:		
Comatose		
Ventilator dependent		
Respiratory problems requiring consistent treatments, observation, or monitoring by or under the direction of an RN		
An unstable medical condition that requires 24-hour availability of services and/or observation under the direction of an RN	X	
Nasopharyngeal aspiration for maintenance of a clear airway		
Has a cognitive impairment such that a structured, supervised environment is necessary and other environmental resources are unavailable or unwilling to accommodate those needs	X	X
Tube feeding by nasogastric tube	X	

Maintenance of tracheostomy, gastrostomy, colostomy, ileostomy, or other indwelling tubes, and individual cannot do self-care, and/or no other resources are available to assist with such care. (Note that MCBS could identify the tubes, but not the availability of assistance, or whether assistance was needed.)	X (no data on ileostomy, gastrostomy)	X
Section B includes the following items:		
Need for any assistance, including supervision, in at least two ADLs, and other resources are unavailable/unwilling to help. ADLs include toileting, bathing, eating, transferring, mobility, and maintaining safety.	X (no data on maintaining safety)	X (no data on maintaining safety)
Administration of potent and dangerous (or routine oral) medications on a daily basis, individual cannot self-administer, and other resources are unavailable or unwilling to help.	X	X
Has physical or medical needs that are deteriorating, and will continue to deteriorate in the absence of regular monitoring or supervision by a health care professional		
Requires restorative nursing or therapy treatments (e.g., gait training, bowel/bladder retraining), at least 5 days per week.	X	
Requires care of extensive decubiti or other widespread skin diseases.		X
Requires regular (at least monthly) intervention by a case manager.		
Decision rule: The individual must meet one or more of the criteria in Section A, or two or more of the criteria in Section B. The state emphasizes the availability of other sources of support to meet the needs. Our ability to identify other sources of support was severely constrained, particularly within the MCBS data. We therefore identified as NHC any individual who met the criteria specified, without regard to the availability of other sources of support.		15.1% meet this definition

Louisiana

Louisiana has three separate criteria, based on level of nursing care needed: SNF, ICF- 1, or ICF- 2. We defined each of these levels separately, and then combined them into a single indicator of NHC eligibility, defined as eligible for any level of care.

Criteria	I' NLTCs	MCBS
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<p>SNF Criteria reflect a need for nursing, psychosocial, or rehabilitation services, i.e., services that must be performed by or under the supervision of an RN, LPN, PT, OT, ST, audiologist, or combination thereof. Such services must be required on a regular basis (7 days per week). Rehabilitation services must be at least 5 days per week.</p> <p>The following services are those exemplary of those considered as requiring the supervision of professional personnel:</p>		
Intravenous, intramuscular, or subcutaneous injections	X	X
Levine tube and gastrostomy feedings		X
Insertion, sterile irrigation and replacement of catheters as an adjunct to active treatment of a urinary tract disease	X	X
Application of dressings involving prescription medications and sterile techniques		X
Nasopharyngeal or tracheostomy aspiration	X	X
Treatment of decubitus ulcers, or a severity grade 3 or worse, or multiple lesions of a lesser severity		X
Heat treatments (most) as part of active treatment done by a physical therapist		X
Initial phases of a regimen involving administration of medical gases such as bronchodilator therapy		
Rehabilitation nursing procedures, e.g., bowel/bladder retraining	X	
Colostomy care, during the immediate postoperative period (note that neither database can determine if this is the postoperative period)	X	X
Observation, assessment and judgment of professional personnel in the presence of an unstable or complex medical condition	X	
Physical therapy, speech therapy, or occupational therapy in conjunction with another therapy, at least 5 times per week	X	X
Intermediate care I requires professional health care services in order to attain and maintain a maximum level of wellness. Examples of IC-1 services include:		
Administration of oral medications and eye drops	X	X
Special appliance: urethral catheter care	X	X
Colostomy care	X	X
Surgical dressings		X
Care of decubitus ulcers that are not extensive		X
Dependent for a majority of personal care needs	X	X
Bed or chair bound	X	
Frequent periods of agitation requiring physical or chemical restraints		
Combined sensory defects (e.g., blindness, deafness, significant speech impairment)	X	X
Care of limbs in case, splints, and other appliances		X

Post-surgical convalescence		
Incontinence of bladder and/or bowel	X	X
Recent history of seizures		
Need for protective restraints		
Use of oxygen occasionally	X	X
Frequent monitoring and recording of vital signs	X	
Need for physical therapy	X	X
Uncommunicative or aphasic and unable to express needs adequately	X	
<i>Intermediate care 2</i> requires care that can be provided by paraprofessionals, under the supervision of professional staff. Examples of IC-2 services include:		
Supervision or assistance with personal care needs	X	X
Assistance in eating	X	X
Administration of medication, eye drops, topical applications	X	X
Injections given less than daily or for which a rigid time schedule is not important	X	X
Prophylactic skin care or treatment of minor skin problems in ambulatory residents		X
Protection from hazards		
Mild confusion or withdrawal		
Medications for stable conditions or those requiring monitoring only once a day	X	X
Stable blood pressure requiring daily monitoring	X	
Decision rules: For each level of care, the individual must need assistance with at least one of the services listed. Documentation from the state indicates that these lists are not exhaustive. However, for this analysis, we have treated these lists as exhaustive.		14.2% meet the definition

Florida

Criteria	NLTCS	MCBS
Proxy informant, due to individuals' mental state, ability, or willingness to communicate	X	X
Cognitive status: orientation to date and place; ability to count backwards from 20	X	X

Primary diagnoses and health conditions, including:		
arthritis	X	X
bed sores		X
cancer	X	X
dementia	X	X
diabetes	X	X
emphysema/COPD	X	X
heart problems	X	X
incontinence	X	X
liver problems		
pneumonia		
stroke	X	X
Use of special services, including PT, OT, RT	X	X
Nutritional status, including:		
unintentional, significant weight change	X	
use 3. or more medications per day	X	
• 2 or more alcoholic drinks per day	X	
change in diet required by health condition		
eat at least 2 meals per day	X	
eat some fruits and vegetables every day		
have some milk everyday		
have problems with chewing or swallowing		
eat alone most of the time	X	
able to shop and cook for self	X	X
able to eat without help	X	X
have enough money to buy the food needed		
Subjective evaluation of health : excellent, good, fair, or poor	X	X
Activities of daily living, scored by level of assistance needed (independent, independent with assistive device or technology, supervision/coaching, some physical help, cannot do without total physical assistance). ADLs include bathing, dressing, eating, toileting, transferring, and walking/mobility	X	X
Instrumental activities of daily living, scored by level of assistance needed using same categories as for ADLs. IADLs include heavy chores, light housekeeping, using the telephone, managing money, preparing meals, shopping, managing medications, and transportation.	X	X (data unavailable for medications management, transportation)

Social resources, including: live alone • individual has someone who could stay with her/him for a while, if needed has a confidante frequency of telephone conversations each week frequency of social visits with people outside of the household	X X X X	X
How safe does individual feel in their home setting	X	
Based on review of the individuals' home environment, the assessor makes a subjective determination of the safety of the home environment as posing no risk, low risk, moderate risk, or high risk. The review includes consideration of barriers to access, structural damage, electrical hazards, fire hazards, sanitation, insects or other pests, lighting, water, heat/air conditioning, accessible shopping, accessible transportation, accessible telephone, neighborhood safety, and ability to evacuate in an emergency.		
Caregiver's assessment of own health as excellent, good, fair, poor		
Caregiver's assessment of changes in own emotional well-being since becoming a caregiver.		
Caregiver's stated ability to continue providing care		
Decision rule: Items receive numeric scores that are entered on a summary form. For purposes of our study, we used a threshold value of 22. Individuals scoring above 22 were considered NHC.		18.4% meet the definition

Massachusetts

Criteria	NLTCS	MCBS
Skilled services include the following:		
Intravenous, intramuscular, or subcutaneous injection, or intravenous feeding	X	X
Nasogastric tube, gastrostomy, or jejunostomy feeding	X	X
Nasopharyngeal aspiration and tracheostomy care	X	X
Treatment and/or application of dressings for deep decubitus ulcers, other widespread skin disorders, or wound care		X
Administration of oxygen on a regular and continuing basis	X	X
Skilled nursing observation and evaluation of an unstable medical condition	X	X
Skilled nursing for management or evaluation of the recipient's care plan	X	
Insertion, irrigation, and replacement of catheters	X	X

Gait evaluation and training administered or supervised by a PT at least 5 days per week, following a recent impairment	X	
Range of motion exercises, if part of an active treatment plan for a specific disease state		
Hot pack, hydrocollator, paraffin bath, or whirlpool treatment, under certain conditions		X
Physical, speech/language, occupational, or other therapy as part of a planned program	X	X
Other services:		
Activities of daily living, including bathing, dressing, toileting, transferring, mobility/ambulation, and eating.	X	X
Other nursing services, required at least three times per week:		
Any skilled nursing services on a frequent, rather than daily, basis	(seeskilled services above, for availability)	
Positioning while in bed or chair		
Measurement of intake and output		
Administration of oral or injectable medications	X	X
Intervention required for dependent or disruptive behaviors, such as disrobing, screaming, being physically abusive to self or others, getting lost or wandering into inappropriate places, being unable to avoid simple dangers, or requiring consistent intervention for reality orientation	X	
Occupational, physical, or speech/language therapy	X	X
Nursing observation and/or vital signs monitoring, ordered by a physician	X	
Treatments with prescription medications for uninfected postoperative or chronic conditions	X	
Routine changing of dressings that require nursing care and monitoring		X
Decision Rule: Any one skilled nursing service required daily; or, requiring at least three of any of the above listed services (skilled nursing, ADLs, other nursing) of which at least one of the three is a skilled nursing service.		10.9% meet the definition

Minnesota

Criteria	NLTCS	MCBS
<i>Activities of daily living</i> include the following:		
Need physical assistance with dressing	X	X

Need physical assistance in grooming	X	
Need physical assistance in bathing (beyond simply helping in and out of the tub)	X	X
Need physical help with eating, including help in cutting food, buttering bread, or arranging food	X	X
Need physical help to sit up or change positions in bed		
Need at least one other person or a mechanical aid to get in/out of a bed or chair	X	X
Need physical help from at least one other person to walk	X	X
Need help with toileting, or are incontinent of bowel or bladder at least once a week	X	X
Behavioral concerns include the following:		
Need intervention to cope with episodes of disorientation, hallucination, wandering, being withdrawn or other similar behaviors.		
Needs intervention due to disruptive behaviors such as verbally abusing others, wandering, removing or destroying property, or acting in a sexually aggressive manner	X	
Needs intervention because physically abusive to self or others	X	
Special nursing treatments include the following:		
Tube feedings	X	X
Oxygen and respiratory therapy		X
Ostomies and catheters	X	X
Wound care, including decubiti		X
Skin care		X
Hyperalimentation/hickman catheter		
Intravenous fluids		
Intravenous medications	X	X
Blood transfusions		X
Drainage tubes		
Symptom control for terminal illness		
Isolation precautions		
Decision rule: A very comprehensive assessment form is completed; however, classification as NHC is related to case-mix classification that is determined only on the basis of items listed above. We used a decision rule that an individual must be dependent in four or more ADLs ; or, if dependent in fewer than 4 ADLs , must also require assistance due to behavioral concerns or must need special nursing care . This rule corresponded to all but the lowest case-mix category, which appears to be a “catch-all” category that can be used with clinical discretion.		11.8% meet the definition