



# Critique of STRIVE Sampling Methodology and Implications for the 2010 SNF NPRM

*Final Report*

*Prepared for:*

American Health Care Association & Alliance for  
Quality Nursing Home Care

*June 30, 2009*



# Critique of STRIVE Sampling Methodology and Implications for the 2010 SNF NPRM

*Final Report*

*Prepared for:*

**American Health Care Association & Alliance for  
Quality Nursing Home Care**

**Prepared by:**

Soumita Lahiri  
Al Dobson  
Namrata Sen  
Nikolay Manolov  
Brian Simonson

*June 30, 2009*

## Table of Contents

<b>I. INTRODUCTION.....</b>	<b>1</b>
<b>II. STRIVE SAMPLING DESIGN AND SAMPLE REPRESENTATIVENESS OF THE SNF MEDICARE UNIVERSE.....</b>	<b>1</b>
A. Survey Sampling Design and sample representativeness – a brief introduction.....	1
B. Comparison of the STRIVE sample to other PPS recalibration and refinement efforts .....	3
C. STRIVE Sampling Design Critique – chance of potential bias as reflected in the eleven (11) step STRIVE sampling plan.....	3
D. Appraising the STRIVE sample.....	8
a) Comparison of STRIVE states and Non-STRIVE states on count of facilities, count of residents, percent of Medicare residents, urban-rural percentages and percent of multifacilities .....	8
b) STRIVE sample representativeness by Medicare and Non-Medicare cases .....	10
c) STRIVE sample by RUG category .....	11
(i) Sample size by hierarchical RUG-53 and RUG-66 patient category.....	11
(ii) Distribution of cases by index maximized RUG-53 categories – comparative analysis using STRIVE and MDS Medicare data for STRIVE and non-STRIVE states .....	13
d) Comparative study of behavioral and clinical patterns between STRIVE Medicare and STRIVE non-Medicare groups and MDS Medicare cases .....	16
e) Nursing time – comparative study between STRIVE Medicare and Non-Medicare cohorts .....	30
f) Distribution of assessment days between STRIVE and Non-STRIVE states.....	32
g) Analysis of selected STRIVE participating providers .....	34
h) Regression model to measure impact of being in a STRIVE state on NTAS costs/charges.....	35
i) Distribution of Therapy minutes across seven day study period.....	41
<b>III. DISCUSSION .....</b>	<b>42</b>
<b>APPENDIX A .....</b>	<b>A-1</b>

## List of Tables and Figures

Exhibit 1: Count and % of Medicare and Non-Medicare cases (actual sample) using STRIVE 2007 data .....	2
Exhibit 2: Number of facilities and case observations used to update case weights by setting..	3
Exhibit 3: STRIVE states .....	4
Exhibit 4: Count of eligible facilities in the 15 STRIVE states study area .....	5
Exhibit 5: Number of facilities initially sampled in STRIVE Step 8 sampling protocol and number of facilities eligible for participation after Step 9 elimination.....	6
Exhibit 6: Facility participation rates from the sampled facilities invited.....	7
Exhibit 7: Summary results by state from OSCAR data .....	8
Exhibit 8: Count and % of Medicare and Non-Medicare cases (actual sample and weighted) using STRIVE 2007 and MDS 2007 data .....	11
Exhibit 9: Count of Medicare and total cases in the STRIVE 2007 sample data by RUGs-53 (hierarchical grouper) and RUGs-66 (hierarchical grouper).....	11
Exhibit 10: Example of RUG categories with sufficient STRIVE sample size, but different proportion of cases in comparison to MDS data and also in the projected (using STRIVE case weights) .....	14
Exhibit 11: Comparative proportion of cases by RUG category using MDS and STRIVE data..	15
Exhibit 12: Comparative response for Self Bed mobility Performance (G1AA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (TABLE) .....	18
Exhibit 13: Comparative response for Self Bed mobility Performance (G1AA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	18
Exhibit 14: Comparative response for Transfer Self Performance (G1BA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (TABLE) .....	19
Exhibit 15: Comparative response for Transfer Self Performance (G1BA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	19

Exhibit 16: Comparative response for Eating Self Performance (G1HA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (TABLE) .....	20
Exhibit 17: Comparative response for Eating Self Performance (G1HA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	20
Exhibit 18: Comparative response for Toilet Use Self Performance (G1IA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (TABLE) .....	21
Exhibit 19: Comparative response for Toilet Use Self Performance (G1IA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	21
Exhibit 20: Comparative response for Diabetes Mellitus (I1A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare .....	22
Exhibit 21: Comparative response for Diabetes Mellitus (I1A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	22
Exhibit 22: Comparative response for Parenteral IV (K5A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare .....	23
Exhibit 23: Comparative response for Parenteral IV (K5A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	23
Exhibit 24: Comparative proportion of cases for Pressure ulcers (M2A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare .....	24
Exhibit 25: Comparative proportion of cases for Pressure ulcers (M2A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	24
Exhibit 26: Comparative response for IV Medication (P1AC) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare .....	25

Exhibit 27: Comparative response for IV Medication (P1AC) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	25
Exhibit 28: Comparative response for Oxygen Therapy (P1AG) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare .....	26
Exhibit 29: Comparative response for Oxygen Therapy (P1AG) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	26
Exhibit 30: Comparative response for Short Term Memory (B2A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare.....	27
Exhibit 31: Comparative response for Short Term Memory (B2A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	27
Exhibit 32: Comparative response for Independent Decision making (B4) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare .....	28
Exhibit 33: Comparative response for Independent Decision making (B4) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	28
Exhibit 34: Comparative response for Making Self understood (C4) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	29
Exhibit 35: Comparative response for Making Self understood (C4) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH).....	29
Exhibit 36: Results of T-test for difference in mean Nursing time and difference in distribution (Kolmogorov-Smirnov) of nursing time between Medicare and Non-Medicare cohorts for STRIVE sample (assumed 95% confidence level for tests).....	30
Exhibit 37: Figure showing distribution of assessment days for STRIVE and non-STRIVE states (both excluding the cases with no or greater than 30 assessment days and all MDS (displaying only till day 30)).....	33
Exhibit 38: Result for nonparametric test (Wilcoxon Signed Rank and Kolmogorov Smirnov) to test Ho: distribution of assessment days same for STRIVE and non-STRIVE states.....	33

Exhibit 39: Result for t-test to test Ho: distribution of assessment days same for STRIVE and non-STRIVE states..... 34

Exhibit 40: Number of STRIVE provider participants, proportion of urban and rural facilities in the sample and from OSCAR data, proportion of multi facility for the sample and OSCAR data.. ..... 35

Exhibit 41: Difference between STRIVE States per Diem Cost (Charges) as Compared to Non-STRIVE States (using 2006 MDS and claims data) ..... 35

Exhibit 42: Coefficient estimates for Routine Cost by each RUG category for STRIVE and Non-STRIVE States ..... 36

Exhibit 43: Coefficient estimates for Therapy Cost by each RUG category for STRIVE and Non-STRIVE States ..... 37

Exhibit 44: Statistical Significance for the Differences Between the Relative Weights by RUG Categories for the STRIVE versus non-STRIVE states..... 38

Exhibit 45: Statistical Significance for the Differences Between the Relative Weights by RUG Categories for the STRIVE participant versus STRIVE non-participants for 7 STRIVE states..... 40

Exhibit 46: Determining Therapy Times ..... 41

## I. INTRODUCTION

The Resource Utilization Group (RUG) is a classification system to group individuals with similar patterns of resource use based on factors such as physical and cognitive function, clinical characteristics. This form of classification system was developed as a solution to rising concerns about quality of care and costs at nursing homes. The Staff Time Resource Intensity Verification (STRIVE) project's data is used for updating the payments for Medicare skilled nursing facilities (SNF) and refine the existing RUG system.

STRIVE information provided important input into the 2010 SNF NPRM. For example, STRIVE data were used to refine RUG ADL splits, recast therapy payments, create a new RUG-66 systems, produce a RUG-66 day distribution across 60 million SNF days, create a budget neutrality adjustment and to support impact analysis. To the extent that STRIVE information is not accurate or cannot otherwise be imported into the 2007 SNF linked claims and assessment file the NPRM's results and methodology is not supportable.

This paper is divided into three major sections. First the discussion focuses on the STRIVE sampling design and the sample representativeness. After that the discussion turns to the precision of RUG-66 day distribution estimates. We conclude the paper with a section on the accuracy of estimating a RUGs-66 day distribution based on STRIVE data and a final discussion on the implications of STRIVE and RUGs-66 analyses as they relate to the NPRM's proposed MDS 3.0 and RUGs-66 implementation, as well as the possibility that the NPRM's impact analysis and budget-neutral assumptions may be flawed.

## II. STRIVE SAMPLING DESIGN AND SAMPLE REPRESENTATIVENESS OF THE SNF MEDICARE UNIVERSE

In this section we discuss the STRIVE sampling design and how it can lead to potential bias. In addition, we also conduct several independent analyses to test the representativeness of the STRIVE data. These studies include a comparison of the distribution of RUGs-53 days between STRIVE and non-STRIVE states, a comparison of distribution of MDS characteristics between STRIVE states and national and non-STRIVE states and regressions designed to estimate the impact of being in a STRIVE state on per diem costs/charges both overall and within RUG category.

The discussion is divided into two main sections. In the first half we present a qualitative discussion on how the sampling protocol might lead to potential bias and inconsistency. The second part of the discussion is a quantitative analysis testing the representativeness of the STRIVE data (STRIVE 2007 and MDS 2007 data have been used for this purpose).

### A. Survey Sampling Design and sample representativeness - a brief introduction

In the study of large populations like Medicare and Medicaid, it is not feasible to collect survey data for each and every case in the universe. Resorting to some sampling technique to get a small portion of the universe and use it to get an idea of the overall effects being studied is

frequently used. It is very important that the sample selected is representative of the universe. Cochran (1977)<sup>1</sup> presents methods to determine sample size. Using the sample size determination techniques, it can be shown that for a nationwide survey even a small portion (say about 0.001%) of the population can produce a representative sample and an estimate (of the parameter of interest in the study) with reasonable precision.

However an important criterion determining the “representativeness” of the sample is the sampling design. It has been widely discussed in sample survey literature that even a large sample might give incorrect answers if the survey sample is systematically biased. In practice sample selection is biased for three common reasons – first, self-selection by individuals or data units being investigated and second, sample selection decisions by analysts or data processors. Item response rates represent a third potential source of bias. The National Center for Education Statistics standards specifies, “Any survey stage of data collection with a unit or item response rate less than 85 percent must be evaluated for the potential magnitude of nonresponse bias before the data or any analysis using the data may be released”. The sample survey literature indicates that voluntary response samples are biased since people with strong opinions or atypical institutions tend to respond<sup>23</sup>. A well known example of bias due to voluntary response and used as a popular example is the survey by Literary Digest in 1936 to find what proportion supported the presidential candidate Franklin Roosevelt and what proportion supported Alf Landon. The response from the survey showed a 57% support for Alf Landon. However history narrates something different – Franklin Roosevelt won the election with almost 60% support.

The STRIVE data have a sample of 205 facilities and 9721 cases – a reasonable sample size to conduct a study if there are no apparent bias issues. The Medicare portion of the sample though is just 2,052 cases (see **Exhibit 1** below). STRIVE uses the Medicare portion of the sample to refine the existing Resource Utilization Group (RUG) classification system.

**Exhibit 1: Count and % of Medicare and Non-Medicare cases (actual sample) using STRIVE 2007 data**

<b>Medicare Flag :</b> 0 = No; 1 = Yes	<b>COUNT</b>	<b>PERCENT</b>
0	7,669	78.89%
1	2,052*	21.11%
<b>Overall</b>	<b>9,721</b>	<b>100.00%</b>

\* In practice this sample size is weighted down to 1381 cases.

In addition, the sampling technique used to collect the STRIVE data is heavily dependent on the voluntary participation and convenience sampling which can lead to potential bias. In STRIVE 14 states out of 50 states agreed to participate in the study as well as Washington DC for a total of 15 “state” participants. Even for the facilities sampled from the 15 states, only 40.9% of the

<sup>1</sup> Cochran, W.G. (1977). Sampling Techniques. 3rd Edition. John Wiley and Sons, New York.

<sup>2</sup> Heckman, Joseph J. 1979. “Sample Selection Bias as a Specification Error.” *Econometrica* 47:153-161.

<sup>3</sup> Groves, Robert. 1989. *Survey Errors and Survey Costs*. New York: John Wiley.

facilities invited agreed to participate (refer to **Exhibit 6** below taken from STRIVE TEP presentation). Thus, on the face of the criterion by The National Center for Education Statistics stated above, the STRIVE sample could have a very large and unknown sampling bias.

**B. Comparison of the STRIVE sample to other PPS recalibration and refinement efforts**

While patient categorization systems are often developed on samples (for example, PPS DRG weights were initially developed on over a million cases), PPS systems’ updates are typically conducted on universe data (see **Exhibit 2**). The update of RUGs, based on 2052 cases (which as we note later are down-weighted to 1380 case) is totally out of alignment with the precision associated with the use of universe data in other PPS systems. This, as much as anything else speaks to a basic flaw in the use of a RUGs system based on nursing minutes to support SNF IPPS.

**Exhibit 2: Number of facilities and case observations used to update case weights by setting**

Setting	No. of Facilities	No. of Observations
SNF	206	9,791 (2,052 Medicare cases out of 9,791)
Home Health	9,227	98M (approximately)
IRF	1,200	369,000
IPPS	3,000	5M (approximately)
LTCH	400	130,160

Source: Report to Congress MEDPAC March 2009

**C. STRIVE Sampling Design Critique - chance of potential bias as reflected in the eleven (11) step STRIVE sampling plan**

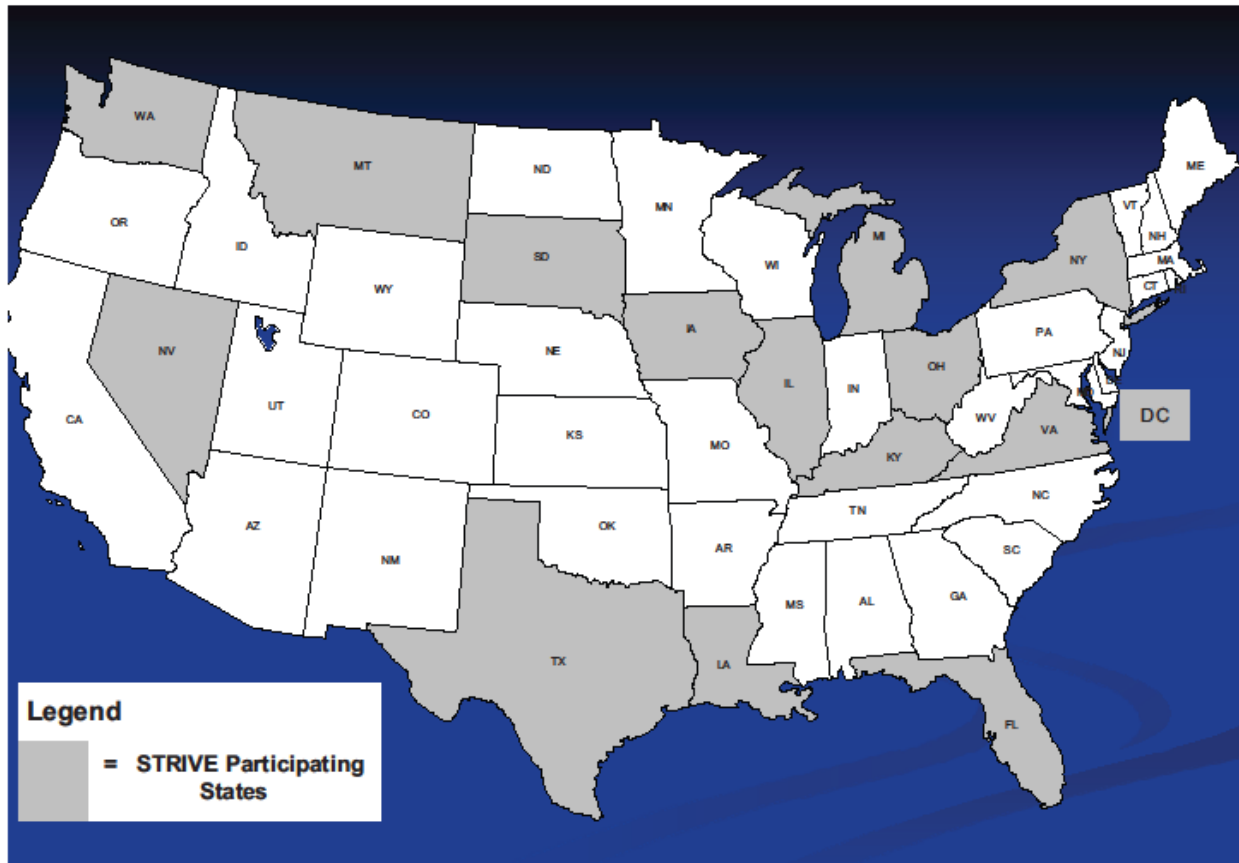
In this section we present a discussion on how the STRIVE sampling protocol resorts to voluntary and convenience sampling which might lead to potential bias. The sampling method used to collect the STRIVE data follows an eleven step sampling protocol (see Appendix A for STRIVE sample protocol) for a three stage cluster sampling with stratification. Of the eleven steps, four may pose potential problems for representativeness and sampling bias. The four “problem” steps are addressed below.

*Step 2 - “Identified 15 states that agreed to participate” -*

In this STRIVE sampling stage a subsample of states from the 50 states (plus District of Columbia) is selected. The sampling here is dependent on voluntary participation by states. This raises the chance of potential bias. It can also be seen that most of the mountain, mid west and New England states, California were not involved in the study (refer to **Exhibit 3** showing the STRIVE states below). These omissions reflect obvious problems with representativeness.

Another factor to consider is the operating characteristics of the facilities in the STRIVE states. A key question is “do these states’ facilities operating characteristics represent those in all remaining states?” For example, do the characteristics of facilities in STRIVE participating states represent the facility characteristics of non-STRIVE states such as California or Maine?

Exhibit 3: STRIVE states



Source: STRIVE TEP notes, March 11, 2009 (exact replication)

*Step 4 – “Applied geographic restrictions for some states”*

This Step 4 restriction was applied to only 4 states – Florida, Illinois, Louisiana and Texas. That is, for some states, due to travel convenience of data monitors, only facilities in close geographic proximity to the data monitors were selected. From **Exhibit 4** it can be seen that out of the 5930 statewide eligible facilities, 1153 (approximately 19%) facilities in the 4 states were outside the favored geographic study area. The geographic restrictions were imposed for travel and budget restrictions and the states “agreed to participate but only if the study area was restricted to certain sections of the state”. It can be observed that there are two factors playing part in the sample selection process and the potential bias problem. The first being the study area was chosen by the state (self selection by individuals or data units being investigated). The second factor is due to facility difference by geographic region. For instance in Florida, for the Miami greater metropolitan region, there are more and perhaps different types of urban facilities than in the Jacksonville greater metropolitan region, or for Illinois, the nature of facilities in the Chicago metropolitan area might be different from the Champaign metropolitan region or rural areas of the state.

Exhibit 4: Count of eligible facilities in the 15 STRIVE states study area

## Facility Sample Fulfillment

Population Group	Facilities	Percent of Total
Certified facilities -15 states	6,493	100.0%
Data exclusions (poor quality)	563	8.7%
Statewide eligible	5,930	91.3%
Facilities outside of geographic study areas (FL, IL, LA, TX)	1,153	17.8%
Eligible facilities in study areas	4,777	73.6%

Source: STRIVE TEP notes, March 11, 2009 (exact replication)

*Step 6 – “Targets were based on .... Number of facilities the data monitors were able to visit ... ”*

This indicates that the sample size was driven by how many facilities could be visited. This type of “convenience sampling” can also lead to potential bias.

*Step 10 – “until enough facilities **agreed** to participate”*

Voluntary sampling again plays a role here in Step 10. The sample is dependent on facility participation. There can be multiple reasons a facility might or might not agree to participate – funding and staff availability. If these types of characteristics are at play then the facility representativeness can be questioned. From **Exhibit 5** it can be seen that out of the 4,777 eligible facilities (after exclusions in Step 3 and geographic restrictions in Step 4 of the sampling plan) 837 facilities were sampled. The 837 sampled facilities went through another screening (Step 9) where 100 facilities were dropped. Out of the 737 eligible facilities, 523 were invited for participation. From **Exhibit 6**, it can be seen that out of the 523 facilities invited, 214 (almost 40%) agreed to participate and out of those 205 (39%) completed the process – showing a low

agreement rate or high non-response rate. This high non-response rate raises concerns that call for further investigation of representativeness of the overall sample.<sup>4</sup>

Exhibit 5: Number of facilities initially sampled in STRIVE Step 8 sampling protocol and number of facilities eligible for participation after Step 9 elimination

## Facility Sample Fulfillment

State/Regional Office Review Results		
Facility Group	Facilities	Percent
Randomly selected for review	837	100.0%
Eliminated by State agencies/ CMS regional offices	100	11.9%
Remaining: eligible for invitation	737	88.1%

Source: STRIVE TEP notes, March 11, 2009 (exact replication)

---

<sup>4</sup> 837 facilities were initially sampled (refer to Exhibit 5). Facilities were invited to participate “until enough facilities agreed”. From Exhibit 5 and Exhibit 6 it can be seen that the process of inviting was stopped when 214 facilities agreed to participate (523 out of the 837 initially selected were invited). Hence it seems the target sample size was 214, however almost four times the required sample size was initially selected. One question raised – the high rejection rate and the underlying reasons for such behavior.

Exhibit 6: Facility participation rates from the sampled facilities invited

## Facility Sample Fulfillment

Facility Participation		
Facility Group	Facilities	Percent
Invited to participate	523	100.0%
Declined to participate	309	59.1%
Agreed to participate	214	40.9%
Facilities with completed studies	205	39.2%

Source: STRIVE TEP notes, March 11, 2009 (exact replication)

In addition to the detailed comments presented above on the 4 steps which could result in bias, we have 3 more concerns. First in the sampling process, there are 2 steps where facilities are dropped based on the quality of the facility – in Step 3 before the sample selection and then later in Step 9 after sample selection. The second concern is, that STRIVE may not capture a representative sample of 5 – 14 – 30 day etc. assessments. The sampling process selects a certain number of facilities within a stratum (strata are created based on the type of staffing pattern, cost structure, treatment provided and so on) for a state. All the cases for the facility are then the sample cases for STRIVE. This form of selection which does not explicitly call for examination of assessment type will not ensure an appropriate representation of the distribution of cases by assessment. This is problematic as long stay cases are different than short stay cases on many dimensions which is a reasonable assumption. Short stay patients tend to have higher case mix index and have higher cost per diem. The third concern is in Step 11 for some facilities that are too large, only a subsample of the facilities has been considered. The subsample (nursing units to be included in the study) was selected by the project staff in consultation with the nursing home management. The same selection logic was used for all large facilities. However it needs to be noted that the subsamples were not randomly selected and instead depend on the judgment of STRIVE project staff and nursing home management.

## D. Appraising the STRIVE sample

This section presents a series of quantitative analyses for the representativeness of the STRIVE data. The STRIVE case data do not have any identifier for state, provider, or patient demographics. They also do not have an identifier for the day assessment type. Hence directly comparing the STRIVE data with similar MDS data for non-sampled facilities is impossible. However, as discussed before we have been able to conduct a variety of comparative analyses.

### *a) Comparison of STRIVE states and Non-STRIVE states on count of facilities, count of residents, percent of Medicare residents, urban-rural percentages and percent of multifacilities*

Lewin received some key identifier variables from OSCAR data. This section presents some of the observations using these OSCAR data. **Exhibit 7** below provides a summary of the count of facilities, total residents, % of urban and rural facilities and percent of multi-facilities in each of the 51 states arranged in descending order of the number of facilities per state.

It can be observed that California has the largest number of facilities and is not a STRIVE participant. Florida has a comparatively large number of facilities and is also the state with the largest percent of Medicare resident (20%). However due to geographic restrictions only 4 facilities have been sampled from Florida. Another interesting factor that can be noticed is – CA, FL, MA, NJ, MD, RI have more than 90% of their facilities in urban region (for all other states the urban to rural ratio is about 70% to 30%). Except for FL, none of the states are STRIVE participants, and even for FL there are geographical restrictions and only 4 sampled facilities.

**Exhibit 7: Summary results by state from OSCAR data**

State  (* indicates the STRIVE participating states)	From OSCAR Data							Number of sample facilities (from TEP presentation)
	Count of facilities	Total count of residents	% of Medicare residents	% of urban and rural facilities		Multi facility		
				urban	rural	% Yes	% No	
California	1,321	106,805	12.7%	96.4%	3.6%	51.9%	48.2%	
Texas *	1,273	94,693	13.9%	65.3%	34.7%	63.6%	36.5%	14
Ohio *	1,017	83,754	13.8%	72.9%	27.1%	60.0%	40.0%	20
Illinois *	834	78,863	13.5%	67.9%	32.1%	47.1%	52.9%	15
Pennsylvania	738	81,077	11.6%	79.3%	20.7%	52.7%	47.3%	
Florida *	693	72,548	19.6%	91.6%	8.4%	56.0%	44.0%	4
New York *	665	112,169	12.7%	85.0%	15.0%	12.9%	87.1%	21
Missouri	547	39,543	12.3%	57.2%	42.8%	48.6%	51.4%	
Indiana	537	40,981	15.3%	66.9%	33.1%	63.3%	36.7%	
Iowa *	478	27,579	6.4%	34.9%	65.1%	49.6%	50.4%	21
Massachusetts	459	45,107	13.5%	99.3%	0.7%	53.2%	46.8%	
Michigan *	449	42,256	16.5%	69.5%	30.5%	51.7%	48.3%	5
North Carolina	429	38,177	15.3%	60.1%	39.9%	67.8%	32.2%	

State  (* indicates the STRIVE participating states)	From OSCAR Data							Number of sample facilities (from TEP presentation)
	Count of facilities	Total count of residents	% of Medicare residents	% of urban and rural facilities		Multi facility		
				urban	rural	% Yes	% No	
Wisconsin	411	33,847	13.2%	57.2%	42.8%	43.1%	56.9%	
Minnesota	402	32,131	10.0%	48.8%	51.2%	50.3%	49.8%	
Kansas	380	20,656	8.4%	36.1%	63.9%	50.0%	50.0%	
Oklahoma	379	22,193	10.6%	42.2%	57.8%	30.3%	69.7%	
New Jersey	370	46,178	17.1%	100.0%	0.0%	35.1%	64.9%	
Georgia	364	35,828	11.1%	61.3%	38.7%	72.3%	27.8%	
Tennessee	337	33,243	15.4%	58.8%	41.2%	60.5%	39.5%	
Louisiana *	307	27,677	11.0%	63.2%	36.8%	47.9%	52.1%	10
Kentucky *	299	23,827	15.2%	48.5%	51.5%	61.2%	38.8%	12
Virginia *	290	28,997	16.8%	71.4%	28.6%	68.6%	31.4%	17
Arkansas	264	19,245	10.9%	48.5%	51.5%	48.5%	51.5%	
Washington *	250	19,679	16.1%	79.6%	20.4%	60.8%	39.2%	15
Connecticut	245	27,279	15.7%	89.4%	10.6%	46.9%	53.1%	
Maryland	238	25,629	15.9%	91.6%	8.4%	54.2%	45.8%	
Alabama	235	23,580	13.5%	62.6%	37.4%	58.7%	41.3%	
Nebraska	232	13,614	10.2%	25.0%	75.0%	46.6%	53.5%	
Colorado	222	17,106	11.1%	71.2%	28.8%	59.0%	41.0%	
Mississippi	216	17,231	13.0%	31.0%	69.0%	43.5%	56.5%	
South Carolina	181	16,969	16.3%	70.7%	29.3%	71.3%	28.7%	
Oregon	141	8,240	12.9%	70.9%	29.1%	68.8%	31.2%	
Arizona	139	12,581	12.5%	84.9%	15.1%	59.0%	41.0%	
West Virginia	133	9,974	13.4%	45.9%	54.1%	46.6%	53.4%	
South Dakota *	114	6,696	7.3%	26.3%	73.7%	56.1%	43.9%	18
Maine	114	6,666	15.9%	46.5%	53.5%	54.4%	45.6%	
Utah	98	5,593	19.0%	82.7%	17.3%	64.3%	35.7%	
Montana *	97	5,282	10.3%	20.6%	79.4%	38.1%	61.9%	9
Rhode Island	90	8,195	8.9%	100.0%	0.0%	32.2%	67.8%	
New Hampshire	86	7,225	14.4%	53.5%	46.5%	48.8%	51.2%	
Idaho	84	4,827	15.5%	54.8%	45.2%	58.3%	41.7%	
North Dakota	83	5,922	7.4%	24.1%	75.9%	44.6%	55.4%	
New Mexico	76	6,194	11.0%	43.4%	56.6%	65.8%	34.2%	
Hawaii	51	3,980	9.0%	58.8%	41.2%	51.0%	49.0%	
Nevada *	48	4,715	13.9%	75.0%	25.0%	62.5%	37.5%	15
Delaware	47	4,022	15.5%	74.5%	25.5%	55.3%	44.7%	
Vermont	41	3,131	13.9%	19.5%	80.5%	41.5%	58.5%	
Wyoming	39	2,394	10.8%	20.5%	79.5%	38.5%	61.5%	

State  (* indicates the STRIVE participating states)	From OSCAR Data							Number of sample facilities (from TEP presentation)
	Count of facilities	Total count of residents	% of Medicare residents	% of urban and rural facilities		Multi facility		
				urban	rural	% Yes	% No	
Washington D.C. *	20	2,807	10.6%	100.0%	0.0%	25.0%	75.0%	9
Alaska	15	627	10.7%	20.0%	80.0%	33.3%	66.7%	

*b) STRIVE sample representativeness by Medicare and Non-Medicare cases*

Lewin received a Medicare case identifier variable for STRIVE data. Using the Medicare case identifier variable it was determined that out of the 9721 cases, only 2052 cases are Medicare (approximately 21% - see **Exhibit 8**). STRIVE data do not have a provider identifier and hence it is not possible to check if the 21% is consistently represented across all providers, and know, for instance, if all the strata have Medicare sample cases. That is, from the variables available in the STRIVE data there is no way to identify how the Medicare cases are distributed – across states, strata (of selection), types of facilities. This would seem to be problematic in that we are asked to take it on faith that the Medicare sample is indeed representative.

The case weights for STRIVE represent the inverse of the probability of selection of a case scaled to the sample. The probability of selection for each facility is product of: A) Probability facility selected for initial list; B) Probability facility selected for inclusion in study; C) Probability each resident within facility included in study. Since the weights have been scaled to the sample size, Lewin checked to see if the projected number of cases in Medicare is close to the actual sample size. Using the case weights in STRIVE data, the Medicare portion of the data projects to 1381 (see **Exhibit 8** below) cases instead of 2052 (about a 30% reduction). Computationally this is a valid representation given the STRIVE sample (which maybe otherwise biased), since the case weights were developed on the overall sample. However, this indicates that the Medicare cases in the STRIVE 2007 data have been down weighted to reflect the fact that some Medicare cases were sampled with greater probability<sup>5</sup> than the overall sample. Any statistical projections or inferences using a survey data entail using the weights to appropriately project to the overall universe. It can be observed that the Medicare cases thus effectively represent 14% of the overall STRIVE cases. From **Exhibit 8** using MDS 2007 data it can be observed that Medicare cases comprise about 35% of all the cases. This finding is highly important when considering how the RUGs-66 day distribution was developed and used for impact analysis and budget neutrality calculations.

---

<sup>5</sup> STRIVE over-sampled some high cost special population to construct a cost model for this population. These cases are down-weighted with the weighting process.

Exhibit 8: Count and % of Medicare and Non-Medicare cases (actual sample and weighted) using STRIVE 2007 and MDS 2007 data

Medicare Flag : 0 = No; 1 = Yes	Unweighted (actual STRIVE sample)		Weighted (using STRIVE case weights)		Using MDS 2007 data	
	COUNT	PERCENT	COUNT	PERCENT	COUNT	PERCENT
0	7,669	78.89%	8,421.50	85.91%	10,554,053	64.86%
1	2,052	21.11%	1,380.80	14.09%	5,719,114	35.14%
<b>Overall</b>	<b>9,721</b>	<b>100%</b>	<b>9,802.30</b>	<b>100%</b>	<b>16,273,167</b>	<b>100%</b>

c) *STRIVE sample by RUG category*

(i) *Sample size by hierarchical RUG-53 and RUG-66 patient category*

Exhibit 9 provides the sample size for the Medicare and all (Medicare and Non-Medicare) cases in each of RUGs-53 and RUGs-66 based on the STRIVE 2007 data. It can be seen that the sample sizes are widely disparate and some categories do not even have any samples and many categories have less than 30 cases (approximately 44 RUGs-66 categories have less than the 30 cases and 3 have no samples). Some RUG groups have less sample size even at the overall level (e.g. RLX, RLA, for RUG-53 grouper; RUX, RUL, RVX, RVL, RHX, RML for RUG-66 grouper). Thus making any statistical inference based on the sample would be theoretically less stable.

Exhibit 9: Count of Medicare and total cases in the STRIVE 2007 sample data by RUGs-53 (hierarchical grouper) and RUGs-66 (hierarchical grouper)

Count of cases by RUG 53 (hierarchy grouper)			Count of cases by RUG 66 (hierarchy grouper)		
RUG 53	Count of Medicare Cases	Overall Count in STRIVE data	RUG 66	Count of Medicare Cases	Overall Count in STRIVE data
RUX	64	79	RUX	4	8
RUL	142	155	RUL	2	2
RVX	53	65	RVX	6	10
RVL	137	164	RVL	9	11
RHX	82	120	RHX	8	11
RHL	45	60	RHL	15	17
RMX	63	102	RMX	12	21
RML	52	82	RML	10	13
RLX	3	4	RUC	31	46
RUC	58	70	RUB	31	41
RUB	170	194	RUA	25	30
RUA	38	47	RVC	84	101
RVC	49	65	RVB	117	130

Count of cases by RUG 53 (hierarchy grouper)			Count of cases by RUG 66 (hierarchy grouper)		
RUG 53	Count of Medicare Cases	Overall Count in STRIVE data	RUG 66	Count of Medicare Cases	Overall Count in STRIVE data
RVB	170	203	RVA	106	127
RVA	86	104	RHC	109	134
RHC	116	164	RHB	167	200
RHB	91	119	RHA	239	283
RHA	56	78	RMC	104	169
RMC	45	106	RMB	159	240
RMB	86	183	RMA	229	339
RMA	51	108	RLB	7	17
RLB	5	25	RLA	7	30
RLA	4	23	ES3	21	200
SE3	62	171	ES2	8	101
SE2	89	596	ES1	16	41
SE1	9	58	HE2	4	21
SSC	21	204	HE1	22	100
SSB	17	205	HD2	8	48
SSA	47	375	HD1	27	139
CC2	5	81	HC2	9	45
CC1	12	199	HC1	31	146
CB2	11	172	HB2	12	40
CB1	30	586	HB1	18	124
CA2	6	140	LE2	6	62
CA1	31	523	LE1	20	235
IB2		71	LD2	15	111
IB1	4	466	LD1	29	306
IA2		14	LC2	10	101
IA1	4	372	LC1	27	278
BB2		4	LB2	4	43
BB1		13	LB1	24	163
BA2		1	CE2	3	18
BA1		50	CE1	6	44
PE2		130	CD2	4	39
PE1	6	588	CD1	18	135
PD2	2	246	CC2	7	66
PD1	17	1051	CC1	14	206
PC2		26	CB2	3	34
PC1	2	121	CB1	15	94
PB2		20	CA2	7	85
PB1	4	195	CA1	48	366

Count of cases by RUG 53 (hierarchy grouper)			Count of cases by RUG 66 (hierarchy grouper)		
RUG 53	Count of Medicare Cases	Overall Count in STRIVE data	RUG 66	Count of Medicare Cases	Overall Count in STRIVE data
PA2		38	BB2	1	101
PA1	6	671	BB1	13	527
BC1	1	14	BA2		34
			BA1	14	598
			PE2		37
			PE1	2	225
			PD2		94
			PD1	15	469
			PC2	1	160
			PC1	39	757
			PB2	1	67
			PB1	26	390
			PA2	1	51
			PA1	21	825
			AAA	1	14
			Missing		1

*(ii) Distribution of cases by index maximized RUG-53 categories - comparative analysis using STRIVE and MDS Medicare data for STRIVE and non-STRIVE states*

STRIVE data do not have enough Medicare sample cases for all RUG groups for making reasonable inferences based on the sample (refer to **Exhibit 11** below). Only 17 out of the 53 RUGs have samples greater than 50. Six additional RUG groups have sample size greater than 30, however still less than 50 (Column I in Exhibit 11 identifies the RUGs which have STRIVE Medicare sample size less than 30%). These sample sizes are not consistent with precision in RUG weight estimation.

A test of difference in proportion of cases between the STRIVE and the Non-STRIVE states for each RUG based on the MDS Medicare data showed that for most RUGs, the proportion of cases is different (a comparison between column A and column B in exhibit 11, column D shows the RUGs that have significant difference). This indicates that the distribution of cases by RUG categories is different for the STRIVE and the Non-STRIVE states.

Even for the RUG categories that have sufficient sample size, it can be seen that the proportion of cases is different between the MDS and the STRIVE data. For example, consider the RUG

---

<sup>6</sup> Federal Register / Vol. 67, No. 56 / Friday, March 22, 2002 / Proposed Rules, pg. 13427, 42 CFR, Part 412 discusses for LTC-CMS-DRG model all DRG groups with less than 25 cases were grouped together.

category RML which has 130 cases in the STRIVE 2007 data. The STRIVE data has approximately 6% of the sample in this category. The projected proportion (using case weights) is only 4%. From the MDS data it can be seen that the RML RUG category has approximately 9% of Medicare cases in the STRIVE states. Consider RUG RHA as another example. STRIVE states (using MDS data) has 2.78% cases in this group. STRIVE sample has 2.73% cases, while projected STRIVE sample have 3.19% of cases.

**Exhibit 10** below shows **some** of the RUG categories with sufficient Medicare sample cases in STRIVE data. However, the proportion of cases represented in the STRIVE data is different from the proportion in MDS data for STRIVE states. **Exhibit 11** lists **all** the 53 RUG groups (index maximized for the STRIVE 2007 data), the count of cases by each group (actual sample and weighted - Medicare and overall), % of cases by RUG group for STRIVE Medicare and Overall and MDS Medicare by STRIVE states and Non-Strive states.

It can be observed that even if overall STRIVE has a reasonable sample size of 9,721 cases - some RUG groups still do not have sufficient sample size (including Medicare and non-Medicare cases) (see for instances IA2, PB2, PC2, RLA, RLB, RLX).

This raises a concern regarding the state level representativeness of STRIVE data.

**Exhibit 10: Example of RUG categories with sufficient STRIVE sample size, but different proportion of cases in comparison to MDS data and also in the projected (using STRIVE case weights)**

RUG	% cases using MDS Medicare data		STRIVE data sample (Medicare ONLY)		STRIVE Data weighted (Medicare ONLY)	
	STRIVE States	Non-STRIVE States	Count	% of cases	Count	% of cases
RHA	2.78%	2.83%	56	2.73%	44.06	3.19%
RHB	4.59%	3.95%	91	4.43%	92.49	6.70%
RHC	6.35%	5.83%	116	5.65%	79.71	5.77%
RML	9.11%	8.87%	130	6.34%	54.02	3.91%
RMX	10.13%	10.35%	135	6.58%	83.22	6.03%
RVB	9.21%	9.41%	170	8.28%	93.26	6.75%

Exhibit 11: Comparative proportion of cases by RUG category using MDS and STRIVE data

RUG-53 (index max for STRIVE)	% cases using MDS Medicare				STRIVE data sample (Medicare ONLY)		STRIVE Data weighted (Medicare ONLY)		STRIVE Medicare sample < 30 indicator	All STRIVE data sample		All STRIVE Data weighted	
	STRIVE States (A)	Non- STRIVE States (B)	Overall (C)	Ho : (A) = (B), vs. Ha: (A) not equal (B) significance indicator (D)	Count of cases (E)	% of cases (F)	Count of cases (G)	% of cases (H)		Count of cases (J)	% of cases (K)	Count of cases (L)	% of cases (M)
RUX	2.95%	3.16%	3.07%	Y	64	3.12%	36.9	2.67%		79	0.81%	42.1	0.43%
RUL	5.89%	5.49%	5.67%	Y	142	6.92%	63.3	4.58%		155	1.59%	67.9	0.69%
RVX	2.89%	3.24%	3.08%	Y	53	2.58%	31.1	2.25%		65	0.67%	34.6	0.35%
RVL	5.85%	6.05%	5.96%	Y	114	5.56%	63.2	4.58%		136	1.40%	71.3	0.73%
RHX				N/A	0	0.00%	0.0	0.00%	Y	0	0.00%	0.0	0.00%
RHL				N/A	0	0.00%	0.0	0.00%	Y	0	0.00%	0.0	0.00%
RMX	10.13%	10.35%	10.25%	Y	135	6.58%	83.2	6.03%		204	2.10%	113.5	1.16%
RML	9.11%	8.87%	8.98%	Y	130	6.34%	54.0	3.91%		188	1.93%	94.6	0.97%
RLX	0.04%	0.04%	0.04%		1	0.05%	0.3	0.02%	Y	2	0.02%	0.4	0.00%
RUC	2.46%	2.80%	2.65%	Y	58	2.83%	49.8	3.61%		70	0.72%	57.1	0.58%
RUB	7.85%	7.35%	7.58%	Y	170	8.28%	122.0	8.83%		194	2.00%	145.4	1.48%
RUA	2.67%	2.35%	2.49%	Y	38	1.85%	20.7	1.50%		47	0.48%	35.4	0.36%
RVC	2.45%	2.85%	2.67%	Y	49	2.39%	36.0	2.61%		65	0.67%	48.3	0.49%
RVB	9.21%	9.41%	9.32%	Y	170	8.28%	93.3	6.75%		203	2.09%	109.7	1.12%
RVA	3.75%	3.80%	3.78%	Y	86	4.19%	68.4	4.95%		104	1.07%	87.8	0.90%
RHC	6.35%	5.83%	6.06%	Y	116	5.65%	79.7	5.77%		164	1.69%	111.3	1.14%
RHB	4.59%	3.95%	4.24%	Y	91	4.43%	92.5	6.70%		119	1.22%	111.3	1.14%
RHA	2.78%	2.83%	2.81%	Y	56	2.73%	44.1	3.19%		78	0.80%	53.0	0.54%
RMC	2.17%	2.11%	2.14%	Y	45	2.19%	14.9	1.08%		106	1.09%	73.1	0.75%
RMB	3.30%	2.81%	3.03%	Y	86	4.19%	63.1	4.57%		183	1.88%	123.5	1.26%
RMA	1.65%	1.59%	1.62%	Y	51	2.49%	31.5	2.28%		108	1.11%	72.0	0.73%
RLB	0.08%	0.09%	0.09%		5	0.24%	2.6	0.19%	Y	25	0.26%	29.7	0.30%
RLA	0.09%	0.08%	0.08%		4	0.19%	7.3	0.53%	Y	23	0.24%	25.7	0.26%
SE3	2.17%	2.17%	2.17%		64	3.12%	40.9	2.96%		173	1.78%	130.3	1.33%
SE2	3.49%	3.50%	3.50%		89	4.34%	66.9	4.85%		596	6.13%	503.6	5.14%
SE1	0.19%	0.19%	0.19%		9	0.44%	3.7	0.27%	Y	58	0.60%	43.4	0.44%
SSC	0.83%	0.78%	0.80%	Y	21	1.02%	19.5	1.41%	Y	204	2.10%	262.5	2.68%
SSB	0.84%	0.84%	0.84%		17	0.83%	8.8	0.64%	Y	205	2.11%	216.0	2.20%
SSA	1.60%	1.77%	1.69%	Y	47	2.29%	24.5	1.77%		375	3.86%	281.0	2.87%
CC2	0.15%	0.17%	0.16%	Y	5	0.24%	0.9	0.07%	Y	81	0.83%	94.7	0.97%
CC1	0.42%	0.46%	0.44%	Y	12	0.58%	3.5	0.26%	Y	199	2.05%	245.4	2.50%
CB2	0.33%	0.40%	0.37%	Y	11	0.54%	7.2	0.52%	Y	172	1.77%	171.3	1.75%
CB1	1.05%	1.18%	1.12%	Y	30	1.46%	23.6	1.71%		586	6.03%	696.2	7.10%
CA2	0.32%	0.38%	0.35%	Y	6	0.29%	15.9	1.15%	Y	140	1.44%	124.9	1.27%
CA1	1.01%	1.19%	1.11%	Y	31	1.51%	37.6	2.72%		523	5.38%	486.2	4.96%

RUG-53 (index max for STRIVE)	% cases using MDS Medicare				STRIVE data sample (Medicare ONLY)		STRIVE Data weighted (Medicare ONLY)		STRIVE Medicare sample < 30 indicator	All STRIVE data sample		All STRIVE Data weighted	
	STRIVE States	Non- STRIVE States	Overall	Ho : (A) = (B), vs. Ha: (A) not equal (B) significance indicator	Count of cases	% of cases	Count of cases	% of cases		Count of cases	% of cases	Count of cases	% of cases
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)		(I)	(J)	(K)	(L)
IB2	0.02%	0.02%	0.02%	Y	0	0.00%	0.0	0.00%	Y	71	0.73%	164.7	1.68%
IB1	0.16%	0.23%	0.20%	Y	4	0.19%	20.3	1.47%	Y	466	4.79%	890.1	9.08%
IA2	0.01%	0.01%	0.01%		0	0.00%	0.0	0.00%	Y	14	0.14%	22.1	0.23%
IA1	0.14%	0.17%	0.15%	Y	4	0.19%	2.2	0.16%	Y	372	3.83%	388.2	3.96%
BB2	0.00%	0.00%	0.00%		0	0.00%	0.0	0.00%	Y	4	0.04%	6.8	0.07%
BB1	0.01%	0.01%	0.01%	Y	0	0.00%	0.0	0.00%	Y	13	0.13%	15.2	0.16%
BA2	0.00%	0.00%	0.00%	Y	0	0.00%	0.0	0.00%	Y	1	0.01%	0.2	0.00%
BA1	0.03%	0.03%	0.03%	Y	0	0.00%	0.0	0.00%	Y	50	0.51%	43.5	0.44%
PE2	0.03%	0.04%	0.03%	Y	0	0.00%	0.0	0.00%	Y	130	1.34%	249.1	2.54%
PE1	0.21%	0.32%	0.27%	Y	6	0.29%	3.5	0.26%	Y	588	6.05%	791.1	8.07%
PD2	0.05%	0.08%	0.07%	Y	2	0.10%	1.7	0.12%	Y	246	2.53%	439.3	4.48%
PD1	0.37%	0.57%	0.48%	Y	17	0.83%	22.2	1.61%	Y	1051	10.81%	1103.6	11.26%
PC2	0.01%	0.01%	0.01%	Y	0	0.00%	0.0	0.00%	Y	26	0.27%	44.0	0.45%
PC1	0.06%	0.08%	0.07%	Y	2	0.10%	0.4	0.03%	Y	121	1.24%	158.2	1.61%
PB2	0.01%	0.01%	0.01%	Y	0	0.00%	0.0	0.00%	Y	20	0.21%	20.6	0.21%
PB1	0.07%	0.09%	0.08%	Y	4	0.19%	2.2	0.16%	Y	195	2.01%	221.0	2.25%
PA2	0.01%	0.01%	0.01%	Y	0	0.00%	0.0	0.00%	Y	38	0.39%	49.9	0.51%
PA1	0.16%	0.23%	0.20%	Y	6	0.29%	1.4	0.10%	Y	671	6.90%	395.1	4.03%
BC1				N/A	1	0.05%	16.0	1.16%	Y	14	0.14%	36.6	0.37%

From **Exhibit 11** it can be seen that the STRIVE Medicare sample did not exist for some of the RUGs-53 categories. For those groups where the sample size is small, less than 30, even less than 10 we have concerns about precision.

*d) Comparative study of behavioral and clinical patterns between STRIVE Medicare and STRIVE non-Medicare groups and MDS Medicare cases*

Another quantitative analysis that has been performed compares MDS characteristic variables in the STRIVE data, to MDS estimates for Strive states and at national level. STRIVE data (all cases including Medicare and Non-Medicare) has case-weights based on the complete data. The nursing weights are also computed using all the cases. Hence analysis was done to test for similarity of behavioral and clinical characteristics between the Medicare and the Non-Medicare cohorts in STRIVE. A comparative analysis was also done to check if the characteristic pattern for the STRIVE Medicare cohort is similar to the Medicare universe (from MDS data – by

STRIVE states, Non-STRIVE states and overall). The Iowa Care Foundation has presented such a comparative study for selected characteristics. Lewin has run tests for all the characteristics (like ADLs, Cognitive patterns, Communication/Hearing patterns, diseases and likewise) that are available both in the STRIVE and the MDS data. We present some of the results in the tables and figures below. These results were determined using MDS 2007 and STRIVE 2007 data.

**Exhibit 12 - 35** shows the results for response to some (12 characteristics) behavioral characteristics in MDS (Medicare) and STRIVE data. We note that for STRIVE, the response is different for the two cohorts (Medicare and Non-Medicare) (compare columns A and B) – indicating a behavioral difference between the two groups for most characteristics. Also the response proportion for STRIVE Medicare cohort is different from the response proportion from MDS Medicare (compare columns A and C). For most behavioral patterns, the distribution of responses for a characteristic is not different between the STRIVE states and the Non-STRIVE states when looking at the universe MDS data (compare columns C and D). Chi-square test for association between two categorical variables (row variable - characteristics and column variable-Medicare/Non-Medicare identifier) was performed for each of the characteristics on the STRIVE sample data. The tests showed that most behavioral patterns are dependent on whether a case is a Medicare or a Non-Medicare case. This supports the observations that the responses for the characteristics are different between the Medicare and non-Medicare cohorts in the STRIVE sample.

For example, in case of Self bed mobility (refer Exhibit 12 and 13) 36% of the STRIVE Medicare cases reported “Extensive Assistance” while for STRIVE Non-Medicare this figure is 28% and for MDS STRIVE states it is 45%. Consider the next ADL characteristics displayed – G1BA (how does a resident move between surfaces like bed and chair) (refer Exhibit 14 and 15). 4.4% of STRIVE Medicare cases reported independence while 18% of Non-Medicare STRIVE cases reported independence. From the MDS Medicare data for STRIVE states, 5.6% reported independence. Similar observations can be made for the different response levels of the variable.

Some characteristics like incidence of disease like Diabetes Mellitus are not dependent on if a case is Medicare or Non-Medicare (and chi-square test also indicated the same). However even for those variables, the incidence rates between the Medicare cohort and the Non-Medicare STRIVE cohorts are different. The incidence rate is also different between the STRIVE Medicare cohort and incidence rate for STRIVE states from MDS data (for example refer to exhibit 20 and 21).

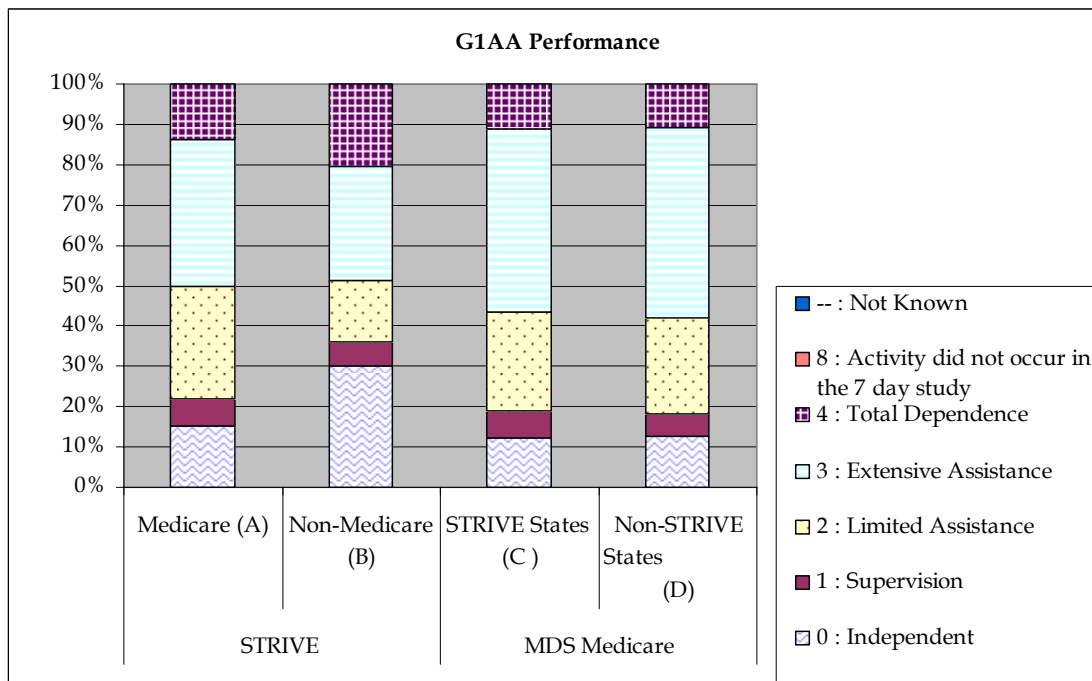
This shows that Medicare and Non-Medicare cohorts have different behavioral and clinical patterns (in most cases). Also the difference in behavioral and clinical patterns between the STRIVE Medicare and MDS Medicare data raises a concern about the representativeness of the STRIVE sample data. This may suggest that the RUG weights based on the entire STRIVE sample may not reflect Medicare patients as much as Non-Medicare patients.

The behavioral patterns are not different for most cases between the STRIVE and the non-STRIVE states from the MDS Medicare data.

Exhibit 12: Comparative response for Self Bed mobility Performance (G1AA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (TABLE)

Self Bed mobility Performance (G1AA)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
0 : Independent	208.52	15.28%	2515.48	29.94%	12.12%	12.70%	12.44%
1 : Supervision	89.93	6.59%	522.40	6.22%	6.82%	5.68%	6.19%
2 : Limited Assistance	380.96	27.91%	1256.99	14.96%	24.72%	23.54%	24.06%
3 : Extensive Assistance	498.19	36.50%	2373.13	28.25%	45.11%	47.35%	46.35%
4 : Total Dependence	186.81	13.69%	1731.10	20.61%	11.19%	10.70%	10.92%
8 : Activity did not occur in the 7 day study	0.35	0.03%	1.85	0.02%	0.03%	0.02%	0.03%
<b>Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)</b>							
<b>Statistics</b>	<b>Value</b>						
Chi-Square	264.0088						
DF for Chi-Square	5						
P-value for Chi-Square	< 0.0001						

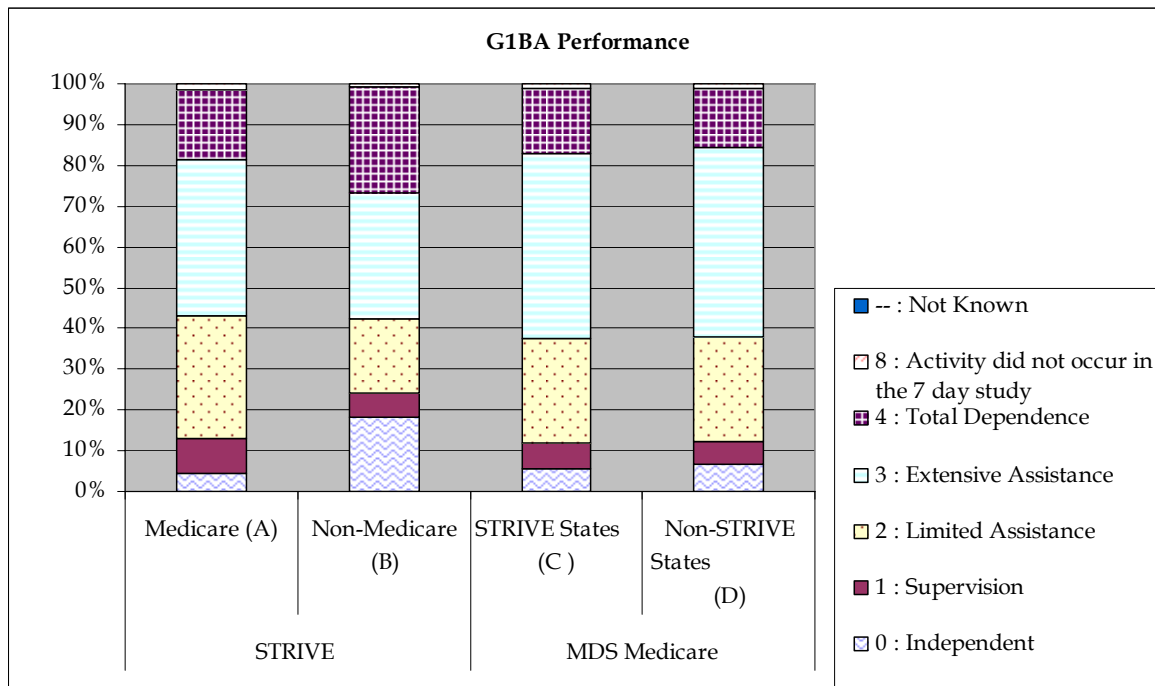
Exhibit 13: Comparative response for Self Bed mobility Performance (G1AA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)



**Exhibit 14: Comparative response for Transfer Self Performance (G1BA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (TABLE)**

Transfer Self Performance (G1BA)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
0 : Independent	60.70	4.45%	1538.91	18.32%	5.58%	6.53%	6.10%
1 : Supervision	115.71	8.48%	486.29	5.79%	6.15%	5.72%	5.91%
2 : Limited Assistance	410.47	30.08%	1535.96	18.28%	25.67%	25.51%	25.58%
3 : Extensive Assistance	523.65	38.37%	2591.12	30.84%	45.67%	46.58%	46.17%
4 : Total Dependence	236.28	17.31%	2173.97	25.88%	15.96%	14.61%	15.21%
8 : Activity did not occur in the 7 day study	17.94	1.31%	74.70	0.89%	0.97%	1.05%	1.01%
<b>Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)</b>							
<b>Statistics</b>	<b>Value</b>						
Chi-Square	291.5956						
DF for Chi-Square	5						
P-value for Chi-Square	< 0.0001						

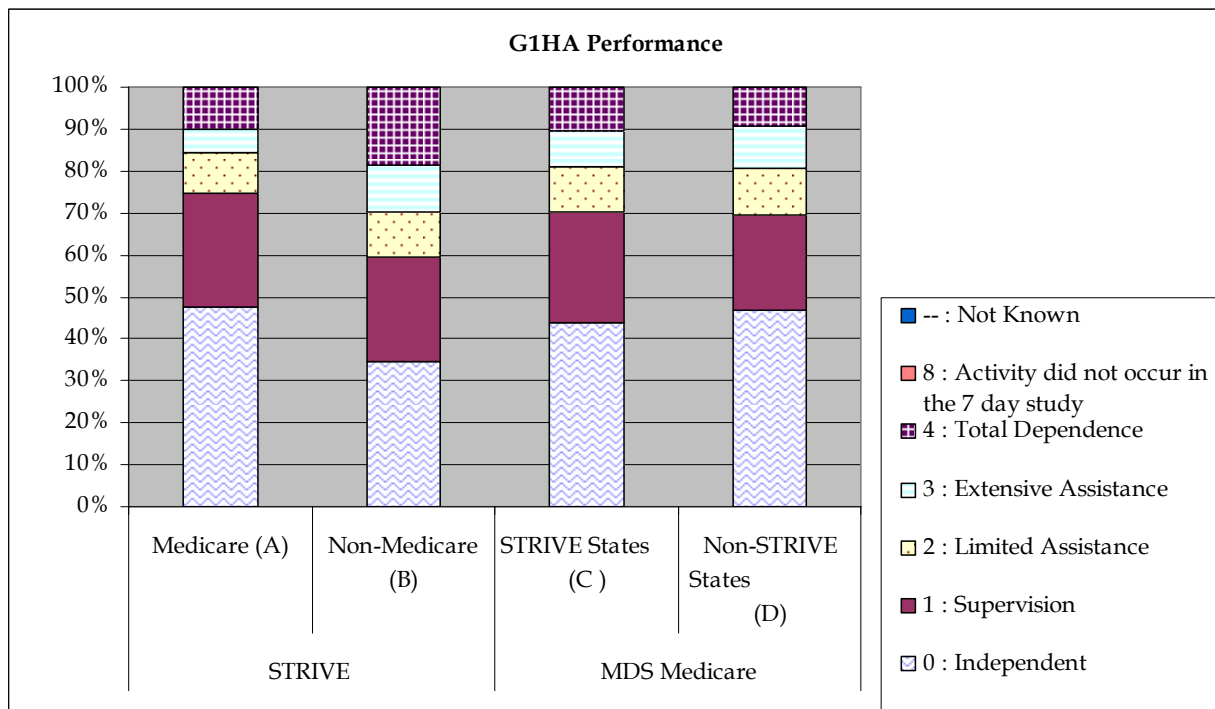
**Exhibit 15: Comparative response for Transfer Self Performance (G1BA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)**



**Exhibit 16: Comparative response for Eating Self Performance (G1HA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (TABLE)**

Eating Self Performance (G1HA)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
0 : Independent	651.85	47.76%	2904.40	34.57%	43.99%	46.81%	45.55%
1 : Supervision	366.44	26.85%	2081.74	24.78%	26.35%	22.64%	24.29%
2 : Limited Assistance	133.20	9.76%	912.45	10.86%	10.60%	11.26%	10.96%
3 : Extensive Assistance	74.73	5.48%	944.37	11.24%	8.52%	9.86%	9.26%
4 : Total Dependence	138.24	10.13%	1557.27	18.54%	10.41%	9.26%	9.77%
8 : Activity did not occur in the 7 day study	0.30	0.02%	0.72	0.01%	0.13%	0.16%	0.14%
<b>Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)</b>							
<b>Statistics</b>		<b>Value</b>					
Chi-Square		144.8189					
DF for Chi-Square		5					
P-value for Chi-Square		< 0.0001					

**Exhibit 17: Comparative response for Eating Self Performance (G1HA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)**



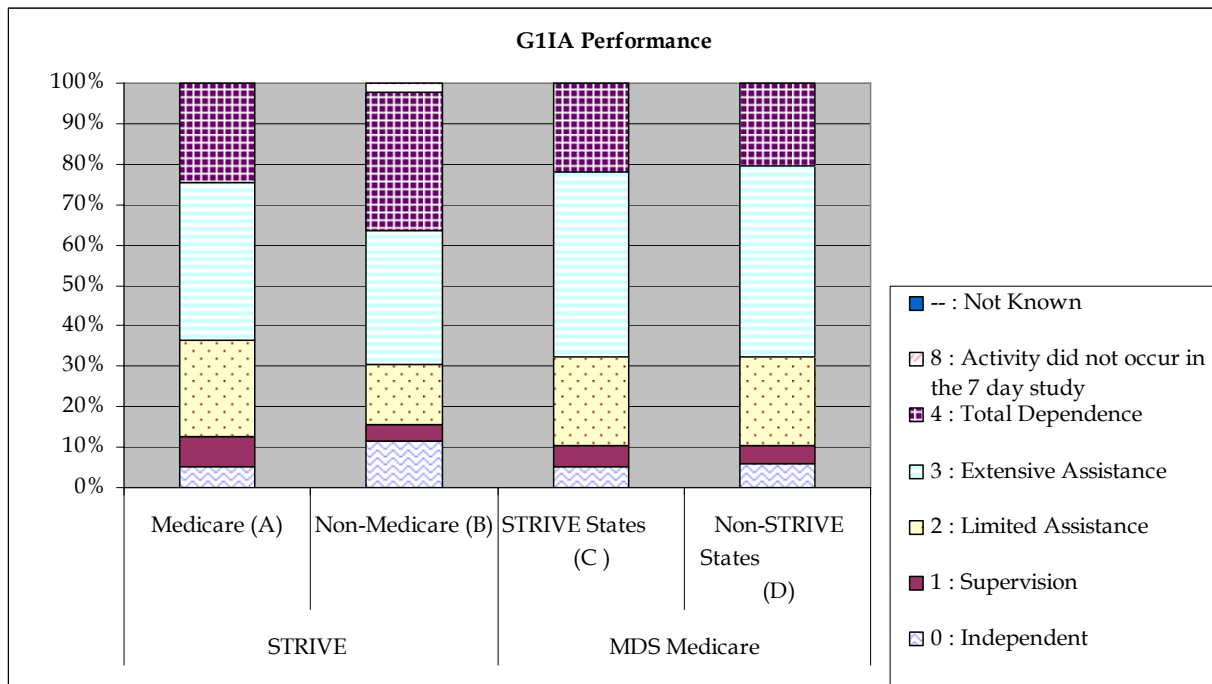
**Exhibit 18: Comparative response for Toilet Use Self Performance (G1IA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (TABLE)**

Toilet Use Self Performance (G1IA)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
0 : Independent	70.17	5.14%	977.58	11.64%	5.10%	5.81%	5.49%
1 : Supervision	104.28	7.64%	345.91	4.12%	5.15%	4.76%	4.94%
2 : Limited Assistance	324.43	23.77%	1224.01	14.57%	21.97%	21.66%	21.80%
3 : Extensive Assistance	531.50	38.94%	2806.28	33.40%	45.89%	47.33%	46.69%
4 : Total Dependence	334.37	24.50%	2846.71	33.89%	21.74%	20.28%	20.93%
8 : Activity did not occur in the 7 day study	0.00	0.00%	200.46	2.39%	0.15%	0.13%	0.14%

Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)	
Statistics	Value
Chi-Square	215.3271
DF for Chi-Square	5
P-value for Chi-Square	< 0.0001

**Exhibit 19: Comparative response for Toilet Use Self Performance (G1IA) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)**



**Exhibit 20: Comparative response for Diabetes Mellitus (I1A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare**

Diabetes Mellitus (I1A)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
-1 : Unable to Determine	0.67	0.05%	0.67	0.01%	0.05%	0.05%	0.05%
0 : No	931.71	67.48%	5892.77	69.99%	64.10%	64.89%	64.54%
1 : Yes	448.42	32.48%	2526.40	30.01%	35.85%	35.06%	35.41%
<b>Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)</b>							
<b>Statistics</b>		<b>Value</b>					
Chi-Square		4.8758					
DF for Chi-Square		2					
P-value for Chi-Square		0.0873					

**Exhibit 21: Comparative response for Diabetes Mellitus (I1A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)**

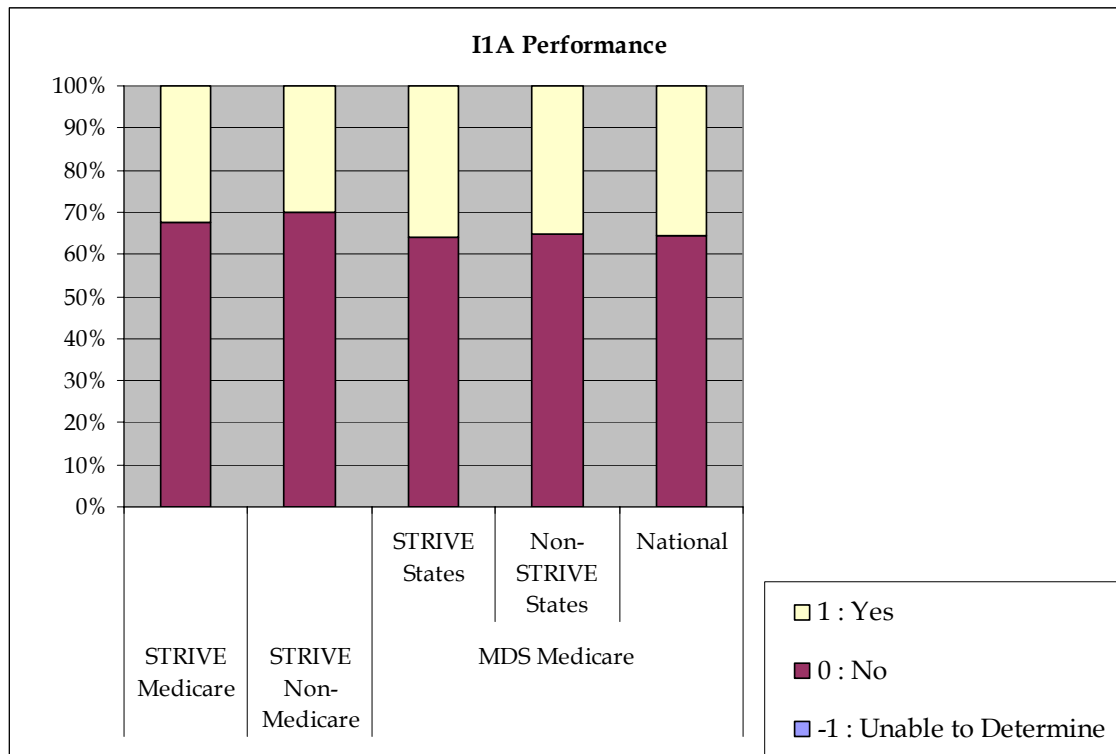


Exhibit 22: Comparative response for Parenteral IV (K5A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare

Parenteral IV (K5A)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
-1 : Unable to Determine	1.73	0.13%	1.10	0.01%	0.37%	0.53%	0.46%
0 : No	1253.71	90.80%	8301.30	98.59%	91.94%	90.93%	91.38%
1 : Yes	125.35	9.08%	117.44	1.39%	7.69%	8.55%	8.16%
<b>Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)</b>							
<b>Statistics</b>	<b>Value</b>						
Chi-Square	295.2303						
DF for Chi-Square	2						
P-value for Chi-Square	< 0.0001						

Exhibit 23: Comparative response for Parenteral IV (K5A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)

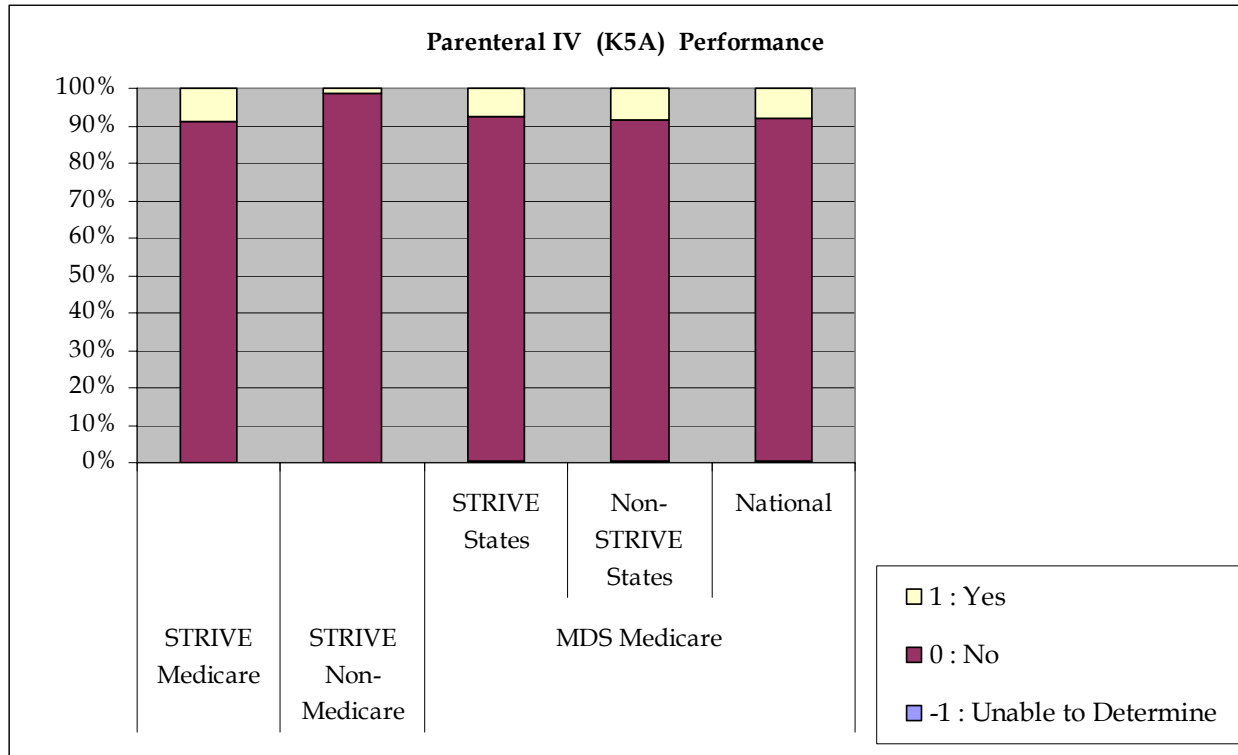
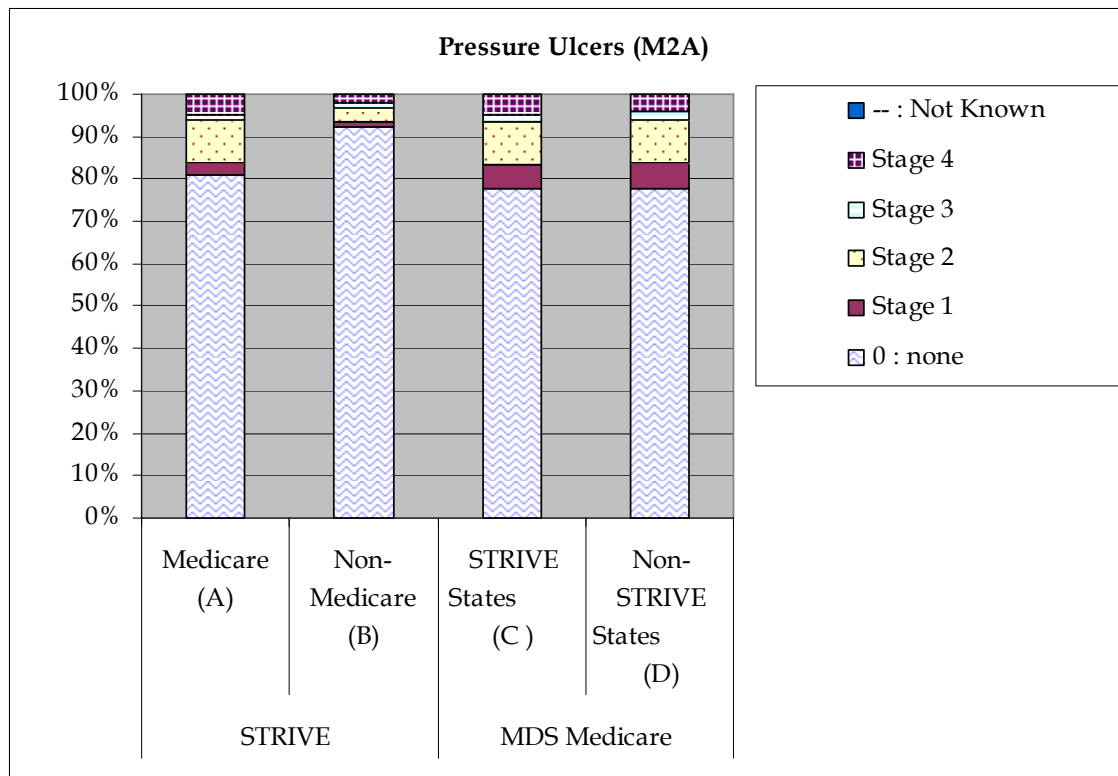


Exhibit 24: Comparative proportion of cases for Pressure ulcers (M2A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare

Pressure Ulcers (M2A) - Stages	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
0 : none	1102.39	80.78%	7742.17	92.14%	77.62%	77.93%	77.79%
1	39.93	2.93%	110.63	1.32%	5.67%	6.01%	5.86%
2	141.80	10.39%	282.33	3.36%	10.07%	10.17%	10.12%
3	16.56	1.21%	94.35	1.12%	1.82%	1.88%	1.85%
4	64.07	4.69%	172.94	2.06%	4.74%	4.00%	4.33%
<b>Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)</b>							
<b>Statistics</b>	<b>Value</b>						
Chi-Square	203.8108						
DF for Chi-Square	4						
P-value for Chi-Square	< 0.0001						

Exhibit 25: Comparative proportion of cases for Pressure ulcers (M2A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)



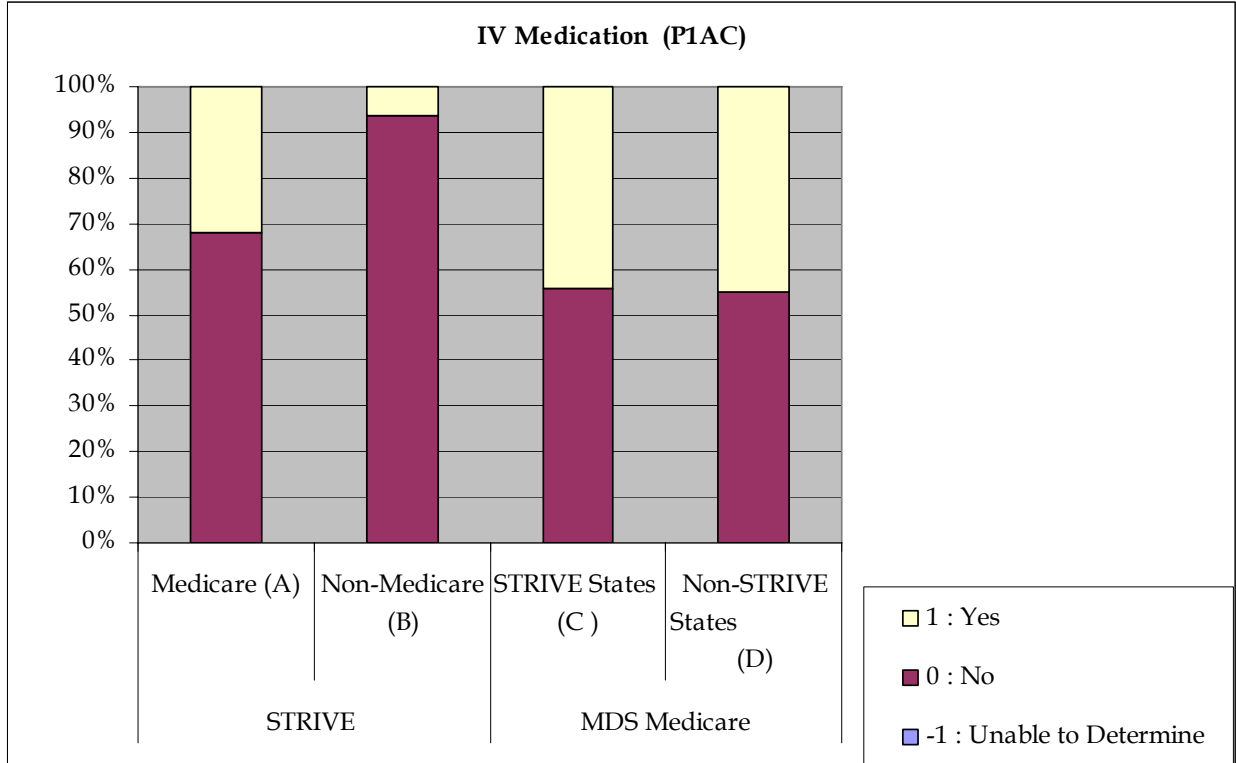
**Exhibit 26: Comparative response for IV Medication (P1AC) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare**

IV Medication (P1AC)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
-1 : Unable to Determine	0.95	0.07%	0.95	0.01%	0.01%	0.01%	0.01%
0 : No	935.92	67.78%	7875.06	93.53%	55.80%	54.99%	55.35%
1 : Yes	443.91	32.15%	543.83	6.46%	44.18%	44.99%	44.63%

Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)	
Statistics	Value
Chi-Square	866.3351
DF for Chi-Square	2
P-value for Chi-Square	< 0.0001

**Exhibit 27: Comparative response for IV Medication (P1AC) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)**



**Exhibit 28: Comparative response for Oxygen Therapy (P1AG) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare**

Oxygen Therapy (P1AG)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
-1 : Unable to Determine	0.95	0.07%	0.95	0.01%	0.01%	0.01%	0.01%
0 : No	1097.91	79.51%	7558.22	89.77%	70.76%	70.30%	70.50%
1 : Yes	281.92	20.42%	860.67	10.22%	29.23%	29.69%	29.49%

Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)	
Statistics	Value
Chi-Square	121.9218
DF for Chi-Square	2
P-value for Chi-Square	< 0.0001

**Exhibit 29: Comparative response for Oxygen Therapy (P1AG) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)**

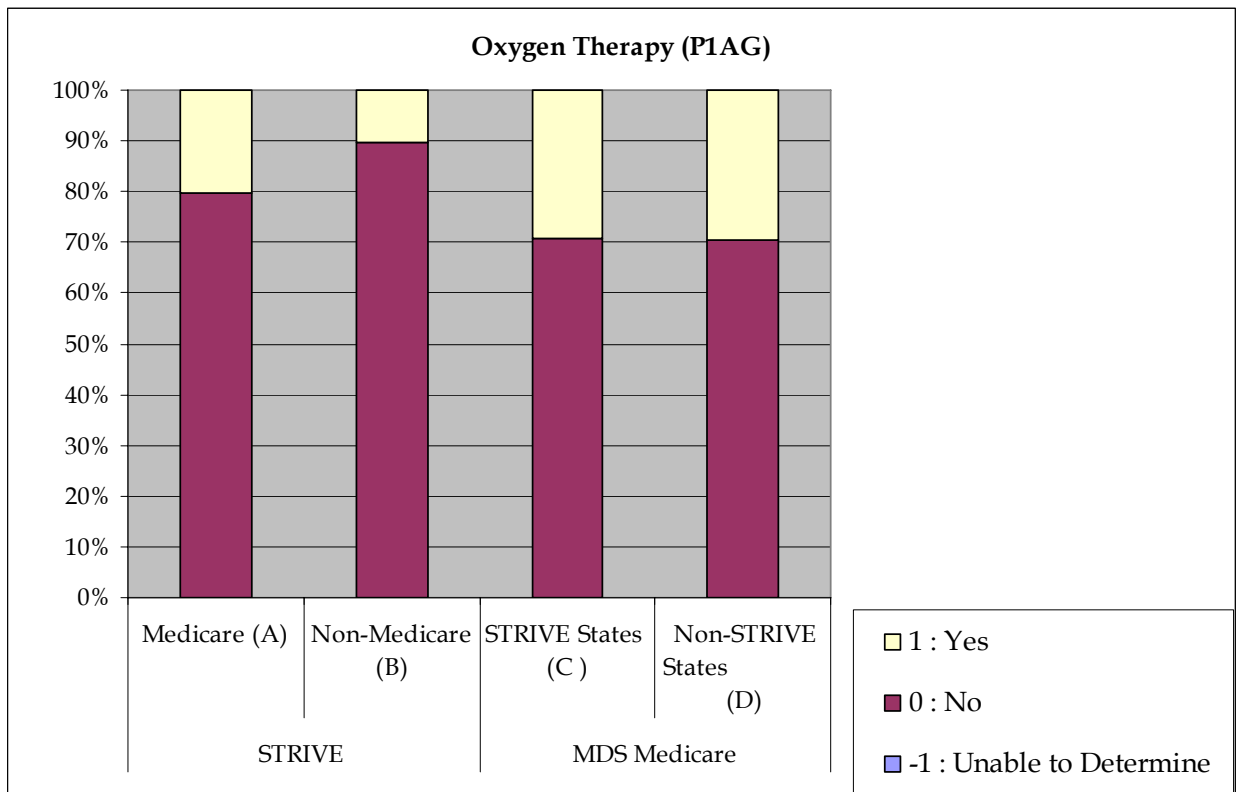


Exhibit 30: Comparative response for Short Term Memory (B2A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare

Short Term Memory (B2A) (Memory OK = Seems to recall in 5 minutes)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
-2. Skip Pattern	17.78	1.29%	52.29	0.62%	0.00%	0.00%	0.00%
-1. Unable to determine	4.85	0.35%	21.31	0.25%	0.48%	0.52%	0.50%
0. Memory OK	638.14	46.22%	1690.84	20.08%	46.10%	46.54%	46.34%
1. Memory problem	720.02	52.15%	6655.40	79.04%	53.42%	52.95%	53.16%

Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)	
Statistics	Value
Chi-Square	462.7912
DF for Chi-Square	3
P-value for Chi-Square	< 0.0001

Exhibit 31: Comparative response for Short Term Memory (B2A) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)

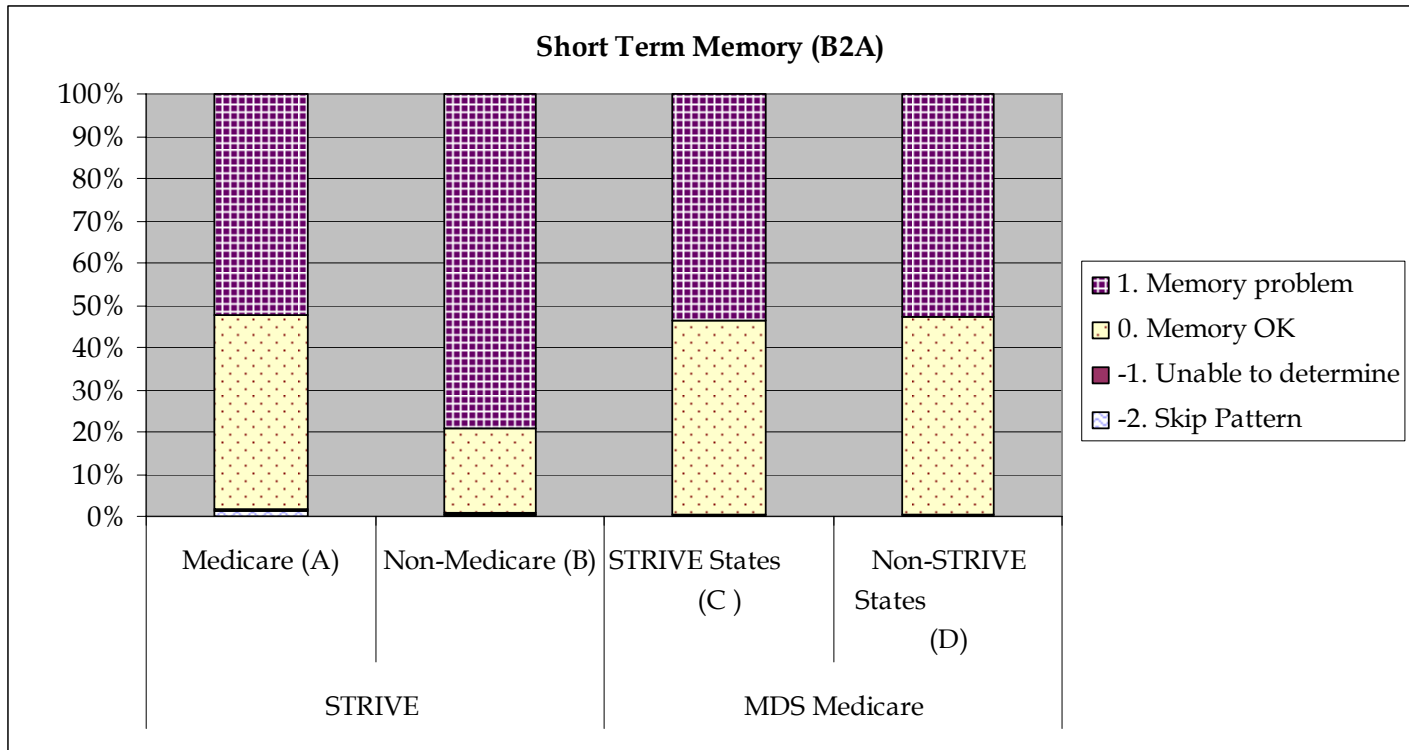


Exhibit 32: Comparative response for Independent Decision making (B4) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare

Cognitive Skills for independent decision making (B4)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
-2. Skip Pattern	17.78	1.29%	52.56	0.62%	0.00%	0.00%	0.00%
-1. Unable to determine	0.00	0.00%	0.26	0.00%	0.20%	0.13%	0.16%
0. INDEPENDENT	456.37	33.05%	1192.72	14.17%	37.60%	39.87%	38.85%
1. MODIFIED INDEPENDENCE	375.88	27.22%	1531.24	18.19%	25.60%	23.77%	24.58%
2. MODERATELY IMPAIRED	434.33	31.46%	3690.62	43.83%	29.42%	28.91%	29.14%
4. SEVERELY IMPAIRED	96.42	6.98%	1952.44	23.19%	7.18%	7.33%	7.26%
<b>Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)</b>							
<b>Statistics</b>	<b>Value</b>						
Chi-Square	500.7398						
DF for Chi-Square	5						
P-value for Chi-Square	< 0.0001						

Exhibit 33: Comparative response for Independent Decision making (B4) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)

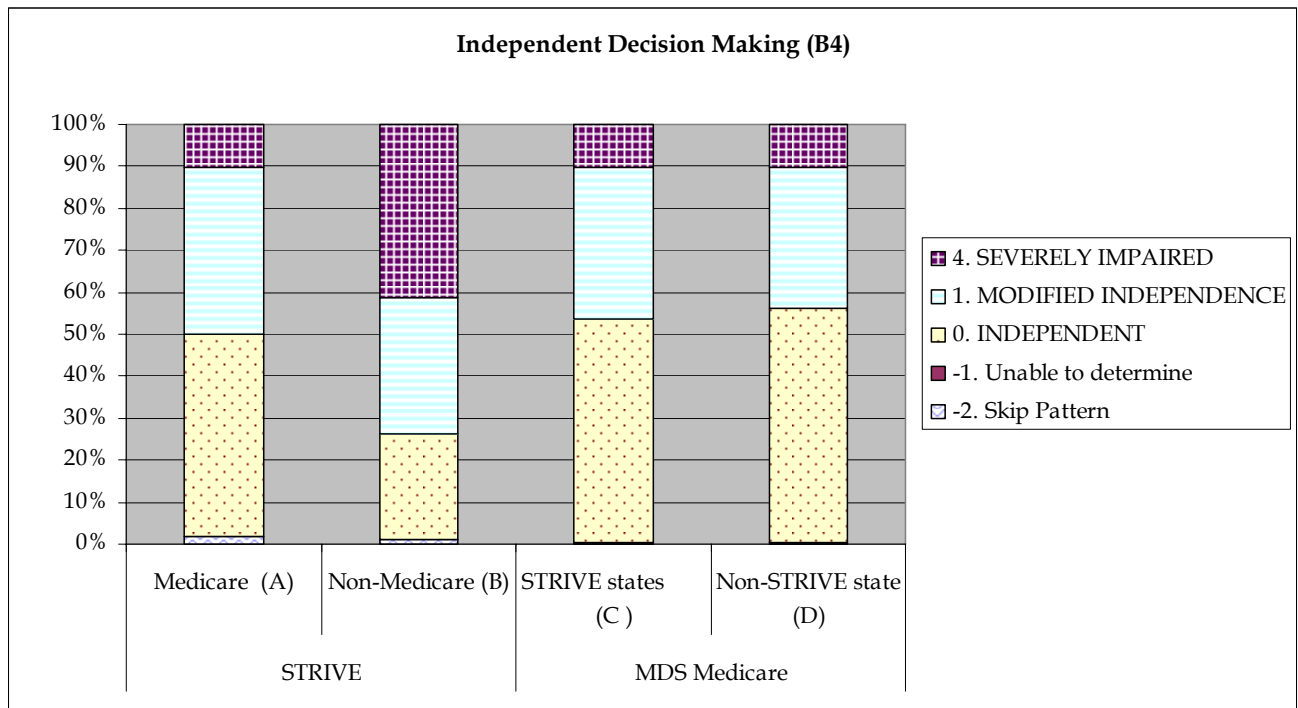


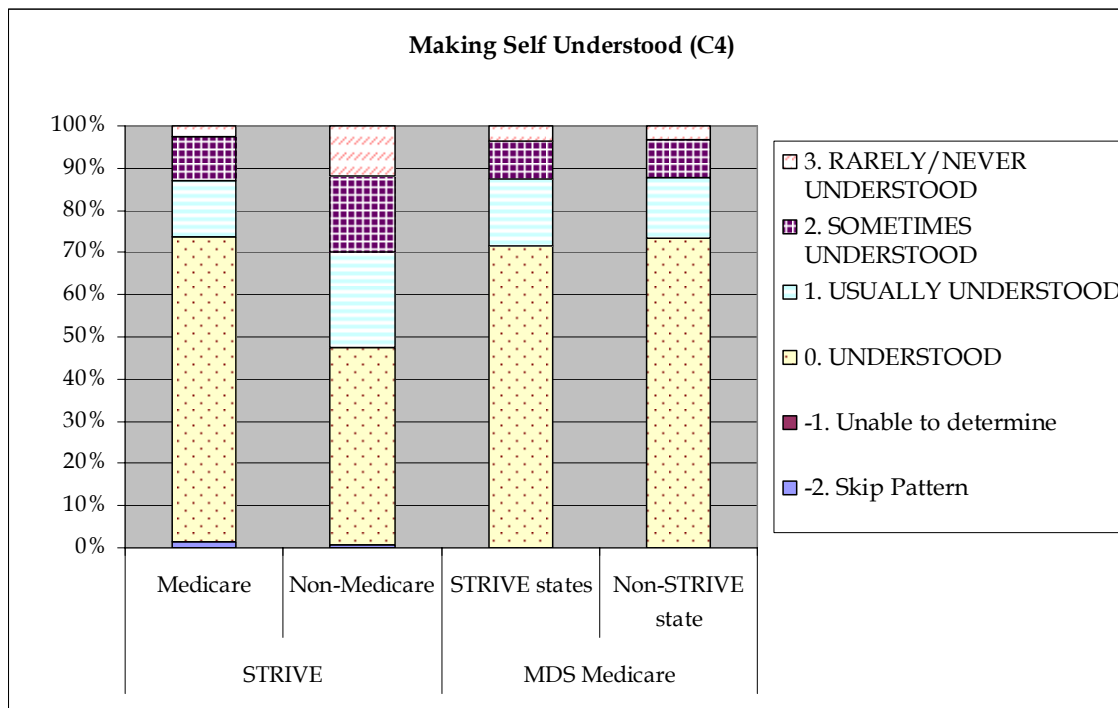
Exhibit 34: Comparative response for Making Self understood (C4) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)

Communication skills - Making Self Understood (C4)	STRIVE Medicare		STRIVE Non-Medicare		MDS (Medicare only) % of cases		
	count of cases	% of cases (A)	count of cases	% of cases (B)	STRIVE states (C)	Non-STRIVE states (D)	All Medicare
-2. Skip Pattern	17.78	1.29%	52.16	0.62%	0.00%	0.00%	0.00%
-1. Unable to determine	0.00	0.00%	7.46	0.09%	0.16%	0.07%	0.11%
0. UNDERSTOOD	1002.46	72.60%	3930.69	46.68%	71.32%	73.29%	72.41%
1. USUALLY UNDERSTOOD	183.94	13.32%	1922.18	22.83%	15.82%	14.47%	15.08%
2. SOMETIMES UNDERSTOOD	143.96	10.43%	1496.30	17.77%	9.17%	8.82%	8.98%
3. RARELY/NEVER UNDERSTOOD	32.65	2.36%	1011.06	12.01%	3.53%	3.35%	3.43%

Test Ho : Characteristics independent of Medicare/Non-Medicare (based on STRIVE data)	
Statistics	Value
Chi-Square	358.6808
DF for Chi-Square	5
P-value for Chi-Square	< 0.0001

Exhibit 35: Comparative response for Making Self understood (C4) between STRIVE Medicare and Non-Medicare (weighted), MDS Medicare STRIVE States and Non-STRIVE States and Overall Medicare (GRAPH)



*e) Nursing time - comparative study between STRIVE Medicare and Non-Medicare cohorts*

Each RUG has associated nursing and therapy weights. These weights are used to compute the SNF PPS payment for each group. The computation of RUG nursing weights uses the wage weighted nursing minutes. Two tests were performed to test for the wage weighted nursing time between the Medicare and the Non-Medicare cohorts in the STRIVE sample – Kolmogorov Smirnov (KS) test and two sample t-test. The KS test is a non-parametric analysis which tests if for the two samples (Medicare and Non-Medicare nursing time) the data comes from same distribution. The two sample test for difference in mean is a parametric t-test to test for difference in mean nursing time between the Medicare and the Non-Medicare groups by each RUG. **Exhibit 36** shows the results for the two tests. It can be seen that for most RUGs the nursing time is similar between the Medicare and the Non-Medicare groups. However, for some groups like RUX, RLX the nursing times are statistically different (last column in **Exhibit 36** with “\*” indicate a statistically significant difference between the Medicare and Non-Medicare groups). This would indicate that some RUG weights may not be reflective of Medicare patients. Since the computation of nursing weights use all the cases, a difference in the Medicare and Non-Medicare cohorts nursing time (average time or distribution) questions the use of all cases for creation of the weights.

**Exhibit 36: Results of T-test for difference in mean Nursing time and difference in distribution (Kolmogorov-Smirnov) of nursing time between Medicare and Non-Medicare cohorts for STRIVE sample (assumed 95% confidence level for tests)**

RUG - 53 (index maximized)	Nursing time (by RUG category for Medicare cohort in STRIVE)		Nursing time (by RUG category for Non-Medicare cohort in STRIVE)		p-value for T-test for difference in mean (p-value for KS test for difference in distribution)
	Average Nursing time	Std. Dev. Of nursing time	Average Nursing time	Std. Dev. Of nursing time	
RUX	237.20	70.49	315.71	63.14	0.0181* ( 0.0573 )
RUL	200.02	74.26	184.84	64.77	0.6698 ( 0.9878 )
RVX	212.67	74.40	235.74	73.00	0.5806 ( 0.5098 )
RVL	223.19	118.52	185.71	58.49	0.3682 ( 0.9943 )
RHX					
RHL					
RMX	261.72	111.63	285.44	96.34	0.2962 ( 0.7387 )
RML	195.05	72.13	169.48	81.83	0.1035 ( 0.7160 )
RLX	287.84	0	409.62	0	
RUC	213.48	80.02	247.67	65.42	0.2718 ( 0.9650 )
RUB	179.45	92.33	130.38	57.67	0.0153* ( 0.2601 )
RUA	181.37	81.85	139.92	60.16	0.1287 ( 0.8544 )
RVC	235.09	74.48	150.01	60.85	0.0006* ( 0.9963 )
RVB	150.21	52.82	117.70	41.23	0.0185* ( 0.0373* )
RVA	107.37	56.78	120.80	31.75	0.3308 ( 0.9617 )

RUG - 53 (index maximized)	Nursing time (by RUG category for Medicare cohort in STRIVE)		Nursing time (by RUG category for Non-Medicare cohort in STRIVE)		p-value for T-test for difference in mean (p-value for KS test for difference in distribution)
	Average Nursing time	Std. Dev. Of nursing time	Average Nursing time	Std. Dev. Of nursing time	
RHC	207.67	68.89	199.86	64.84	0.5843 (0.7473)
RHB	144.74	66.54	122.32	44.87	0.1573 (0.0567)
RHA	156.00	89.39	87.06	36.69	0.0192* (0.1022)
RMC	227.95	75.02	176.92	66.60	0.0140* (0.3738)
RMB	150.16	60.75	150.85	59.68	0.9492 (0.3806)
RMA	118.33	61.84	67.09	51.79	0.0002* (0.2519)
RLB	159.69	67.49	178.78	82.00	0.7166 (0.9639)
RLA	131.86	223.16	117.34	44.53	0.7270 (0.8341)
SE3	258.27	128.54	236.38	123.81	0.3571 (0.0698)
SE2	231.42	100.46	211.90	118.68	0.2010 (0.4239)
SE1	280.79	93.97	166.98	105.99	0.0488* (0.9346)
SSC	181.34	68.78	170.96	70.27	0.5301 (0.4544)
SSB	226.89	45.97	160.62	76.81	0.0107* (0.1060)
SSA	229.04	62.74	126.63	65.15	0.0000* (0.0003*)
CC2	223.43	19.76	197.32	76.97	0.7393 (0.4241)
CC1	214.10	58.52	162.75	66.93	0.1509 (0.2970)
CB2	202.95	53.48	154.84	65.60	0.0526 (0.4602)
CB1	212.74	61.13	140.64	64.15	0.0000* (0.0000*)
CA2	335.70	111.83	130.81	77.77	0.0000* (0.3763)
CA1	105.36	55.65	92.20	53.58	0.1495 (0.0360*)
IB2					
IB1	112.65	173.79	98.14	75.58	0.3995 (0.1191)
IA2					
IA1	92.43	47.10	61.00	45.90	0.3127 (0.2021)
BB2					
BB1					
BA2					
BA1					
PE2					
PE1	214.18	37.02	147.43	69.28	0.0708 (0.0382*)
PD2	171.12	11.43	115.45	80.43	0.3722 (0.3388)
PD1	125.58	39.45	123.65	69.31	0.8963 (0.3225)
PC2					
PC1	142.68	70.87	82.96	42.98	0.3883 (0.7480)
PB2					
PB1	151.92	29.32	78.87	50.32	0.0334* (0.1226)
PA2					

RUG - 53 (index maximized)	Nursing time (by RUG category for Medicare cohort in STRIVE)		Nursing time (by RUG category for Non-Medicare cohort in STRIVE)		p-value for T-test for difference in mean (p-value for KS test for difference in distribution)
	Average Nursing time	Std. Dev. Of nursing time	Average Nursing time	Std. Dev. Of nursing time	
PA1	95.98	25.48	56.24	33.05	0.1551 ( 0.1101 )
BC1	185.44		115.47	87.45	0.0334* ( 0.9506 )

*f) Distribution of assessment days between STRIVE and Non-STRIVE states*

Assessment days indicate how long a case has been under treatment. A case with a larger number of assessment days (long stay) might have different characteristics than a case with fewer assessment days (short stay). STRIVE data does not have the assessment day variable. Hence it is not possible to check if the STRIVE sample captures sufficient samples to represent the assessment day distribution. Analysis was performed to compare assessment days (e.g., 5, 14, 30 and so on) distributions between the STRIVE states and non-STRIVE states using MDS 2007 data. MDS 2007 data has overall 5,719,114 Medicare cases. Lewin was able to match 4,623,366 cases to claims data. It was observed that for the STRIVE states, almost 21% of the cases could not be matched to claims data to get assessment days and for the non-STRIVE states 18% of the cases could not be matched. **Exhibit 37** shows the distribution (proportion of cases) for assessment days (missing to 30 days). It can be observed that the maximum proportion of cases have days 14, 16, 30 days assessment – both for STRIVE and non-STRIVE states. The shape and spread of distribution for both STRIVE and non-STRIVE states are same. Further nonparametric and T-tests were done on the data to test if the assessment day distributions are different for STRIVE and non-STRIVE states. From **Exhibit 38** and **Exhibit 39** it can be observed that the p-value for all the tests is less than 0.05 (standard assumption for level of significance). Hence it can be concluded that even though the spread is same, the distribution of assessment days for STRIVE and non-STRIVE states are not statistically similar. Also, it is possible that STRIVE does not reflect the national distribution of assessment times because the STRIVE sample design was not designed to account for this variable.

Exhibit 37: Figure showing distribution of assessment days for STRIVE and non-STRIVE states (both excluding the cases with no or greater than 30 assessment days and all MDS (displaying only till day 30))

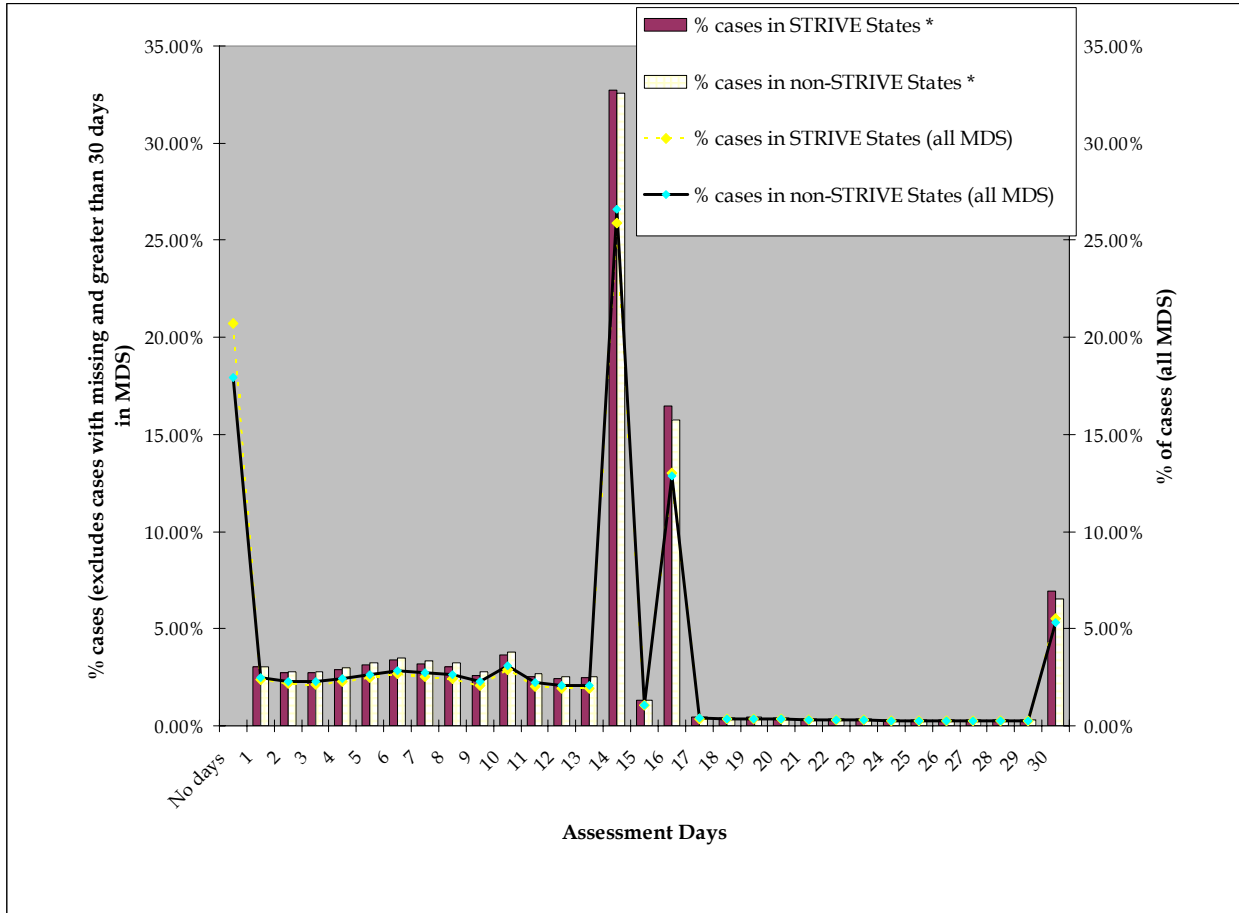


Exhibit 38: Result for nonparametric test (Wilcoxon Signed Rank and Kolmogorov Smirnov) to test Ho: distribution of assessment days same for STRIVE and non-STRIVE states

Wilcoxon Scores (Rank Sums) for Variable AssessmentDays Classified by Variable strive_flag					
strive_flag	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Non-STRIVE State	2587272	5.91287E12	5.95568E12	1386525178	2285369.84
STRIVE State	2016559	4.68476E12	4.64195E12	1386525178	2323144.94

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	4.68476E12
Normal Approximation	
Z	30.8753
One-Sided Pr > Z	<.0001
Two-Sided Pr >  Z	<.0001

t Approximation			
One-Sided Pr > Z			<.0001
Two-Sided Pr >  Z			<.0001
Kolmogorov-Smirnov Test for Variable AssessmentDays Classified by Variable strive_flag			
strive_flag	N	EDF at Maximum	Deviation from Mean at Maximum
Non-STRIVE State	2587272	0.391846	9.765327
STRIVE State	2016559	0.377986	-11.061204
Total	4603831	0.385775	
Maximum Deviation Occurred at Observation 43 Value of AssessmentDays at Maximum = 13.0			
Kolmogorov-Smirnov Two-Sample Test (Asymptotic)			
KS	0.006877	D	0.013860
KSa	14.755062	Pr > KSa	<.0001

**Exhibit 39: Result for t-test to test Ho: distribution of assessment days same for STRIVE and non-STRIVE states**

The TTEST Procedure Statistics									
Variable	strive_flag	N	Lower CL Mean	Mean	Upper CL Mean	Std Dev	Std Err	Minimum	Maximum
Assessmen tDays	Non-STRIVE State	259E4	12.983	12.991	12.999	6.7142	0.0042	1	30
Assessmen tDays	STRIVE State	202E4	13.151	13.161	13.17	6.7814	0.0048	1	30
Assessmen tDays	Diff (1-2)		-0.182	-0.17	-0.157	6.7437	0.0063		
T-Tests									
Variable	Method		Variances	DF	t Value	Pr >  t			
AssessmentDays	Pooled		Equal	46E5	-26.77	<.0001			
AssessmentDays	Satterthwaite		Unequal	43E5	-26.74	<.0001			
Equality of Variances									
Variable	Method	Num DF	Den DF	F Value	Pr > F				
AssessmentDays	Folded F	202E4	259E4	1.02	<.0001				

**g) Analysis of selected STRIVE participating providers**

AHCA identified 83 providers participating in the STRIVE study. **Exhibit 40** shows some observations based on this list of 83 providers. It can be observed that there were some facilities which did not have any Medicare residents. Another observation is the distribution of urban-rural and distribution of multi-facility in the sample in comparison to the OSCAR data. The sample distribution is different from the OSCAR distribution.

Exhibit 40: Number of STRIVE provider participants, proportion of urban and rural facilities in the sample and from OSCAR data, proportion of multi facility for the sample and OSCAR data

State	Sample Size	Number of list of providers from AHCA	Number of providers with no Medicare residents	% of urban and rural facilities		Multi facility		Hospital Based	
				Urban	Rural	% Yes	% No	% Yes	% No
<b>Based on list of 93 providers participating in STRIVE study</b>									
Louisiana	10	9	1	55.6%	44.4%	33.3%	66.7%	11.1%	88.9%
Montana	9	10	1	40.0%	60.0%	60.0%	40.0%	30.0%	70.0%
New York	21	18	2	94.4%	5.6%	11.1%	88.9%	11.1%	88.9%
Ohio	20	19	0	84.2%	15.8%	63.2%	36.8%	5.3%	94.7%
Virginia	17	15	1	86.7%	13.3%	53.3%	46.7%	13.3%	86.7%
Washington	15	14	2	71.4%	28.6%	50.0%	50.0%	14.3%	85.7%
Washington D.C.	9	8	0	100.0%	0.0%	0.0%	100.0%	12.5%	87.5%
<b>From OSCAR data</b>									
Louisiana				63.2%	36.8%	47.9%	52.1%	7.49%	92.51%
Montana				20.6%	79.4%	38.1%	61.9%	37.11%	62.89%
New York				85.0%	15.0%	12.9%	87.1%	10.53%	89.47%
Ohio				72.9%	27.1%	60.0%	40.0%	5.11%	94.89%
Virginia				71.4%	28.6%	68.6%	31.4%	6.55%	93.45%
Washington				79.6%	20.4%	60.8%	39.2%	7.60%	92.40%
Washington D.C.				100.0%	0.0%	25.0%	75.0%	25.00%	75.00%

***h) Regression model to measure impact of being in a STRIVE state on NTAS costs/charges***

For the first test, total case charges, therapy case costs, and pharmacy costs were calculated for each case in the database. Lewin constructed four case cost (charges) regressions which estimated the impact of being in a STRIVE state on costs/charges where:

$$\text{Cost (charge) per case} = f(\text{RUG-III specific days and a STRIVE data dummy variable})$$

This regression is run for each of routine cost (charges) and therapy costs per case dependent variables. The results of these regressions are shown in **Exhibit 41**.

Exhibit 41: Difference between STRIVE States per Diem Cost (Charges) as Compared to Non-STRIVE States (using 2006 MDS and claims data)

	\$ Value	Percent of National per Diems Cost (Charge)
Total Charges per Diem	-47.08	-10.33%
Therapy Cost per Diem	-8.02	-9.24%
Pharmacy Cost Per Diem	-11.17	-25.48%

While these results do not reflect the actual facilities within a given state entered into the STRIVE sample, they do reflect overall state representativeness.

In the next test, we calculate the per diem cost per RUG for STRIVE and non-STRIVE states. The per diems were then converted to a set of relative values by dividing each RUG's per diem rate by the overall average within STRIVE and non-STRIVE states. The resultant RUG relative weights for STRIVE states and non-STRIVE states were then correlated. These results are presented below. From **Exhibit 42** and **43** it can be observed that most RUGs have a significant impact on the per diem costs both for the STRIVE states and the Non-STRIVE states.

**Exhibit 42: Coefficient estimates for Routine Cost by each RUG category for STRIVE and Non-STRIVE States**

Parameters	STRIVE States	Non-STRIVE States
R-Square for model fit	0.7148	0.7002
<b>RUG - 53</b>		
RUX	182.31*	220.38*
RUL	195.23*	241.26*
RVX	197.93*	233.86*
RVL	208.56*	243.82*
RHX	225.93*	273.72*
RHL	228.06*	520.13*
RMX	219.80*	264.05*
RML	230.08*	279.67*
RLX	308.91*	339.45*
RUC	191.65*	220.33*
RUB	198.44*	224.39*
RUA	193.24*	215.02*
RVC	204.67*	231.78*
RVB	211.86*	224.90*
RVA	191.77*	219.59*
RHC	258.90*	233.35*
RHB	267.22*	236.27*
RHA	214.62*	235.27*
RMC	266.93*	249.41*
RMB	304.90*	246.50*
RMA	261.22*	250.43*
RLB	247.69*	212.68*
RLA	258.29*	199.47*
SE3	248.05*	298.82*
SE2	258.25*	298.62*
SE1	247.11*	258.61*
SSC	239.62*	219.48*
SSB	246.63*	224.40*
SSA	232.40*	272.71*

Parameters	STRIVE States	Non-STRIVE States
CC2	207.42*	249.88*
CC1	247.52*	233.10*
CB2	195.67*	276.35*
CB1	252.43*	248.67*
CA2	202.66*	288.92*
CA1	245.48*	271.00*
IB2	298.94*	188.72*
IB1	221.00*	279.97*
IA2	339.45*	167.81*
IA1	220.72*	268.34*
BB2	110.04*	172.49*
BB1	161.38*	208.53*
BA2	329.53*	8.37
BA1	301.43*	251.86*
PE2	168.19*	135.49*
PE1	217.60*	296.68*
PD2	188.37*	197.81*
PD1	216.00*	287.30*
PC2	171.19*	252.74*
PC1	214.85*	275.51*
PB2	330.18*	98.98*
PB1	172.95*	295.84*
PA2	196.03*	165.41*
PA1	205.60*	294.00*

Exhibit 43: Coefficient estimates for Therapy Cost by each RUG category for STRIVE and Non-STRIVE States

Parameters	STRIVE States	Non-STRIVE States
R-Square for model fit	0.8508	0.8226
<b>RUG - 53</b>		
RUX	129.57*	137.02*
RUL	125.10*	139.64*
RVX	104.81*	108.10*
RVL	102.79*	114.43*
RHX	59.25*	149.68*
RHL	58.42*	163.13*
RMX	77.60*	91.74*
RML	76.78*	99.29*
RLX	33.29*	59.80*
RUC	131.41*	137.14*
RUB	128.30*	135.33*
RUA	131.48*	137.48*

Parameters	STRIVE States	Non-STRIVE States
RVC	99.67*	96.99*
RVB	100.08*	101.69*
RVA	100.67*	102.02*
RHC	80.51*	78.57*
RHB	84.62*	85.40*
RHA	74.49*	80.06*
RMC	46.55*	43.20*
RMB	54.82*	56.04*
RMA	46.75*	52.71*
RLB	0.41	17.02*
RLA	11.21*	15.37*

The STRIVE data will be ultimately utilized to develop payment weights for nursing and therapy. Given this purpose, we tested the hypothesis that the relative weights for the RUG categories based on the claims data for the STRIVE versus the non-STRIVE states are different. The results of this hypothesis test are shown in **Exhibit 44**.

In order to test this hypothesis, we ran separate set of regression for the STRIVE and non-STRIVE states with the same model specifications, as mentioned above. Relative weights were derived using the parameter estimates of the RUG categories in the model. The set of relative weights for each regression (STRIVE and non - STRIVE) were compared. A paired t-test for each couplet of RUG category (e.g. RUX<sub>STRIVE</sub> versus RUX<sub>non-STRIVE</sub>) was used to test the statistical significance of the difference between the relative weights.

**Exhibit 44: Statistical Significance for the Differences Between the Relative Weights by RUG Categories for the STRIVE versus non-STRIVE states**

RUG - 53	2007 Routine Cost Relative Weights			2007 Therapy Cost Relative Weights		
	Relative weights		Statistically significant difference indicator	Relative weights		Statistically significant difference indicator
	STRIVE States	Non-STRIVE States		STRIVE States	Non-STRIVE States	
RUX	0.824	0.828	N	1.443	1.295	Y
RUL	0.882	0.906	Y	1.393	1.320	Y
RVX	0.894	0.879	Y	1.167	1.022	Y
RVL	0.942	0.916	Y	1.145	1.082	Y
RHX	1.021	1.028	N	0.660	1.415	Y
RHL	1.030	1.954	Y	0.651	1.542	Y
RMX	0.993	0.992	N	0.864	0.867	N
RML	1.039	1.051	Y	0.855	0.939	Y
RLX	1.396	1.275	N	0.371	0.565	Y
RUC	0.866	0.828	Y	1.463	1.296	Y
RUB	0.896	0.843	Y	1.429	1.279	Y
RUA	0.873	0.808	Y	1.464	1.300	Y
RVC	0.925	0.871	Y	1.110	0.917	Y
RVB	0.957	0.845	Y	1.115	0.961	Y

RUG - 53	2007 Routine Cost Relative Weights			2007 Therapy Cost Relative Weights		
	Relative weights		Statistically significant difference indicator	Relative weights		Statistically significant difference indicator
	STRIVE States	Non-STRIVE States		STRIVE States	Non-STRIVE States	
RVA	0.866	0.825	Y	1.121	0.964	Y
RHC	1.170	0.877	Y	0.897	0.743	Y
RHB	1.207	0.888	Y	0.942	0.807	Y
RHA	0.970	0.884	Y	0.830	0.757	Y
RMC	1.206	0.937	Y	0.518	0.408	Y
RMB	1.377	0.926	Y	0.611	0.530	Y
RMA	1.180	0.941	Y	0.521	0.498	Y
RLB	1.119	0.799	N	0.005	0.161	Y
RLA	1.167	0.749	Y	0.125	0.145	N
SE3	1.121	1.123	N			
SE2	1.167	1.122	Y			
SE1	1.116	0.972	Y			
SSC	1.083	0.825	Y			
SSB	1.114	0.843	Y			
SSA	1.050	1.025	Y			
CC2	0.937	0.939	N			
CC1	1.118	0.876	Y			
CB2	0.884	1.038	Y			
CB1	1.140	0.934	Y			
CA2	0.916	1.085	Y			
CA1	1.109	1.018	Y			
IB2	1.351	0.709	N			
IB1	0.998	1.052	N			
IA2	1.534	0.630	Y			
IA1	0.997	1.008	N			
BB2	0.497	0.648	N			
BB1	0.729	0.783	N			
BA2	1.489	0.031	Y			
BA1	1.362	0.946	Y			
PE2	0.760	0.509	Y			
PE1	0.983	1.115	Y			
PD2	0.851	0.743	Y			
PD1	0.976	1.079	Y			
PC2	0.773	0.950	N			
PC1	0.971	1.035	N			
PB2	1.492	0.372	Y			
PB1	0.781	1.111	Y			
PA2	0.886	0.621	N			
PA1	0.929	1.105	Y			

AHCA identified 83 providers from 7 states. STRIVE sampling heavily based on voluntary participation of facilities. Hence, similar cost model was built with the STRIVE participants on

the data for the 7 states to test for any difference in behavior of a STRIVE participant to a non-participant. Considering the data for only 7 states and for the STRIVE participants, some RUGs do not have sufficient sample size. Hence model was built to compare the effect for the important RUGs with high therapy times or the special services. **Exhibit 45** below shows that for some RUGs the relative weights are significantly different between the participants and the non-participants.

**Exhibit 45: Statistical Significance for the Differences Between the Relative Weights by RUG Categories for the STRIVE participant versus STRIVE non-participants for 7 STRIVE states**

RUG - 53	2007 Routine Cost Relative Weights			2007 Therapy Cost Relative Weights		
	Relative weights		Statistically significant difference indicator	Relative weights		Statistically significant difference indicator
	STRIVE participants	STRIVE Non-participants		STRIVE participants	STRIVE Non-participants	
RUX	0.92	0.83	N	1.48	1.65	Y
RUL	0.85	0.88	N	1.46	1.56	Y
RVX	0.93	0.87	N	1.25	1.26	N
RVL	0.94	0.93	N	1.19	1.25	Y
RHX	0.20	1.34	N	1.64	0.39	Y
RHL	(0.65)	1.25	N	0.25	0.55	N
RMX	1.01	1.05	N	0.86	0.91	Y
RML	0.96	1.07	Y	0.87	0.89	Y
RLX	3.45	1.44	Y	0.31	0.36	N
RUC	0.85	0.84	N	1.40	1.61	Y
RUB	1.03	0.85	Y	1.39	1.58	Y
RUA	0.74	0.78	N	1.38	1.56	Y
RVC	0.96	0.91	N	1.10	1.21	Y
RVB	0.95	0.96	N	1.11	1.23	Y
RVA	0.67	0.82	Y	1.02	1.18	Y
RHC	1.18	1.22	N	1.00	0.99	N
RHB	1.28	1.27	N	1.09	1.05	Y
RHA	1.03	0.99	N	1.02	0.91	Y
RMC	1.66	1.37	Y	0.67	0.60	Y
RMB	1.69	1.39	Y	0.90	0.67	Y
RMA	1.69	1.25	Y	0.83	0.57	Y
RLB	1.75	1.17	Y	0.06	(0.01)	N
RLA	1.24	1.14	N	0.24	0.00	N
SE3	1.74	1.55	Y			
SE2	1.50	1.47	N			
SE1	2.59	1.31	Y			

*i) Distribution of Therapy minutes across seven day study period*

The determination of therapy times has been problematic for STRIVE analysts because these data were collected using two methods: PDA data collection (a handheld electronic data entering system) and paper data collection. The PDA data collection results do not match the paper data collection results.

**Exhibit 46**, as taken from STRIVE TEP materials, shows that as a percent of the weekly total times, PDA daily (week day only) data collection represents between 21 percent and 30 percent. By way of comparison, paper data collection times for weekdays represent between 10 and 12 percent of weekly total times. Most telling is that for Friday, paper data collection represents 12 percent of weekly total times while PDA data collection represents 21 percent. As it seems unlikely that facilities surveyed would vary this much on Friday therapy minutes, STRIVE analysts determined that paper data collection under-counted minutes.<sup>7</sup> Accordingly, they decided to increase Monday and Friday paper data collection minutes to reflect PDA data collection levels as observed on Tuesday, Wednesday, Thursday and partially on Friday.

**Exhibit 46: Determining Therapy Times**

<b>Collection Schedule</b>	<b>N</b>	<b>Tu</b>	<b>We</b>	<b>Th</b>	<b>Fr</b>	<b>Sa</b>	<b>Su</b>	<b>Mo</b>	<b>Tu</b>
<b>A</b>	8012	26%	25%	22%	12%	2%	1%	12%	-
<b>B</b>	1193	25%	27%	26%	12%	1%	0%	10%	-
<b>C</b>	516	-	30%	26%	21%	1%	1%	12%	9%
<b>Total</b>	9721	24%	26%	23%	13%	2%	1%	12%	1%

---

<sup>7</sup> The paper data collection technique may have under reported therapy minutes because the individuals responsible for the data collection were not adequately trained and monitored

### III. DISCUSSION

This paper indicates that the STRIVE sample is minimally adequate to create a revision to MDS. We pointed to numerous instances where the STRIVE sample is subject to biases.

In addition to our concerns with STRIVE sampling procedures, we have an over-arching strategic concern. The RUGs based SNF PPS system is based on a set of nursing and therapeutic case time relationships (case relative) that are expensive to replicate and because of this expense, are rarely updated. To date these nursing times have been derived from a relatively small sample as compared to the universe of SNF facilities and SNF claims. This places SNF IPPS apart from all other IPPS systems where the relative weights are updated on an annual basis using the universe of claims data. As compared to SNF PPS, other PPS systems are advantaged by annual revisions, using in many cases millions of case level observations. The SNF PPS might be well served to be placed on an entirely different platform (i.e., DRGs) so that all of its millions of cases could contribute to annual updates of case weights. This is all the more plausible as SNFs become more like acute care settings and less like traditional long term care settings.

## APPENDIX A

### Overview of STRIVE sampling procedure

Step	Description	Sampling Procedure
1	Identified all certified facilities in the nation.	Definition of population
2	Identified 15 states that agreed to participate in the study.	Self-selection (not random)
3	Applied data-based exclusions using QI/QM data and survey deficiency data. Eliminated poorest quality facilities in each state (5% to 10% of all facilities). Population defined as all remaining facilities (referred to as “eligible facilities”).	Redefinition of population
4	Applied geographic restrictions in certain states.	Redefinition of population
5	Stratified eligible facilities within each state into five strata. Some strata were not represented in some states.	Stratification
6	Set targeted number of facilities for each stratum within each state. Targets were based upon number of available facilities, number of facilities data monitors were able to visit, and overall study targets.	Sample size determination (no selection involved)
7	Within each stratum within each state, selected the target number of facilities with probability proportional to size (where size was defined by the number of residents in the facility on a given day). Selected an over-sample allowing for deletions and refusals.	Sample with probability proportional to size
8	Each list of sampled facilities (for each stratum within each state) was put in random order.	Randomization
9	Sample lists within each state were reviewed by stakeholders who eliminated facilities that were closed, unable to participate, or were known to be of very poor quality.	Exclusions based on judgment (not random)