



**Skilled Nursing Facility  
Payment Models  
*Technical Expert Panel***

---

Acumen, LLC  
June 15<sup>th</sup> 2016

# Outline

Sessions	
1	Introductions and Overview of Payment System Alternatives
2	Options for Revising Therapy Component (PT+OT)
3	Options for Creating Speech-Language Pathology Component
4	Options for Creating Non-Therapy Ancillary Component
5	Options for Revising Nursing Component
6	Exploring Alternative Features of a Payment System
7	Open Discussion

# Outline

Sessions	
1	<b>Introductions and Overview of Payment System Alternatives</b>
2	Options for Revising Therapy Component (PT+OT)
3	Options for Creating Speech-Language Pathology Component
4	Options for Creating Non-Therapy Ancillary Component
5	Options for Revising Nursing Component
6	Exploring Alternative Features of a Payment System
7	Open Discussion

# Session 1 Outline

---

## Session Objective

- Introduce TEP participants and today's goals

## Session Topics

- Introduce panelists and project team
- Explain project goals and scope of today's TEP
- Introduce the main elements of the proposed alternative payment system

## Session Time

- 30 minutes

# Welcome

- CMS has contracted with Acumen, LLC to identify potential refinements and alternatives to the existing Prospective Payment System (PPS) for Medicare Part A SNF stays
- This TEP is an important venue for acquiring vital stakeholder and expert input during the process
- Introduction
  - Panelists
  - Project team representatives

# Overview of Project

- Three main project goals
  - Develop alternative approaches that improve adequacy and appropriateness of payment
  - Evaluate performance of each approach
  - Select among alternatives and support implementation of revised payment approach
- To ensure readily implementable alternatives, the project will make recommendations under two constraints:
  - Statutory requirements (e.g. per diem payments)
  - Currently available data
- Project recommendations address all components of the SNF PPS

# Previous TEPs Focused on Two Current Payment Components

- Current PPS consists of three components:

Therapy	Nursing	Non-Case-Mix
<ul style="list-style-type: none"><li>• Physical therapy</li><li>• Occupational therapy</li><li>• Speech-Language Pathology</li><li>• Evaluation for therapy</li></ul>	<ul style="list-style-type: none"><li>• Nursing services</li><li>• Social services</li><li>• Non-Therapy Ancillary services</li></ul>	<ul style="list-style-type: none"><li>• Room and board</li><li>• Administrative costs</li><li>• Capital-related costs</li></ul>

- TEP focused on the Therapy component was held in February 2015
- TEP focused on the Nursing component was held in November 2015

# Both TEPs Have Been a Valuable Resource

- Recommendations from the therapy and nursing TEPs have been implemented in ongoing analyses and will inform planned analyses
- The summary of the TEP discussions can be found here:

<https://www.cms.gov/Medicare/Medicare-Fee-For-Service-Payment/SNFPFS/therapyresearch.html>

- Additional comments about the TEPs or overall project research can be sent to:

SNFTherapyPayments@cms.hhs.gov

# Goals of Today's TEP

- Present and obtain feedback on a comprehensive, preliminary proposal for an alternative payment system
  - Introduce the payment components of an alternative system
  - Describe the resident groups that would determine payment for each of the four case-mix-adjusted components
  - Propose use of front-loaded daily pricing to adjust payment rates over stays

# Proposal for Alternative Payment System Covers Costs for Five Service Components

---

- Physical and Occupational Therapy (PT+OT)
- Speech-Language Pathology (SLP)
- Non-Therapy Ancillary (NTA) Services
- Nursing
- Non-Case-Mix

# Payments Designed to Reflect Costs of Caring for Groups Defined by Resident Characteristics

- CMS initiatives have moved towards paying providers based on resident characteristics and assessing value, rather than paying directly for input use
- Payment accuracy involves setting payments for each resident group reflecting average resource intensity/costs for that group
  - Costs per stay calculated by multiplying covered charges on individuals' claims by cost-to-charge ratios (CCRs) from their facility's cost report at the cost center level
  - Costs per day derived by dividing costs per stay by the number of utilization days in the stay
- Empirical analysis and clinical input used to identify resident groups that explain substantial variation in costs per stay and day for each service component

# Flexible Payment Structure Embodies Broad Range of Payment Options

- Resource intensity for two of the service components varies markedly over course of a stay
- Flexible structure of “front-loaded daily pricing” can account for these patterns
  - Front-loaded payment can account for initial costs of stay
  - Daily payments can start at different levels, and can decline, remain constant, or rise by length of stay
  - Level of front-loaded payment and/or profile of daily payments can depend on resident group
  - Payment schedules could vary or be integrated across service components

# Questions Addressed in Upcoming Sessions in Design of Alternative Payment System

- What resident groups should be used for each case-mix-adjusted payment component?
  - PT+OT [Session 2]
  - SLP [Session 3]
  - NTA [Session 4]
  - Nursing [Session 5]
- How should front-loaded daily pricing be designed for each service component? [Session 6]
  - Constant vs. declining daily rate
  - Front-loading of payments
  - Block pricing vs. linear pricing
  - Interaction among service components

# TEP Agenda

Session		Time	Topic
Morning	Session 1	8:30 to 9:00 AM	Introductions and Overview of Payment System Alternatives
	Session 2	9:00 to 10:30 AM	Options for Revising Therapy Component (PT+OT)
	Break	10:30 to 10:45 AM	-
	Session 3	10:45 to 11:45 AM	Options for Creating Speech- Language Pathology Component
Lunch		11:45 AM to 12:45 PM	-
Afternoon	Session 4	12:45 – 1:45 PM	Options for Creating Non-Therapy Ancillary Component
	Session 5	1:45 to 2:30 PM	Options for Revising Nursing Component
	Break	2:30 to 2:45 PM	-
	Session 6	2:45 to 3:45 PM	Exploring Alternative Features of a Payment System
	Session 7	3:45 to 4:45 PM	Open Discussion

# Outline

Sessions	
1	Introductions and Overview of Payment System Alternatives
<b>2</b>	<b>Options for Revising Therapy Component (PT+OT)</b>
3	Options for Creating Speech-Language Pathology Component
4	Options for Creating Non-Therapy Ancillary Component
5	Options for Revising Nursing Component
6	Exploring Alternative Features of a Payment System
7	Open Discussion

# Session 2 Outline

---

## Session Objective

Describe reasons for creating two therapy components and obtain feedback on proposed PT+OT payment groups

## Session Topics

- Motivation to separate therapy into PT+OT and SLP components
- Selection of resident characteristics to determine PT+OT payments
- Description of proposed PT+OT resident groups

## Session Time

1 hour and 30 minutes

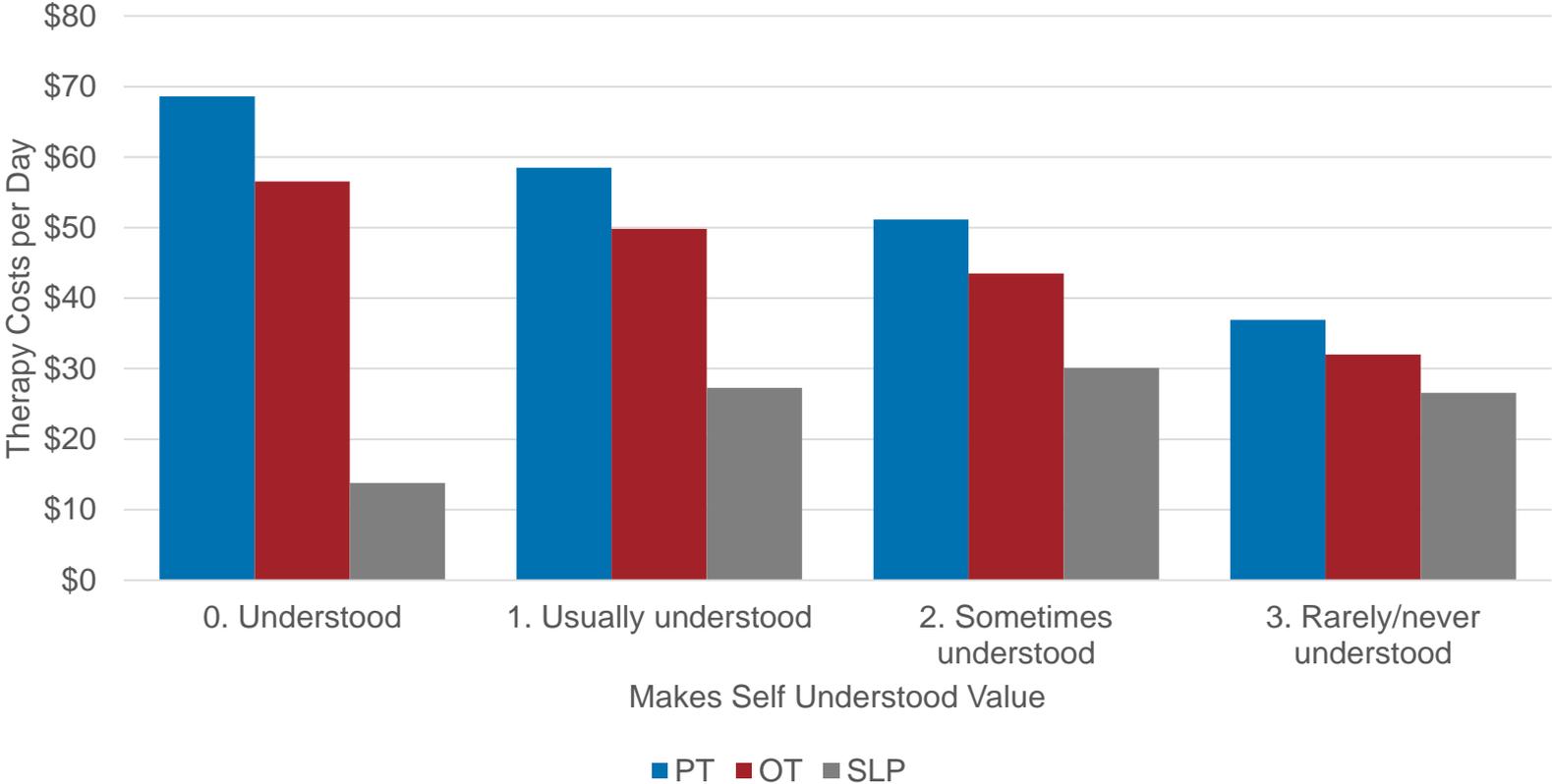
# Residents' PT+OT Costs per Day Can Diverge Markedly from SLP Costs per Day

---

- Correlation between PT+OT costs per day and SLP costs per day across stays is only 0.04
- Focusing on total therapy costs therefore obscures differences between determinants of PT+OT and SLP utilization

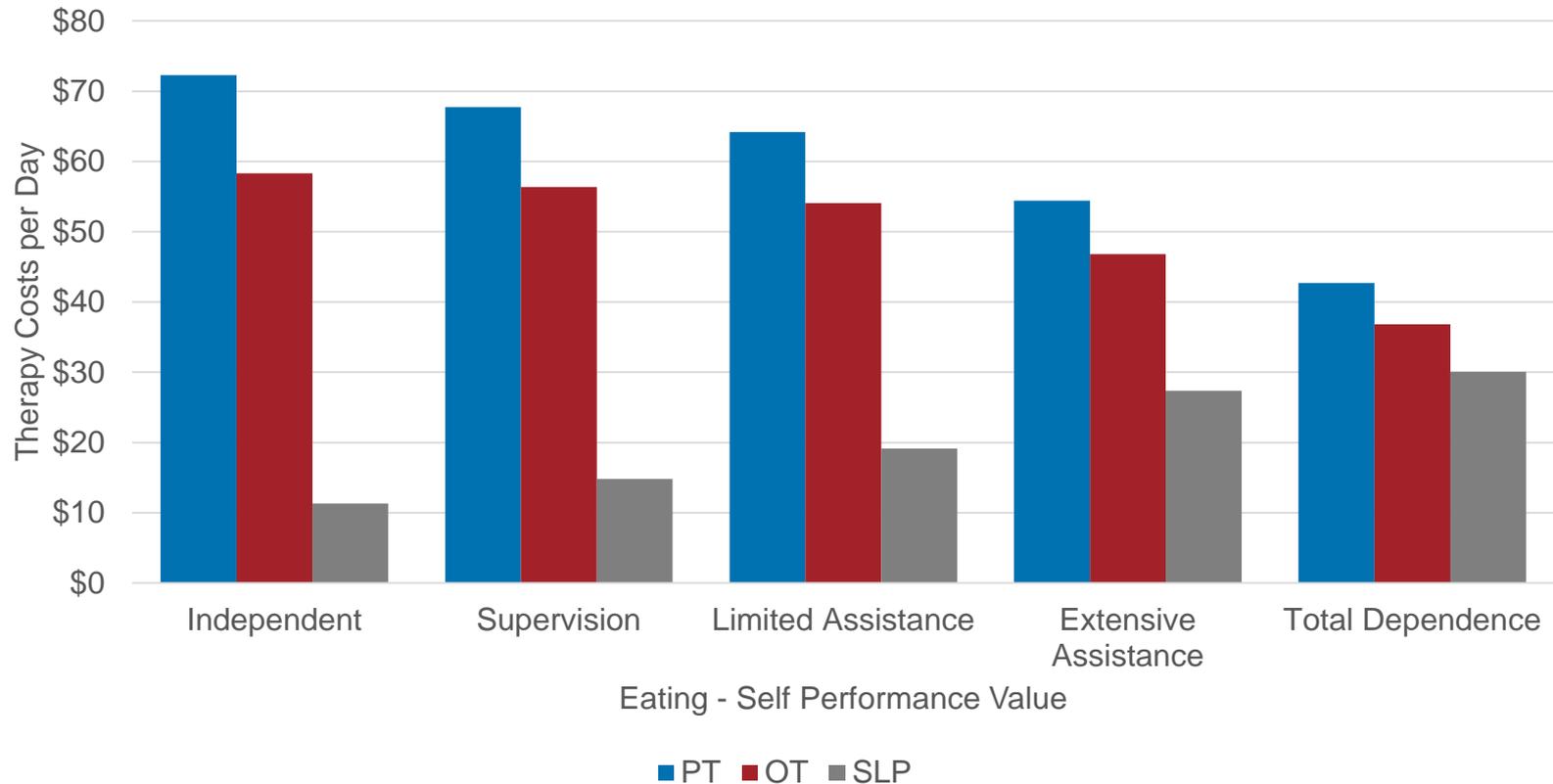
# Example 1: Residents With Lower Cognitive Status Receive Less PT+OT and More SLP

Costs Per Day by Therapy Type for  
MDS Item B0700: Makes Self Understood



# Example 2: Residents With Eating Assistance Receive Less PT+OT and More SLP

Costs Per Day by Therapy Type for  
MDS Item G0110H1: Eating - Self-Performance



# Clinicians Identified Resident Characteristics Potentially Predictive of PT+OT Intensity

- Clinical reasons for prior inpatient stay and SNF stay
- Functional status
- Cognitive status
- Age
- Prior utilization of services (acute inpatient, post-acute care, outpatient)
- Indicators of Condition Categories (CCs) and Hierarchical Condition Categories (HCCs) during the SNF stay and in year prior to stay
- Impairments
- Services received during SNF stay

# Three Sets of These Resident Characteristics are Empirically Important

- Extensive regression analyses revealed that three sets of characteristics are highly predictive of PT+OT costs per day
  - Clinical reasons for prior inpatient stay and SNF stay
  - Functional status
  - Cognitive status
- Particular aspects of these characteristics from claims and Minimum Data Set (MDS) assessments are especially prominent for predicting PT+OT costs

# Prior Inpatient Stay Provides Useful Source of Clinical Information to Predict SNF Care

- Residents normally have an inpatient stay prior to SNF admission
- Inpatient claims contain specific information on the resident's recently treated condition
  - In contrast, SNF claims data are missing specific diagnostic information for many residents
  - More than 40% of residents are assigned generic V codes as the principal diagnosis on the SNF claim
  - Principal diagnosis from inpatient claim is as predictive of therapy costs and more predictive of NTA costs than principal diagnosis from SNF claim
- Clinical information from another setting is unlikely to be affected by SNF payment incentives and can be easily verified

# Multiple Categorizations of Clinical Information from Prior Inpatient Stay Have Been Explored

- Preliminary options to categorize prior inpatient stays were presented in November 2015 TEP
- Based on feedback from that TEP and subsequent analysis, clinicians identified clinical categories for use in predicting PT+OT, SLP, NTA, and Nursing costs
  - Categories are defined using MS-DRG from prior inpatient stay (or RIC for IRF transfers)
  - Ten clinical categories were developed
- Regression analysis demonstrated that only a subset of these categories is relevant to PT+OT
  - Different subsets potentially relevant for SLP, NTA, and Nursing

# Five Clinical Categories Identify Distinct Levels of PT+OT Treatments

Clinical Category	Description
Major Joint Replacement or Spinal Surgery	Received major joint replacement surgery or spinal surgery during prior inpatient stay
Other Orthopedic	Received orthopedic surgery (not major joint) or a non-surgical treatment for orthopedic condition during prior inpatient stay
Non-Orthopedic Surgery	Received non-orthopedic surgery during prior inpatient stay
Acute Neurologic	Received non-surgical treatment for acute neurologic condition (e.g. stroke) during prior inpatient stay
Medical Management	Received other non-surgical treatment during prior inpatient stay

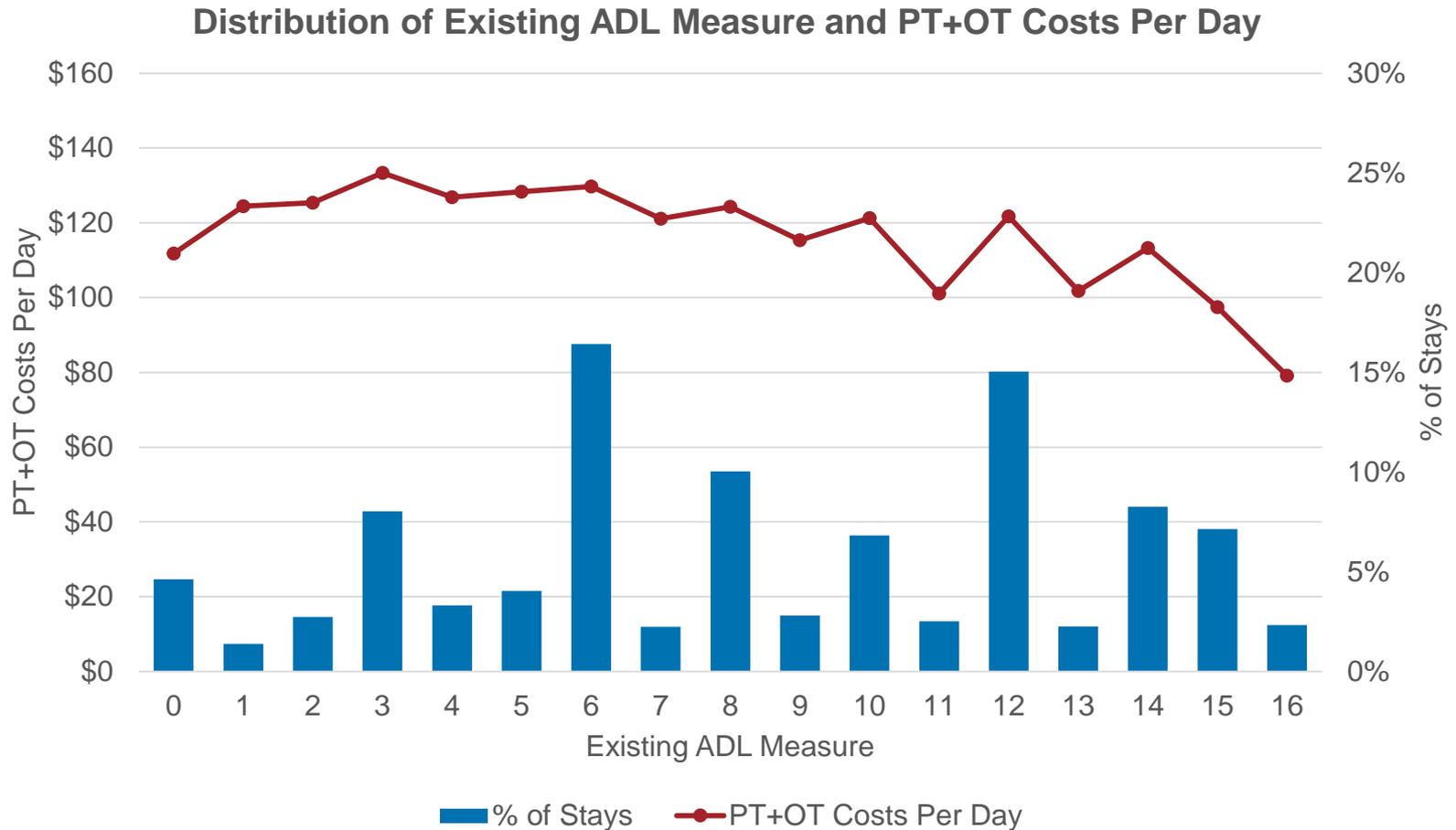
# Clinical Categories Associated with Differences in PT+OT Costs

Clinical Category	% of Stays	PT+OT Costs/Day
Major Joint Replacement or Spinal Surgery	10.1%	\$149
Other Orthopedic	14.0%	\$129
Non-Orthopedic Surgery	11.6%	\$120
Acute Neurologic	5.9%	\$119
Medical Management	58.3%	\$112

# Existing ADL Measure Not Intended to Capture Important Role of Functional Status in PT+OT

- Current measure ranges from 0 to 16 and is based on the 4 late-loss Activities of Daily Living (ADLs) from the full set of 10 ADLs on Section G of the MDS
  - Bed mobility
  - Eating
  - Toileting
  - Transfer
- Each of the four ADLs is scored from 0 to 4 based on a combination of the resident's ability to perform the activity independently and amount of support provided
- Current ADL measure is only used in the SNF PPS to determine payments for the nursing component, not for the therapy component

# Existing ADL Measure Captures Little Variation in PT+OT Costs



# Methodology for Constructing New Functional Measure to Better Capture Variation in PT+OT Use

---

- Determine which ADLs best explain PT+OT use
- Determine whether to use self-performance information, support-provided information, or both
- Determine how to score each ADL

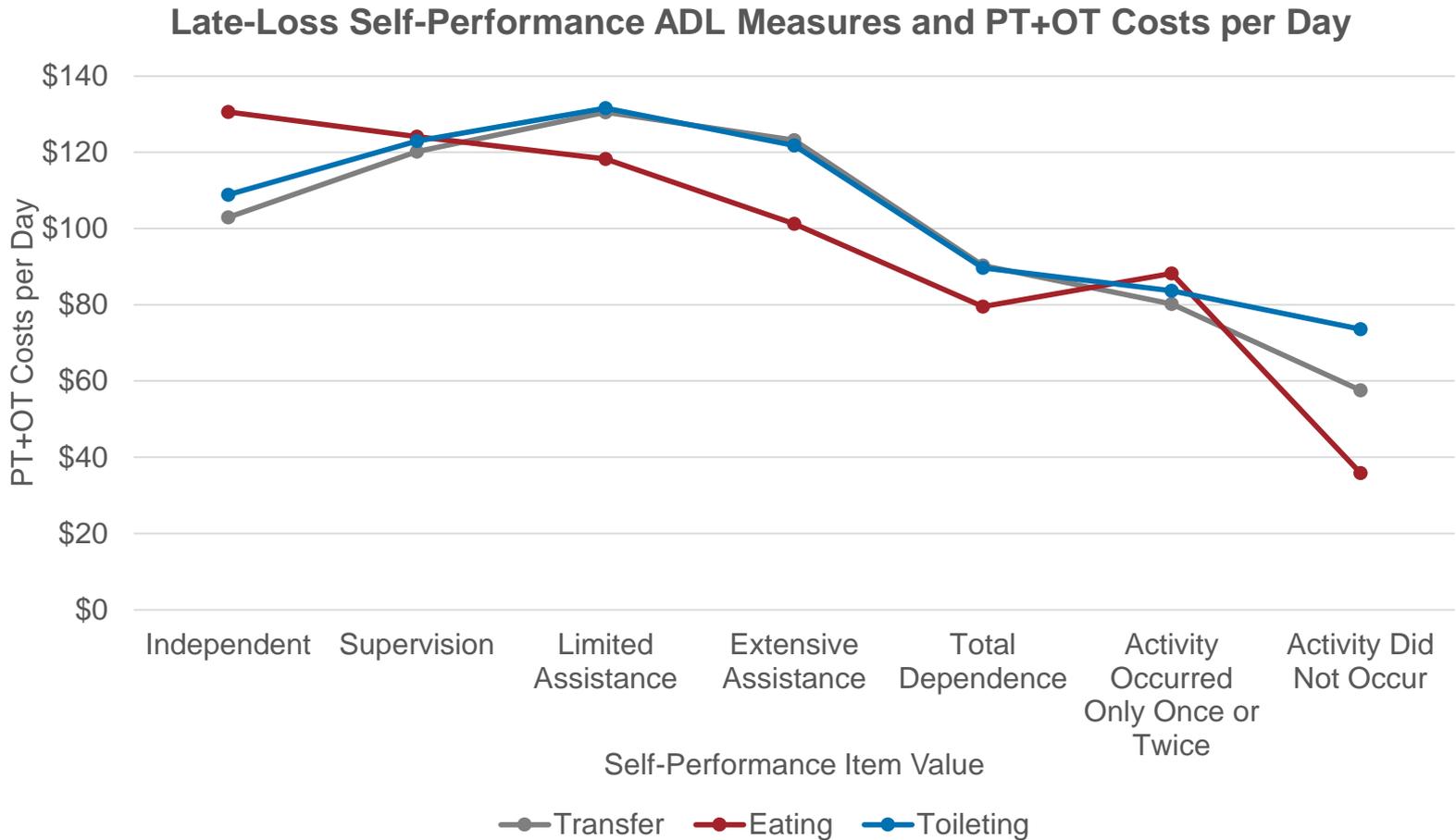
# Three Late-Loss ADLs Selected as Best Indicators of PT+OT Use

- Acumen investigated the 10 ADLs listed in the MDS and other function-related items, such as balance information
- The four late-loss ADLs were good predictors of PT+OT costs, according to regression analysis
  - Late-loss ADLs include bed mobility, eating, toileting, and transfer
  - This finding matches clinical expectations
- According to clinicians, bed mobility could be influenced by environmental factors in facility, such as type of bed, which are not indicative of resident characteristics
- Transfer, eating, and toileting selected to construct new Functional Measure

# Self-Performance Items Capture Clinical Differences and Align with New Assessment Items

- MDS includes both self-performance and support information
- Self-performance information explains a greater share of the variation in PT+OT costs than support information, according to regression analysis
- Support information is not included on the new Section GG of the MDS (planned implementation October 2016)
- Self-performance information alone will be used to construct Functional Measure

# Cost Trends across Performance Levels are Different for Eating than for Transfer and Toileting



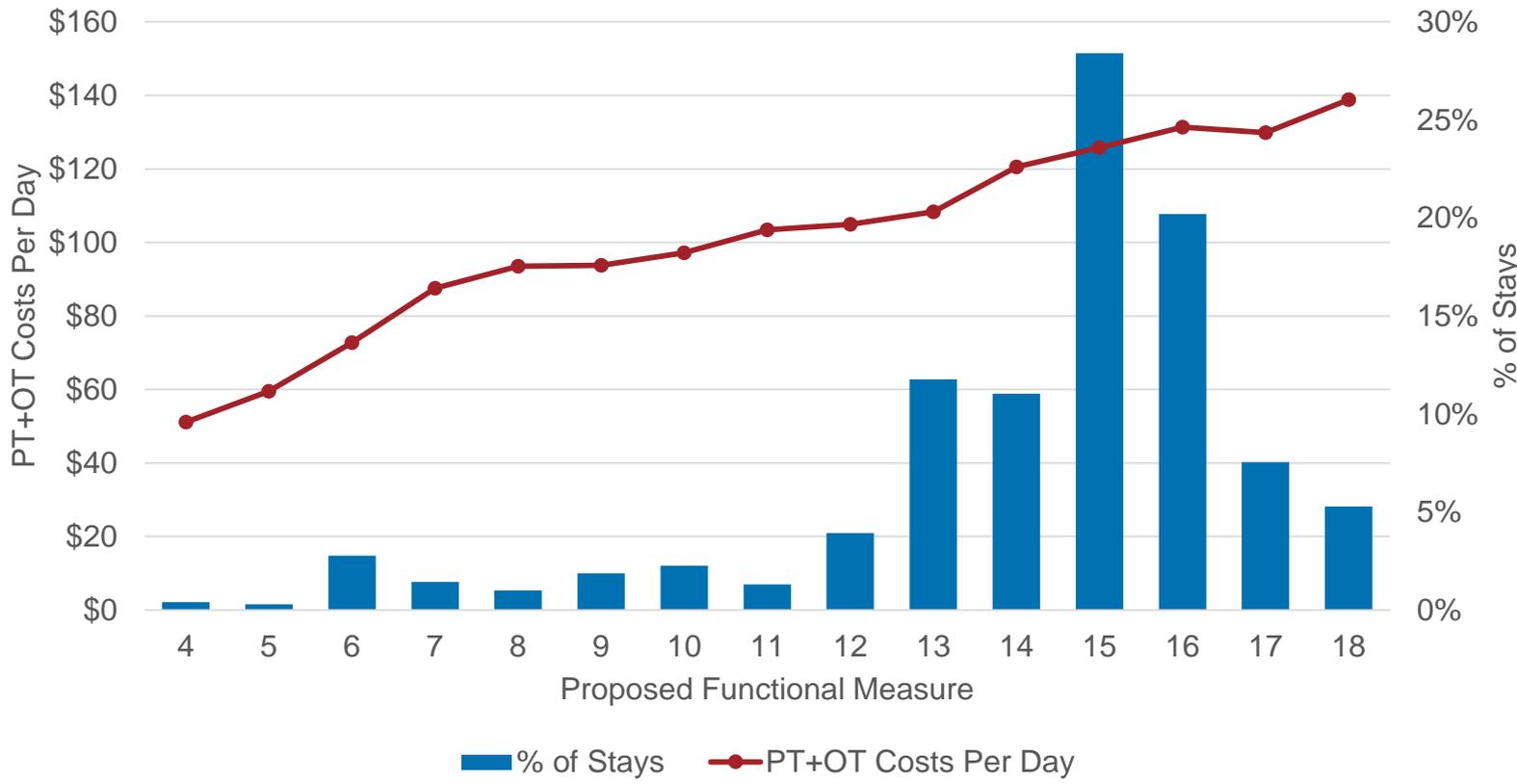
# Proposed Scoring for ADLs Accounts for Differences in Cost Trends for Different ADLs

- Self-performance for the three ADLs is scored from 0 to 6 based on expected PT+OT costs (higher scores reflect higher costs)
  - Current 0-4 scoring does not account for the low costs associated with “activity did not occur” or “occurred only once or twice”
- Proposed Functional Measure consists of the sum of the self-performance scores for the three selected ADLs
  - Proposed Functional Measure ranges from 0 to 18

ADL Self-Performance Level	Transfer	Toileting	Eating
Independent	+3	+3	+6
Supervision	+4	+4	+5
Limited Assistance	+6	+6	+4
Extensive Assistance	+5	+5	+3
Total Dependence	+2	+2	+2
Activity Occurred only Once or Twice	+1	+1	+1
Activity did not Occur	+0	+0	+0

# Proposed Functional Measure Has Monotonic Relationship with PT+OT Costs

Distribution of Proposed Functional Measure and PT+OT Costs Per Day



# Clinical Input and Statistical Evidence Used to Evaluate Measures of Cognitive Status

- Clinicians selected diverse array of proxies for cognitive status on the MDS, including items reflecting:
  - BIMS score
  - Ability to understand others and make oneself understood
  - Short-term and long-term memory
  - Disorganized thinking
  - Inattention
  - Temporal orientation
- Acumen investigated predictive power of selected measures
  - Items B0700 (Makes Self Understood) and B0800 (Ability to Understand Others) had best predictive ability
- High degree of overlap between items B0700 and B0800
  - Clinicians determined B0700 may be a more appropriate measure of cognitive status

# Proposed Cognitive Measure Is Associated with Substantial Variation in PT+OT Costs

- Higher scores in the Cognitive Measure correlate with lower PT+OT costs per day

**B0700. Makes Self Understood**

Enter Code

**Ability to express ideas and wants, consider both verbal and non-verbal expression**

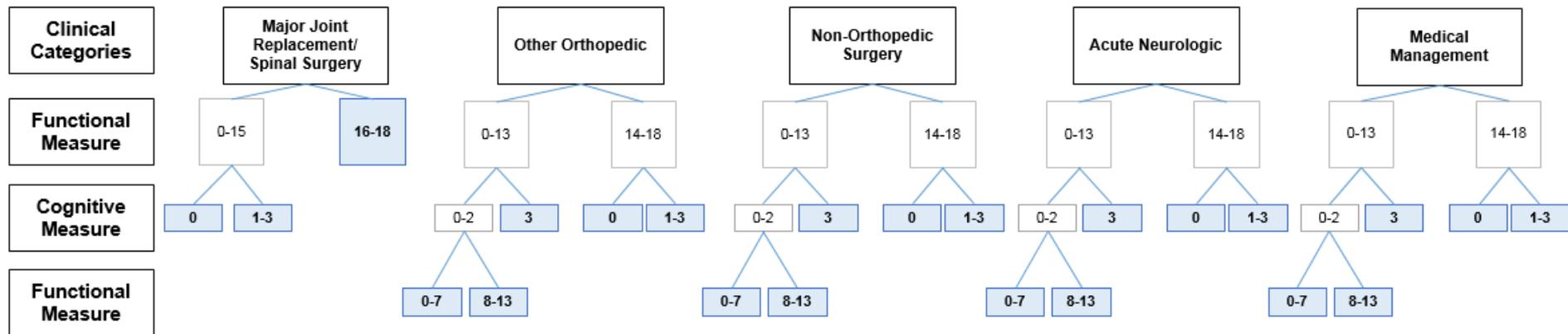
- 0. Understood**
- 1. Usually understood** - difficulty communicating some words or finishing thoughts **but** is able if prompted or given time
- 2. Sometimes understood** - ability is limited to making concrete requests
- 3. Rarely/never understood**

Cognitive Measure Value	% of Stays	PT+OT Costs/Day
0 – Understood	80.2%	\$125
1 – Usually understood	11.4%	\$108
2 – Sometimes understood	5.6%	\$95
3 – Rarely/never understood	2.8%	\$69

# Three Types of Resident Characteristics Distilled into PT+OT Resident Groups

- Clinical categories, new Functional Measure, and cognitive status from B0700 are used to develop new resident groups
- Classification And Regression Tree (CART) algorithm was run within each clinical category to suggest distinct groups based on differences in PT+OT costs per day
- Clinical input and regression analysis were used to refine and simplify statistical results
- Sensitivity analysis conducted to ensure that five clinical categories and functional/cognitive divisions are sufficient to capture variation

# Proposed PT+OT Case-Mix Classification System



- 23 resident groups
- Function and cognition classification is the same for all clinical categories except Major Joint Replacement/Spinal Surgery

# Proposed PT+OT Resident Groups Capture Differences in Average Costs per Day

Clinical Category	Function	Cognition	% of Stays	Avg. PT+OT Costs per Day
Major Joint Replacement/ Spinal Surgery	0-15	0	4.7%	\$145
		1,2,3	0.6%	\$120
	16-18	-	4.9%	\$156
Other Orthopedic	0-7	0,1,2	0.3%	\$75
	8-13	0,1,2	2.6%	\$100
	0-13	3	0.1%	\$60
	14-18	0	10.0%	\$123
		1,2,3	1.0%	\$110
Medical Management	0-7	0,1,2	2.6%	\$96
	8-13	0,1,2	13.5%	\$118
	0-13	3	1.8%	\$83
	14-18	0	34.6%	\$135
		1,2,3	5.8%	\$123
Non-Orthopedic Surgery	0-7	0,1,2	0.5%	\$84
	8-13	0,1,2	2.4%	\$109
	0-13	3	0.3%	\$66
	14-18	0	7.8%	\$129
		1,2,3	0.7%	\$118
Acute Neurologic	0-7	0,1,2	0.3%	\$101
	8-13	0,1,2	1.5%	\$114
	0-13	3	0.3%	\$85
	14-18	0	3.0%	\$128
		1,2,3	0.9%	\$120

# Discussion Questions

- Are the independent variables selected appropriate predictors of PT+OT? Are there sources of clinical or other information that would be predictive of PT+OT costs and were not already considered?
- Is the proposed Functional Measure a better indicator of PT+OT use than the existing ADL score? Are there any proposed refinements to the Functional Measure?
- Is item B0700 (Makes Self Understood) an appropriate measure of how cognitive status affects PT+OT use? Are there other measures of cognition that should be explored?

# Outline

Sessions	
1	Introductions and Overview of Payment System Alternatives
2	Options for Revising Therapy Component (PT+OT)
<b>3</b>	<b>Options for Creating Speech-Language Pathology Component</b>
4	Options for Creating Non-Therapy Ancillary Component
5	Options for Revising Nursing Component
6	Exploring Alternative Features of a Payment System
7	Open Discussion

# Session 3 Outline

---

## Session Objective

Obtain feedback on proposed Speech-Language Pathology (SLP) resident groups

## Session Topics

- Selection of resident characteristics to determine SLP payments
- Description of SLP resident groups

## Session Time

1 hour

# Clinicians Identified Resident Characteristics Potentially Predictive of SLP Utilization

---

- Clinical reasons for prior inpatient stay
- Speech-related items on the MDS
- Cognitive status
- Functional status
- Age
- Indicators of Condition Categories (CCs) and Hierarchical Condition Categories (HCCs) during the SNF stay and in year prior to stay

# Two Sets of Resident Characteristics are Empirically Important

- Extensive regression analyses revealed that two sets of characteristics are highly predictive of SLP costs per day
  - Clinical reasons for prior inpatient stay
  - Speech-related items on the MDS
- Particular aspects of these characteristics are especially prominent for predicting SLP costs

# Clinical Categories Examined to Find Those Predictive of SLP Costs

- As described in Session 2, clinicians identified 10 clinical categories for use in predicting PT+OT, SLP, NTA, and Nursing costs
- Regression analysis demonstrated that only one category was sharply different from the others, particularly when other speech-related measures from the MDS were simultaneously used as predictors

# Two Clinical Categories Used to Identify Different Levels of SLP Use

- Residents with acute neurologic conditions on average received more SLP than other residents

Clinical Category	Description	% of Stays	Avg. SLP Costs per Day
Acute Neurologic	Received treatment for acute neurologic condition (e.g. stroke) in prior inpatient stay	5.9%	\$34
Other	Did not receive treatment for acute neurologic condition in prior inpatient stay	94.1%	\$16

# Speech-Related Items on the MDS Differ Markedly in Ability to Predict SLP Costs

MDS Item	Description	R-Squared*
G0110H1	Eating - Self-Performance	0.042
B0700	Makes Self Understood	0.040
K0100Z	No Sign of Swallowing Disorder	0.030
B0600	Speech Clarity	0.025
K0100C	Coughing or Choking during Meals or when Swallowing Medications	0.017
K0100D	Complaints of Difficulty or Pain with Swallowing	0.011
K0100B	Holding Food in Mouth/Cheeks or Residual Food in Mouth after Meal	0.010
K0100A	Loss of Liquids/Solids from Mouth when Eating or Drinking	0.004

\*R-Squared from OLS regressions using as independent variables only the responses to MDS items in that row. The R-Squared represents the fraction of variation in SLP costs explained by each MDS item alone.

# Three Speech Measures Associated with Substantial Variation in SLP Costs



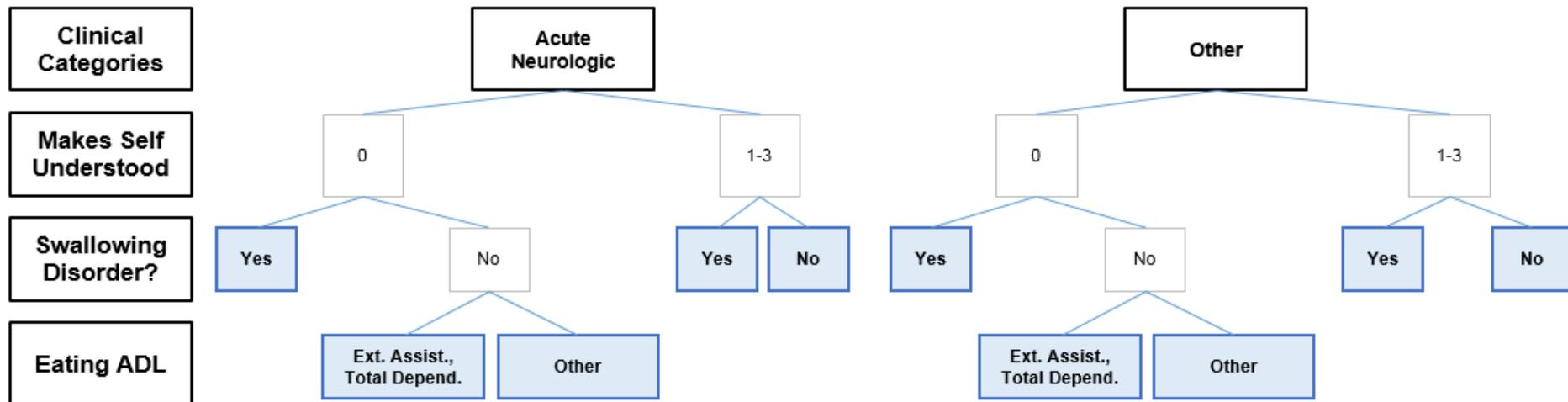
- Further analyses focus on these measures due to their higher explanatory power

# Acute Neurologic Indicator and Selected Speech-Related Items Used to Create Resident Groups

---

- CART algorithm was run within each clinical category to suggest groups based on differences in SLP costs per day
- Clinical input and further regression analysis were used to refine and simplify statistical results
- Sensitivity analysis examined relevance of other clinical categories

# Analysis Resulted in 10 Resident Groups



# Average Costs per Day Vary Across Resident Groups in Clinically Intuitive Ways

Clinical Category	Makes Self Understood	Swallowing Disorder	Eating ADL (self-performance)	% of Stays	SLP Costs per Day
Acute Neurologic	0	No	Ext. Assist. / Total Depend.	0.5%	\$38
			Other	3.1%	\$26
		Yes	-	0.3%	\$47
	1-3	No	-	1.7%	\$42
		Yes	-	0.3%	\$54
	Other	0	No	Ext. Assist. / Total Depend.	6.7%
Other				66.7%	\$11
Yes			-	2.9%	\$34
1-3		No	-	15.8%	\$25
		Yes	-	1.9%	\$38

# Discussion Questions

- Given the distinct resident groups for SLP and PT+OT resulting from the empirical analysis, is it appropriate to create two separate components for SLP and PT+OT?
- Besides the clinical categories considered, are there other types of acute inpatient stays that should be examined?
- Are there other items on the MDS that were not already tested, but potentially predictive of SLP costs?
- Are there other comorbidities or diagnoses that should be considered? Are there other services in residents' history that should be considered?

# Outline

Sessions	
1	Introductions and Overview of Payment System Alternatives
2	Options for Revising Therapy Component (PT+OT)
3	Options for Creating Speech-Language Pathology Component
<b>4</b>	<b>Options for Creating Non-Therapy Ancillary Component</b>
5	Options for Revising Nursing Component
6	Exploring Alternative Features of a Payment System
7	Open Discussion

# Session 4 Outline

---

## Session Objective

Obtain feedback on proposed NTA payment groups

## Session Topics

- Motivation to create separate NTA component
- Selection of variables to determine NTA payments
- Description of NTA resident groups

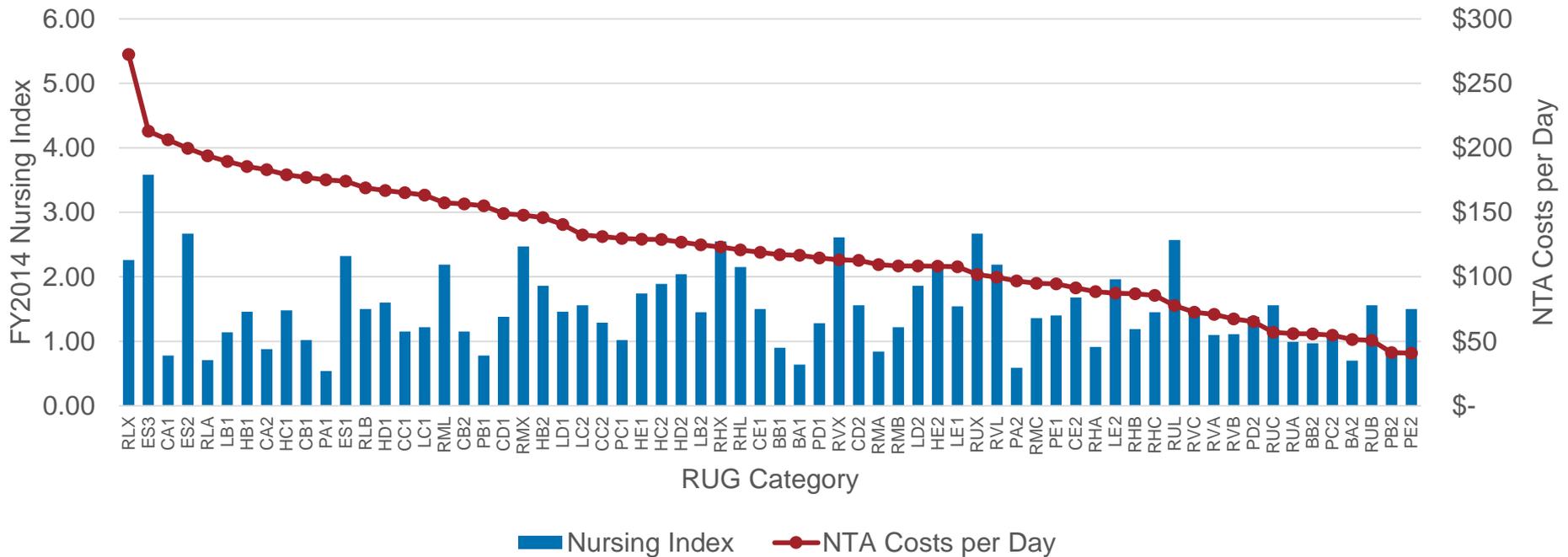
## Session Time

1 hour

# Current Nursing Payments Do Not Correspond with Variation in NTA Costs Across Residents

- A separate NTA component would better account for variation in costs

Nursing Index and Average NTA Costs by RUGs

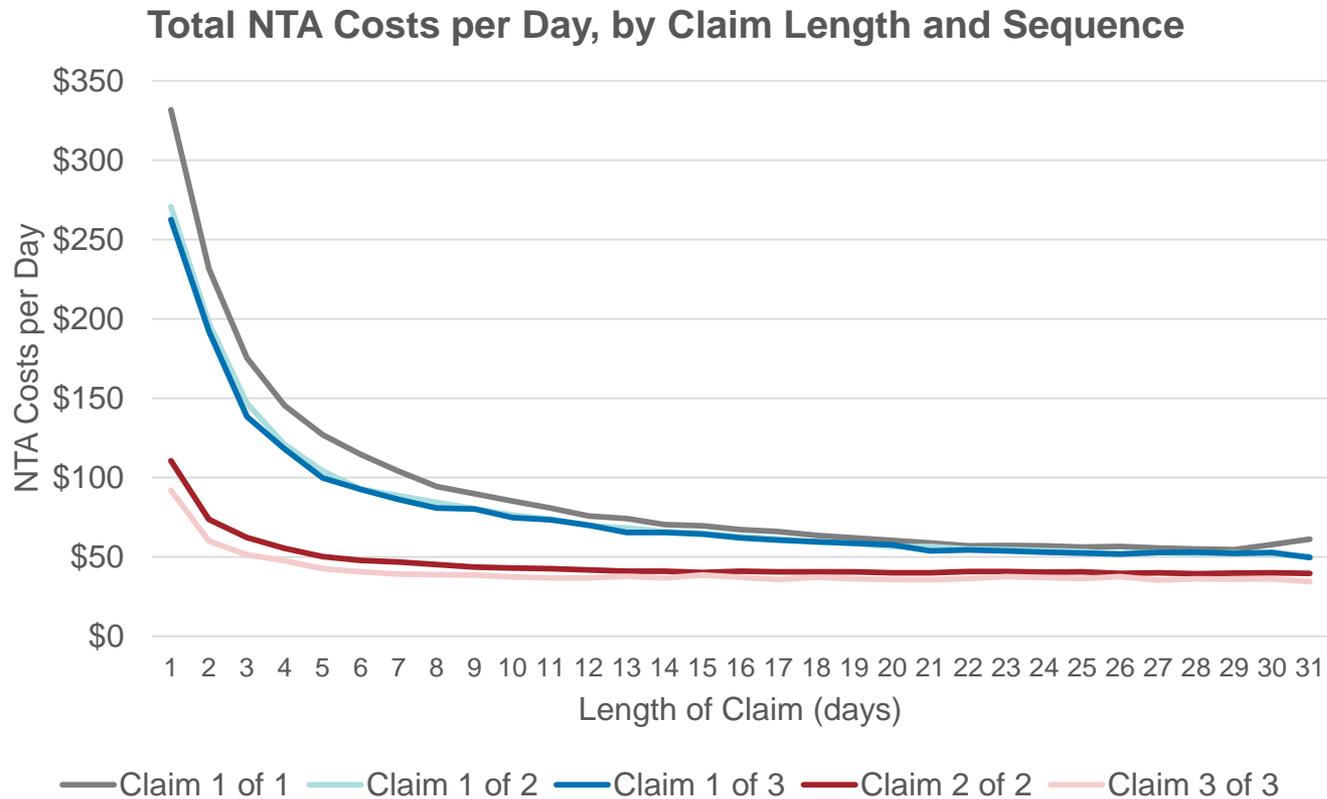


# Resident Characteristics are Identified to Design NTA Payments

- Clinicians identified several sets of resident characteristics potentially predictive of NTA costs
  - Clinical reasons for prior inpatient stay
  - Extensive Services
  - Indicators of Condition Categories (CCs) and Hierarchical Condition Categories (HCCs) during the SNF stay and in year prior to stay
  - Medications
  - Age
  - Cognitive status
- As with PT+OT and SLP, NTA costs are calculated by multiplying charges for relevant revenue centers on claims by CCRs from facility cost reports

# Analyses on NTA Utilization are Restricted to Stays Longer Than Seven Days

- NTA costs per day are much higher for shorter stays because of cost clustering at the beginning of the stay



# Three Sets of Resident Characteristics are Empirically Important

- Extensive regression analyses revealed that three sets of characteristics are highly predictive of NTA costs per day
  - Comorbidities
  - Use of extensive services
  - Age
- Certain medications also had high predictive ability, but they were not considered for further analysis due to potential incentive issues caused by linking drugs to payment
- Particular aspects of these characteristics identified by claims and MDS assessments are especially prominent for predicting NTA costs

# Comorbidities Based on Condition Categories (CCs) Used in the CMS Risk Adjustment Model

- Diagnosis codes were mapped to condition categories (CCs). All CCs were considered regardless of inclusion in Part C model
- Diagnosis codes were obtained from the following sources:
  - First SNF claim in the stay
  - Most-recent inpatient claim
  - Item I8000 of the MDS
  - For chronic conditions only: all inpatient, outpatient, and physician claims in the year prior to SNF admission

# Comorbidity Score Considers Number of Conditions and their Relative Costliness

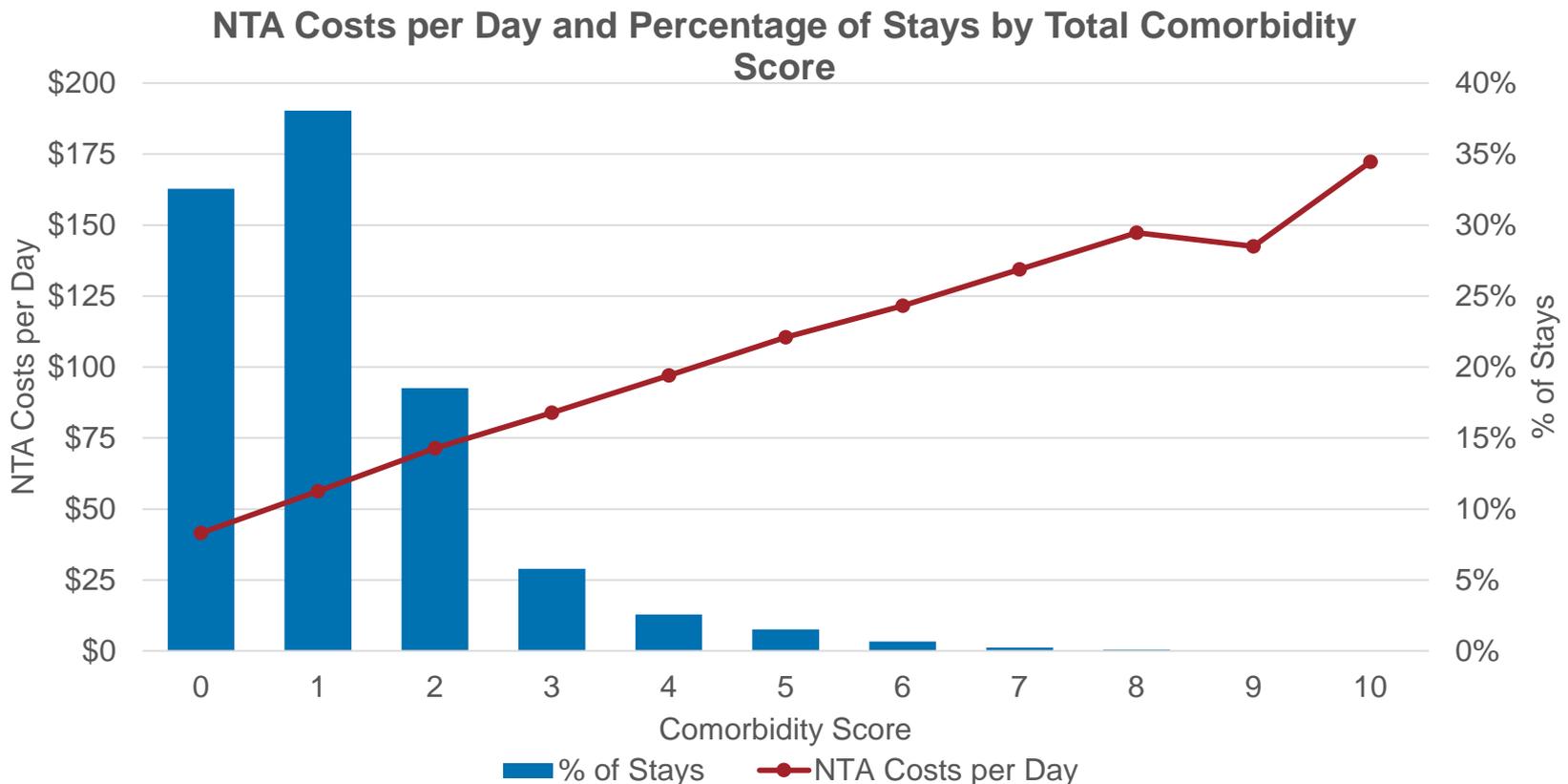
- Various options to incorporate comorbidities are problematic:
  - Total number of comorbidities is linked to NTA costs, but a simple count of conditions overlooks differences in relative costliness
  - Some conditions are more expensive than others, but a tier system similar to the IRF PPS does not account for number of comorbidities
- Proposed comorbidity score is a weighted count of comorbidities
  - Comorbidities associated with high increases in NTA costs grouped into high cost (>\$25 per day), medium cost (\$15-\$25 per day), and low cost tiers (\$9-\$15 per day)
  - Points assigned for each additional comorbidity present, with more points awarded for higher-cost tiers

# High-Cost Comorbidities Grouped into Three Tiers and Assigned Points to Compute Score

CC	Description	% of Stays	Increase in NTA Costs (OLS coeff)	Tier	Points
1	HIV/AIDS	0.4%	\$45	High	3
37	Bone/Joint/Muscle Infections/Necrosis	3.3%	\$32	High	3
128	Kidney Transplant Status	0.4%	\$26	High	3
107	Cystic Fibrosis	0.0%	\$23	Medium	2
5	Opportunistic Infections	0.5%	\$19	Medium	2
174	Major Organ Transplant Status	0.4%	\$17	Medium	2
85	Heart Infection/Inflammation, Except Rheumatic	0.8%	\$16	Medium	2
15-18	Diabetes with Complications	27.2%	\$14	Low	1
77	Respirator Dependence/Tracheostomy Status	2.9%	\$13	Low	1
165	Other Complications of Medical Care	3.5%	\$13	Low	1
3	Central Nervous System Infection	0.8%	\$12	Low	1
72	Multiple Sclerosis	1.2%	\$12	Low	1
181	Chemotherapy	0.1%	\$11	Low	1
108	Chronic Obstructive Pulmonary Disease	41.7%	\$10	Low	1
6	Other Infectious Diseases	14.9%	\$10	Low	1
25	End-Stage Liver Disease	2.2%	\$9	Low	1
164	Major Complications of Medical Care and Trauma	6.6%	\$9	Low	1

# Comorbidity Score has Positive Correlation with NTA Costs

- Score theoretically ranks from 0 to 26, however no stay in the study population exceeded a score of 14



# Extensive Services Selected Based on Clinical Input, Statistical Evidence

- Clinicians selected various extensive services recorded on the MDS
  - Services for respiratory conditions
  - Services for acute infections
  - Treatments for skin conditions
  - Nutritional approaches
  - Services for bladder and bowel conditions
  - Restorative nursing programs
- Acumen investigated the relationship between extensive services and NTA Costs
  - Most services were not associated with notably higher NTA costs
- Some services were not considered because their provision is more likely to be impacted by payment incentives (e.g., parenteral/IV feeding, oxygen therapy)

# Seven Extensive Services are Proposed due to their Link to Substantial Increases in NTA Costs

MDS Item	Description	Increase in NTA Costs per Day*	% of Stays with Service
O0100F2	Ventilator/Respirator	\$54	0.3%
M1040B	Diabetic Foot Ulcer	\$33	1.0%
M1040A	Foot Infection	\$29	1.2%
O0100M2	Infection Isolation	\$28	1.3%
O0100E2	Tracheostomy	\$26	0.9%
O0100D2	Suctioning	\$16	0.9%
H0100C	Ostomy	\$13	2.5%

\*OLS regression coefficients predicting NTA costs per day

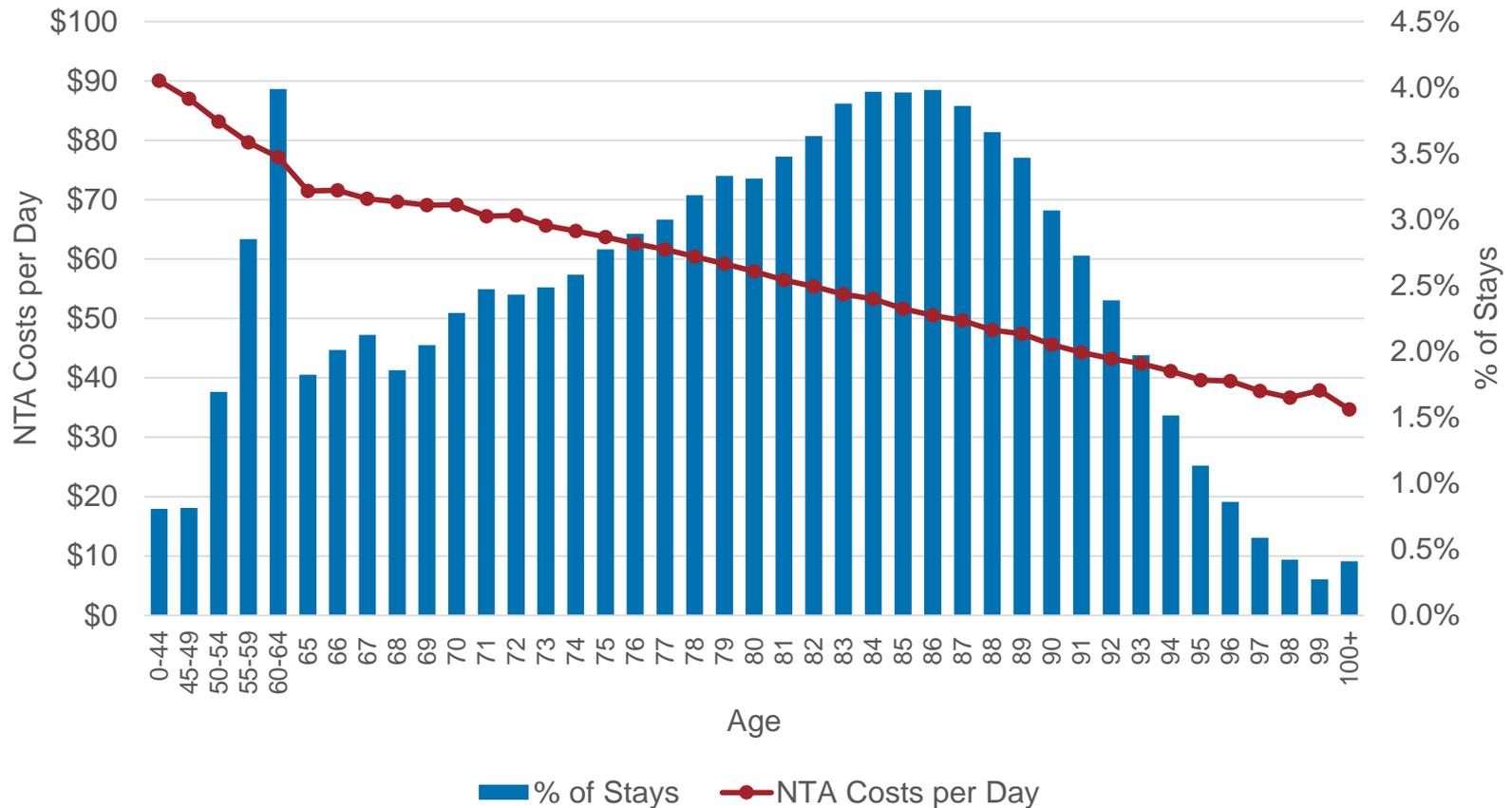
# Extensive Services Grouped into Three Tiers Based on Similar Costs

- Combinations of services were analyzed to create tiers that capture differences in NTA costs
- Residents are assigned to the highest tier for which they qualify

Extensive Service	Tier	% of Stays	Avg. NTA Costs per Day
Both Tracheostomy and Ventilator	High	0.3%	\$155
Tracheostomy	Medium	1.1%	\$100
Ventilator			
Suctioning			
Two or more of the following: Ostomy, Infection Isolation, Foot Infection, Diabetic Foot Ulcer			
Ostomy	Low	5.2%	\$79
Infection Isolation			
Foot Infection			
Diabetic Foot Ulcer			

# Age Has a Clear Negative Correlation with NTA Costs

Average NTA Costs per Day, by Age



# Clinical Categories Are Relatively Weak Predictors of NTA Costs

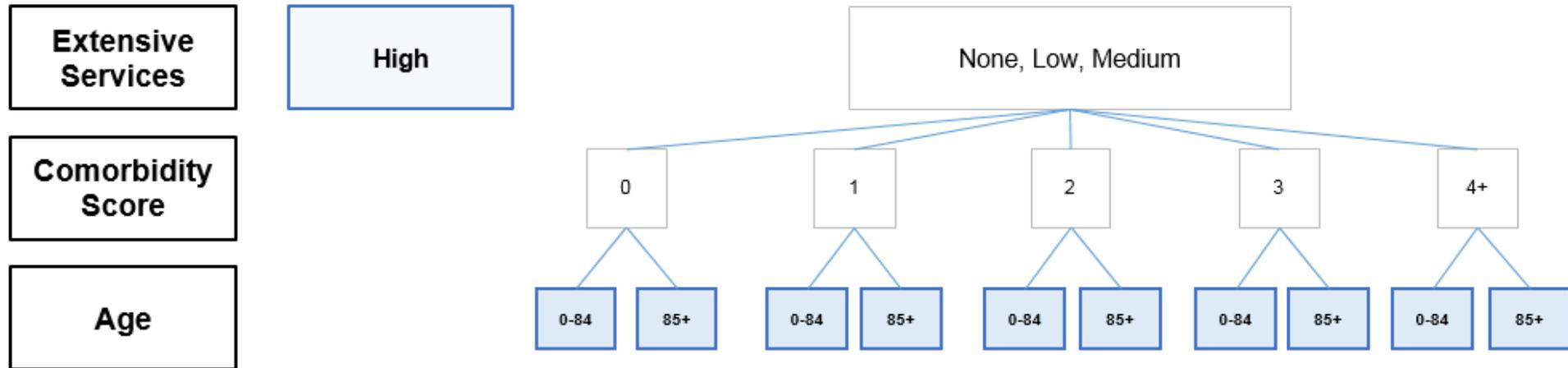
- As described in Session 2, clinicians identified 10 categories for use in predicting PT+OT, SLP, NTA, and Nursing costs based on the prior inpatient stay
- Regression analysis demonstrated that Acute Infections, Pulmonary residents had significantly higher NTA costs, but other resident characteristics are stronger predictors of NTA costs

# Comorbidity Score, Extensive Service Tiers, and Age Used to Create NTA Resident Groups

---

- CART algorithm was run to create groups based on differences in NTA costs per day
  - Age was tested both as a continuous variable and as a categorical variable using 10-year bins
- Clinical input was used to refine and simplify statistical results

# Analysis Resulted in 11 Resident Groups



# Average NTA Costs per Day Vary Across Proposed Resident Groups

Extensive Services	Comorbidity Score	Age	% of Stays	Avg. NTA Costs per Day
High	-	-	0.3%	\$156
None, Low, Medium	0	0-84	17.6%	\$45
		85+	15.0%	\$37
	1	0-84	24.1%	\$61
		85+	14.0%	\$48
	2	0-84	13.6%	\$75
		85+	4.8%	\$58
	3	0-84	4.6%	\$87
		85+	1.1%	\$67
	4+	0-84	4.3%	\$109
		85+	0.7%	\$85

# Discussion Questions

- Are the independent variables selected appropriate predictors of NTA service use? Are there other explanatory variables that should be considered?
- Do the selected comorbidities match clinical expectations on which conditions increase NTA costs? Are there additional conditions that should be considered?
- Do the selected extensive services account for the differences in NTA costs in a comprehensive way? Are there additional services that should be considered?
- Does the trend of declining NTA costs with increasing age match clinical expectations?
- Are there clinical categories based on types of inpatient stays that would be appropriate to consider for use in NTA payments?

# Outline

Sessions	
1	Introductions and Overview of Payment System Alternatives
2	Options for Revising Therapy Component (PT+OT)
3	Options for Creating Speech-Language Pathology Component
4	Options for Creating Non-Therapy Ancillary Component
<b>5</b>	<b>Options for Revising Nursing Component</b>
6	Exploring Alternative Features of a Payment System
7	Open Discussion

# Session 5 Outline

---

## Session Objective

Obtain input on proposed approach for revising the nursing component

## Session Topics

- Motivation to revise the nursing component
- Measurement of resident-specific nursing costs
- Approach for deriving nursing resident groups using STRIVE data

## Session Time

45 minutes

# Current Nursing Indexes Based on STRIVE Nursing Time Study

- 2006-2007 STRIVE study collected data on resident-specific nursing minutes for all residents in the study
- Using wage data, minutes were weighted by relative wage of the staff member who administered service to produce “wage weighted staff time” (WWST)
- Nursing index for each RUG is the average WWST per day for the RUG divided by overall average

# Reform of Therapy and NTA Components Requires Revision of Nursing Indexes

- In the case of changes to the therapy categories, the nursing index should change because it currently relies on the interaction between therapy categories and nursing predictors (ADL, extensive services)
- In the case of the creation of new resident groups to account for variation in NTA services, the nursing component would need to be re-calculated

# Calculating Nursing Indexes Requires Data on Nursing Costs

- Nursing indexes are intended to reflect average nursing costs of resident groups relative to overall average
- Nursing costs cannot be derived from MDS assessments
  - Assessments do not report nursing time
  - In contrast, reported therapy minutes can be used to infer therapy costs
- Claims contain charges, which could be converted to costs using the cost-to-charge ratios (CCR) on cost reports

# Limitations of Using Claims Data to Measure Resident-Specific Nursing Charges

- Charges on claims can be recorded in various revenue centers indicating the type of service associated with the charge
- Nursing charges are normally reported within general revenue centers that also include “non-case-mix” services such as room and board, rather than revenue centers specific to nursing
- Nursing+non-case-mix charges reported in claims often do not vary across different points in the stay or across different residents within each facility, even when comparing dissimilar RUGs

# STRIVE Data Can Be Combined with Current Data to Revise Nursing Resident Groups

- Methodology
  - Divide STRIVE population into cells using resident characteristics that affect wage-weighted staff time
  - Divide current population into same cells and assign costs using STRIVE's wage-weighted staff time
  - Create resident groups by using cells above and other relevant resident characteristics from current data that are not available from STRIVE
- Key assumption: **Relative costs** of nursing services across types of residents have remained stable since 2006-2007
  - Evidence that the clinical composition of the SNF population has remained stable over time
  - Functional status is the main exception, but this is not a problem if **relative costs** are stable

# Step 1: Divide STRIVE Population Into Cells That Predict Wage-Weighted Staff Time

- Identify resident characteristics likely to affect nursing time
  - Use both clinical input and exploratory empirical analysis
  - Ensure that characteristics are available in current claims data as well
- Implement regression methods to identify a division of the population into cells based on those resident characteristics
- Examine the sensitivity of the choice of cells by altering the cells and assessing the impact on predictive ability

# Step 2: Divide Current Population Into Same Cells and Assign Nursing Costs

- Simplest method is to assign average cost in each cell from the STRIVE data to the corresponding cell in current data
- More complicated method uses the distribution of costs in each cell of the STRIVE data to produce a corresponding distribution of costs in each cell of the current data
- Assigned costs can be statistically adjusted to ensure that facility-level actual costs are close to facility-level assigned costs

# Step 3: Create Resident Groups

- Resident groups can simply be cells of resident characteristics defined in Step 1
  - Disadvantage of this method is that it is not possible to use resident characteristics that are available in current data but not in STRIVE data
- To overcome this disadvantage, possible to create further subsets of population based on resident characteristics in current data
- For resulting resident groups, calculate average costs and translate these into case-mix indexes

# Discussion Questions

- Is there any reason to believe that relative nursing costs across different types of residents have changed over time?
- What are salient resident characteristics that should be used to divide the population into analogous cells in the STRIVE data and the current data?
- Beyond making comparisons using facility costs, are there other ways to adjust for changes in nursing costs across time?
- What are some resident characteristics that are available in current data but not available in STRIVE, and should be used to define resident groups?

# Outline

Sessions	
1	Introductions and Overview of Payment System Alternatives
2	Options for Revising Therapy Component (PT+OT)
3	Options for Creating Speech-Language Pathology Component
4	Options for Creating Non-Therapy Ancillary Component
5	Options for Revising Nursing Component
<b>6</b>	<b>Exploring Alternative Features of a Payment System</b>
7	Open Discussion

# Session 6 Outline

---

## Session Objective

Describe motivation for using front-loaded daily pricing for the PT+OT and NTA components, and present potential pricing options

## Session Topics

- Reasons for using front-loaded daily pricing for PT+OT and NTA payments
- Framework for alternative pricing structures
- Examples for PT+OT using linear pricing and block pricing

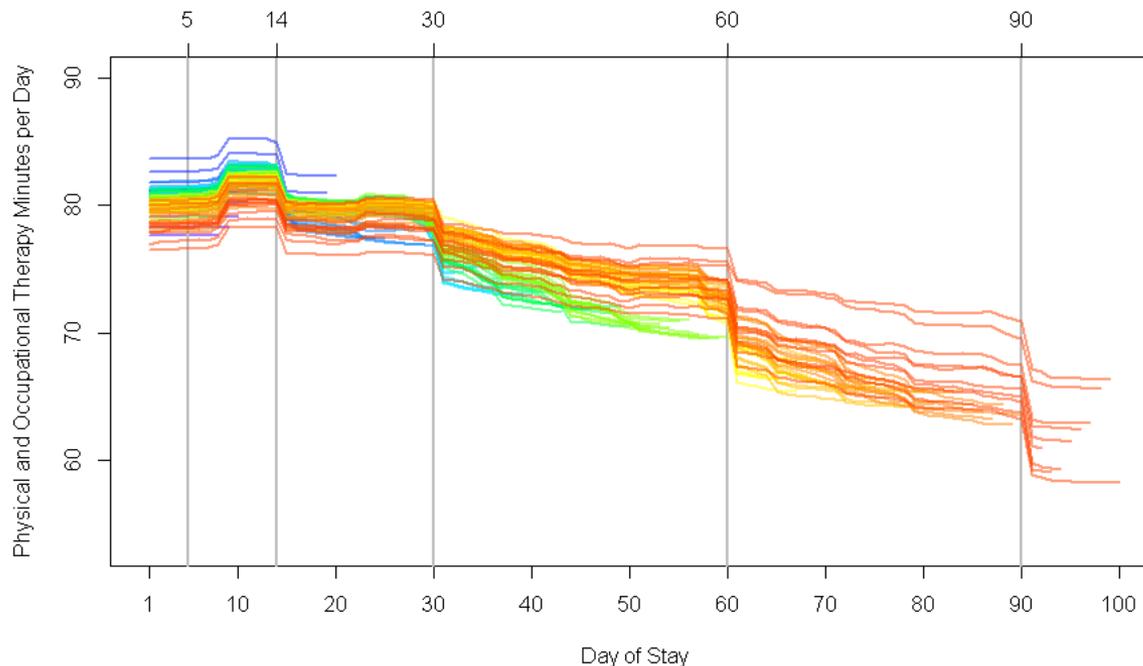
## Session Time

1 hour

# PT+OT Use Declines over the Course of the Stay

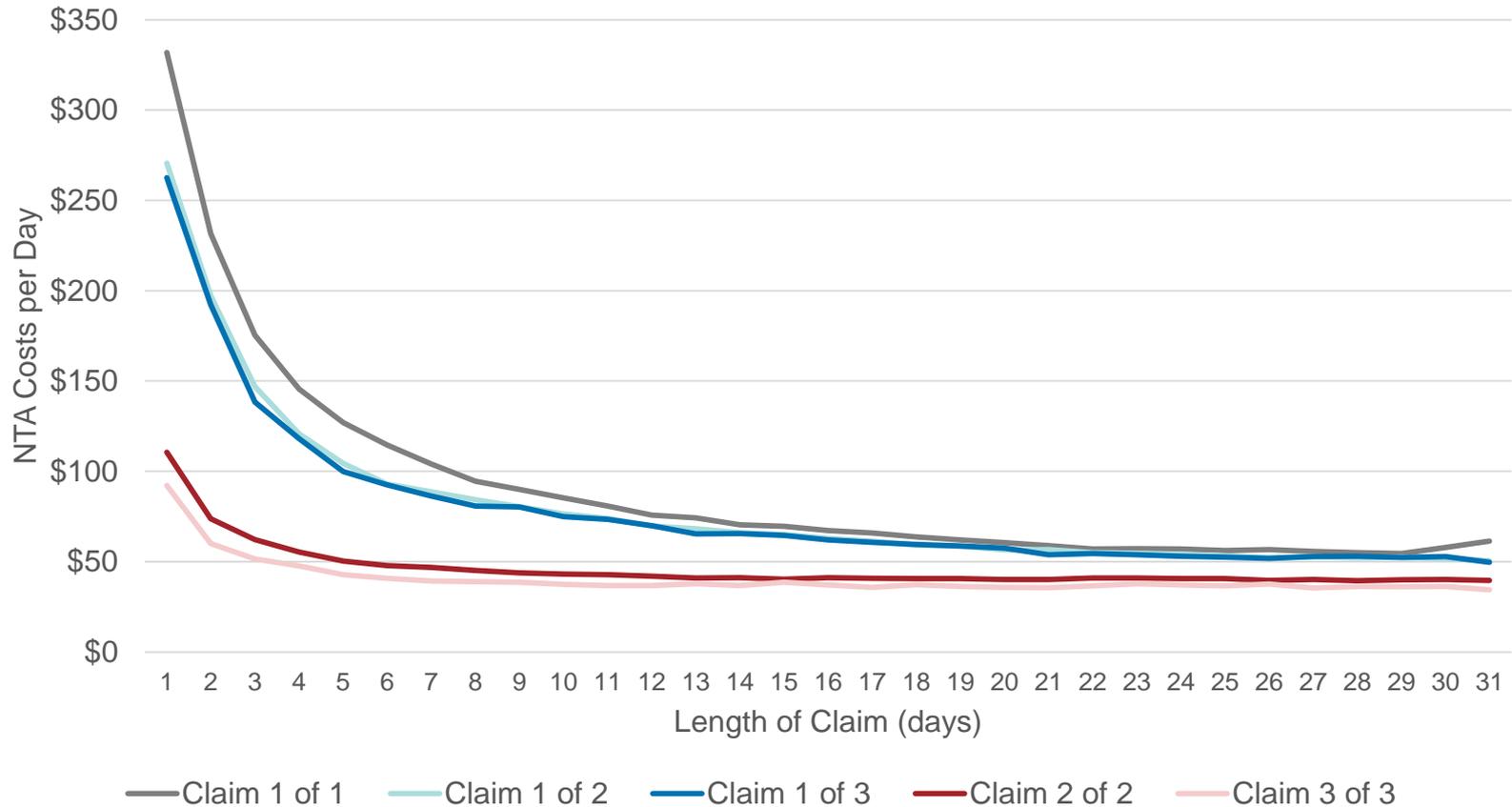
- Declining pattern exists for stays of different lengths
- Shifts observed primarily at scheduled PPS assessment windows

Physical and Occupational Therapy Minutes per Day vs. Day of Stay (for Various Stay Length)



# NTA Costs Decline Sharply After the First Few Days of the Stay

Total NTA Costs per Day, by Claim Length and Sequence



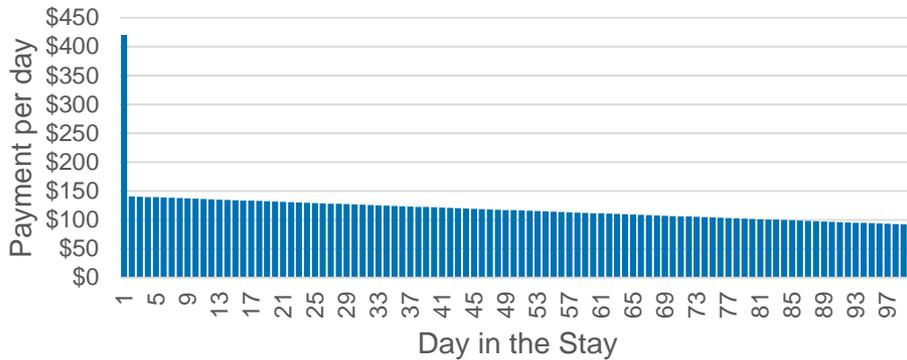
# Front-Loaded Daily Pricing Structure Can Flexibly Account for Relative Resource Use Over a Stay

- Implementation through linear pricing has just three parameters
  - Front-loading (portion of payment made on Day 1)
  - Intercept (daily payment that is constant across stay)
  - Slope (number indicating how quickly payment changes by day)
- Many payment patterns are special cases of this flexible structure
  - Constant per diem rate (Zero front-loading, zero slope)
  - Declining daily rate (Zero front-loading, negative slope)
- Parameters constrained so that average payment across all stays for a resident group is the same in every pricing option
  - For illustrative purposes below, average payment equal to average cost

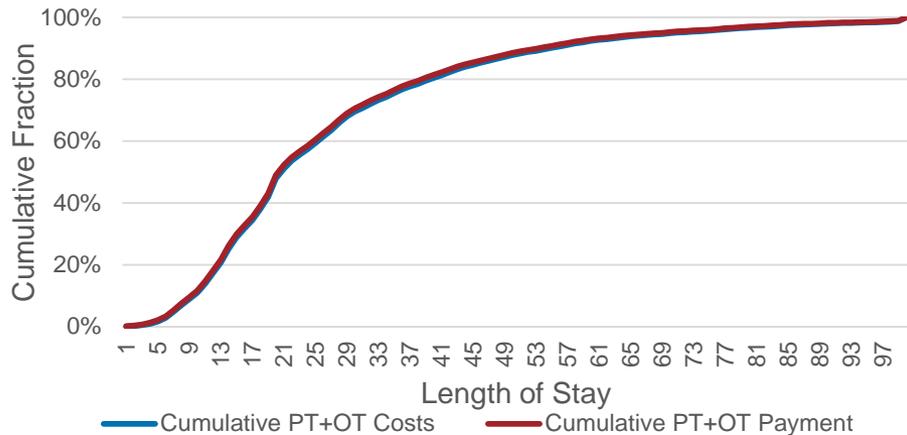
# Partial Frontloading of Payments

## 10% frontloading

Payment Rates by Day

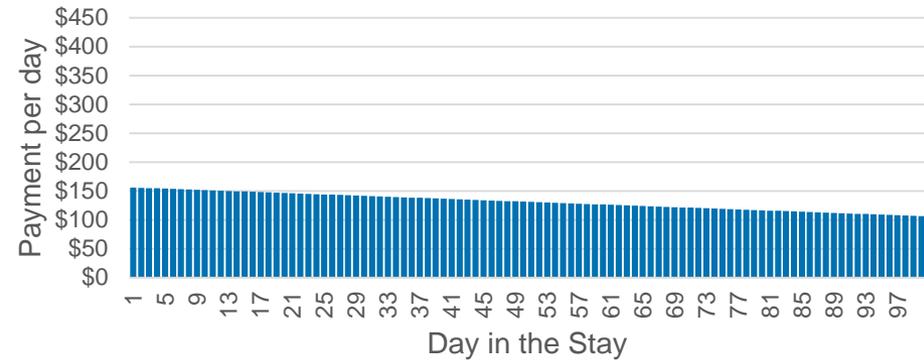


Cumulative Fraction of Total Payment & Costs

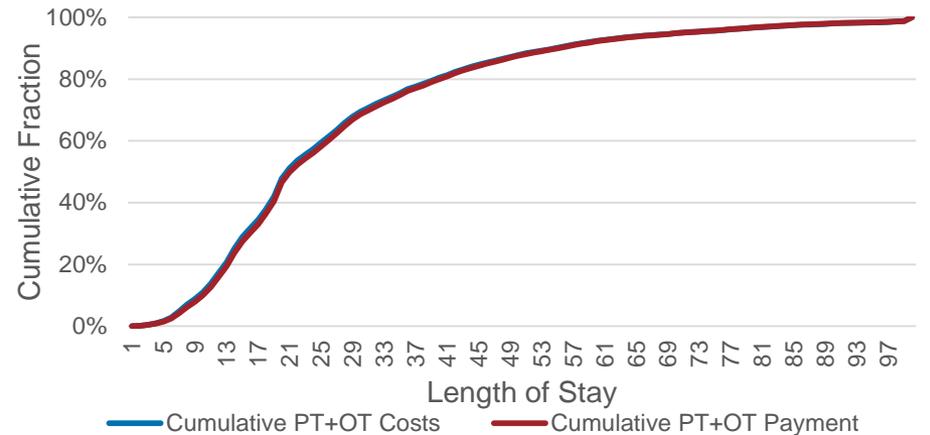


## 0 % frontloading

Payment Rates by Day

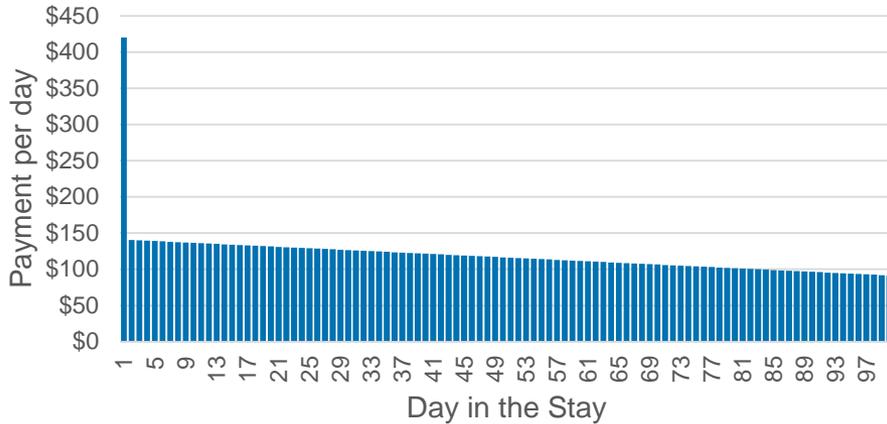


Cumulative Fraction of Total Payment & Costs

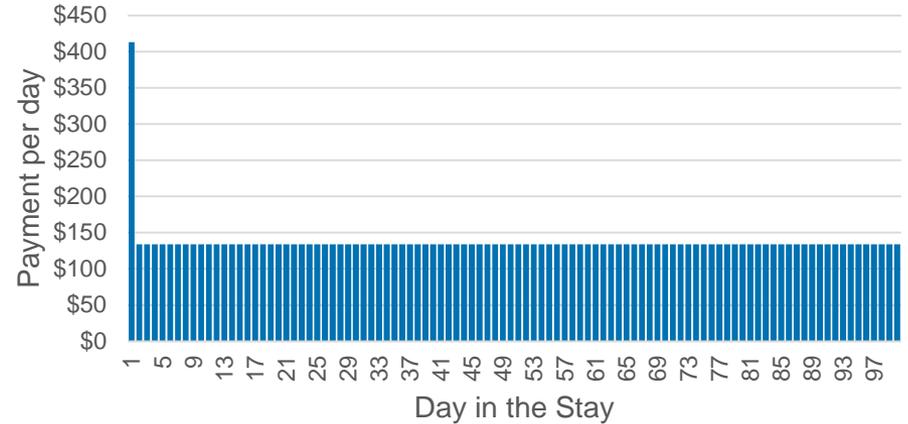


# Declining Per Diem Rates vs Constant Per Diem Rates

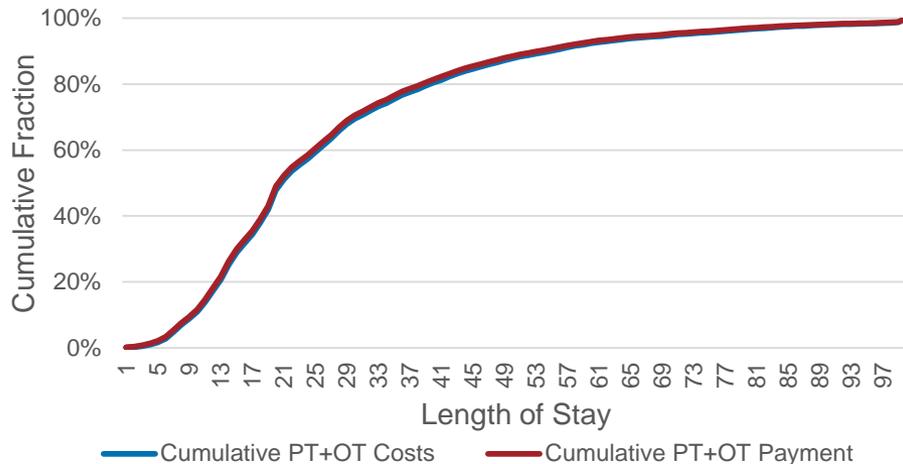
Payment Rates by Day



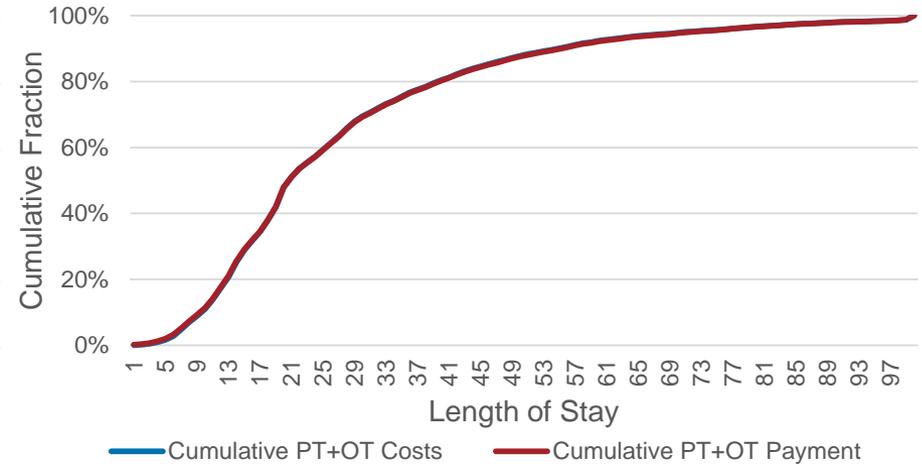
Payment Rates by Day



Cumulative Fraction of Total Payment & Costs

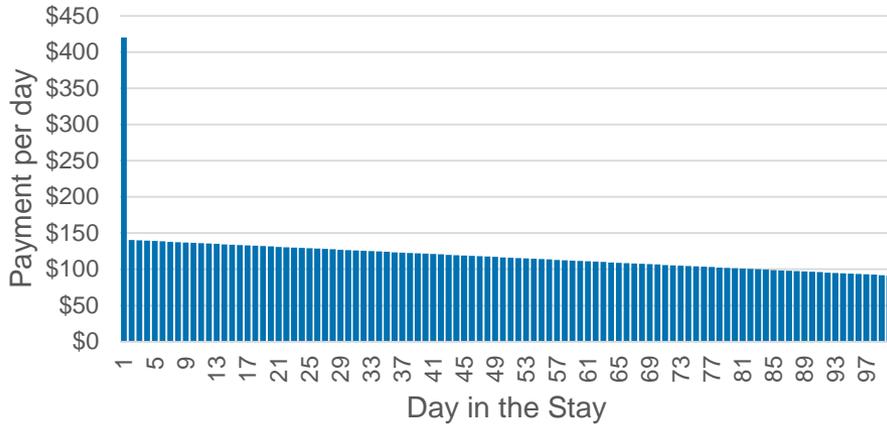


Cumulative Fraction of Total Payment & Costs

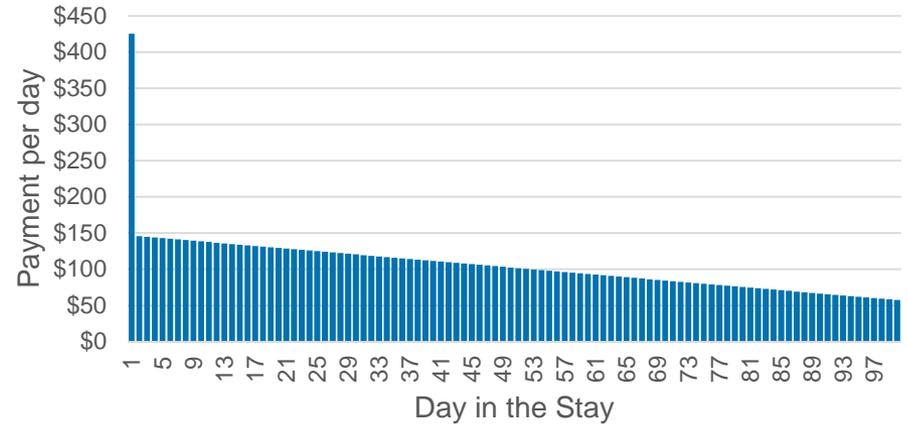


# Shallower vs Steeper Slopes

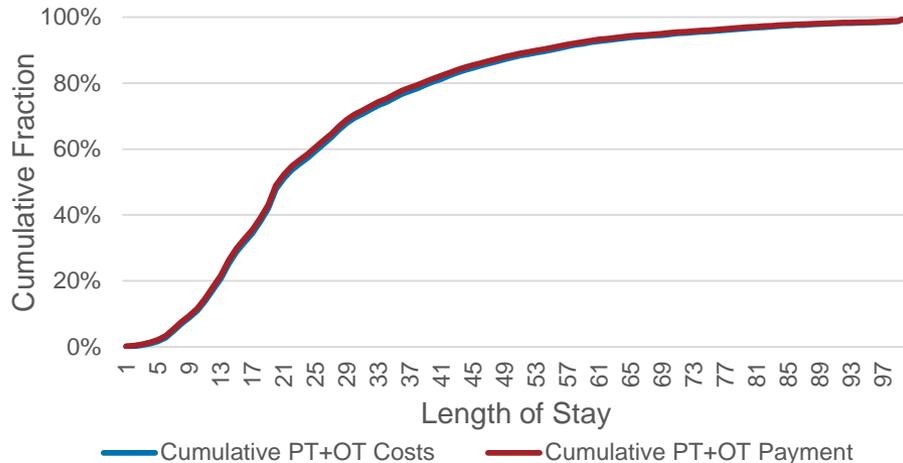
Payment Rates by Day



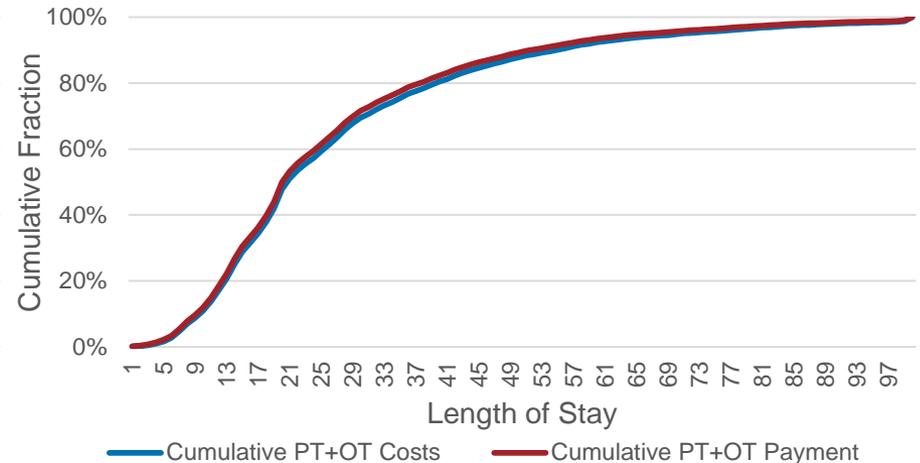
Payment Rates by Day



Cumulative Fraction of Total Payment & Costs



Cumulative Fraction of Total Payment & Costs

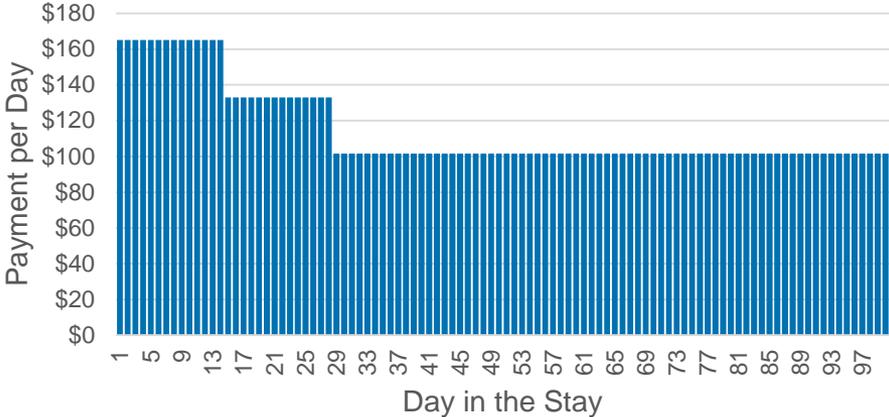


# Front-Loaded Daily Pricing Can Also Be Implemented Through Block Pricing

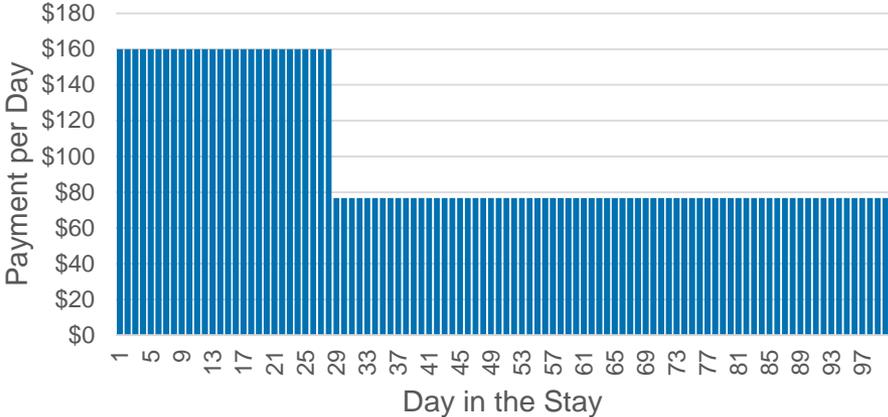
- Five parameters
  - Number of blocks
  - Amount of front-loading
  - Length of each block
  - Intercept (daily payment)
  - Rate of decline in payments across blocks
- Key tradeoff in number of blocks
  - Smaller number of blocks creates a simpler pricing structure with more stays within each block to estimate resource use
  - Larger number of blocks can track relative resource use more closely
- Parameters again constrained so that average payment across all stays for a resident group is the same in every pricing option
  - For illustrative purposes below, average payment equal to average cost

# Two Blocks vs. Three Blocks

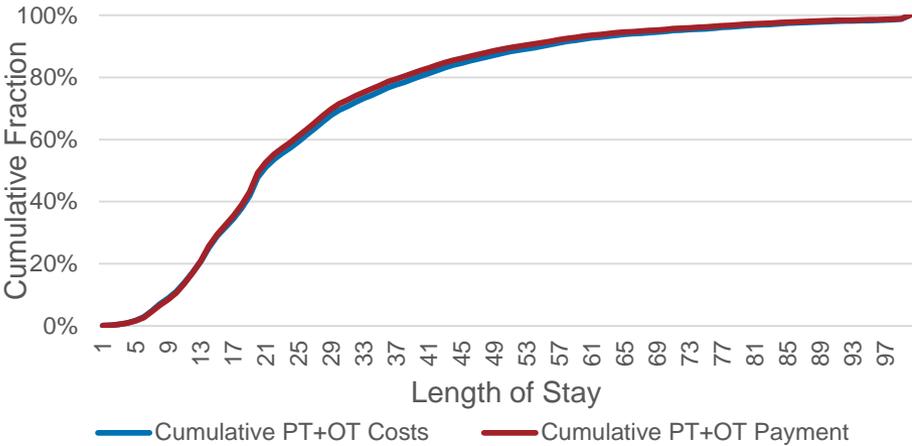
Payment Rates by Day



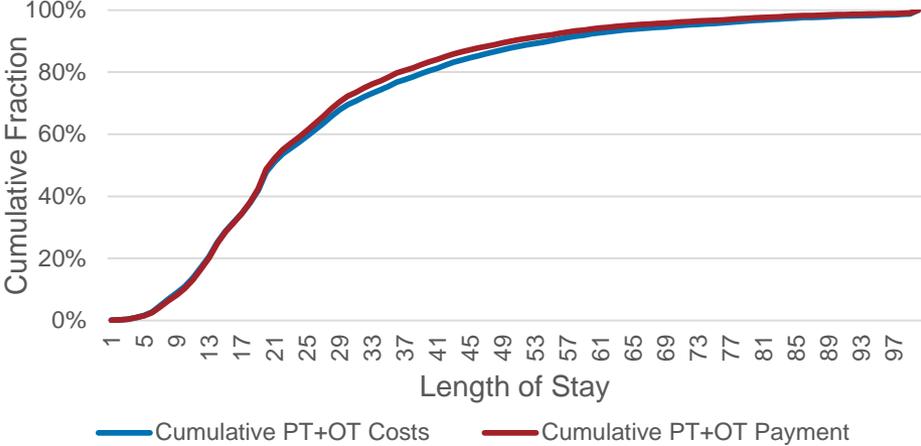
Payment rates by Day



Cumulative Fraction of Total Payment & Costs

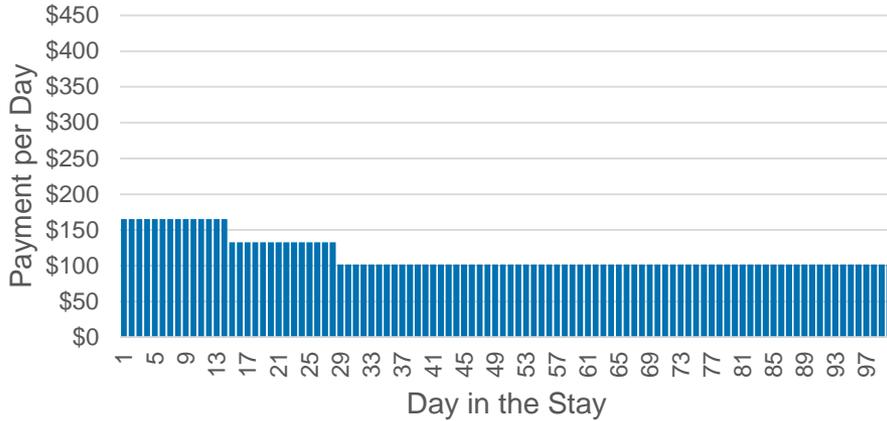


Cumulative Fraction of Total Payment & Costs

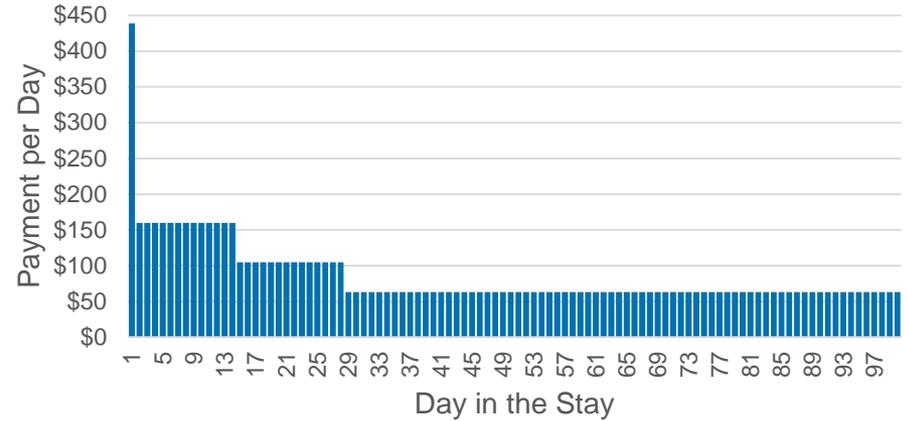


# Partial Frontloading of Payments

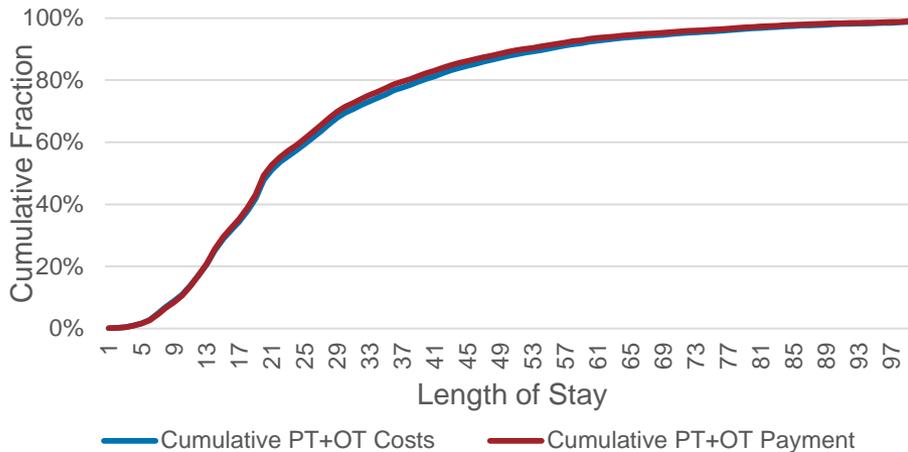
Payment Rates by Day



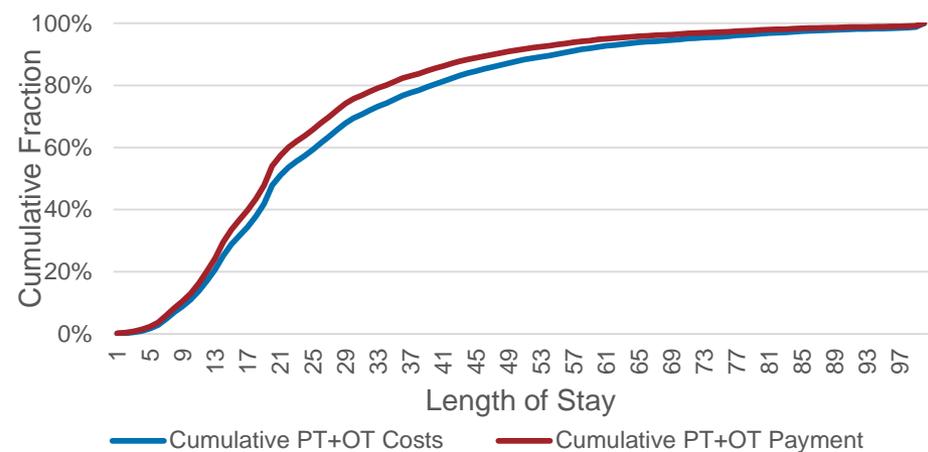
Payment Rates by Day



Cumulative Fraction of Total Payment & Costs

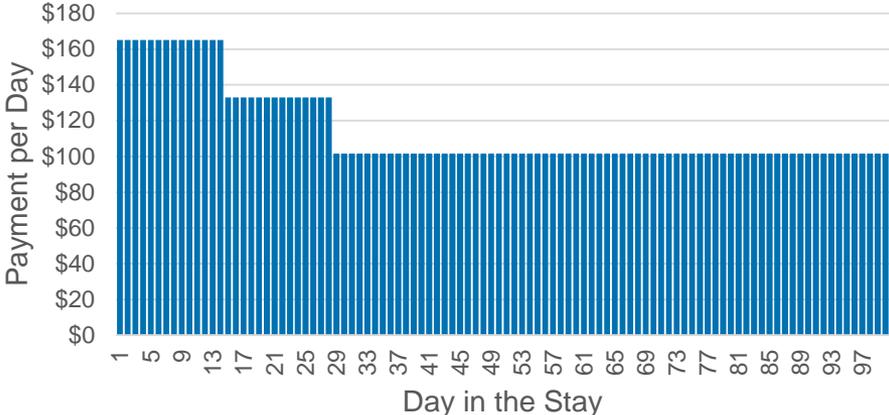


Cumulative Fraction of Total Payment & Costs

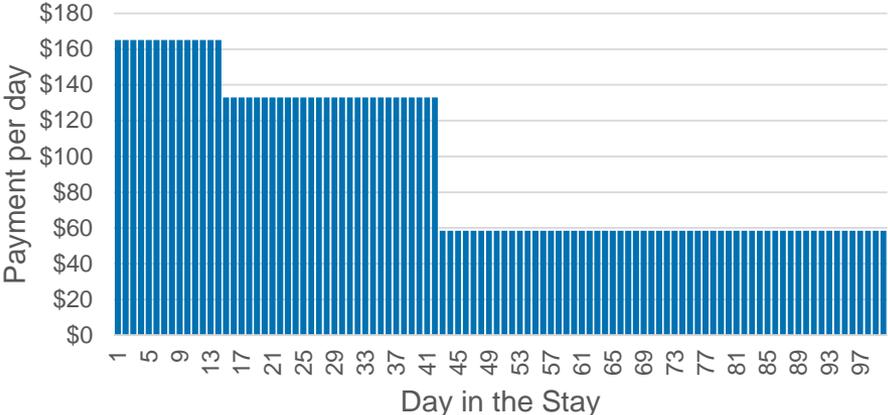


# Middle Block of Two Weeks vs. Four Weeks

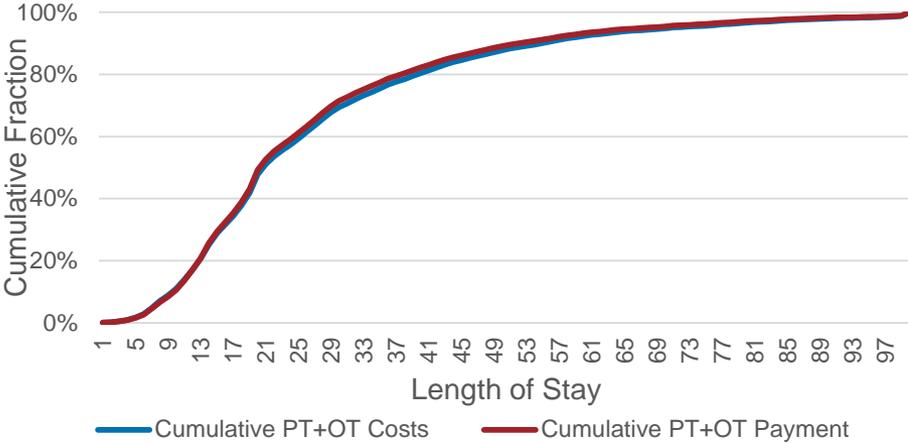
Payment Rates by Day



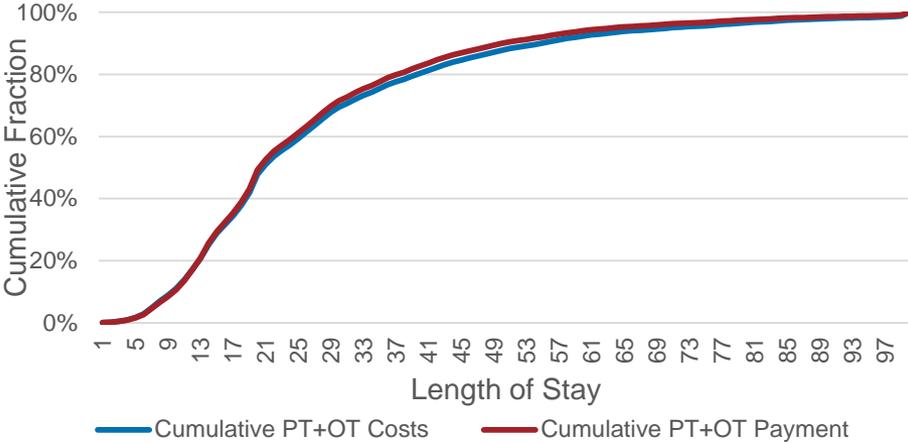
Payment Rates by Day



Cumulative Fraction of Total Payment & Costs

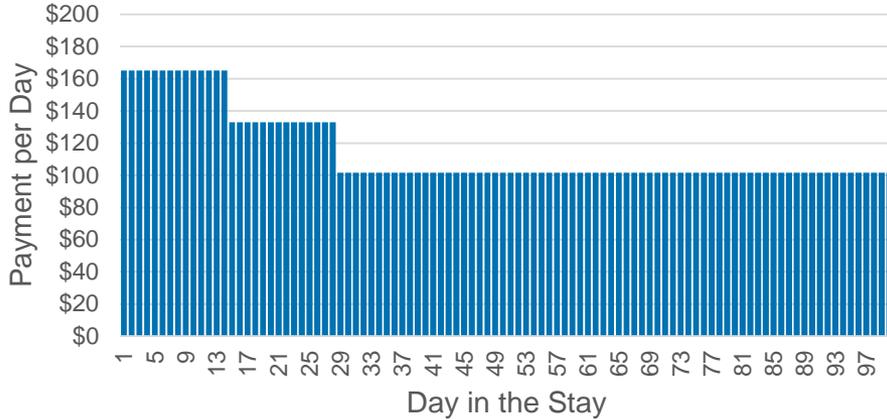


Cumulative Fraction of Total Payment & Costs

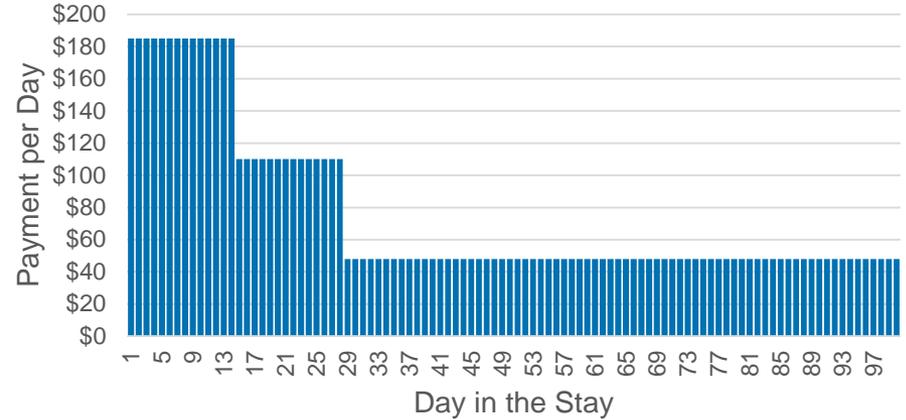


# Decline in Payments Across Blocks

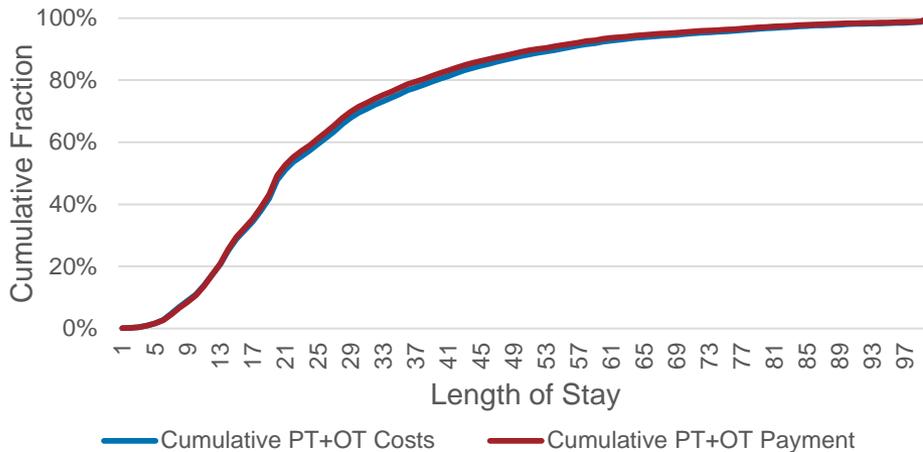
Payment Rates by Day



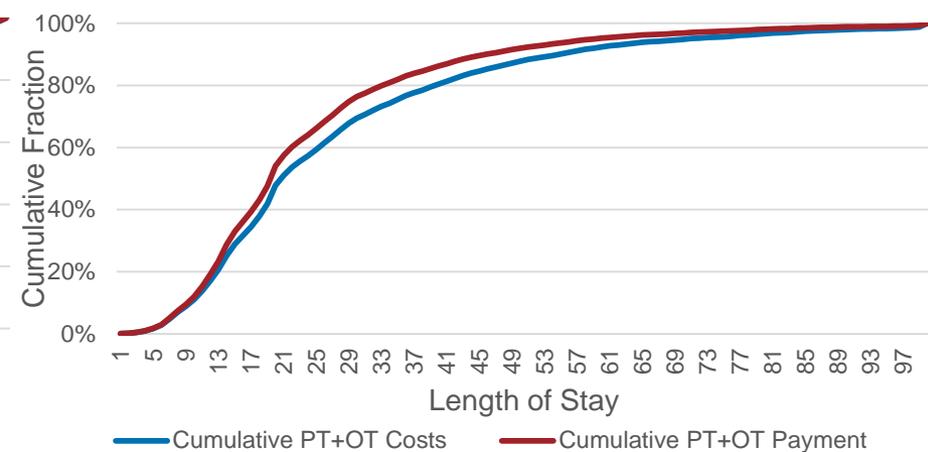
Payment Rates by Day



Cumulative Fraction of Total Payment & Costs



Cumulative Fraction of Total Payment & Costs



# Discussion Questions

---

- Should there be separate payment schedules for the four different service components, or should there be an integration of payment schedules across components?
- What portion of payments should be frontloaded to Day 1?
- Should daily payments be constant or decline through the stay? How quickly should payments decline?
- Should different resident groups have different decline rates, frontloading amounts, or initial daily rates?
- What are the advantages of block pricing relative to linear pricing?

# Outline

Sessions	
1	Introductions and Overview of Payment System Alternatives
2	Options for Revising Therapy Component (PT+OT)
3	Options for Creating Speech-Language Pathology Component
4	Options for Creating Non-Therapy Ancillary Component
5	Options for Revising Nursing Component
6	Exploring Alternative Features of a Payment System
7	<b>Open Discussion</b>

# Session 7 Outline

---

## Session Objective

- Provide opportunity for all TEP participants to offer feedback and thoughts

## Session Topics

- Open Discussion

## Session Time

1 hour\*

\*May be adjusted to accommodate for overtime in earlier sessions

# Open Discussion

---

- All attendees, including observers, are encouraged to comment on day's discussion
- Speakers may offer comments or direct technical questions to project team representatives
- Please limit remarks to allow time for others to participate

# Thank You

---

