Actuaries Club of the Southwest – June 8, 2018

Best Practices In Health Care Quality Data Analytics

Total Cost of Care (TCoC) Data Analytics

Comparative Effectiveness Study – Inpatient Rehab Hospital (IRF) vs. Skilled Nursing Facility (SNF)

SPEAKER:

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Use and Value of Data Analytics

Comparative Effectiveness Study – Inpatient Rehab Hospital (IRH/IRF) vs. Skilled Nursing Facility (SNF)

Disclaimers

HealthSouth and the Opportunity

- Focus: Post-acute inpatient rehab (IRF)
- Challenges
- Need for Data & Analytics
- Study Design and Value Proposition
- Study Findings
  - Total Cost of Care (TCoC)
  - Readmission Rate
  - Average Length of Stay (LOS)
- Unique Characteristics of Study Design
- Lessons Learned and Final Thoughts

Total Quality Control (TQM) Principles

Triple Role Model

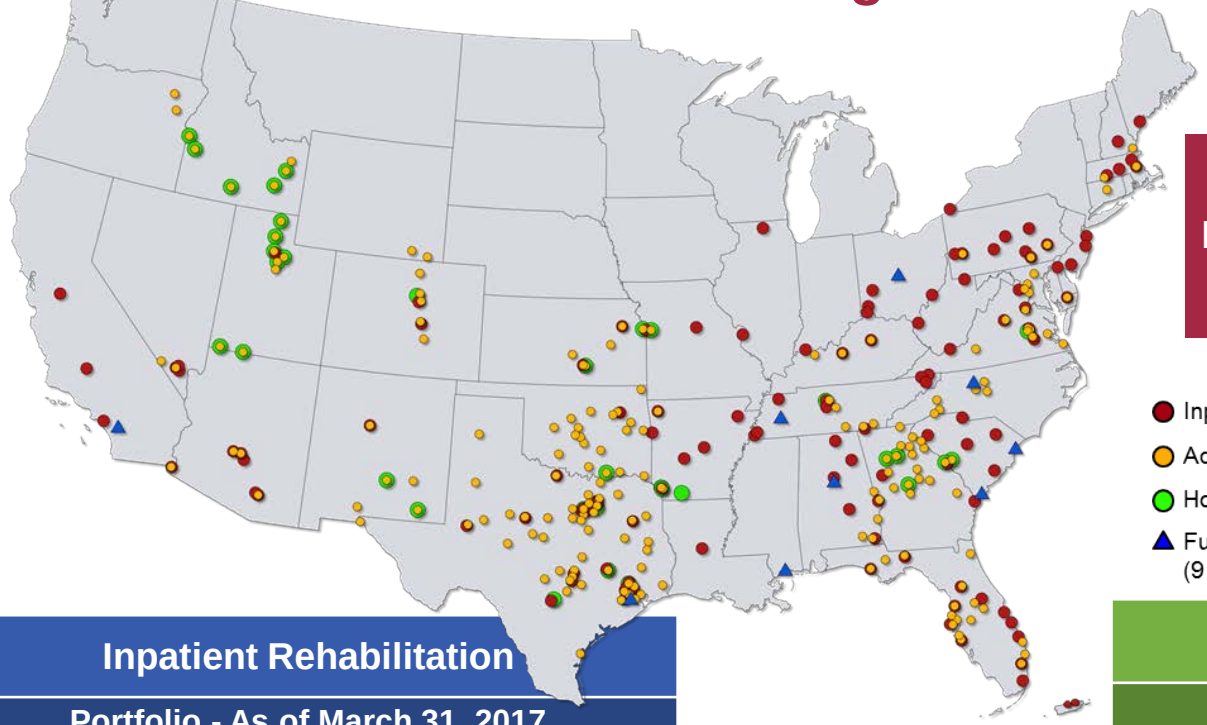
- Customer
- Processor
- Supplier

Artisan Concept

- Worker in control of process
- Access to quality data and metrics
- Knowledge and authority to remedy defects

What happens to patients before they arrive and after they leave?

HealthSouth: A Leading Provider of Post-Acute Care



61% of HealthSouth's IRFs are located within a 30-mile radius of an Encompass location.

- Inpatient Rehabilitation Hospitals
- Adult Home Health Locations
- Hospice Locations
- Future Inpatient Rehabilitation Hospitals (9 under development)

Inpatient Rehabilitation

Portfolio - As of March 31, 2017

123	Inpatient Rehabilitation Hospitals • 37 operate as joint ventures with acute care hospitals
30	Number of States (plus Puerto Rico)
~ 28,500	Employees

Key Statistics - Trailing 4 Quarters

~ $3.1 Billion	Revenue
166,466	Inpatient Discharges
630,507	Outpatient Visits

IRF Market Share

Largest owner & operator of IRFs

21% of Licensed Beds

28% of Medicare Patients Served

Home Health and Hospice Market Share

4th largest provider of Medicare-certified skilled home health services

Encompass Home Health and Hospice

Portfolio – As of March 31, 2017

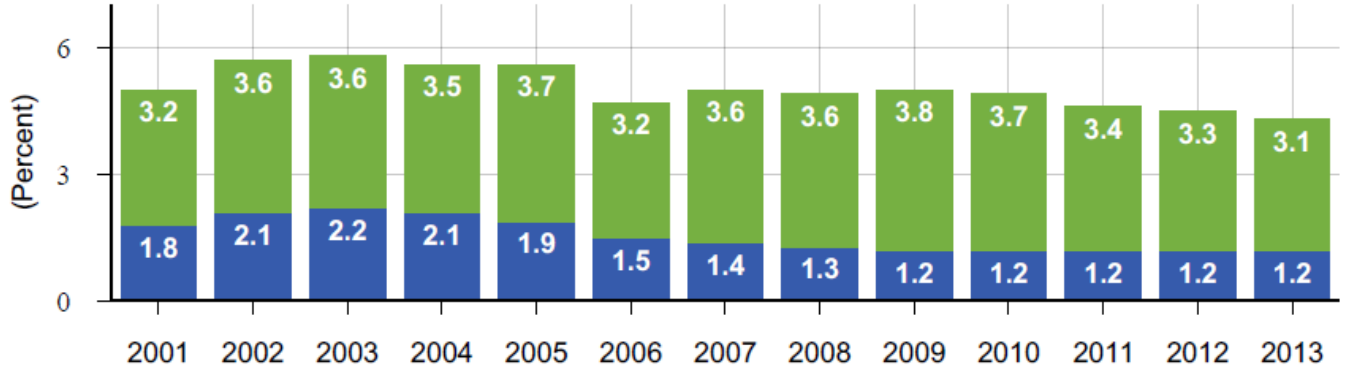
193	Home Health Locations
35	Hospice Locations
25	Number of States
~ 8,000	Employees

Key Statistics - Trailing 4 Quarters

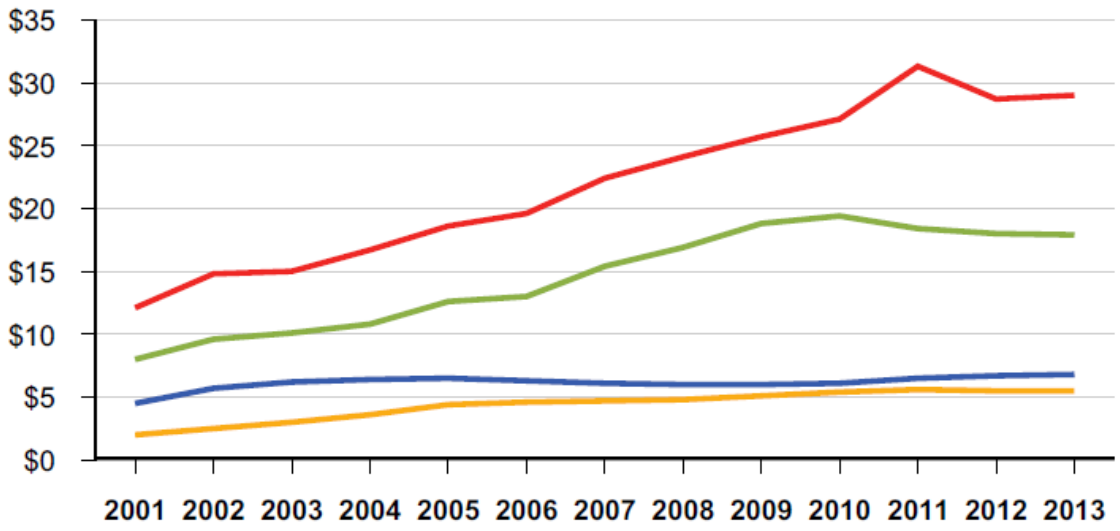
~ $708 million	Revenue
191,153	Home Health Episodes
3,741	Hospice Admissions

Note: One of the 123 IRFs and two of the 193 adult home health locations are nonconsolidated. These locations are accounted for using the equity method of accounting.

Medicare Spending on Post-Acute Services



Total Medicare Spending on Post-Acute Services approx. $59.4 billion in 2014



Post-Acute Settings	2013 Medicare Margin	Projected 2015 Medicare Margin
Skilled nursing facilities	13.1%	10.5%
Home health agencies	12.7%	10.3%
Inpatient rehabilitation hospitals	11.4%	12.6%
Long-term acute care hospitals	6.6%	4.6%

Source: MedPac Healthcare Spending and the Medicare Program, June 2015- page 114. MedPAC Payment Policy, March 2015 – pages 181,194, 202, 213, 227, 230, 239, 250, 254, 261, 275 and 277

What Prompted HealthSouth's Interest in Data?

1. Attention to Post-Acute Care (PAC) Sector

Federal cost-cutting interest

2. Confusion between segments of PAC sector

Payers, patients and families – and even referring physicians – may not know or appreciate the distinctions between LTACH, IRF & SNF.

3. Desire to differentiate our sector: Inpatient Rehabilitation Facilities (IRFs)

How to Tell an IRF from an SNF

Rehab Hospital	
Average Length of Stay [1]	= 13.0 days
Discharge to Home (percent) [2]	= 81.1%
Requirements:	
Rehab hospitals must also satisfy **regulatory/policy requirements for hospitals**, including Medicare hospital conditions of participation	
All patients must be admitted by a rehab physician.	
Rehab physicians must re-confirm each admission w/n 24 hours.	
All patients, regardless of diagnoses/condition, must demonstrate need and receive at least 3 hours of daily intensive therapy.	
All patients must see a rehabilitation physician "in person" **at least 3 times weekly**.	
Rehab hospitals required to provide **24 hour, 7 days per week** nursing care; many nurses are RNs and rehab nurses.	
Rehab hospitals are required to use a coordinated **interdisciplinary team** approach led by a rehab physician, includes a rehab nurse, a case manager, and a licensed therapist from each therapy discipline who must meet weekly to evaluate/discuss each patient's case.	
Rehab hospitals are required to follow **stringent admission/coverage policies** and must carefully document justification for each admission; further restricted in number/type of patients (60% Rule)	

Nursing Home	
Average Length of Stay [2] Covered Days per Admission [1]	= 30 days = 27.2 days
Discharge to Home (percent) [2]	= 45.5%
Requirements:	
No similar requirement; Nursing homes are regulated as nursing homes only	
No similar requirement	
No similar requirement	
No similar requirement	
No similar requirement. SNF patients must be seen once a month by a physician (not necessarily a rehabilitation physician)	
No similar requirement	
No similar requirement; Nursing homes are not required to provide care on a interdisciplinary basis and are not required to hold regular meetings for each patient.	
Nursing homes have comparatively few policies governing the number or types of patients they treat.	

(1) MedPAC, Report to the Congress: Medicare Payment Policy, March 2013 – Pages 218 and 167

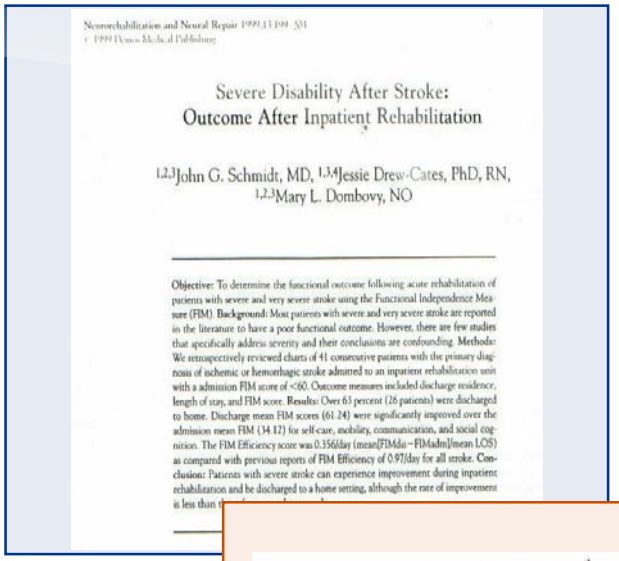
(2) Centers for Medicare and Medicaid Services, FY 2012 SNF-PPS Final Rule, 76 Fed. Reg. 48486, 48525, and 48499 (August 8, 2011); March 2005 report in the Archives of Physical Medicine and Rehabilitation (http://www.archives-pmr.org/article/PIIS0003999304012493/abstract)

The Challenge/Opportunity

How do we connect the dots?

Numerous clinical journals have documented the superiority of clinical and functional outcomes achieved by IRF compared to SNFs for appropriate patients

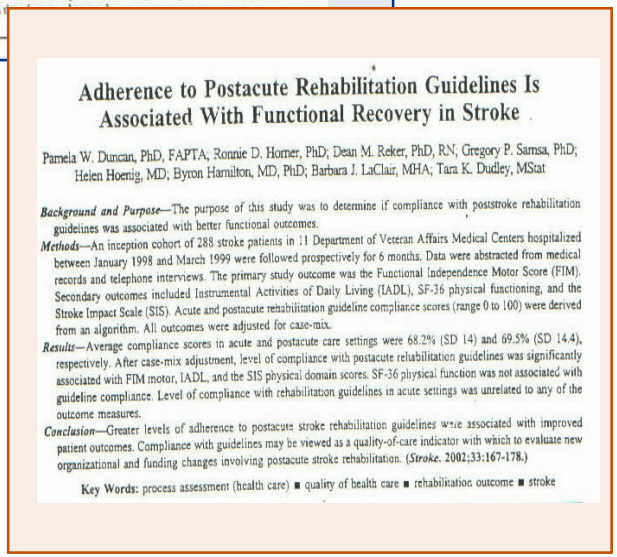
Do superior clinical outcomes translate into lower cost on a “Total Cost of Care” basis?



Severe Disability After Stroke:
Outcome After Inpatient Rehabilitation

[1,2,3]John G. Schmidt, MD, [1,3,4]Jessie Drew-Cates, PhD, RN, [1,2,3]Mary L. Dombovy, NO

Objective: To determine the functional outcome following acute rehabilitation of patients with severe and very severe stroke using the Functional Independence Measure (FIM). **Background:** Most patients with severe and very severe stroke are reported in the literature to have a poor functional outcome. However, there are few studies that specifically address severity and their conclusions are confounding. **Methods:** We retrospectively reviewed charts of 41 consecutive patients with the primary diagnosis of ischemic or hemorrhagic stroke admitted to an inpatient rehabilitation unit with a admission FIM score of <60. Outcome measures included discharge residence, length of stay, and FIM score. **Results:** Over 63 percent (26 patients) were discharged to home. Discharge mean FIM scores (61.24) were significantly improved over the admission mean FIM (34.12) for self-care, mobility, communication, and social cognition. The FIM Efficiency score was 0.356/day (mean[FIMdis−FIMadm]/mean LOS) as compared with previous reports of FIM Efficiency of 0.97/day for all stroke. **Conclusion:** Patients with severe stroke can experience improvement during inpatient rehabilitation and be discharged to a home setting, although the rate of improvement is less than t



Adherence to Postacute Rehabilitation Guidelines Is Associated With Functional Recovery in Stroke

Pamela W. Duncan, PhD, FAPTA; Ronnie D. Horner, PhD; Dean M. Reker, PhD, RN; Gregory P. Samsa, PhD; Helen Hoenig, MD; Byron Hamilton, MD, PhD; Barbara J. LaClair, MHA; Tara K. Dudley, MStat

Background and Purpose—The purpose of this study was to determine if compliance with poststroke rehabilitation guidelines was associated with better functional outcomes.

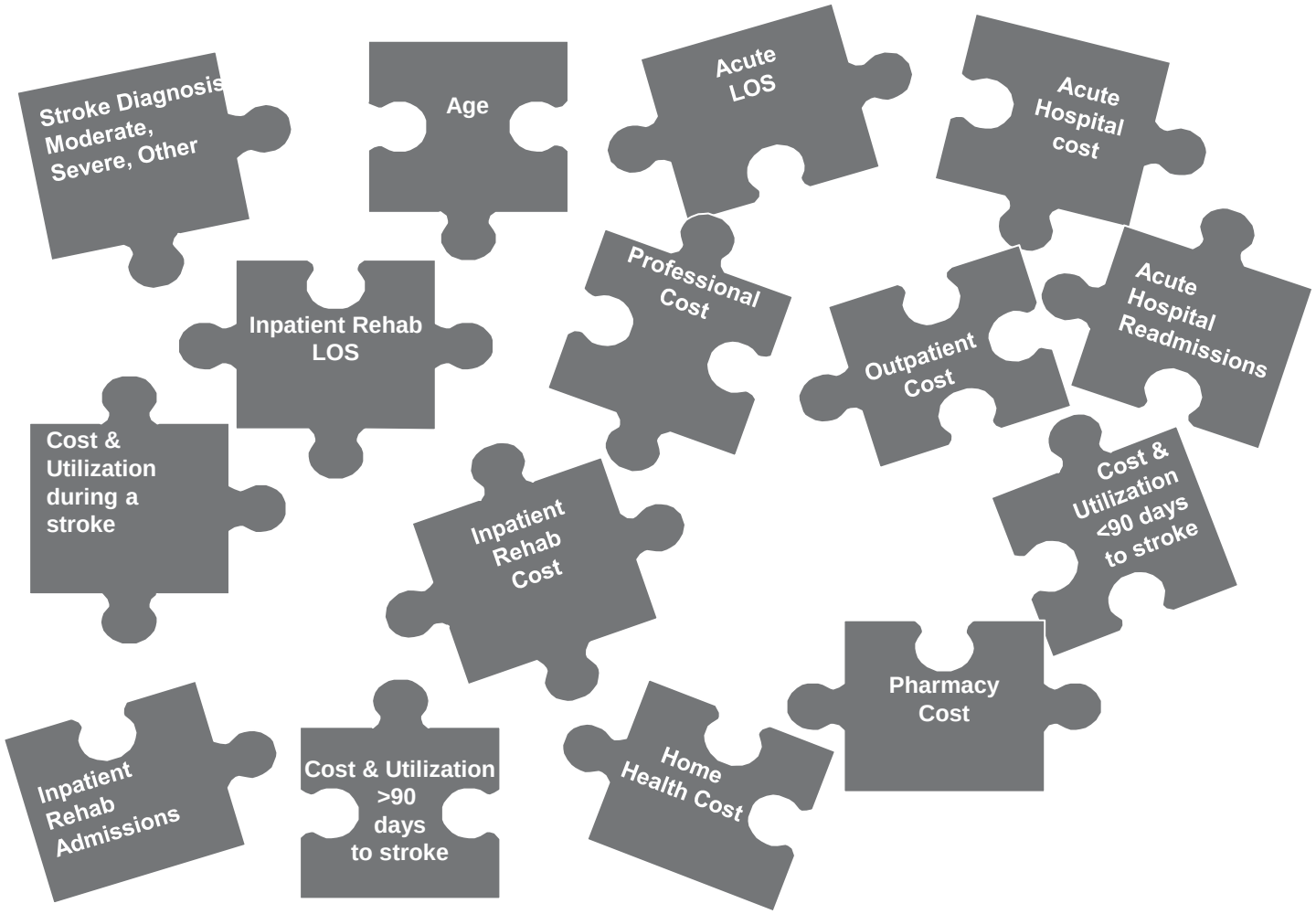
Methods—An inception cohort of 288 stroke patients in 11 Department of Veteran Affairs Medical Centers hospitalized between January 1998 and March 1999 were followed prospectively for 6 months. Data were abstracted from medical records and telephone interviews. The primary study outcome was the Functional Independence Motor Score (FIM). Secondary outcomes included Instrumental Activities of Daily Living (IADL), SF-36 physical functioning, and the Stroke Impact Scale (SIS). Acute and postacute rehabilitation guideline compliance scores (range 0 to 100) were derived from an algorithm. All outcomes were adjusted for case-mix.

Results—Average compliance scores in acute and postacute care settings were 68.2% (SD 14) and 69.5% (SD 14.4), respectively. After case-mix adjustment, level of compliance with postacute rehabilitation guidelines was significantly associated with FIM motor, IADL, and the SIS physical domain scores. SF-36 physical function was not associated with guideline compliance. Level of compliance with rehabilitation guidelines in acute settings was unrelated to any of the outcome measures.

Conclusion—Greater levels of adherence to postacute stroke rehabilitation guidelines were associated with improved patient outcomes. Compliance with guidelines may be viewed as a quality-of-care indicator with which to evaluate new organizational and funding changes involving postacute stroke rehabilitation. (***Stroke.*** 2002;33:167-178.)

Key Words: process assessment (health care) ■ quality of health care ■ rehabilitation outcome ■ stroke

Pieces of the Health Care Puzzle



The Journey

1. Select a third party/parties to objectively quantify the Inpatient Rehabilitation Hospital total cost of care advantage
2. RFP Process and interviews
3. **Consulting expertise coupled with actuarial expertise**
4. **Industry recognized and respected experts**
5. **Outcomes were not “guaranteed”**
6. Big commitment in resources, both time and financial with significant risk/reward potential

The Journey (Continued)

1. Step-by-step process:
   - a. Establishing goals
   - b. Choosing a partner
   - c. **Identifying data source**
   - d. **Developing methodology**
   - e. Analyzing results
   - f. Communicating the findings

Research Hypothesis

Hypothesis – Compared to SNFs, IRFs focus on rehabilitative care, which results in patients:

- Being discharged from the acute care setting earlier
- Show higher functional improvement during rehab
- Have a shorter length of stay in rehab
- Have lower acute care hospital readmission rates
- Have a lower average total cost of care

Obstacles – Challenges for HealthSouth

There are no valid industry-wide metrics (e.g., JD Power) to evaluate cost and quality of post-acute rehabilitative care

- Most current research is at facility (i.e., SNF vs. IRF), not the patient, level
- Stand-alone metrics of ALOS, cost per day and readmissions are meaningless
- Assume that Use = Value – e.g., does longer LOS = better/worse level of care
- Failing to control for inputs – e.g., higher hospital mortality rates often reflect
  - A focus on older Medicare patients more likely to die
  - Higher quality centers of excellence that attract the most severe cases
- Most valid quality metric – FIM Gain – is not on standard health care claim

Need to create homogeneous categories for proper comparison

Study Design

Focus on one specific condition (stroke) to control for inputs

Target patients defined as admitted to a rehabilitation facility (IRF or SNF) following discharge from an acute care hospital for stroke

Define Quality/Total Cost of Care of all health plan expenses in three periods, combined with LOS and readmission metrics:

1. **Pre-stroke: 90 days prior to hospitalization for stroke**
2. **Stroke: from hospital admission for stroke thru rehab facility discharge**
3. **Post-stroke: 90 days following rehab facility discharge**

Available Datasets

HealthSouth Internal Patient Records

- 72,000 admissions for 58,000 stroke patients from January 1, 2010 – June 30, 2013
- Detailed metrics such as Functional Improvement Measure (FIM) gains
- Only show cost and quality of HealthSouth care, not Total Cost of Care or competitor comparisons

CMS National Medicare Fee For Service (FFS) Claim Data

- 62% of HealthSouth patients are Medicare
- CMS restrictions prevent release of Professional and Rx data required for this analysis

Available Datasets (Continued)

BHI Commercial Employer Dataset

- Nationwide in coverage with total cost of all care
- 202,650 de-identified members with stroke diagnosis from January 1, 2010 – June 30, 2013
- Consecutive years increases sample size and allow patient level durational analysis

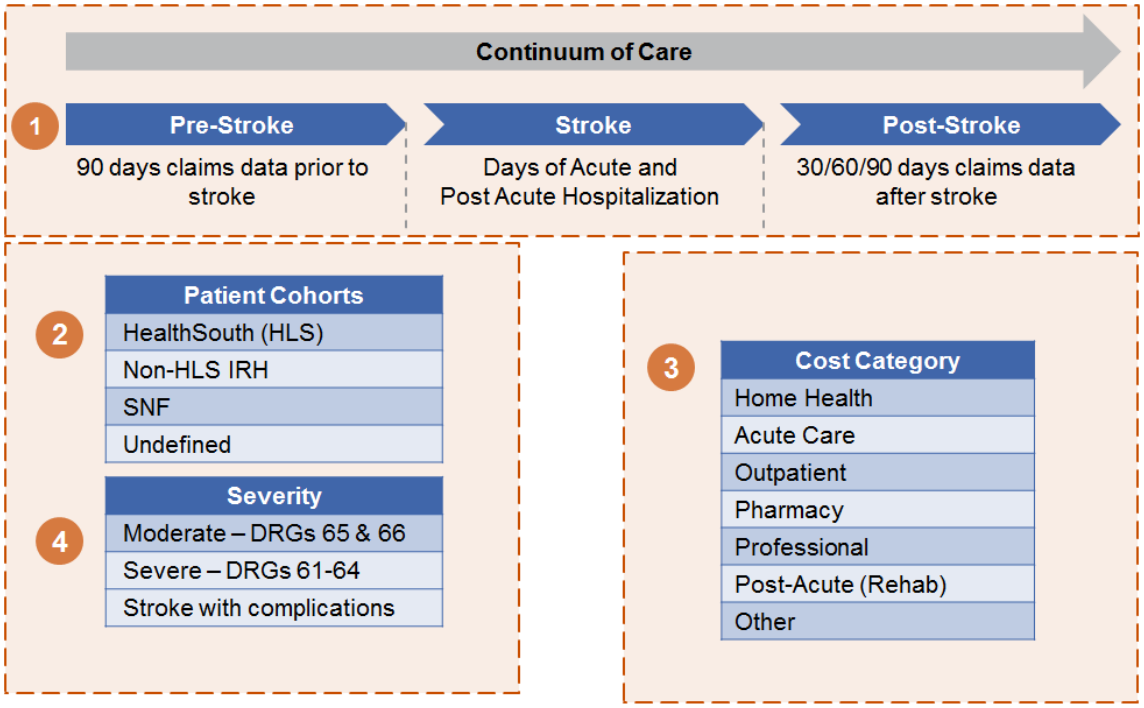
Lessons Learned from Data Validation

Data Validation Findings — Iterative Process to Refine Study Design

- Need to define inpatient stays from consecutive billings
- Need to distinguish IRF from SNF provider type
- Some rehab facilities could not be classified as IRF or SNF and were categorized as “Undefined”
- Inpatient physician visits coded as inpatient claims
- Admit and discharge dates used to bill for a series of multiple therapy sessions
- Minor anomalies and errors affecting < 1.0% of cases are inevitable
- Research results and conclusions are relative, not absolute

Value Proposition Data Analysis: Revised Study Design

The study design was revised based on the data available, the validation results, the provider landscape and observed patient behaviors.



Step 1: Three Continuum of Care periods were defined to assign key insights to relative periods and enable segment comparisons

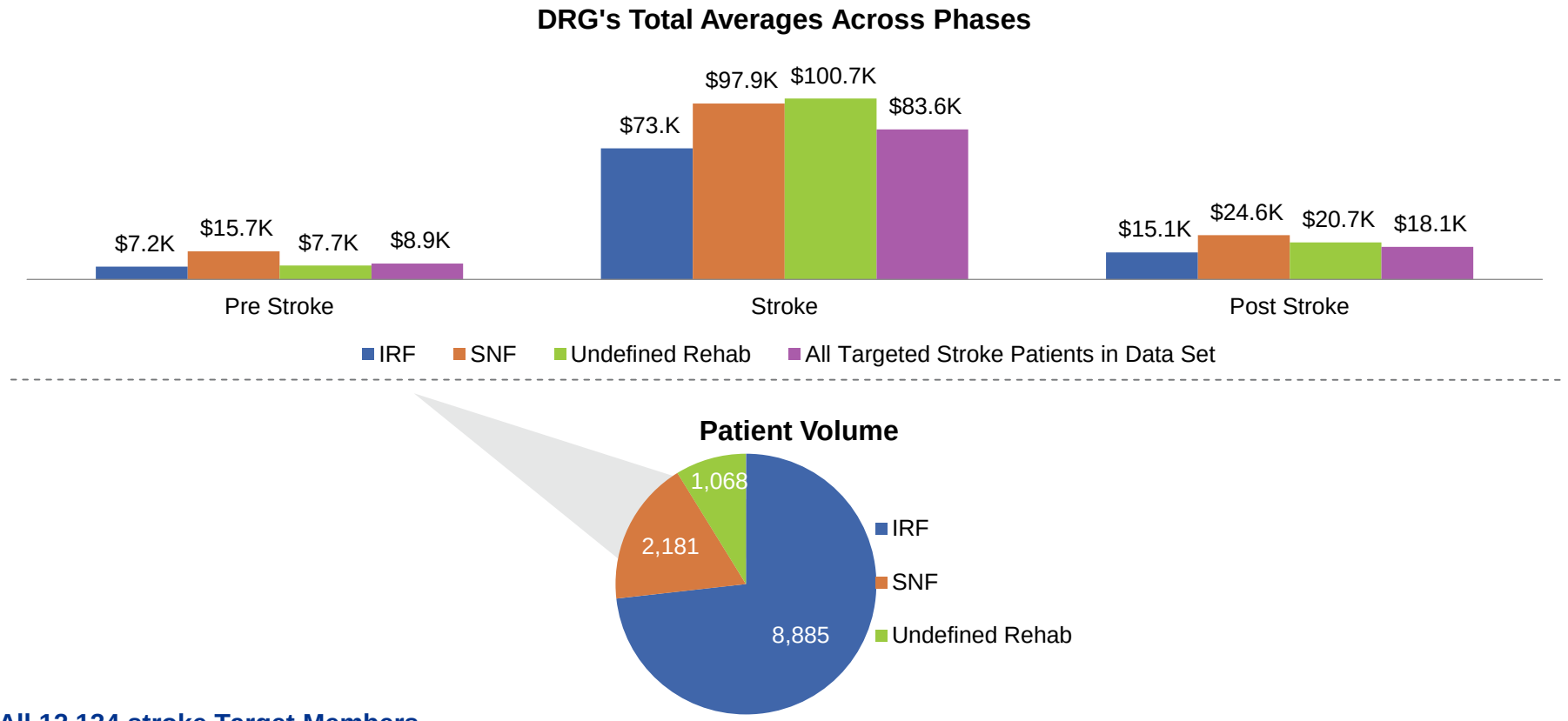
Step 2: Four Cohorts of Place of Service (POS) were identifiable

Step 3: Seven relevant Categories Of Service (COS) were defined to analyze the costs incurred across the continuum of care

Step 4: Stroke patients were sub-divided into three categories by industry standard DRG categories, Moderate, Severe and Other

Total Cost of Care Analysis Results

IRF costs are comparatively lower in each of the three care continuum phases



All 12,134 stroke Target Members

IRFs had the lowest cost of care in each three stroke phases

Readmissions Key Findings

IRF patients have the lowest total costs in each of the three 30 day segments of the 90 day post-stroke period

- With an average post-stroke readmission rate half of Skilled Nursing Facilities, significant savings can be realized by utilizing IRFs.
- IRF patients have the lowest total costs in each of the three 30 day segments of the 90 day post-stroke period
- IRF patients have the lowest Acute Inpatient readmission costs in each of the three 30 day segments of the 90 day post-stroke period
- **SNF readmission rate is about 2X greater than IRF**

Average Percentage of patients readmitted (during the 90 day post-stroke phase)

	Post-Stroke (90 days after discharge from post-acute)
IRF	13.3%
SNF	24.2%

~10.9% More SNF Patients Readmitted — *Average Readmissions Rate Advantage of IRF over SNFs per 100 Stroke Patients*

x

$32,372 — *Average acute readmission cost during Post-Stroke period for Target Members*

=

$352,855 — *Average Readmission Savings Generated from IRF over SNF per 100 Stroke Patients*

Average Length of Stay (ALOS) Analysis

Average Acute Care Inpatient Days by Cohort by Phase				
	Pre-Stroke	**Stroke**	**Post-Stroke**	**Overall**
All 12,134 Members	1.03	12.24	1.76	**15.03**
IRF	0.80	10.36	1.24	**12.40**
SNF	2.21	19.74	3.53	**25.48**
Undefined	0.72	12.32	2.11	**15.14**

Average Rehab Care Days by Cohort by Phase				
	Pre-Stroke	**Stroke**	**Post-Stroke**	**Overall**
All 12,134 Members	0.46	20.80	4.12	**25.38**
IRF	0.19	18.31	2.71	**21.21**
SNF	1.54	30.50	11.06	**43.10**
Undefined	0.12	20.51	4.27	**24.90**

Phase I – Study Refinements to Normalize Patient Cohorts

IRF cohort patient advantages

- Average age six years younger
- Pre-Stroke phase
  - Cost 50% less
  - 64% less inpatient days
  - 88% less rehab days
- Stroke phase
  - 50% less acute inpatient days

Cohort refinements

- Stroke severity
  - Moderate – DRGs 65 – 66
  - Severe – DRGs 61 – 64
  - Co-morbidities – Other DRGs
- Age bands
  - < 65 vs. > 65
  - < 55 vs. 55 – 64
- Readmitted vs. not readmitted

Phase II – Study Refinements to Normalize 90 Day Pre-Stroke Cost

Patient sub-cohort definitions

Three patient sub-cohorts

- Minimal: < $200
- Moderate: $200 - $3,000
- Severe: > $3,000 (readmissions)
- IRF cost advantage eliminated in Minimal and Moderate sub-cohorts
- SNF average age still ~ 6 years for all three sub-cohorts

90-day pre-stroke cost sub-cohort results

- 90 day pre-stroke period costs not a predictor of stroke period costs
- 90 day pre-stroke period costs not a predictor of 90-day post-stroke period costs, except for pre-stroke period readmissions
- IRF advantages held for 90 day period post-stroke costs for all three pre-stroke sub-cohorts

Unexpected Study Findings

01 More than two-thirds of patients hospitalized for a stroke are discharged to the home and never enter a rehab facility

02 Original definition of stroke did not produce desired level of target patient homogeneity

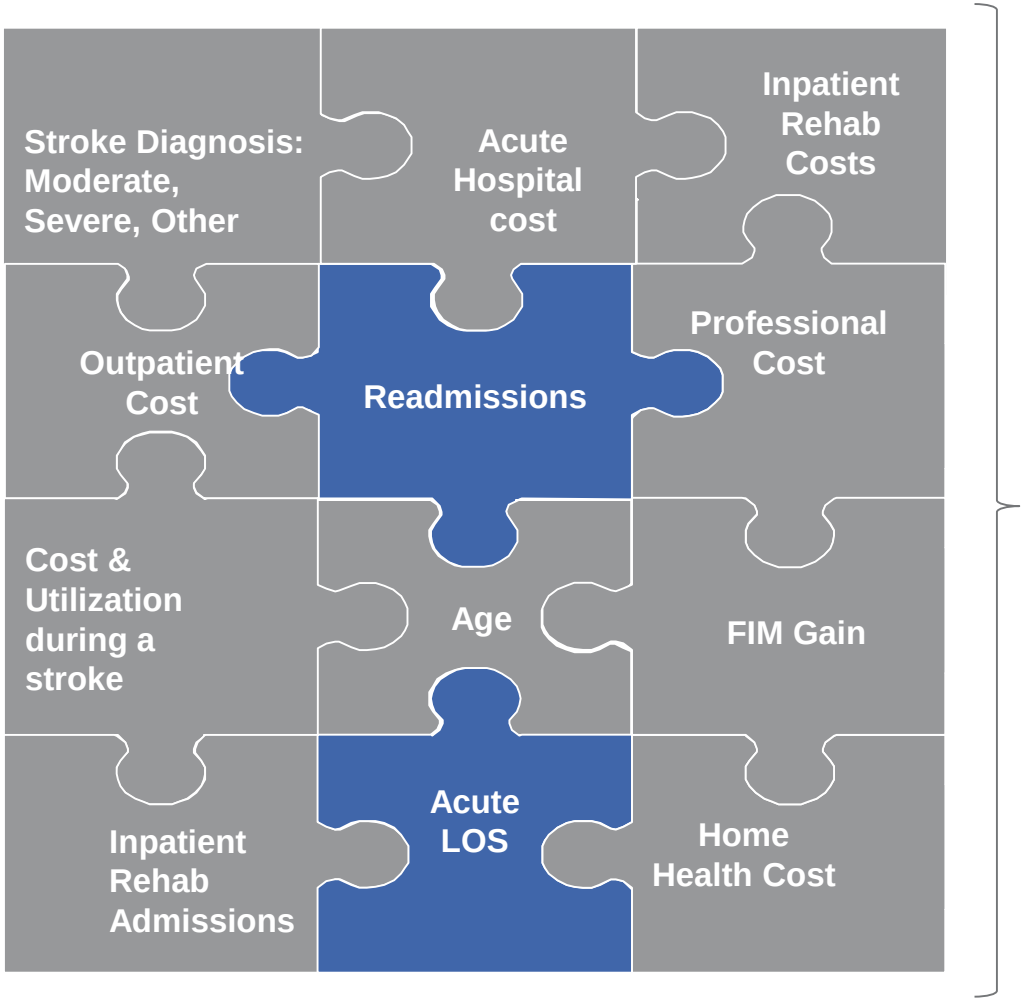
03 Measured IRF advantages for all metrics were both large and consistent, regardless of level of refinement

04 30, 60 and 90 day post-discharge readmission rates declined consistently for all post-acute facility types

Unique Characteristics of Study Design

1. Patient-Focused – Cost, quality and outcomes measured at patient level, not provider level
2. Controls for inputs – Homogeneous patients with specific profile of hospitalization for stroke, followed by inpatient rehab
3. Longitudinal study period – From 90 days prior to stroke thru stroke incident to 90 days after completion of rehab
4. Total cost of care – Measure all categories of care delivered to patients, not just for a specific provider category, care setting or incident
5. Measure interactions of all available variables and metrics – Age, cost, acute and rehab LOS, acute and rehab readmissions (return to work not available in dataset)

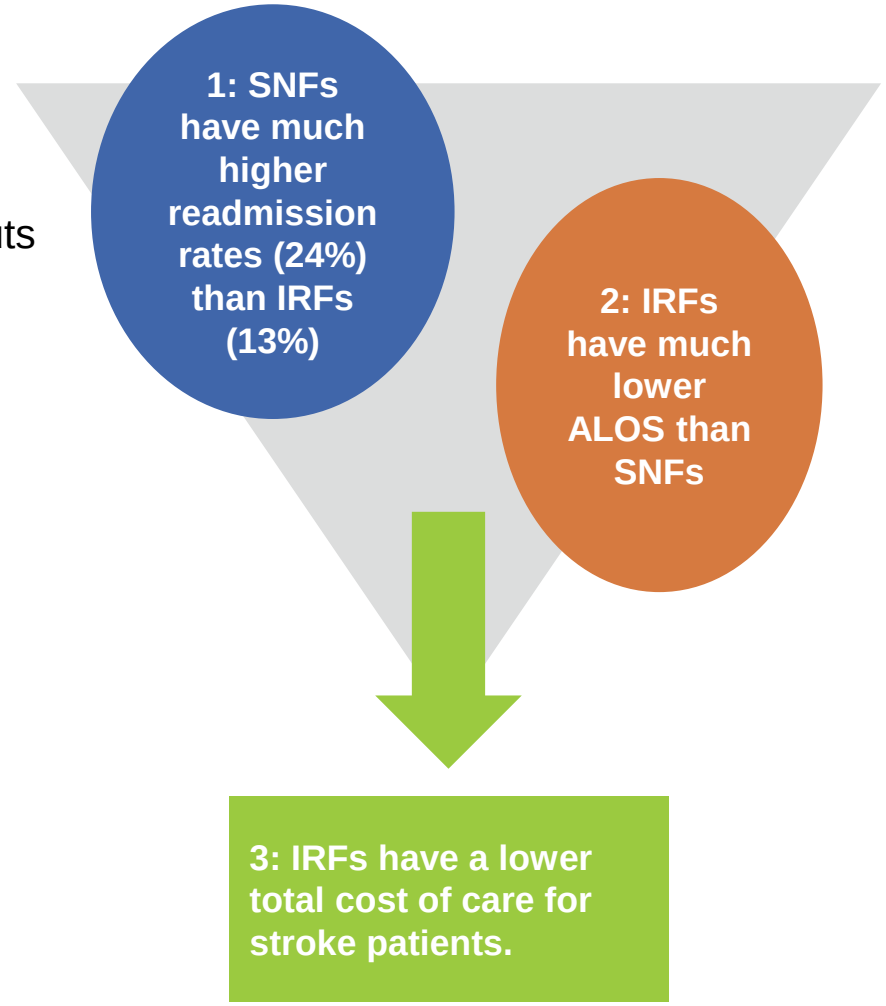
Bringing the Pieces of Care Together



Findings Summary

Study clearly demonstrated that IRFs have a cost advantage over SNFs:

- In every phase of care
- For every sub-category of patients
- Regardless of efforts to control for inputs



Final Thoughts: These Findings Can…