2017 Benefit Year HHS Risk Adjustment Data Validation (HHS-RADV) Error Estimation

RETIRED

May 23, 2018

Health Insurance Marketplace Program Training Series

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Session Agenda

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- Intended Audience
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- Role of Error Estimation in HHS-RADV
- Changes in the 2017 Benefit Year HHS-RADV
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- Error Estimation in the HHS-RADV Process
- Three Sub-Processes of Error Estimation
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  - 1.1 Conduct Pairwise Means Test
  - 1.2 Establish Final Enrollee Results

Session Agenda (continued)

- Sub-Process #2 – Calculate Error Rates
  - 2.1 Categorize all HCCs into Three Groups
  - 2.2 Identify Outliers and Calculate Adjustment Factors based on HCC Group Failure Rates
  - 2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores
  - 2.4 Calculate Standard Errors and Confidence Intervals
- Sub-Process #3 – Results Reporting
- Question and Answer (Q&A)
- Next Steps
- Resources
- Closing Remarks

Session Guidelines

- This is a 90-minute webinar session
- For questions regarding content, please submit questions to the HHS-RADV team at the following email:
  - o CCIIOACARADatavalidation@cms.hhs.gov
- For questions regarding logistics and registration, contact the Registrar at: (800) 257-9520

Intended Audience

- Issuers subject to the HHS-RADV Audit:
  - Issuers offering non-grandfathered Patient Protection and Affordable Care Act-compliant individual and/or small group health plans both inside and outside the Exchange
- Potential Initial Validation Audit (IVA) Entities
- Second Validation Audit (SVA) Entities
- Third Party Administrators (TPA) and support vendors



This includes State-based Exchange (SBE) Issuers, Federally-facilitated Exchange (FFE) Issuers, and Small Business Health Options Programs (SHOP)

Session Purpose

Audience will be able to:

- Describe the importance of Error Estimation in HHS-RADV
- Understand what Error Estimation processes changed from the pilot 2016 benefit year HHS-RADV
- Understand when the HHS-RADV Error Estimation process occurs
- Define and calculate the HHS-RADV Error Rate
- Understand the Error Estimation sub-processes

HHS-RADV Timeline

Benefit Year 2017 HHS-RADV Timeline



To access the most current HHS-RADV Timeline for the 2017 Benefit Year, please refer to the REGTAP Library under the HHS Risk Adjustment Data Validation program area: 2017 Benefit Year HHS-RADV Timeline

Role of Error Estimation in HHS-RADV & 2017 Benefit Year Changes

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HTTPS://WWW.REGTAP.INFO

Role of Error Estimation in HHS-RADV

- Error Estimation is the method by which the HHS-RADV process identifies issuers with EDGE data validation rates that are statistically different than national validation rates, through:
  1. Verifying the accuracy of Initial Validation Audit (IVA) results
  2. Calculating failure rates (rate at which Hierarchical Condition Categories [HCCs] are not supported by IVA or Second Validation Audit [SVA] findings)
  3. Determining risk score adjustments (when applicable)
- By adjusting those issuers who are statistical outliers in their health status submission, the new Error Estimation process streamlines the HHS-RADV process, improves issuers' ability to predict risk adjustment transfers, and promotes confidence and stability in the budget-neutral payment transfer methodology, while ensuring the integrity and quality of data provided by issuers

Changes in the 2017 Benefit Year HHS-RADV

Changes	Updated Process in the 2017 Benefit Year HHS-RADV	Why it Changed
1. Previously, the Error Estimation methodology calculated issuer Error Rates based on missing HCCs' coefficients, with all issuers receiving an Error Rate	CMS will assess an issuer's IVA and SVA results at the HCC level and apply an adjustment only to issuers with HCC results that statistically deviate from the national mean. *Note that the new method is referred to as the "HCC failure rate methodology"*	• Accounts for excepted variation and error in the compilation of data for risk scores • Focuses the application of adjustments to issuers with statistically different HCC validations compared to other issuers • Identifies HCC Groups that are producing higher Error Rates

Changes in the 2017 Benefit Year HHS-RADV (continued)

Changes	Updated Process in the 2017 Benefit Year HHS-RADV	Why it Changed
2. Who will receive an Error Rate?	Only issuers identified as having an outlier in one (1) or more of three (3) HCC Groups will receive an Error Rate adjustment	Promotes stability and adjusts statistically significant outliers
3. Results reporting	At the conclusion of the SVA review, CMS will provide each issuer with their enrollee-level audit results, their Error Rates (if applicable), and benchmark data to use for comparison purposes	Increases transparency of the RADV process and results

What is an Error Rate?

- The Error Rate indicates the percent of an issuer's EDGE risk scores that are in error after applying the risk score adjustments to issuers identified as outliers in the HCC Groups



Refer to the 2017 benefit year HHS-RADV Protocols: 7.3.3 Calculation of Error Rates to Adjust Issuer Plan Risk Scores

What is an Error Rate? (continued)

- For issuers that are not outliers, they will have no Error Rate

$$ErrorRate_i = 0$$

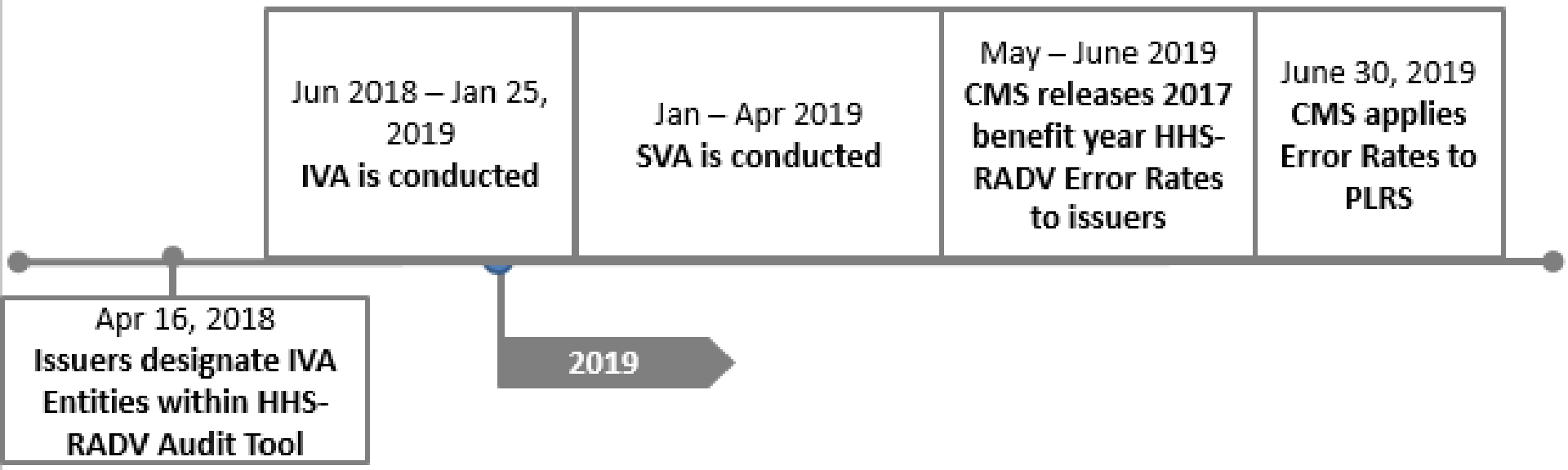
- A positive Error Rate means an issuer's EDGE risk scores are higher than the adjusted risk scores found during the audit

$$ErrorRate_i = Positive\,Value\,(e.g., 10\%)$$

- A negative Error Rate indicates that an issuer's EDGE risk scores are lower than the adjusted risk scores found during the audit

$$ErrorRate_i = \ Negative\,Value\,(e.g., -10\%)$$

Relevant Dates in the 2017 Benefit Year HHS-RADV Timeline

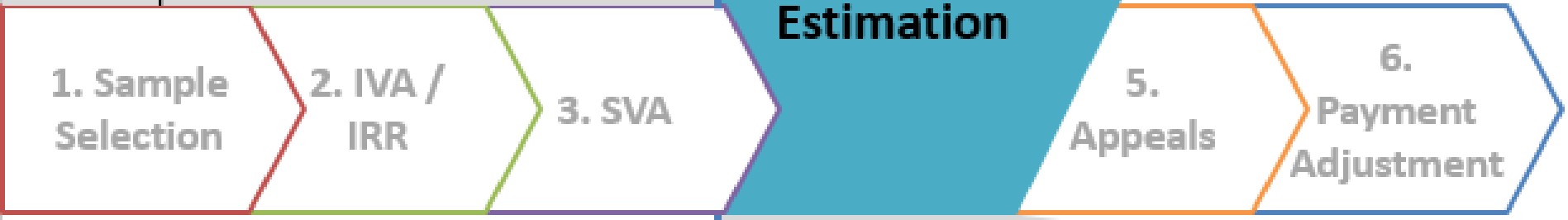


The 2017 benefit year HHS-RADV Timeline is located on REGTAP (https://www.regtap.info)

Error Estimation in the HHS-RADV Process

Prior to Error Estimation:

- CMS communicates HHS-RADV samples to issuers
- Issuer hires an IVA Entity to perform an independent validation
- CMS performs a second validation

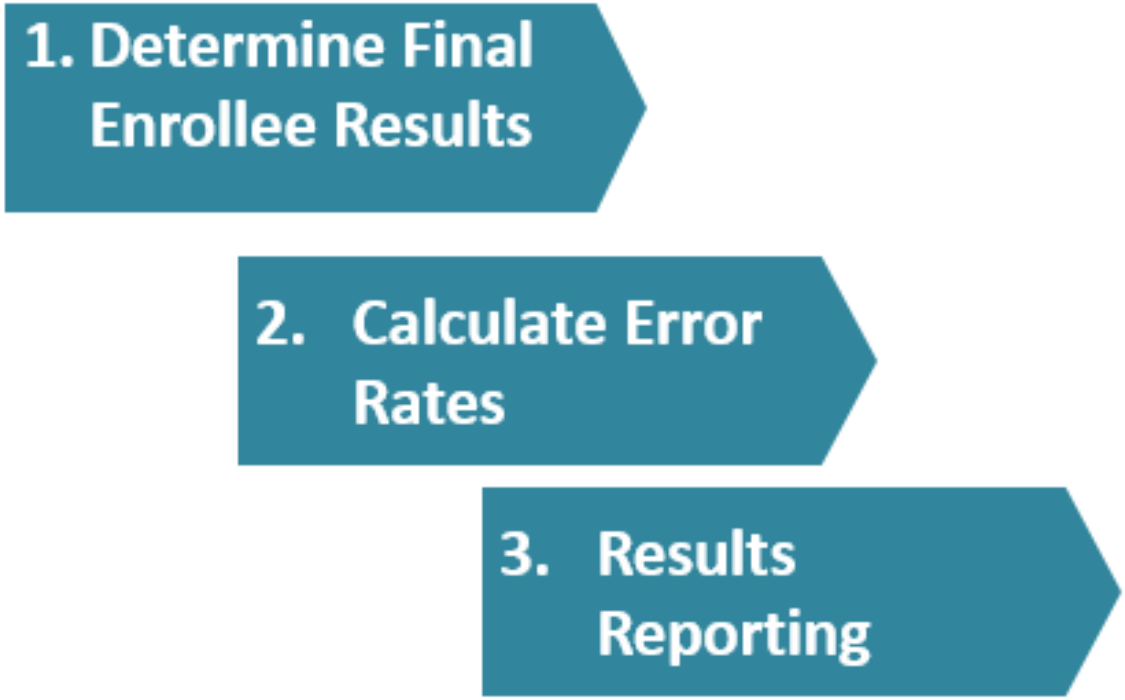


During Error Estimation CMS:

- Verifies the accuracy of the IVA results.
- Calculates HCC failure rates
- Determines if risk score adjustments are required
- Projects corresponding adjustments to risk scores in the issuer's population

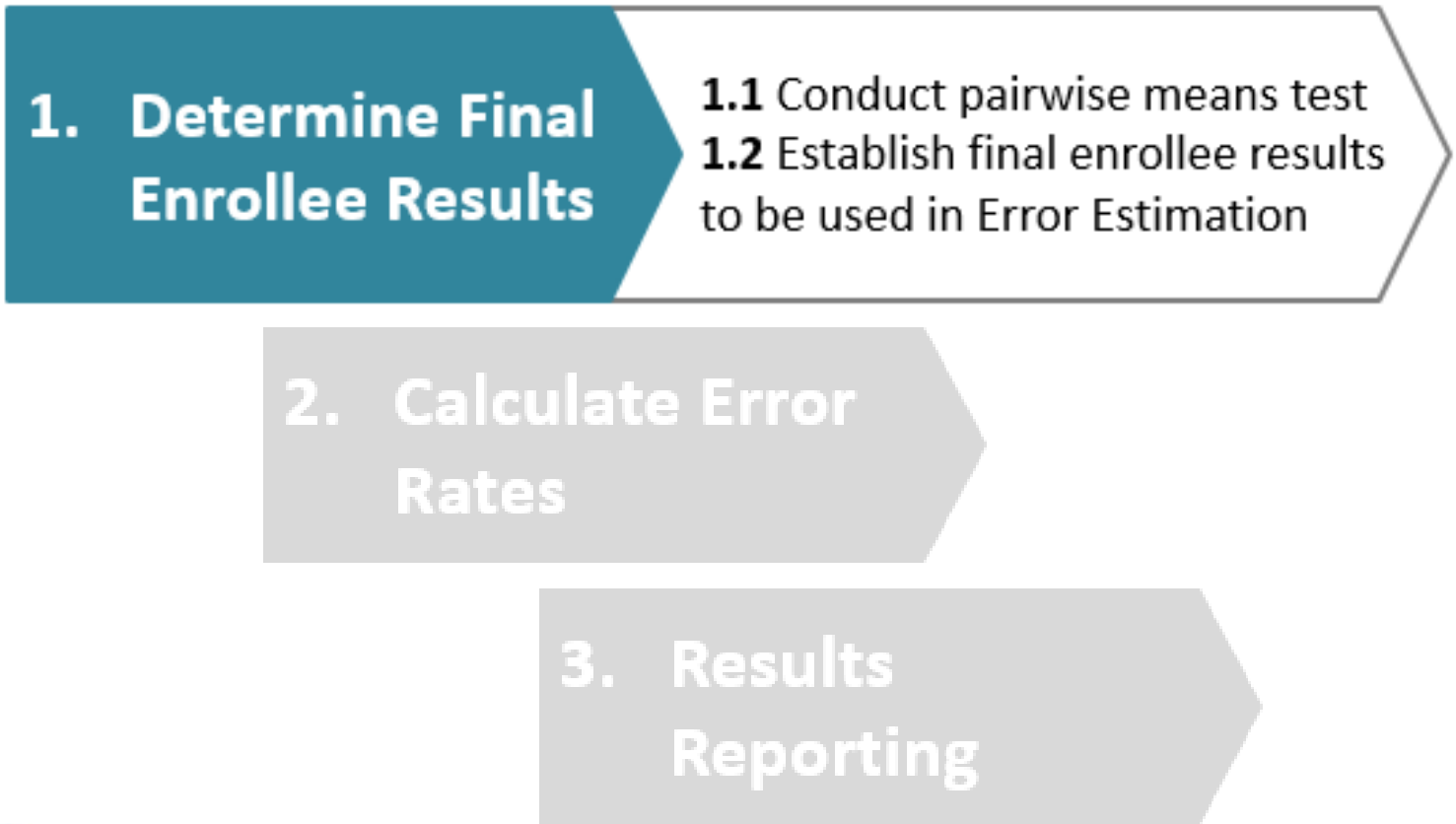
Three Sub-Processes of Error Estimation

- Three (3) sub-processes of Error Estimation



Sub-Process #1
Determine Final Enrollee Results

1. Determine Final Enrollee Results



1. Determine Final Enrollee Results (continued)

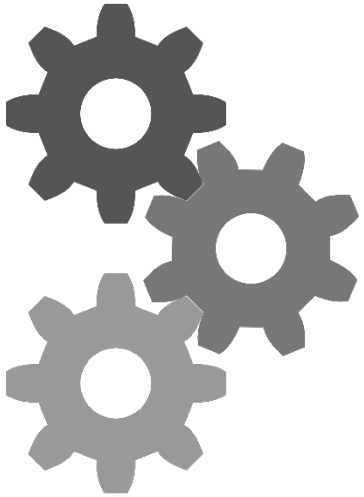
Input(s)	Process	Output(s)
• IVA results • SVA results	• 1.1 Conduct pairwise means test • 1.2 Establish final enrollee results to be used in Error Estimation	• Accepted IVA results, or • Use SVA results for issuers with statistically significant different pairwise test results between IVA and SVA

1.1 Conduct Pairwise Means Test



Objective: To determine when a statistically significant difference exists between IVA and SVA results

1.1 Conduct Pairwise Means Test
(continued)



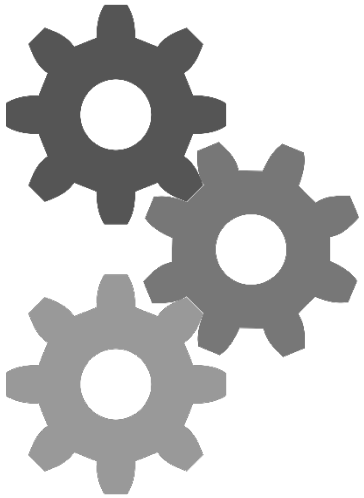
Process: CMS conducts pairwise means test to determine if there is a statistically significant difference in enrollee risk score results between the IVA and SVA findings. If none, CMS will use all enrollees selected for the IVA Entity's sample and the IVA results (i.e., IVA HCCs) to conduct the Error Estimation process

1.2 Establish Final Enrollee Results



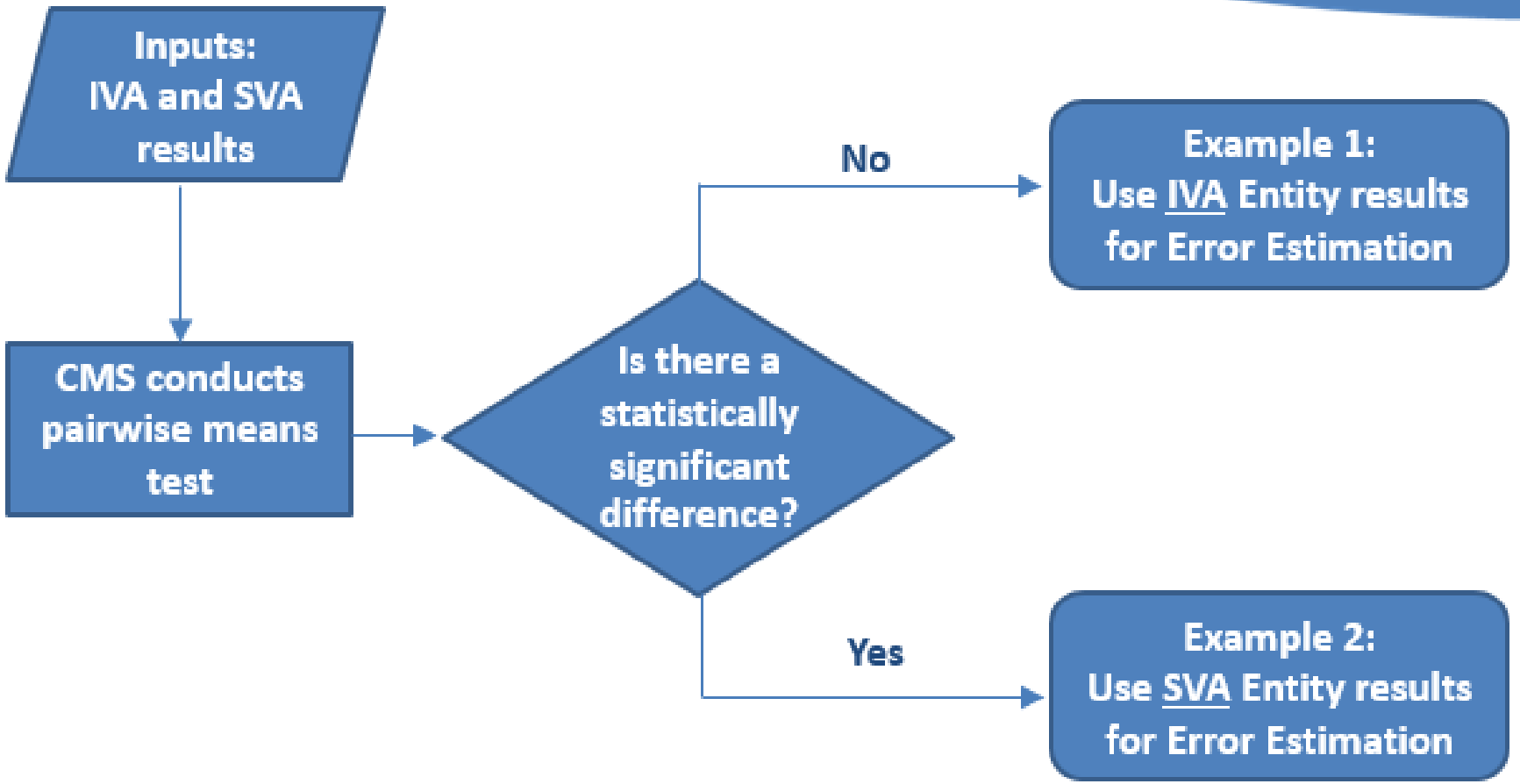
Objective: To ensure that HHS-RADV is using IVA sample results that are consistent and reliable

1.2 Establish Final Enrollee Results (continued)



Process: If the final pairwise means test concludes that there is a statistically significant difference between the IVA results and the results of the expanded SVA sample, then CMS will use the SVA results (i.e., the SVA confirmed HCCs and HCC failure rates) to replace the IVA validated HCCs for all enrollees in the IVA sample. CMS will use the final SVA subsample to adjust the IVA sample enrollee findings

1.2 Establish Final Enrollee Results
(continued)



1.2 Establish Final Enrollee Results
(continued)

Example 1: Outcome - Use IVA results

- *Issuer 10001* has 200 IVA sampled enrollees
- *Issuer 10001* has passed the pairwise means test based on the 24 SVA sample

Compare IVA and SVA results

IVA Results	
Enrollee ID	IVA HCC
10001-001	[1,2,3]
10001-002	[4,5,6]
…	…
10001-024	[1,4]
…	…
10001-200	[2,5]

SVA Results	
Enrollee ID	SVA HCC
10001-001	[1,2]
10001-002	[4,5,6]
…	…
10001-024	[1,4]

***Outcome* - Use IVA results**

IVA Results	
Enrollee ID	IVA HCC
10001-001	[1,2,3]
10001-002	[4,5,6]
…	…
10001-024	[1,4]
…	…
10001-200	[2,5]

Note: Examples throughout the presentation are for illustrative purposes only and are not based on real HHS-RADV data.

1.2 Establish Final Enrollee Results
(continued)

Example 2: Outcome - Use SVA results

- *Issuer 10002* has 200 IVA sampled enrollees
- The pairwise test results in a significant difference between IVA and SVA results for the 100 enrollees reviewed and the SVA determined the precision to be high.*

*In the event that the IVA fails pairwise 100, a precision analysis will be conducted to determine whether to use the SVA 100 level findings (a result of high precision) or expand to the full SVA 200 (a result of low precision).

Compare IVA and SVA results

IVA Results	
Enrollee ID	**IVA HCC**
10002-001	[4,5,7,8]
10002-002	[1,4]
…	…
10002-200	[]

SVA Results	
Enrollee ID	**SVA HCC**
10002-001	[4,5]
10002-002	[1]
…	…
10002-100	[2]

***Outcome* - Use SVA results**

SVA Results	
Enrollee ID	**IVA HCC**
10002-001	[4,5]
10002-002	[1]
…	…
10002-100	[2]

1.2 Establish Final Enrollee Results (continued)



Example 2: Outcome - Use SVA results - Precision analysis details

- In the event that the pairwise 100 test shows statistically significant differences between IVA and SVA findings, a precision analysis will be conducted. There are two (2) possible outcomes of the precision analysis:
  - Precision analysis indicates **high precision**
    - Outcome: SVA 100 level findings are used for error estimation. SVA 100 findings will be used in place of IVA findings
  - Precision analysis indicates **low precision**
    - Outcome: CMS will require IVA Entities to submit all remaining enrollees' medical records in the IVA sample
    - SVA evaluates these additional enrollees' medical records and uses SVA findings for Error Estimation

Sub-Process #2

Calculate Error Rates

2. Calculate Error Rates

1. Determine Final Enrollee Results

2. Calculate Error Rates

- **2.1** Categorize all HCCs into three (3) Groups
- **2.2** Identify outliers and calculate adjustment factors based on HCC Group Failure Rates
- **2.3** Calculate Error Rates to adjust issuer plan level risk scores (PLRS)
- **2.4** Calculate standard errors and confidence intervals

3. Results Reporting

2. Calculate Error Rates (continued)

Input(s)	Process	Output(s)
• EDGE server results • IVA and SVA sample results	• 2.1 Categorize all HCCs into three (3) Groups • 2.2 Identify outliers and calculate adjustment factors based on HCC Group Failure Rates • 2.3 Calculate Error Rates to adjust issuer PLRS • 2.4 Calculate standard errors and confidence intervals	• Enrollee-level adjusted risk scores • Issuer-level Error Rates

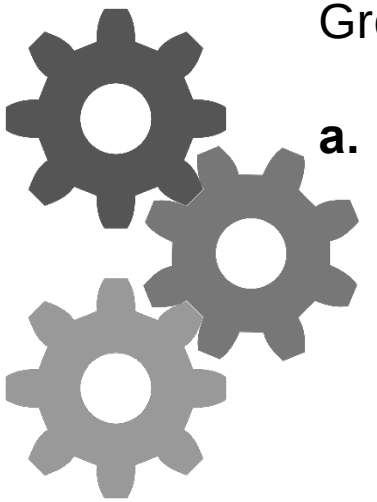
2.1 Categorize All HCCs Into Three Groups



Objective:

- With the current sample size of 200 per issuer and 127 distinct HCCs in the HHS-HCC Model, the sample size of each unique HCC would be too small at the issuer level to provide a sufficient amount of data for statistical analysis, especially for rare diseases
- To increase the HCC sample size for an issuer, CMS will categorize all HCCs nationally into one (1) of three (3) Groups based on similar failure rates

2.1 Categorize All HCCs Into Three Groups (continued)



Process: CMS will categorize each HCC into one (1) of three (3) Groups using the following steps:

a. **Determine total frequencies and calculate HCC failure rates** - For each HCC, determine total frequencies on EDGE and in the IVA results across all issuers' samples.
   Calculate the Failure Rate as $1 - \frac{Frequency\ in\ IVA\ results}{Frequency\ on\ EDGE}$.
   This failure rate is a measurement of all issuers' average probability of correctly coding an HCC in that Group

b. **Tier HCCs Nationally into Low, Medium, and High failure rate groups** - All HCCs are placed in ascending order using their Failure Rate. Two (2) boundaries to cut all HCCs into three (3) Groups (Low, Medium and High failure Groups) are selected such that the size of the first two (2) Groups are approximately each one-third of the total EDGE frequency

2.1 Categorize All HCCs Into Three Groups (continued)



Example 3: Introduction

- Assume there are 50,000 total enrollees sampled during one year's HHS-RADV process
- The EDGE HCCs and adjusted IVA HCCs are stored as shown in the table

Enrollee ID	EDGE HCC	Adjusted IVA HCC
1	[30, 115, 138]	[30, 115]
2	[1, 30]	[1, 30]
…	…	…
50,000	[30, 57]	[57]

2.1 Categorize All HCCs Into Three Groups (continued)

Example 3 (a): Determine total HCC frequencies and calculate HCC failure rates

1 – (Freq_IVA / Freq_EDGE) = $Failure\ Rate^h$

Ex: 1 – (1,833 / 2,200) = **17%**

HCC	$*\ Freq_EDGE^h$	$**\ Freq_IVA^h$	$Failure\ Rate^h$
1	2,200	1,833	**17%**
12	2,500	1,700	32%
30	200	180	10%
37	2,000	1,100	45%
57	1,500	500	67%
115	700	607	13%
125	2,700	2,237	17%
130	3,000	2,300	23%
138	1,200	1,020	15%
248	1,700	1,428	16%
Total	17,700	12,905	27%

**Freq_EDGE = total number of enrollees containing such HCC on EDGE.*

***Freq_IVA = total number of enrollees containing such HCC in the adjusted IVA results.*

2.1 Categorize All HCCs Into Three Groups (continued)

Example 3 (b): Tier HCCs nationally into Low, Medium, and High failure rate Groups

- The first boundary to segment Low and Medium failure HCCs is drawn between HCCs 248 and 1 because the total EDGE frequencies of the first four (4) HCCs from the list (30, 115, 138, 248) makes the Group size close to **33.33%** of all EDGE frequencies
- The second boundary to segment Medium and High failure HCCs is drawn between HCC 130 and HCC 12 because the Group size is close to **66.67%** of all EDGE frequencies

HCC	$Freq_EDGE^h$	$Freq_IVA^h$	FR^h	$Freq_EDGE^h$ Cumulative Probability	Boundary	Group
30	200	180	10%	1%		Low
115	700	607	13%	5%		Low
138	1,200	1,020	15%	12%		Low
248	1,700	1,428	16%	21%	**33.33%**	Low
1	2,200	1,833	17%	34%		Medium
125	2,700	2,237	17%	49%		Medium
130	3,000	2,300	23%	66%	**66.67%**	Medium
12	2,500	1,700	32%	80%		High
37	2,000	1,100	45%	92%		High
57	1,500	500	67%	100%	100%	High
Total	17,700	12,905	27%			

2.1 Categorize All HCCs Into Three Groups (continued)



Example 3 (b) (continued): Tier HCCs nationally into Low, Medium, and High failure rate Groups

HCC	Group
30	Low
115	Low
138	Low
248	Low
1	Medium
125	Medium
130	Medium
12	High
37	High
57	High

2.1 Categorize All HCCs Into Three Groups (continued)

Example 3 (b) (continued): Tier HCCs nationally into Low, Medium, and High failure rate Groups

- HCC Group Low
  - HCCs identified as having *low failure rates** amongst all issuers nationwide based on this year's HHS-RADV process
- HCC Group Medium
  - HCCs identified as having *medium failure rates* amongst all issuers nationwide based on this year's HHS-RADV process
- HCC Group High
  - HCCs identified as having *high failure rates* amongst all issuers nationwide based on this year's HHS-RADV process

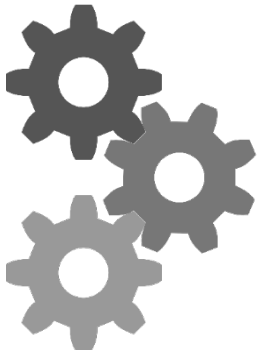
**HCC failure rates are the probability of an assigned HCC being found to be incorrect based on HHS-RADV findings.*

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates



Objective: To assess how well issuers are submitting accurate health status information and to calculate adjustment factors for issuers who deviate from the national average for each HCC Group

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)



Process: CMS will determine each issuer's HCC Group Failure Rate (GFR) and assess if it statistically differs from the weighted mean of all issuers' GFRs

a. **Determine GFR** - Determine the frequency of HCCs in each Group and calculate the GFR across each issuer

Calculate weighted mean and standard deviation - For each HCC Group, calculate the weighted mean and standard deviation for the GFRs

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)



Process:

c. **Create a decision boundary** - For each HCC Group, use the weighted mean and standard deviation to create a two (2)-sided 1.96 standard deviation decision boundary

d. **Calculate adjustment factors for Group outliers** - For each issuer, their Group Failure Rate for HCCs is compared against the corresponding Group's lower and upper decision boundaries. If the issuer GFR falls outside of the decision boundary, then the issuer's Group adjustment factor is calculated as the difference between the issuer's GFRs and the weighted mean failure rate for the HCC Group

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)

Example 4: Introduction

- Assume *Issuers 10001 and 10002* each had 200 sampled enrollees
- The EDGE HCCs and adjusted IVA HCCs are stored as shown in the left table
- Recall the output of sub-process #2, step 2.1 as shown in the right table

HIOS ID	Enrollee ID	EDGE HCC	Adjusted IVA HCC
10001	10001-001	[30, 115, 138]	[30, 115]
10001	10001-002	[1, 30]	[1, 30]
…	…	…	…
10001	10001-200	[248, 125]	[125]
10002	10002-001	[30, 57]	[57]
10002	10002-002	[125]	[125]
…	…	…	…
10002	10002-200	[37]	[37]

HCC Group Breakout

HCC	Group
30	Low
115	Low
138	Low
248	Low
1	Medium
125	Medium
130	Medium
12	High
37	High
57	High

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)

Example 4 (a): Determine Group Failure Rate

- Notice that *Issuers 10001 and 10002* enrollee HCCs have been replaced by their appropriate HCC Groups (Low, Medium, High) in the left table
- Gather enrollee HCC Group level data to determine Freq_EDGE and Freq_IVA for each issuer

(Continued on the next slide)

HIOS ID	Enrollee ID	EDGE HCC	Adjusted IVA HCC
10001	10001-001	[Low, Low, Low]	[Low, Low]
10001	10001-002	[Medium, Low]	[Medium, Low]
…	…	…	…
10001	10002-200	[Low, Medium]	[Medium]
10002	10002-001	[Low, High]	[High]
10002	10002-002	[Medium]	[Medium]
…	…	…	…
10002	10002-200	[High]	[High]

HCC Group	Issuer	Freq_EDGE^{G}	Freq_IVA^{G}
Low	10001	133	104
	10002	96	87
	⋮	⋮	⋮
Medium	10001	171	128
	10002	111	86
	⋮	⋮	⋮
High	10001	131	96
	10002	96	79
	⋮	⋮	⋮

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)

Example 4 (a) (continued): Determine Group Failure Rate

- Using the Freq_EDGE and Freq_IVA data collected in the previous slide, calculate Group Failure Rate for each issuer's HCC Groups:

1– ((Freq_IVA) / (Freq_EDGE)) = Group Failure Rate (GFR)

Ex: 1 – (104 / 133) = **21.8%** (*Issuer 100001, Group Low*)

HCC Group	Issuer	Freq_EDGE^{G}	Freq_IVA^{G}	GFR^{G}
Low	10001	133	104	**21.8%**
	10002	96	87	9.4%
	⋮	⋮	⋮	⋮
Medium	10001	171	128	25.1%
	10002	111	86	22.5%
	⋮	⋮	⋮	⋮
High	10001	131	96	26.7%
	10002	96	79	17.7%
	⋮	⋮	⋮	⋮

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)

Example 4 (b): Calculate weighted mean and standard deviation

- For each HCC Group, calculate the weighted mean and standard deviation using all individual issuers nationwide:
  - HCC Group G1 has a weighted mean of **11.8%** and a standard deviation of **3.0%**
  - HCC Group G2 has a weighted mean of **17.1%** and a standard deviation of **3.4%**
  - HCC Group G3 has a weighted mean of **25.9%** and a standard deviation of **4.0%**

HCC Group	HIOS ID	Freq_EDGE^G	Freq_IVA^G	GFR^G	*μ(GFR^G)	**Sd(GFR^G)
G1	10001	133	104	21.8%	**11.8%**	**3.0%**
	10002	96	87	9.4%		
	⋮	⋮	⋮	⋮		
G2	10001	171	128	25.1%	**17.1%**	**3.4%**
	10002	111	86	22.5%		
	⋮	⋮	⋮	⋮		
G3	10001	131	96	26.7%	**25.9%**	**4.0%**
	10002	96	79	17.7%		
	⋮	⋮	⋮	⋮		

*μ(GFR^G) = weighted mean

**Sd(GFR^G) = standard deviation

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2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)

Example 4 (c): Create a decision boundary

- Use the HCC Group weighted mean and standard deviation calculated in step (b) to create a two (2)-sided 1.96 decision boundary:

HCC Group G1

Weighted Mean – Sigma Cutoff * Standard Deviation = Lower Boundary

11.8% - 1.96 * 3% = **5.9%**

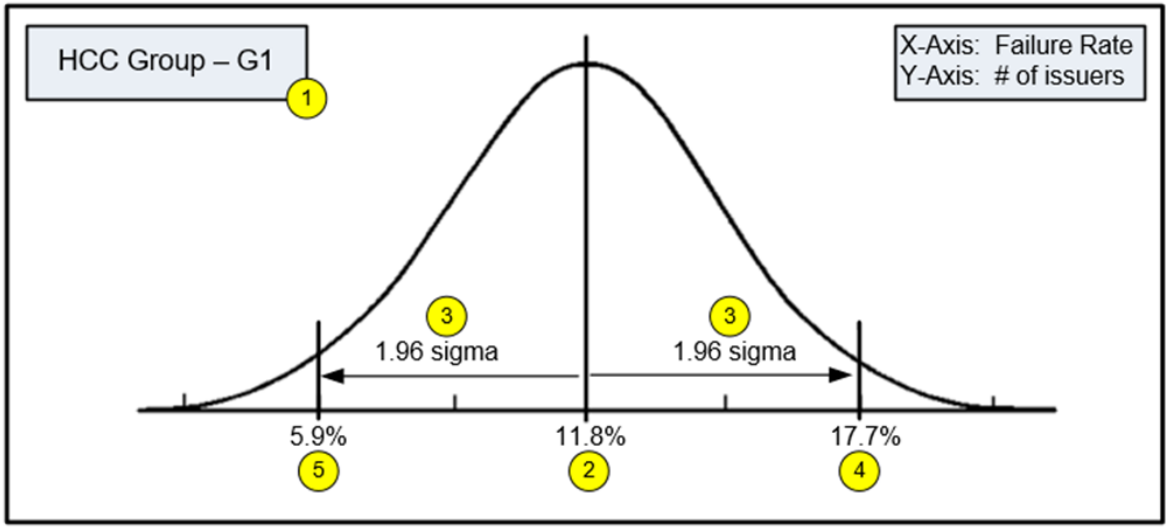
Weighted Mean + Sigma Cutoff * Standard Deviation = Upper Boundary

11.8% + 1.96 * 3% = **17.7%**

HCC Group	HIOS ID	Freq_EDGE^{G}	Freq_IVA^{G}	GFR^{G}	μ(GFR^{G})	Sd(GFR^{G})	sigma_cutoff	UB^{G}	LB^{G}
G1	10001	133	104	21.8%	11.8%	3.0%	1.96	**17.7%**	**5.9%**
	10002	96	87	9.4%					
	⋮	⋮	⋮	⋮					
G2	10001	171	128	25.1%	17.1%	3.4%	1.96	23.8%	10.4%
	10002	111	86	22.5%					
	⋮	⋮	⋮	⋮					
G3	10001	131	96	26.7%	25.9%	4.0%	1.96	33.7%	18.1%
	10002	96	79	17.7%					
	⋮	⋮	⋮	⋮					

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)

- G1 Group Distribution Example:



1 HCC Group					2 Weighted Mean		3 Sigma	4 Upper Bound	5 Lower Bound
HCC Group	HIOS ID	Freq_EDGE^G	Freq_IVA^G	GFR^G	μ(GFR^G)	Sd(GFR^G)	sigma_cutoff	UB^G	LB^G
G1	10001	133	104	21.8%	11.8%	3.0%	1.96	17.7%	5.9%
	10002	96	87	9.4%					
	⋮	⋮	⋮	⋮					

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)

Example 4 (d): Calculate adjustment factors for Group outliers

- If the issuer's GFR falls outside of the decision boundary, then an issuer's Group adjustment factor is calculated:

$$GFR - \mu(GFR^G) = \text{Group Adjustment}$$

$$21.8\% - 11.8\% = \mathbf{10\%}$$

HCC Group	Issuer	Freq_EDGE^G	Freq_IVA^G	GFR^G	μ(GFR^G)	Sd(GFR^G)	sigma_ cutoff	UB^G	LB^G	Group Adjustment^G
G1	10001	133	104	21.8%	11.8%	3.0%	1.96	17.7%	5.9%	**10%**
	10002	96	87	9.4%						0*
	⋮	⋮	⋮	⋮						…
G2	10001	171	128	25.1%	17.1%	3.4%	1.96	23.8%	10.4%	8%
	10002	111	86	22.5%						0*
	⋮	⋮	⋮	⋮						…
G3	10001	131	96	26.7%	25.9%	4.0%	1.96	33.7%	18.1%	0*
	10002	96	79	17.7%						-8.2%
	⋮	⋮	⋮	⋮						…

Notice that for instances where an issuer's GFR did not lie beyond the upper or lower boundary, no Group Adjustment was calculated.

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)



Example 4 (d) (continued): Calculate adjustment factors for Group outliers

HCC Group	Issuer	Freq_EDGE^G	Freq_IVA^G	GFR^G	μ(GFR^G)	Sd(GFR^G)	sigma_ cutoff	UB^G	LB^G	Group Adjustment^G
G1	10001	133	104	21.8%	11.8%	3.0%	1.96	17.7%	5.9%	**10%**
	10002	96	87	9.4%						0*
	⋮	⋮	⋮	⋮						…
G2	10001	171	128	25.1%	17.1%	3.4%	1.96	23.8%	10.4%	**8%**
	10002	111	86	22.5%						0*
	⋮	⋮	⋮	⋮						…
G3	10001	131	96	26.7%	25.9%	4.0%	1.96	33.7%	18.1%	0*
	10002	96	79	17.7%						**-8.2%**
	⋮	⋮	⋮	⋮						…

Group adjustment factor calculations: *Issuer 10001*

GFR – μ(GFR^G) = Group Adjustment

G1) 21.8% - 11.8% = **10%**

G2) 25.1%-17.1% = **8%**

G3) 0%

2.2 Identify Outliers and Calculate Adjustment Factors Based on HCC Group Failure Rates (continued)



Example 4 (d) (continued): Calculate adjustment factors for Group outliers

- If an issuer's HCC GFR falls outside of its corresponding decision boundary, it will receive a non-zero adjustment factor
  - A positive (+) adjustment factor will reduce the risk score

    G2) 25.1%-17.1% = **8%** *(reference previous slide)*

  - A negative (-) adjustment factor will increase the risk score

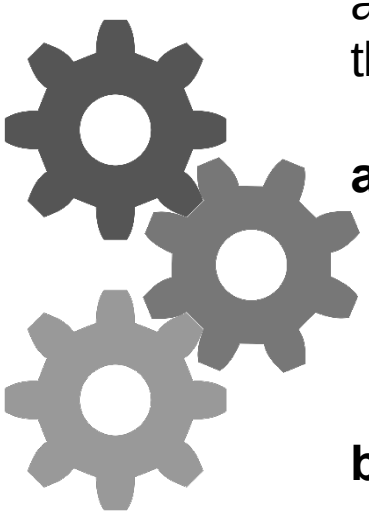
    G3) 17.7% -25.9% = **-8.2%** *(reference previous slide)*

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores



Objective: Apply the adjustment factors to sampled enrollees and calculate issuer's Error Rates

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)



Process: CMS will use the issuer's HCC Group adjustment factors to adjust enrollee-level risk scores and project a finalized risk score to the population

a. **Determine enrollee-level adjustments** - Determine the enrollee-level adjustment factor by calculating the weighted average from the issuer's HCC Group level adjustment factors calculated for the three HCC Groups (if applicable)

b. **Adjust EDGE risk scores** - Use the enrollees' adjustment factors to adjust their EDGE risk score

c. **Determine issuer Error Rate** - Calculate the issuer's Error Rate at the stratum level and then combine to a single value by weighing in the stratum size in the issuer's population and sample

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5: Introduction

- The **Error Rate formula** is one (1) minus the ratio of the weighted sum of adjusted risk scores over the weighted sum of EDGE risk scores

$$ErrorRate_i = 1 - \frac{\sum_e (w_e * AdjRS_{i,e})}{\sum_e (w_e * EdgeRS_{i,e})},$$

$$\text{where } w_e = \frac{stratum\ size\ in\ population}{number\ of\ sample\ enrollees\ of\ the\ stratum}$$

$AdjRS_{i,e}$	The sampled enrollee's adjusted risk score
$EdgeRS_{i,e}$	The sampled enrollee's risk score recorded on EDGE

Refer to 2017 benefit year HHS-RADV Protocols: 7.3.3 Calculation of Error Rates to Adjust Issuer Plan Risk Scores

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5: Introduction (continued)

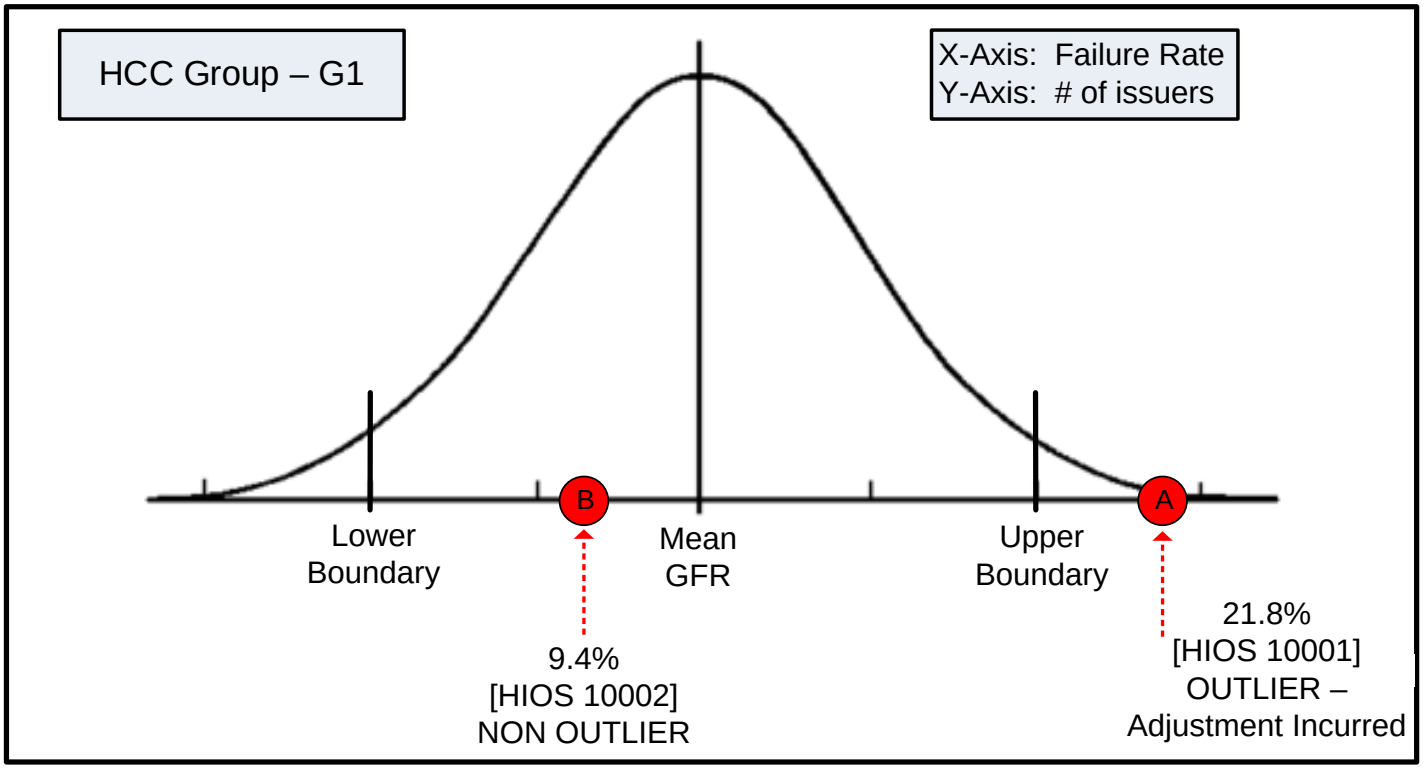
- How the Error Rate is calculated:
  - CMS will first use the HCC Group level adjustment factor to determine the enrollee level adjustment factor for all samples
  - The enrollee adjustment factor ($Enrollee\ Adjustment_{i,e}$) will be calculated as the weighted average of all HCCs' associated Group level adjustment factor(s) ($Group\ Adjustment_i^G$), where the weight is assigned as the risk score component contributed by the single HCC along ($RS_{i,e}^{hcc,G}$)

$$Enrollee\ Adjustment_{i,e} = \frac{\sum_{hcc}\left(RS_{i,e}^{hcc,G} * Group\ Adjustment_i^G\right)}{\sum_{hcc}\left(RS_{i,e}^{hcc,G}\right)}$$

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5: Introduction (continued)

- For example, *HIOS 10001 (A)* in the below chart is considered an outlier as it falls outside the two (2)-sided 1.96 standard deviation decision boundary and an adjustment would be incurred



2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5: Introduction (continued)

- All enrollees (Strata 1-10) contribute to the calculation of the overall issuer error rate and all HCCs identified by the IVA or SVA (as applicable) will be used in determining HCC failure rates for issuers in the HCC Groups (Low, Medium, High).
- However, an enrollee-level adjustment to a sampled enrollee's risk score will only be computed when the following conditions are satisfied:
  1. An issuer has at least one (1) HCC Group Failure Rate that falls outside of the corresponding two (2)-sided 1.96 standard deviation decision boundary; and
  2. A sampled enrollee has an HCC recorded on EDGE (i.e., Strata 1-9) that falls in an outlier HCC Group for which the issuer incurs a non-zero adjustment

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5: Introduction (continued)

- For sampled enrollees, the adjustment factor is applied to the enrollee's EDGE server risk score to obtain their adjusted risk score ($AdjRS_{i,e}$)

$$AdjRS_{i,e} = EdgeRS_{i,e} * \left(1 - Enrollee\ Adjustment_{i,e}\right)$$

- Next, the issuer's Error Rate is estimated from all of the issuer's IVA sampled enrollees using the total stratum weighted risk scores on EDGE and the adjusted risk scores. The stratum weight is the ratio of the stratum size in the population to the number of IVA sampled enrollees from the stratum

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)



Example 5: Introduction (continued)

- The output of component 2.2, *Issuer 10001* received the adjustment factors of 10%, 8%, and 0% for the three (3) HCC Failure Groups, respectively
- Assume the first two (2) sampled enrollees of *Issuer 10001* have the detailed information in the table below

Issuer	Enrollee	Stratum Size in Population	Sample Enrollees from the Stratum	Stratum Level	Plan Metal Level	Age Last (Infant)	HCCs
10001	10001-1	352	67	Infant-Medium	Silver	0	125,130,138,248
10001	10001-2	1418	37	Adult-High	Silver	-	1,12,30,37,57,115
10001	⋮	⋮	⋮	⋮			⋮

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5 (a): Determine enrollee-level adjustments

- Enrollee level adjustment factors are calculated using the weighted average from its issuer's Group level adjustment factors
  - *Enrollee 10001-1* has four (4) HCCs recorded on EDGE [125,130,138,248]
  - For each EDGE HCC, compute the risk score for a single HCC using the logic defined in HHS Risk Adjustment Model table. Since the enrollee is an infant, the computation of the single HCC risk score takes into consideration the enrollee's actual maturity and severity levels. This results in risk scores for a single HCC as **6.402, 175.329, 41.549,** and **41.549**, respectively

Enrollee	Stratum Level	Plan Metal Level	Age Last	HCC Failure Group	HCC	Severity Associated with HCC	Maturity Associated with HCC	Enrollee's Severity	Enrollee's Maturity	Variable Used for Risk Score Calculation	$RS^{hcc,G}_{i,e}$
10001-1	Infant-Medium	Silver	0	G1	138	4	Age 1	5	PREMATURE MULTIPLE	AGE1_X_SEVERITY4	**6.402**
					248		PREMATURE MULTIPLES			PREMATURE_MULTIPLES_X_SEVERITY5	**175.329**
				G2	125	5	Age 1			AGE1_X_SEVERITY5	**41.549**
					130	5	Age 1			AGE1_X_SEVERITY5	**41.549**

- "Enrollee's Severity" is the highest "Severity Associated with HCC" among all HCCs.
- "Enrollee's Maturity" is the highest "Maturity Associated with HCC" among all HCCs.
- "Variable Used for Risk Score Calculation" is the variable used to identify coefficient in HHS Risk Adjustment Model table.
  - For HCCs associated with Severity level (e.g., 138, 125, 130), the variable is "Maturity Associated with HCC" X "Severity Associated with HCC".
  - For HCCs associated with Maturity level (e.g., 248), the variable is "Maturity Associated with HCC" X "Enrollee's severity".

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)



Example 5 (a) (continued): Determine enrollee-level adjustments

- Enrollee level adjustment factors are calculated using the weighted average from its Issuer's Group level adjustment factors
  - *Enrollee 10001-1* HCCs are categorized in HCC Groups G1, G1, G2, and G2 respectively. They are associated with the Group level adjustment factors of 10%, 10%, 8% and 8%
  - Compute the enrollee adjustment score as the weighted average of group level adjustment factors, weighting by the risk score of the HCCs. This results in a weighted adjustment score of **9.4%**

Enrollee	Stratum Level	HCC Failure Group	HCC	$RS_{i,e}^{hcc,G}$	Group $Adjustment_i^G$	Enrollee $Adjustment_{i,e}$
10001-1	Infant-Medium	G1	138	6.402	10.0%	**9.4%**
			248	175.329		
		G2	125	41.549	8.0%	
			130	41.549		

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5 (a) (continued): Determine enrollee-level adjustments

- Enrollee level adjustment factors are calculated using the weighted average from its issuer's Group level adjustment factors
  - *Enrollee 10001-2* has six (6) HCCs recorded on EDGE [30, 115, 1,12, 37, 57]
  - For each EDGE HCC, compute the risk score of a single HCC using the logic defined in HHS Risk Adjustment Model. This results in risk scores for a single HCC as listed in the last column of the table

Enrollee	Stratum Level	Plan Metal Level	HCC Failure Group	HCC	$RS_{i,e}^{hcc,G}$
10001-2	Adult-High	Silver	G1	30	**2.16**
				115	**5.29**
			G2	1	**5.302**
			G3	12	**3.117**
				37	**2.077**
				57	**1.066**

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5 (a) (continued): Determine enrollee-level adjustments

- Enrollee level adjustment factors are calculated using the weighted average from its Issuer's Group level adjustment factors
  - *Enrollee 10001-2* HCCs are categorized in HCC groups G1, G1, G2, G3, G3, and G3 respectively. They are associated with the Group level adjustment factors of 10%, 10%, 8%, 0%, 0%, and 0%
  - Compute the enrollee adjustment score as the weighted average of Group level adjustment factors, weighting by the risk score of the HCCs. This results in a weighted adjustment score of **6.1%**

Enrollee	Stratum Level	HCC Failure Group	HCC	$RS_{i,e}^{hcc,G}$	Group $Adjustment_i^G$	Enrollee $Adjustment_{i,e}$
10001-2	Adult-High	G1	30	2.16	10.0%	6.1%
			115	5.29		
		G2	1	5.302	8.0%	
		G3	12	3.117	0%	
			37	2.077		
			57	1.066		

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5 (b): Adjust EDGE risk scores

- Use the enrollees' adjustment factors to adjust the EDGE risk score for samples
  - Apply the enrollee level adjustment factor to the EDGE risk score of the sampled enrollee. *Enrollees 10001-1* and *10001-2* have 9.4% and 6.1% adjustment factors applied to their EDGE risk scores, respectively
    - *Enrollee 10001-1* has an adjusted risk score of (175.329 * (1 – 9.4%)) = **158.85**
    - *Enrollee 10001-2* has an adjusted risk score of (19.012 * (1 – 6.1%)) = **17.85**

Issuer	Enrollee	EDGE HCCs	$EdgeRS_{i,e}$	$Adjustment_{i,e}$	$AdjRS_{i,e}$
10001	10001-1	125,130,138,248	175.329	9.4%	**158.85**
10001	10001-2	1,12,30,37,57,115	19.012	6.1%	**17.85**

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)

Example 5 (c): Determine issuer Error Rate

- For *Issuer 10001*, sum the EDGE risk scores and adjusted risk scores for all enrollees in the sample
- For each stratum, compute the stratum weight as the ratio of stratum size in the population to the number of sampled enrollees from the stratum
- Compute the issuer-level Error Rate for *Issuer 10001* as one (1) minus the stratum weighted sum of adjusted risk scores (20,538) over the EDGE risk scores (20,751). This results in an error rate of **1.03%** (1 – 20,538/20,751) for *Issuer 10001*

Issuer	Enrollee	Stratum Level	$EdgeRS_{i,e}$	$AdjRS_{i,e}$	w_e	$w_e * EdgeRS_{i,e}$	$w_e * AdjRS_{i,e}$	$\sum w_e * EdgeRS_{i,e}$	$\sum w_e * AdjRS_{i,e}$	Error Rate
10001	10001-1	Infant-Medium	175.329	158.85	5.25	920	834			
10001	10001-2	Adult-High	19.012	17.85	38.32	729	684	20751	20538	1.03%
10001	⋮	⋮	⋮	⋮	⋮	⋮	⋮			

2.3 Calculate Error Rates to Adjust Issuer Plan Risk Scores (continued)



Example 5 (c) (continued): Determine issuer Error Rate

Issuer	Enrollee	Stratum Level	$EdgeRS_{i,e}$	$AdjRS_{i,e}$	w_e	Error Rate
10001	10001-1	Infant-Medium	175.329	158.85	5.25	1.03%
10001	10001-2	Adult-High	19.012	17.85	38.32	
10001	⋮	⋮	⋮	⋮	⋮	
10002	10002-1	Child-Medium	6.7	3.1	50.10	1.5%
10002	10002-2	Adult-Low	5	4.7	1.32	
10002	⋮	⋮	⋮	⋮	⋮	
10003	10003-1	Adult-Medium	17	15.3	15.53	0%
10003	10003-2	Adult-High	25	19.4	10.11	
10003	⋮	⋮	⋮	⋮	⋮	

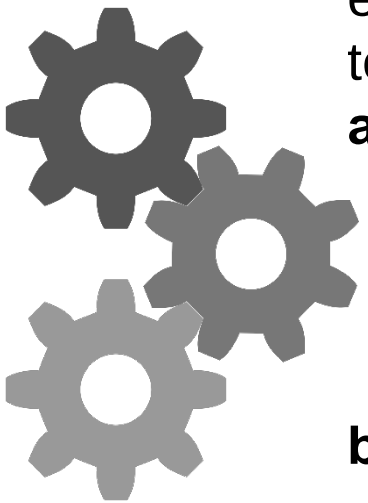
2.4 Calculate Standard Errors and Confidence Intervals



Objective:

- To measure the precision of the Error Rate estimates (i.e., all issuers with non-zero adjustments), CMS will leverage a bootstrap resampling approach
- The bootstrap sampling methodology is a non-parametric resampling approach for estimating properties of an estimate (such as variance) where parametric inference is impossible for the calculation of standard errors
- CMS will implement a bootstrap resampling method to determine the standard error and confidence interval for an issuer's Error Rate estimate

2.4 Calculate Standard Errors and Confidence Intervals (continued)



Process: CMS will determine a 95% confidence interval for each issuer's Error Rate using a bootstrap resampling technique

a. **Execute bootstrap resampling** - A new Error Rate is estimated based on a resampled dataset from the issuer's sample of enrollees, which is run at least 1,000 times, to account for instances of sampling variability

b. **Calculate standard errors and confidence intervals for issuers** - The standard error is determine by calculating the sample standard deviation of all the resampled Error Rates and the confidence interval is obtained by determining the 2.5^{th,} and 97.5th centiles of all the resampled Error Rates

2.4 Calculate Standard Errors and Confidence Intervals (continued)



Example 6: Introduction

- Output from sub-process 2.3 - enrollee level EDGE risk scores, adjusted risk scores, and stratum weightings
- Assume *Issuer 10001* has 200 enrollees

2.4 Calculate Standard Errors and Confidence Intervals (continued)



Example 6 (a): Execute bootstrap resampling

- Draw 200 enrollees from *Issuer 10001's* sample of enrollees with replacement at least 1,000 times and calculate the Error Rate for each sample

Sample Enrollee	1	2	…	1,000
1	10001-27	10001-12	…	10001-32
2	10001-1	10001-92	…	10001-67
⋮	⋮	⋮	⋮	⋮
200	10001-43	10001-85		10001-67
Error Rate:	**0.96%**	**1.17%**	…	**1.09%**

2.4 Calculate Standard Errors and Confidence Intervals (continued)



Example 6 (b): Calculate standard errors and confidence intervals for issuers

- Compute the bootstrapped standard error by calculating the sample standard deviation across the 1,000 samples
  - This results in a standard error of 0.12%
- Determine the bootstrapped confidence intervals by identifying the 2.5^{th} and 97.5^{th} centiles of the 1,000 sample of resampled Error Rates
  - This results in a confidence interval of [0.83%, 1.23%]

2.4 Calculate Standard Errors and Confidence Intervals (continued)



Example 6 (b) (continued): Calculate standard error and confidence interval for issuers

- *Error Rate* – RADV adjustment to PLRS
- *Standard Error* – standard deviation divided by the square root of the sample size

Issuer	Error Rate	Standard Error	Confidence Interval	
			Lower	Upper
10001	1.03%	0.12%	0.83%	1.23%
10002	1.5%	0.27%	1.19%	1.78%
⋮	⋮	⋮	⋮	⋮

2.4 Calculate Standard Errors and Confidence Intervals (continued)

When is the Error Rate applied?

- The first HHS-RADV benefit year for which the issuer Error Rates will be used to adjust Risk Adjustment (RA) payment transfers will be 2017
- The Error Rate is then generally applied to the subsequent benefit year's calculated PLRSs to adjust the issuer's PLRSs before RA transfers are calculated, except for issuers who exit the market during or at the end of the benefit year subject to HHS-RADV. For exiting issuers, adjustments will be made to the transfer amounts for the last benefit year in which they participated in the State market risk pool
- The HHS-RADV Final Results Discrepancy and Administrative Appeals processes will occur annually for each benefit year in which the final risk score Error Rates are applied to risk scores and adjust RA transfers

Sub-Process #3
Results Reporting

3. Results Reporting

1. Determine final enrollee results
2. Calculate Error Rates
3. Results Reporting

3. Results Reporting



Note - Results Reporting will be covered in a subsequent training session.

Objective: CMS will provide each issuer with their enrollee-level audit results, their Error Rate (if applicable) for the benefit year under HHS-RADV review, and benchmark data to use for comparison purposes

Q&A

To submit questions by computer:

- Type your question in the text box under the “Q&A” tab located to the left hand panel of your screen
  - To submit the question, click “Submit”



If your question did not receive a response during this webinar session, please submit your question to the HHS-RADV team at CCIIOACARADataValidation@cms.hhs.gov

Next Steps

Next Steps: Training Sessions

Upcoming Webinars

Date	Time	Topic
Wednesday, May 30, 2018	2:00 p.m. – 3:00 p.m. ET	2017 Benefit Year HHS-RADV Protocols: Updates

Resources

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

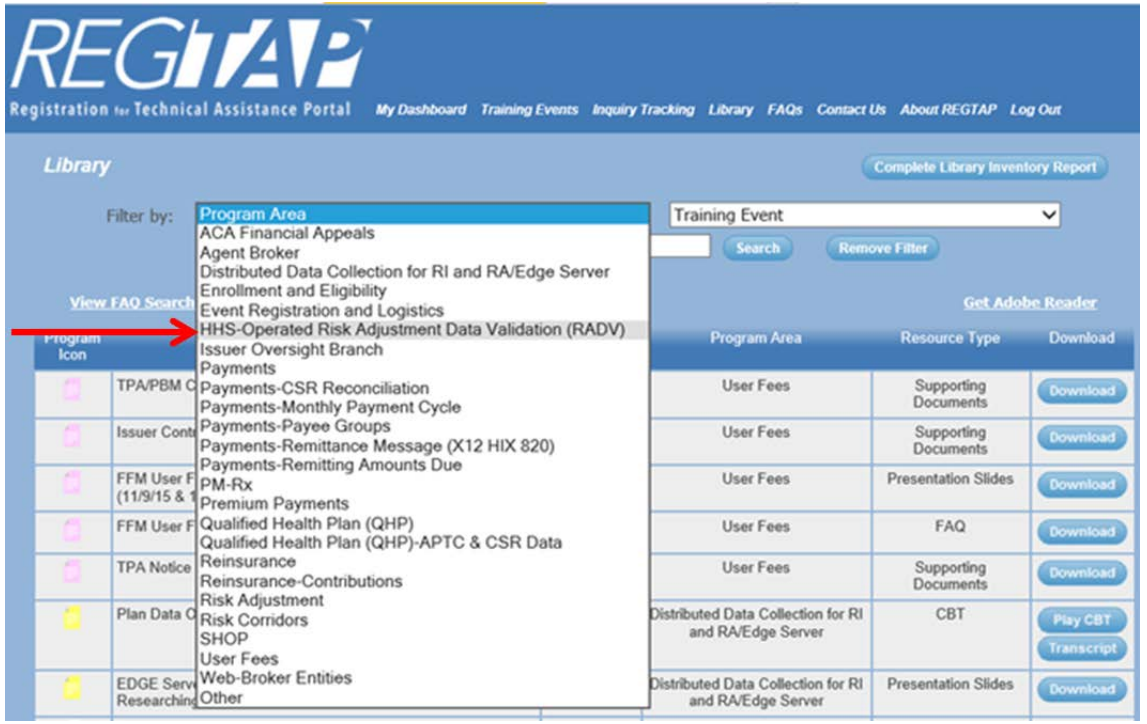
RETIRED

HTTPS://WWW.REGTAP.INFO

Locating HHS-RADV Documents in REGTAP

Stakeholders can access additional documents at https://www.REGTAP.info in the REGTAP Library.

Under Program Area, select "HHS Risk Adjustment Data Validation (HHS-RADV)"



Resources: Contact Information

Resource	Contact Information
CCIIO PPACA RA Data Validation Email Address. For RADV policy questions, contact the RADV Team	CCIIOACARADataValidation@cms.hhs.gov
EDGE server questions, please contact your Financial Management (FM) Service Representative directly and copy the Centers for Medicare & Medicaid Services (CMS) Help Desk	EDGE_server_data@cms.hhs.gov and copy CMS_FEPS@cms.hhs.gov

Resources: Contact Information

To contact us with questions, email us at:
CCIIOACARADataValidation@cms.hhs.gov

OR

Contact us within the HHS-RADV Audit Tool using the **Inquiries** tab and selecting **Submit Inquiry**

Resources: Links

Resource	Resource Link
U.S. Department of Health & Human Services (HHS)	http://www.hhs.gov/
Centers for Medicare & Medicaid Services (CMS)	http://www.cms.gov/
The Center for Consumer Information & Insurance Oversight (CCIIO) web page	http://www.cms.gov/cciio
Consumer website on Health Reform	http://www.healthcare.gov/
Registration for Technical Assistance Portal (REGTAP) - presentations, FAQs	https://www.REGTAP.info
Patient Protection and Affordable Care Act (PPACA)	http://www.gpo.gov/fdsys/pkg/PLAW-111publ148/content-detail.html

Resources: Links (continued)

Resource	Resource Link
HHS Notice of Benefit and Payment Parameters for 2014	http://www.gpo.gov/fdsys/pkg/FR-2013-03-11/pdf/2013-04902.pdf
HHS Notice of Benefit and Payment Parameters for 2015	http://www.gpo.gov/fdsys/pkg/FR-2014-03-11/pdf/2014-05052.pdf
HHS Notice of Benefit and Payment Parameters for 2016	http://www.gpo.gov/fdsys/pkg/FR-2015-02-27/pdf/2015-03751.pdf
HHS Notice of Benefit and Payment Parameters for 2017	https://www.gpo.gov/fdsys/pkg/FR-2016-03-08/pdf/2016-04439.pdf
HHS Notice of Benefit and Payment Parameters for 2018	https://www.gpo.gov/fdsys/pkg/FR-2016-12-22/pdf/2016-30433.pdf
HHS Notice of Benefit and Payment Parameters for 2019	https://www.gpo.gov/fdsys/pkg/FR-2018-04-17/pdf/2018-07355.pdf

Closing Remarks