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APR-DRG and MS-DRG Grouping Methodologies

About your presenter

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Session Objectives

After this presentation, participants should be able to describe:

- What DRGs, MS-DRGs, and APR-DRGs are:
  - Understand why they were developed
  - Explain what purposes they serve
- What are risk-adjusted and severity-adjusted measures and when should they be used?
- What are the differences between MS-DRGs and APR-DRGs?

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Session Agenda

1. Brief history and description of DRGs
2. Brief overview of MS-DRGs
3. When and how to use MS-DRGs
4. Brief overview of APR-DRGs
5. When and how to use APR-DRGs
6. Risk and severity adjustment with APR-DRGs
7. Comparison of MS and APR DRGs

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General DRG Definitions

- **Case-Mix Complexity:** The overall complexity of the population, or a subset of the population, of inpatients treated at a hospital
- **DRG:** Diagnosis Related Group
- **MDC:** Major Diagnostic Category - each MDC was designed to correspond to one major organ system

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Initial Motivation for DRGs

- The first DRG system was developed at Yale University in the early 1970's
- DRGs were initially developed to:
  - Assess hospital lengths of stay
  - Allow hospitals to compare resource allocation and perform cost-center analysis
  - Predict the likely resource consumption for any given hospital stay
  - Be specific enough that the variation among a DRG was predictable, but also general enough that most hospitals could make comparisons

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Base DRGs and Subclasses

- Base DRGs correspond to different reasons for hospital admission
- Generally, there is at least one base DRG for un-groupable or invalid data
- Subclasses refer to measures of complication
  - MS-DRG has CC/MCC
  - APR-DRG has SOI/ROM
- Initially, “substantial complications” were anything that increased the LOS for a patient by at least 1 day in 75% of hospital patients

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A Note On Case-Mix Complexity

- Case-mix complexity at a hospital has many different attributes, including:
  - Relative resource consumption
  - Prognosis
  - Treatment difficulty
  - SOI/ROM
  - Need for intervention
- All of the above attributes cannot necessarily be incorporated in one measure

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MS-DRG Definitions

- **MS-DRG*:*** Medicare Severity Diagnosis Related Groups
- **CC:** Complication/Comorbidity
- **MCC:** Major Complication/Comorbidity

MS-DRG Grouper Inputs

- Diagnosis codes
  - principal diagnosis
  - secondary diagnoses
- Procedure codes
  - principal procedure
  - secondary procedures
- Patient gender & age
- Discharge status

MS-DRG Subclass Assignment

- MS-DRGs are designed only to reflect the resource consumption of a given group of patients
- Base MS-DRGs have subclasses to better characterize resource utilization

MS-DRG Levels

- **MCC:** Major Complication/Comorbidity – This reflects the highest level of resource use
- **CC:** Complication/Comorbidity – This reflects the second highest level of resource use
- **Non-CC:** Non-Complication/Comorbidity – do not significantly affect resource use

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Using MS-DRGs

- MS-DRGs should be used in the following:
  - When very focused on Medicare population
  - When comparing GM-LOS
  - When looking at Coding Analytics

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Length of Stay Outlier

- LOS outliers can be removed to avoid introducing skew into the LOS distribution
- TBS defines an outlier as any patient with a length of stay greater than two standard deviations from the Nationwide All-Payer Geometric Mean LOS for the MS-DRG that the encounter is grouped into
- Note that all of our benchmarks are based upon percentiles so outlier cases have minimal impact on medians, 75th percentiles and 90th percentiles.
  - For example, assume we have 100 hospitals in a peer group, and that each hospital has 200 patients.
  - We first calculate the median LOS for each of the 100 hospitals in the peer group, and then rank order those hospitals by LOS.
  - That ranked list is then used to create the percentile breakdowns that a user would see in PEAK (e.g. the hospital at the 75th percentile).
  - Since the individual hospital value is set as the median patient LOS for that hospital, outliers are automatically removed, as opposed to using an average LOS approach.

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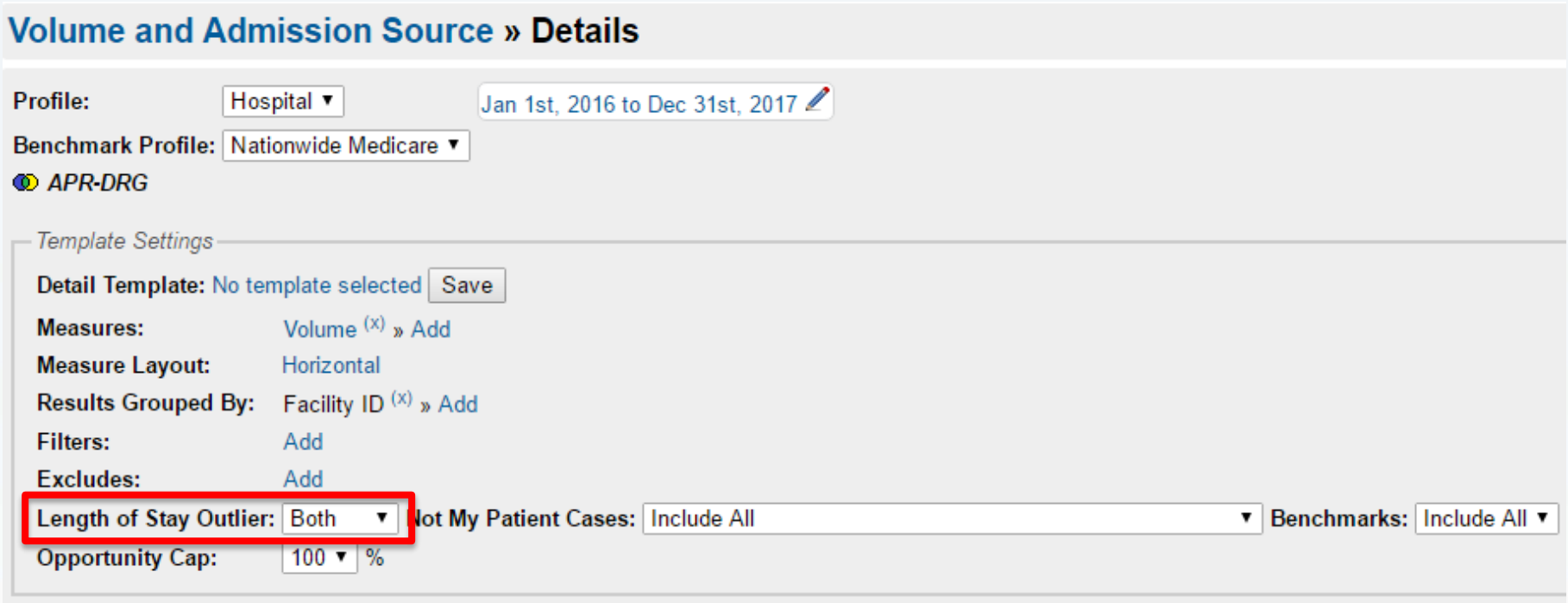
Length of Stay Outlier in PEAK



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APR-DRG Definitions

- **APR-DRG*:*** All Patients Refined Diagnosis Related Groups
- **SOI:** Severity of Illness
- **ROM:** Risk of Mortality

Motivation for APR-DRGs

- DRGs prior to the APR-DRG classification system:
  - Medicare (CMS) DRGs
  - All Patient (AP) DRGs
  - Yale DRGs
  - R-DRGs
- All of the methods listed above exclusively focused on resource intensity using:
  - Relative volume
  - Types of diagnostic, therapeutic, and bed services received

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APR-DRG Goals

- Allow for mortality analysis by avoiding the use of death to define base DRGs
- Account for Severity of Illness and Risk of Mortality
- Recognize impact and interactions of secondary diagnoses
- Allow for reimbursement methodologies to account for SOI and ROM, rather than resource use only
- Allow for outcome comparisons in addition to resource use comparisons
- Completely describe all patients seen within an acute care hospital

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APR-DRG Development Methodology

- AP-DRGs were used as a base
  - PLUS work done by Yale University on complications and comorbidities
  - PLUS pediatric and obstetric modifications from the National Association of Children's Hospitals and Related Institutions (NACHRI)
- Iterative process:
  - Develop clinical models, then test models with data
- Assumptions:
  - Patients with higher SOI would cost more
  - Patients with higher ROM would be more likely to die

APR-DRG Grouper Data Inputs

- Data for APR-DRG classification is taken from the UB claims form
- ICD-9 or ICD-10 codes can be used
- Required elements include:
  - Principal Diagnosis
  - Principal Procedure
  - Secondary Diagnoses
  - Secondary Procedures
  - Age, Sex, Birth Weight
  - Discharge Status

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APR-DRG Grouper Overview

Grouper steps:

1. Assign an MDC (Major Diagnostic Category)
2. Assign a base APR-DRG based on clinical logic
3. Assign an SOI (1-4)
4. Assign an ROM (1-4)

Each of the 314 base APR-DRGs have a separate clinical model for SOI and ROM

SOI Subclass Overview

- Quantifies the extent of the physiological decompensation (organ system loss of function) experienced by the patient
- Designed to explain the relative complexity of a hospital's patients
- Distinct attribute of a patient (not necessarily the same as the ROM)
- Disease specific – each base APR-DRG has a different SOI model

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SOI Subclass Classification

To determine overall SOI:

1. Determine the SOI of each secondary diagnosis
2. Select the highest SOI level
3. Final SOI subclass is determined by considering the impact of principal diagnosis, age, procedures (OR and Non-OR), and combinations of categories of secondary diagnoses

This is a summary; there are 18 steps to determine an SOI subclass!

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ROM Subclass Overview

- ROM uses similar factors to SOI, but everything is related to the risk of mortality
- Disease specific – each base APR-DRG has a different ROM model
- Can be used to adjust for and give information on mortality-related measures

ROM Subclass Classification

To determine overall ROM:

1. Determine the ROM of each secondary diagnosis
2. Select the highest ROM level
3. Final ROM subclass is determined by considering the impact of principal diagnosis, age, procedures (OR and Non-OR)

This is a summary; there are 16 steps in determining the ROM subclass of an encounter!

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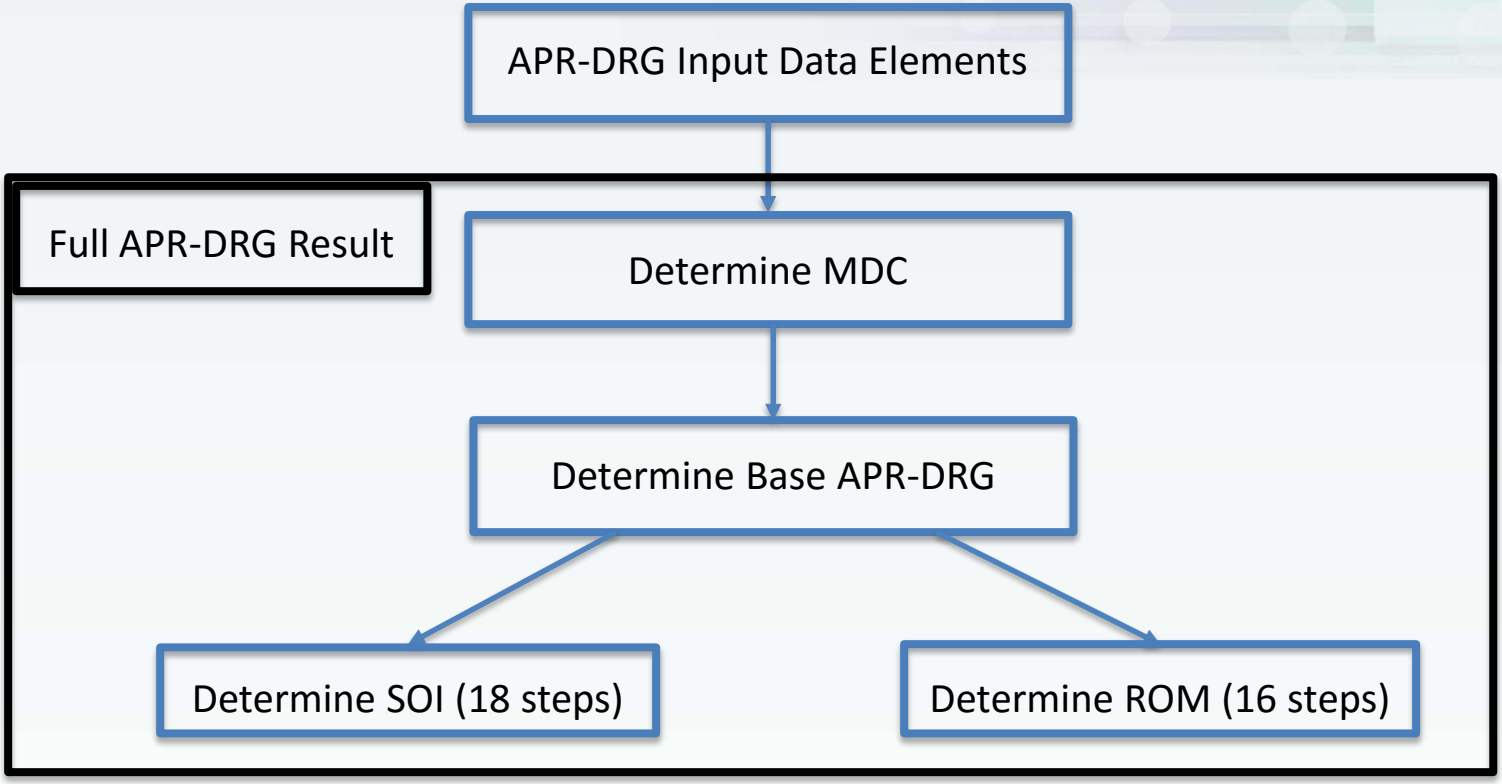
APR-DRG Classification



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Calculating Expected (Benchmark) Values

- The expected value is the average value that would result if the hospital's mix of patients by severity level had been treated at the average level in a reference data set
- This is calculated by taking the average value in a data set for each APR-DRG SOI combination and multiplying the number of patients in the APR-DRG SOI class

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Additional Tips for Accurate Data

- Clear and consistent coding of secondary diagnoses impacts APR-DRG classification
- Truncation of the number of procedure and secondary diagnosis codes will also have an effect on the grouper
  - TBS will accept up to 75 secondary diagnosis and procedure codes
- The high specificity of APR-DRGs make them ideal for analyzing readmission rates, as well as other outcomes measures

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Additional APR-DRG Notes

- There are 47 neonatal related APR-DRGs
- Age generally increases the severity of illness within diagnosis codes
- APR-DRGs are based mostly on clinical logic, not a mathematical model; logic was verified with data

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Using APR-DRGs

- APR-DRGs should be used in the following:
  - Analysis of all patients (especially neonates and obstetrics)
  - When comparing mortality measures
  - When severity adjustment is required
  - When risk adjustment is required (generally mortality)
  - When non-Medicare reimbursement is being considered
  - When all patients at a hospital need to be compared

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APR and MS-DRG Comparison

- TBS recommends using APR-DRG:
  - SOI and ROM are addressed for every base DRG
  - APR-DRGs are more robust for mortality comparisons and risk-adjustment
  - Weights are more significant in the APR-DRG system because it can be weighted at the SOI subclass level.
- Use MS-DRGs for Medicare reimbursement purposes.

APR and MS-DRG Comparison – In PEAK - SOI

APR-DRG(x)	APR-DRG Desc.(x)	SOI(x)	LOS - # encounters(x)	LOS - Avg(x)	LOS - Benchmark(x)
194	Heart Failure	1	16	2.88	2.00
194	Heart Failure	2	91	3.93	3.00
194	Heart Failure	3	265	4.71	4.00
194	Heart Failure	4	46	7.26	7.00

MS-DRG(x)	MS-DRG Desc.(x)	LOS - # encounters(x)	LOS - Avg(x)	LOS - Benchmark(x)
293	Heart failure & shock w/o CC/MCC	48	3.38	2.00
292	Heart failure & shock w CC	114	4.45	3.00
291	Heart failure & shock w MCC	237	5.07	4.00

- Benchmark reflects the higher SOI

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APR and MS-DRG Comparison – In PEAK - ROM

APR-DRG(x)	APR-DRG Desc.(x)	ROM(x)	Mortality Rate - Deaths(x)	Mortality Rate - Encounters(x)	Mortality Rate - Composite(x)	Mortality Rate - Benchmark(x)
194	Heart Failure	1	0.00	13.00	0.00 %	0.00 %
194	Heart Failure	2	1.00	111.00	0.90 %	0.00 %
194	Heart Failure	3	5.00	227.00	2.20 %	2.00 %
194	Heart Failure	4	8.00	67.00	11.94 %	13.74 %

MS-DRG(x)	MS-DRG Desc.(x)	Mortality Rate - Deaths(x)	Mortality Rate - Encounters(x)	Mortality Rate - Composite(x)	Mortality Rate - Benchmark(x)
293	Heart failure & shock w/o CC/MCC	0.00	48.00	0.00 %	0.00 %
292	Heart failure & shock w CC	1.00	114.00	0.88 %	0.48 %
291	Heart failure & shock w MCC	13.00	237.00	5.49 %	4.90 %

- Benchmark reflects the higher ROM

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Data Sources

1. 3M™ APR DRG Classification System Reference Guide
2. https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/AcutePaymtSysfctsht.pdf
3. Averill, R. F., Goldfield, N., Hughes, J. S., Bonazelli, J., McCullough, E. C., Mullin, R., & Tang, A. M. (2008, October 1). *3M APR DRG Classification System (Version 26.1) Methodology Review.* Retrieved from Healthcare Cost and Utilization Project (HCUP): https://www.hcup-us.ahrq.gov/db/nation/nis/v261_aprdrg_meth_ovrview.pdf
4. https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/AcutePaymtSysfctsht.pdf
5. https://www.bcbst.com/providers/webinar/APRDRG.pdf

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Questions?

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Thank You!

For More Information:

- See PEAK Documentation inside your PEAK system. Particularly helpful will be:
  - Scorecards--Working with Scorecards section
  - Webinar Recordings section

Upcoming PEAK Webinars	Central Scorecards:	September 15 10:00 am – 11:00 am
	APR/ MS – DRG:	August 29th 11:00 am – 12:00 pm MST
		September 12th 1:00 pm – 2:00 pm
	Best Practice Analysis	September 1st 10:00 am – 11:00 am
		September 8th 1:30 pm – 2:30 pm

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