Australian Consortium for Classification Development

ADRG splitting methodology in AR-DRG V.9.0

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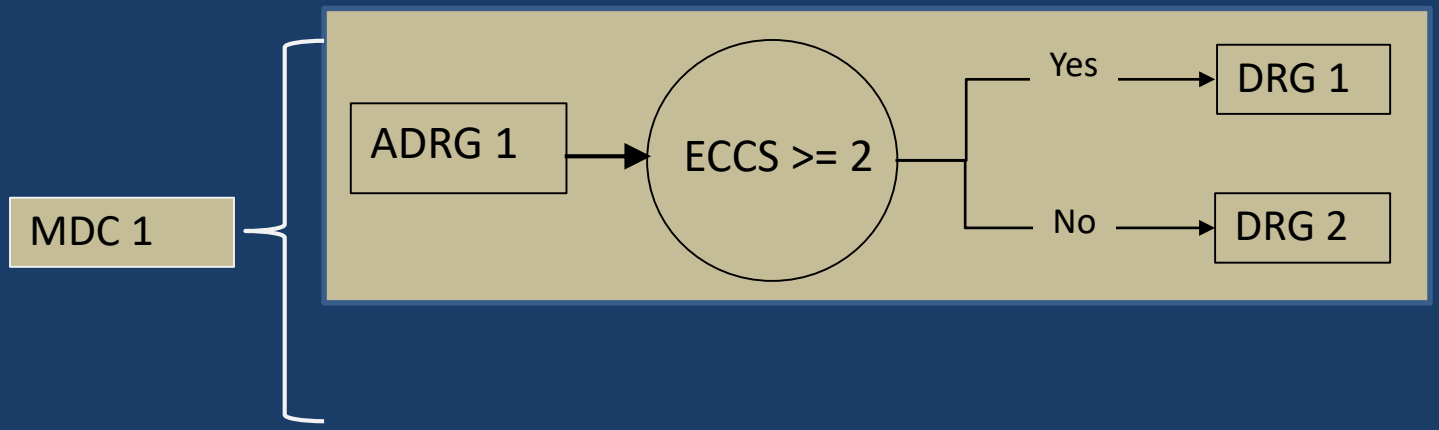
Overview

- AR-DRG, splitting, Reduction in Deviance (RID)
- Splitting criteria
- Candidate models
- Strategy of splitting by ADRG groups
- Exceptions

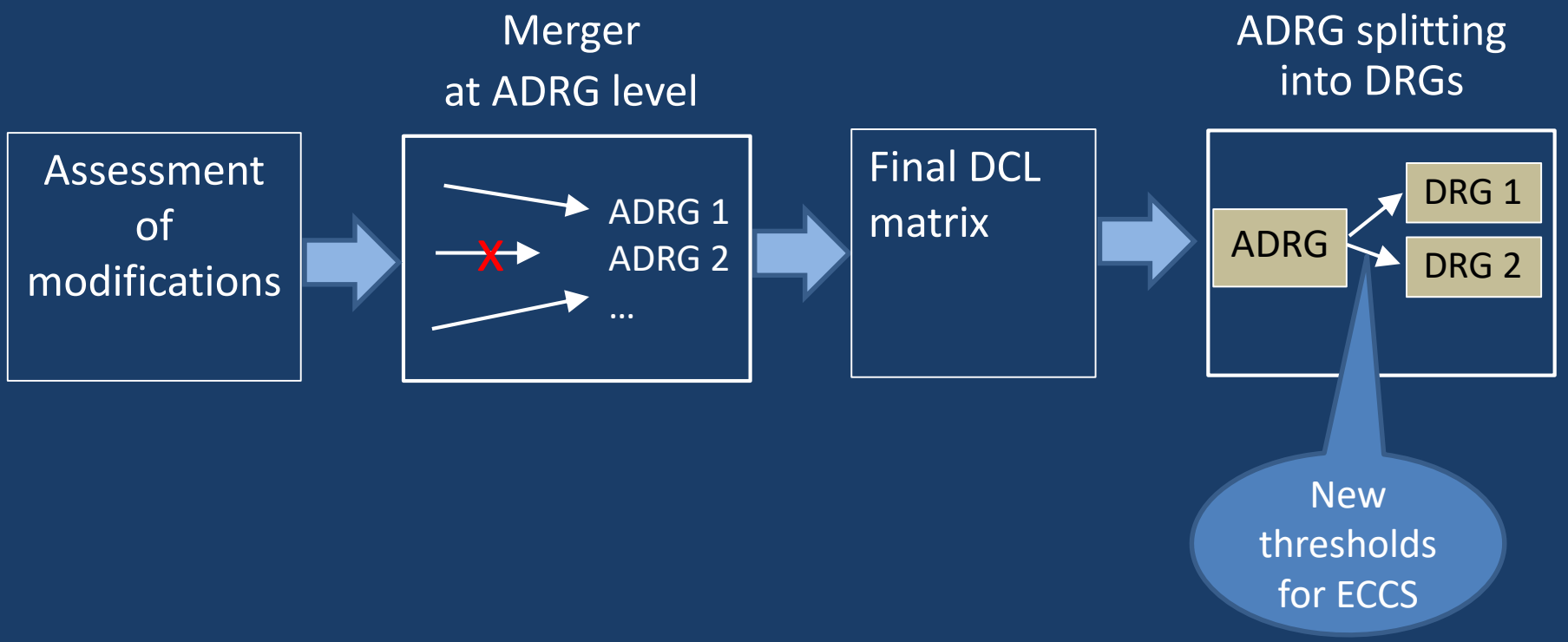
Australian Refined Diagnosis Related Groups (AR-DRG)

- Classification of acute admitted patients
- Updated in 2-3 year cycles using new data
- Structure: MDC ->ADRG ->DRG (mostly by ECCS* - introduced in v8.0).
- 1st time a transition occurred from one ECCS-based AR-DRG version to another.
- Thus -> need for a methodology of transition.

* ECCS = Episode Clinical Complexity Score; DCL = Diagnosis Complexity Level



Milestones in creating AR-DRG versions



RID – Reduction In Deviance

- We model ADRGs to predict cost given ECCS value
- Deviance measures the error in model for non-normal distributions
- RID is a pseudo R-square for non-normal distributions (gamma was used)
- We want ADRGs that predict cost as best as possible, i.e. the highest RID

ADRG splitting criteria

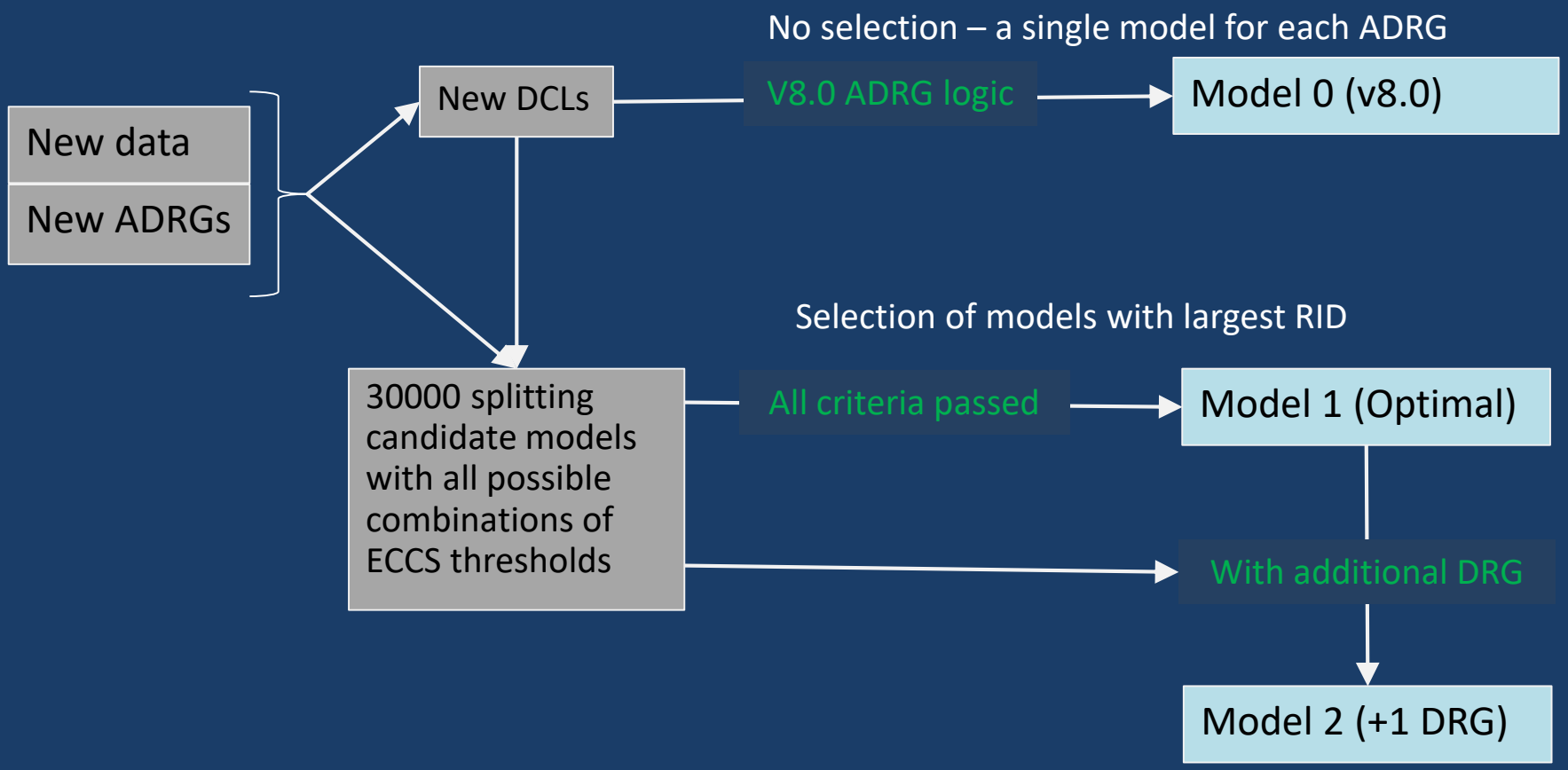
Why not just select the models with the highest RID?

Stability and distinctiveness

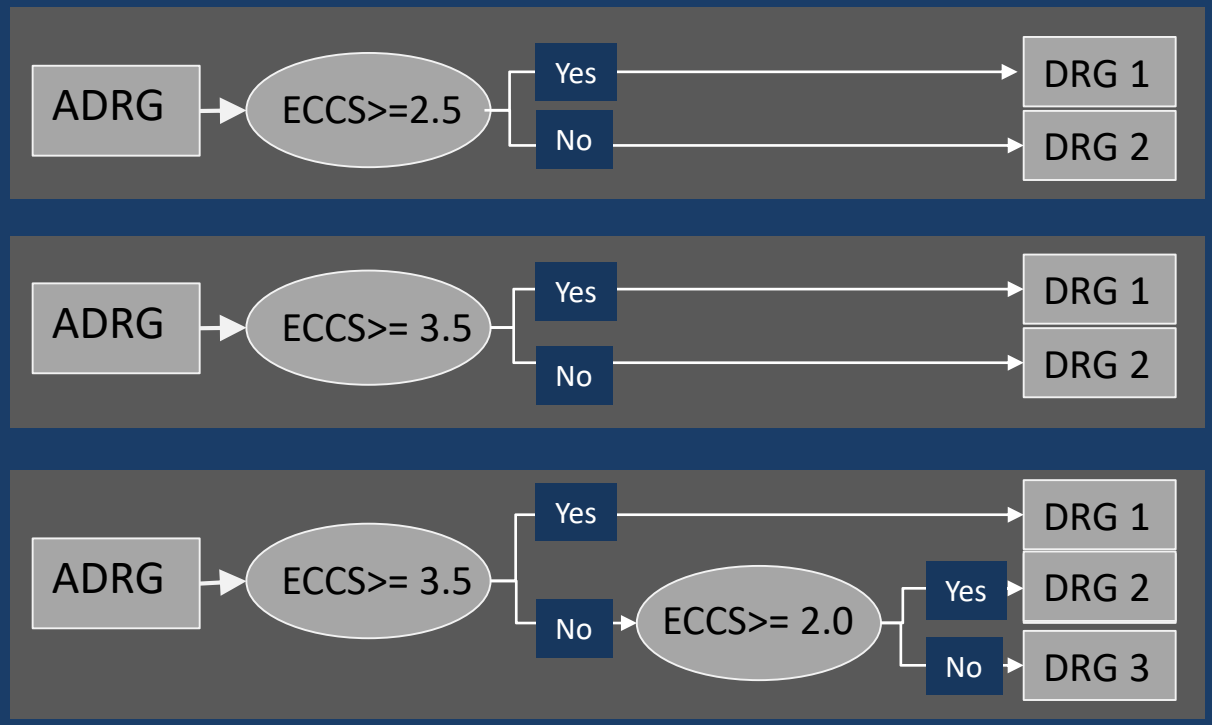
Cr 1: Size of DRGs: n, n%, total cost
Cr 2: Difference between DRG cost means within ADRG (abs and rel)
Cr 3: Irrelevant
Cr 4: Gain in RID with each additional DRG

Criterion*	Description	Threshold
1a	Minimum episodes per DRG	200 per year
1b	Minimum cost per DRG	$1M per year
1c	Minimum percentage of ADRG episodes per DRG	10%
2a	Minimum absolute change in mean cost between consecutive DRGs**	$3,700
2b	Minimum relative change in mean cost between consecutive DRGs	2.0
3a	Maximum relative increase in CV of DRGs compared to ADRG	1.3
4a	Minimum increase in RID from best performing model with one less DRG across initially generated candidate models	5%

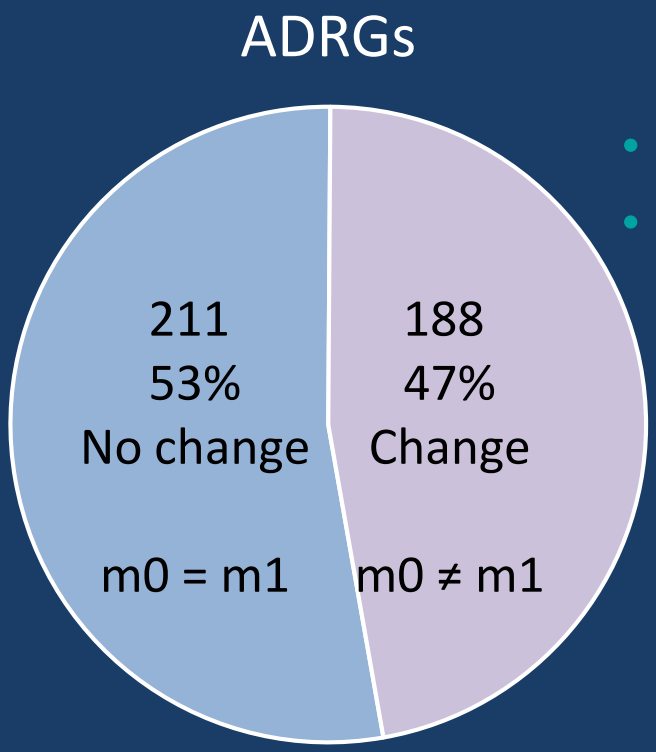
ADRG splitting: Models 0, 1 and 2



Models 0, 1 and 2 example: ADRG F05

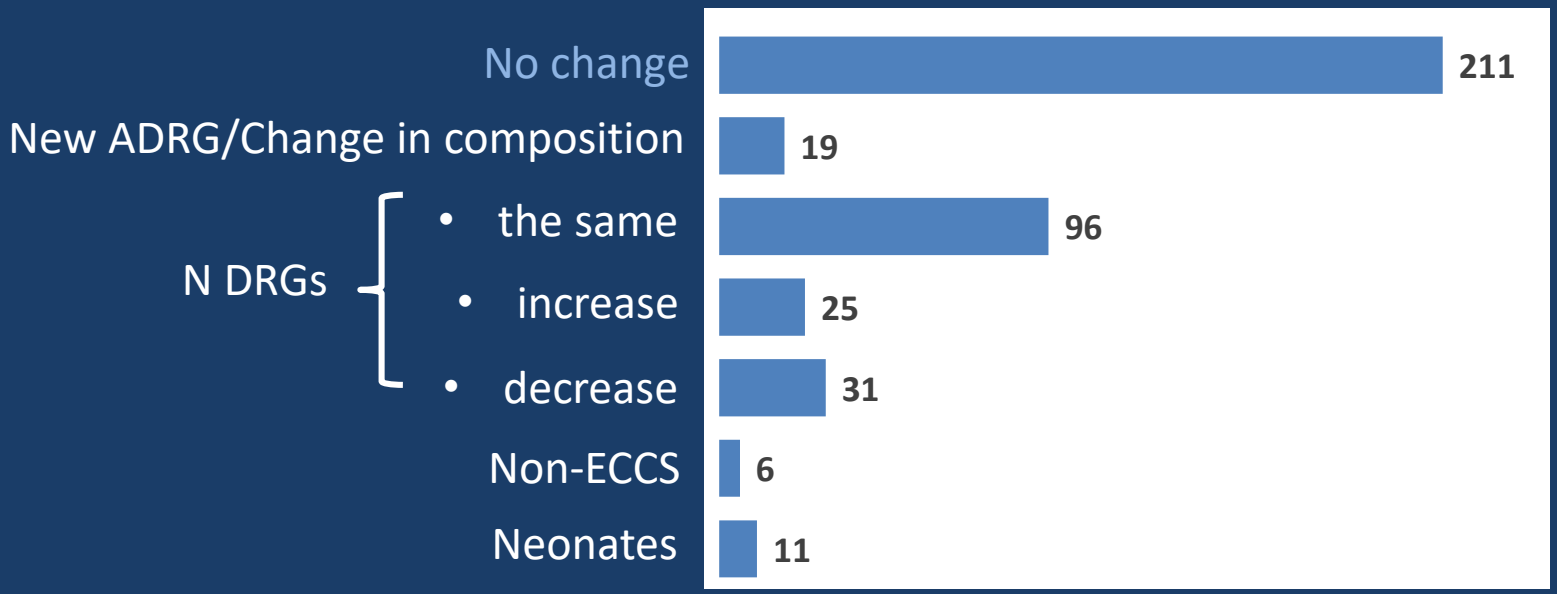


No change vs Change



- No change, i.e. Model 0 = Model 1
- Why the strategy is necessary?
  - Generally, we prefer the Optimal – Model 1
  - Problem: Is any change important?
  - Too many ADRGs with change anyway.

What are the “changed” ADRGs?



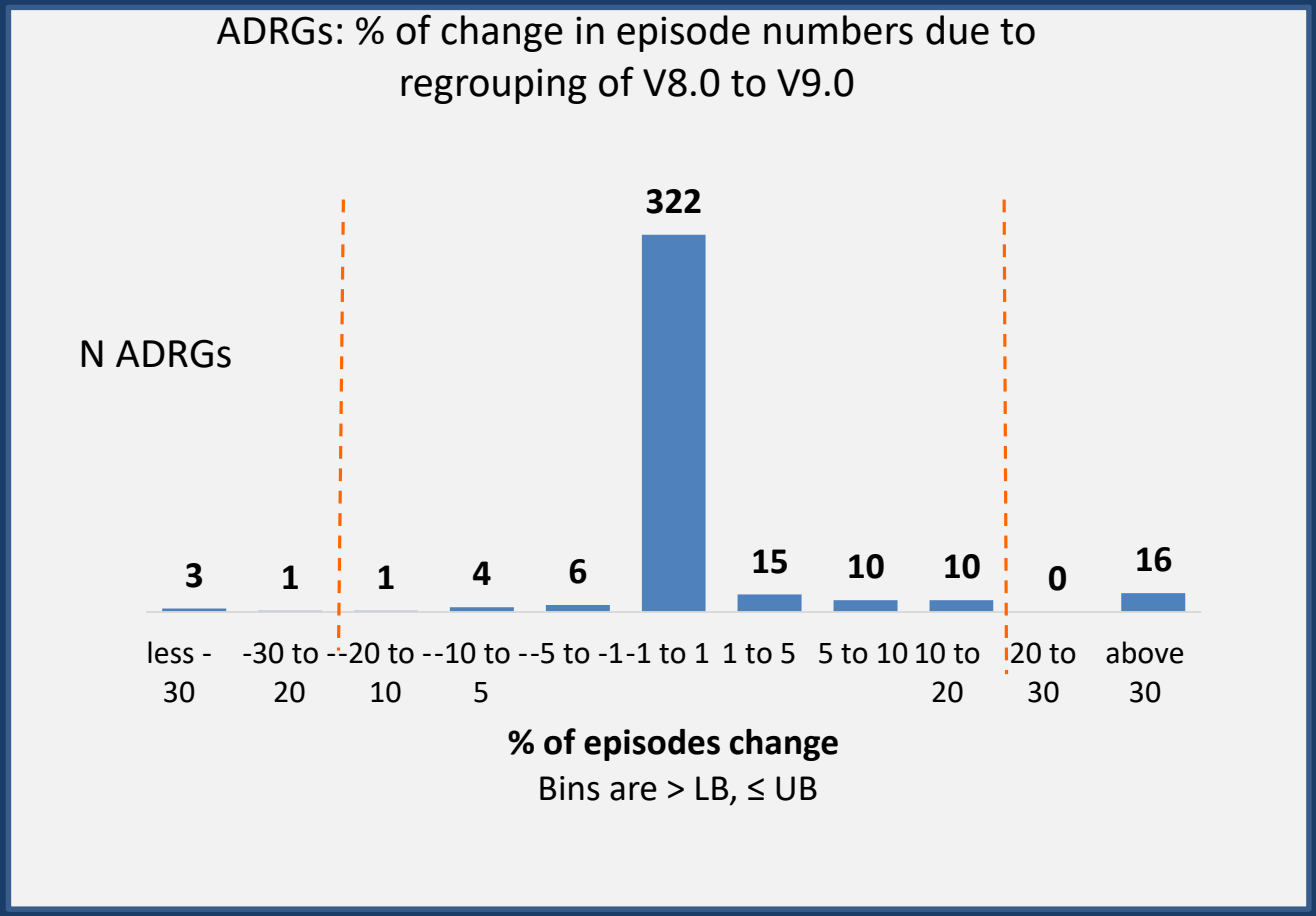
2a. New ADRG

- No Model 0
- Strategy: Accept the optimal - Model 1 - by default

No	ADRG	Description
1	A13	Ventilation >=336hours
2	A14	Ventilation >=96hours & <336hours
3	A15	Tracheostomy
4	B83	Acute Paraplegia and Quadriplegia and Spinal Cord Conditions
5	E77	Bronchiectasis
6	F24	Interventional Coronary Procedures, Not Admitted for AMI
7	H65	Bleeding Oesophageal Varices
8	I33	Hip Replacement for Non-Trauma

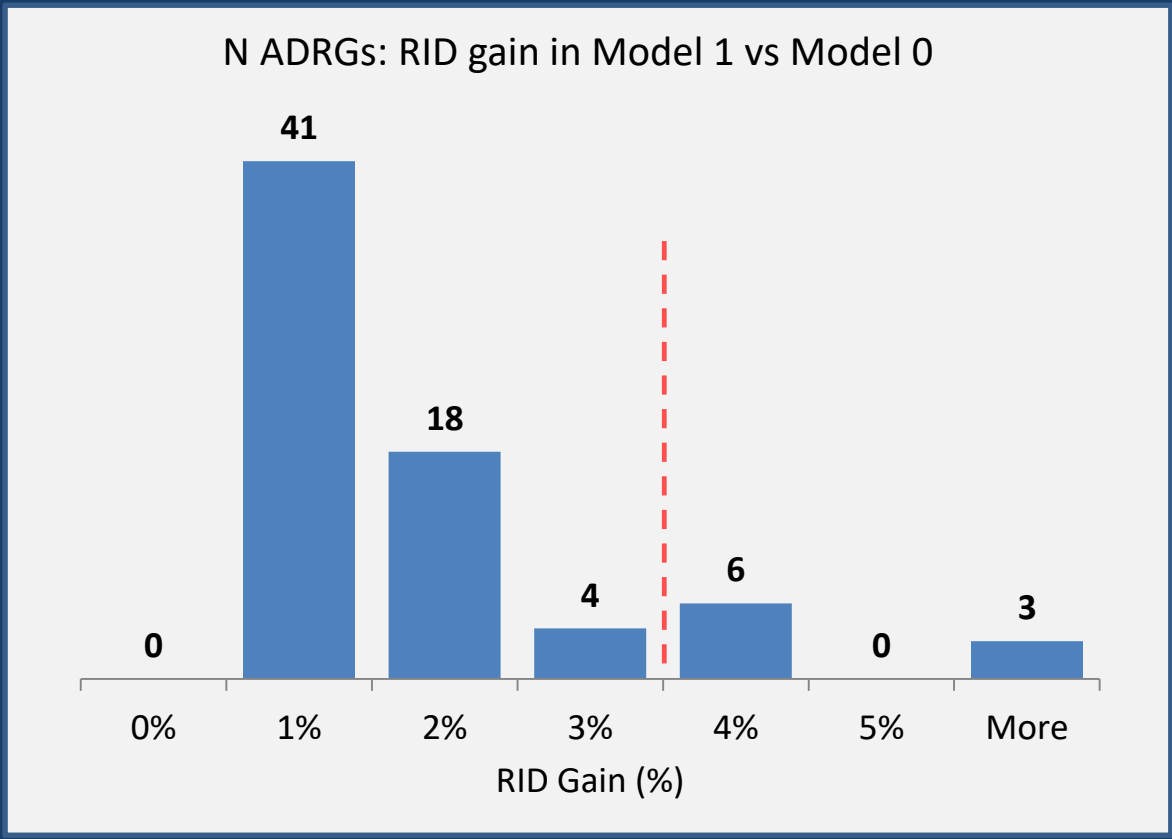
2b. Substantial change in ADRG composition - criterion

- The threshold of substantial change is set to ± 20% of episodes due to regrouping
- Accept the optimal - Model 1 - by default
- 9 of 20 ADRGs were among “Not changed“, i.e Model 0 = Model 1



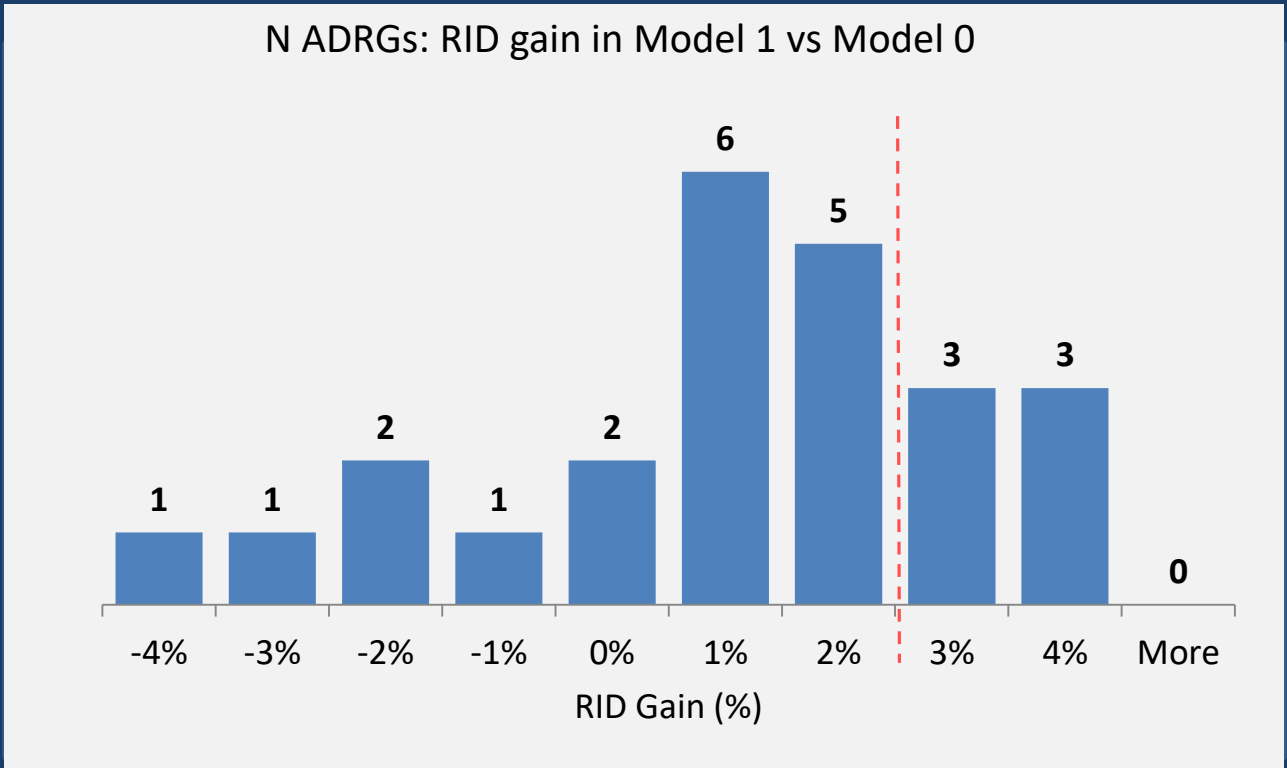
3a/b Change in logic: N DRGs are the same in Model 0 and 1 – Model 0 passed all criteria

- Model 0 is also good – passed all criteria, but all Model 1s are better
- The threshold of RID gain is set to 3%
- By default (a) Model 0 if RID gain below threshold; (b) Model 1 if above



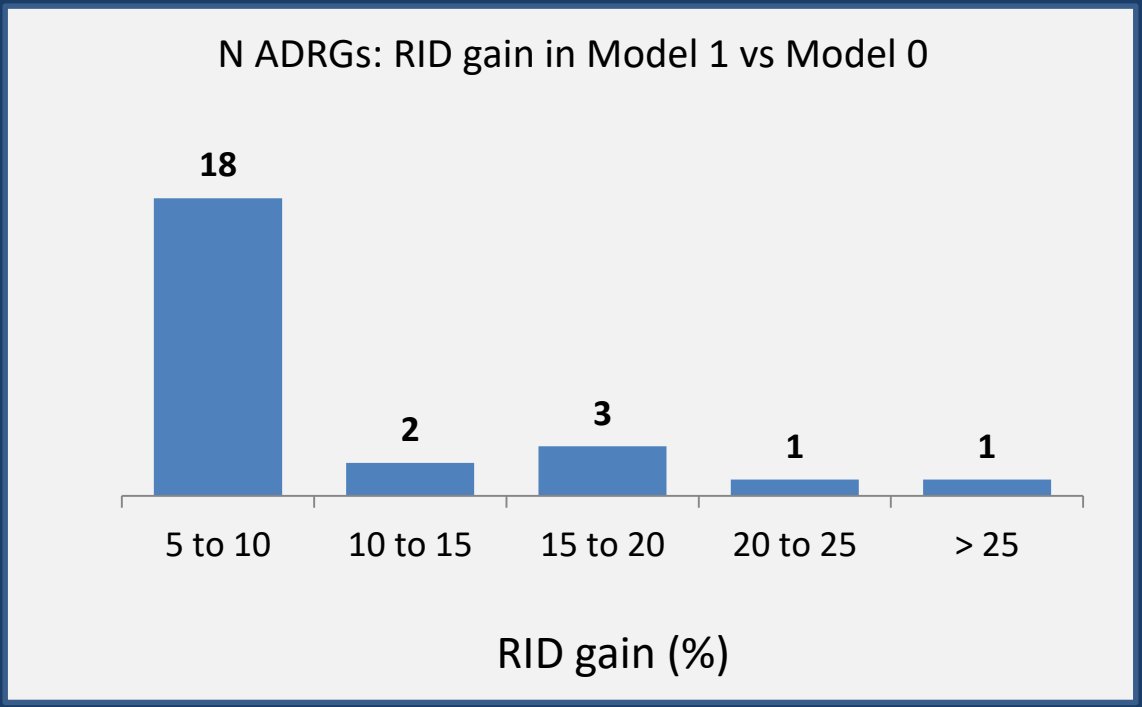
3c/d Change in logic: N DRGs are the same in Model 0 and 1: – Model 0 did NOT pass all criteria

- Balance is tilted toward accepting Model 1
- The threshold of RID gain is set to 2%
- By default (a) Model 0 if RID gain below threshold; (b) Model 1 if above



4 Number of DRGs increase

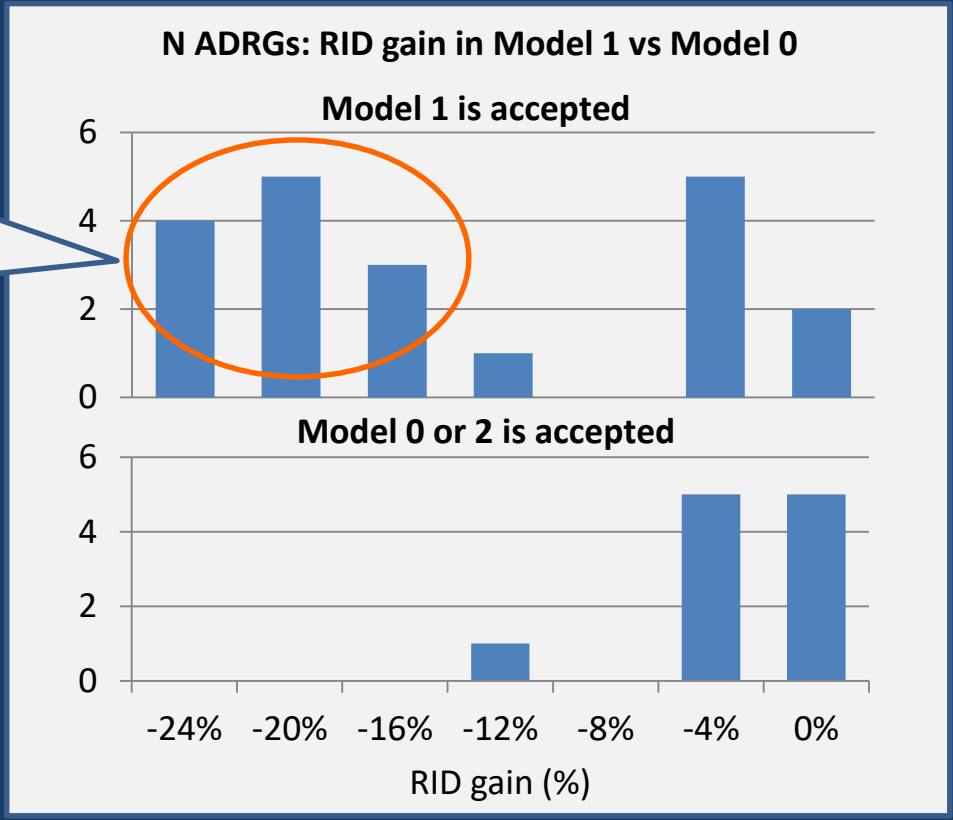
- 25 ADRGs have Model 1 with 1 additional DRG compared to Model 0
- Accept Model 1 by default



5 Number of DRGs decrease

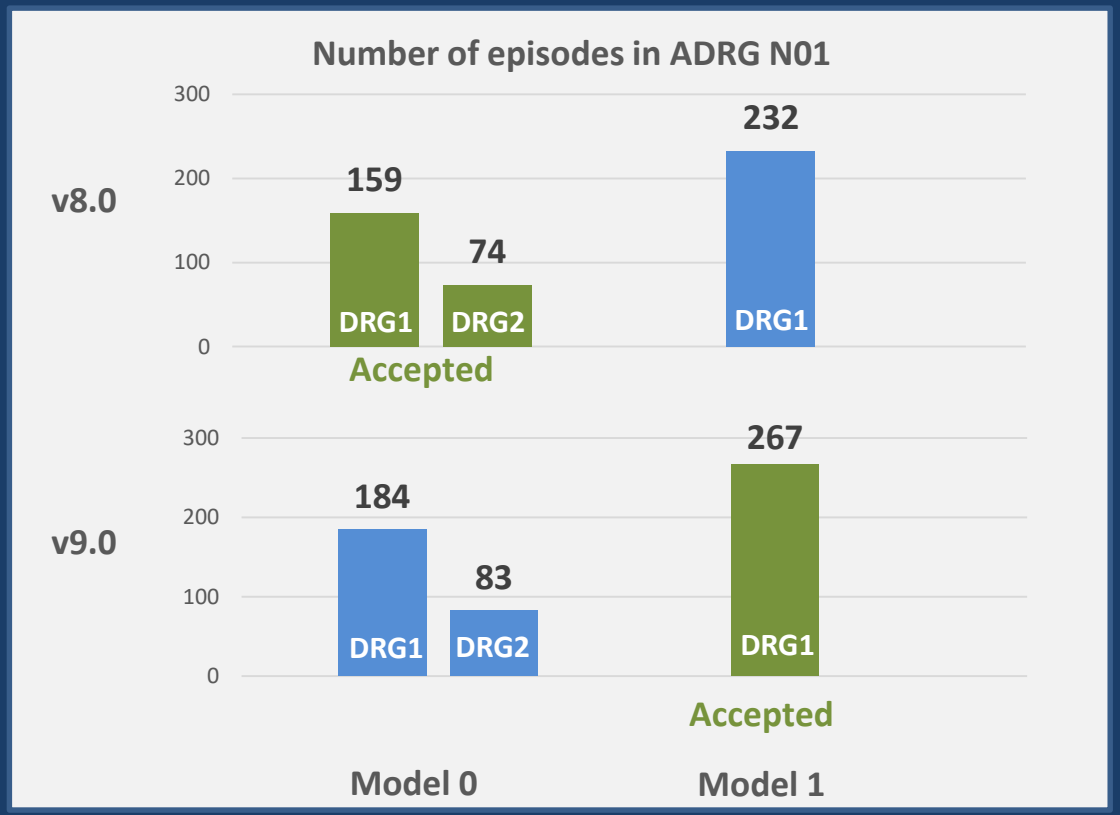
- Historically, in v8.0 all sameday DRGs were abolished and additional splits were forced to replace them and to keep some continuity with v7.0.
- Strategy – review one-by-one, accepting by default Model 1.
- Conditions: gross and persistent from v8.0 breach of criteria.

In most cases accepting Model 1 caused a substantial drop in RID, because RID was artificially kept high.



5 Number of DRGs decrease: Example of ADRG N10

- In v8.0 the model with 2 DRGs was accepted despite severely breaching criterion of minimum size = 200 episodes.
- In v9.0 the data again produced very similar candidate models, and the model with 1 DRG (Model 1) was accepted).
- As the result RID dropped from 36.7% to 0.



6-7: Non-ECCS ADRGs and Neonates

Non-ECCS ADRGs (n=6)

- Additional splitting variables: LOS, transfer to acute facility and age,
- Intensively discussed in v8.0

Neonates (n=11, plus 6 ADRGs with no change)

- Possible replacement of splitting variable with gestational age

Strategy: Leave alone

ACCD

Exceptions

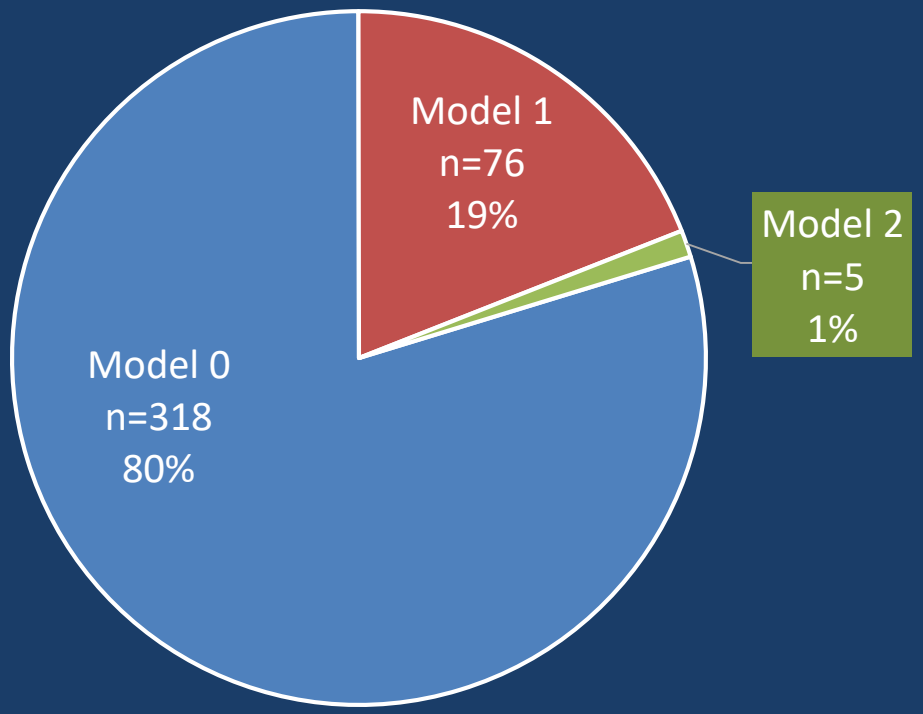
- 20 ADRGs were not assigned default model.
- Most often the exception was made when RID gain criterion was below 5% threshold, but the episodes were too numerous or too costly.
- Most of those are in Group 5 – N DRGs decrease – for most of them the reason for exception has also occurred in v8.0, i.e. it is historic.

Group of ADRG		Default Model	N ADRGs	Exceptions
1	No change	m0	211	
2	New of substantial change in composition	m1	19	3
3	N DRGs is the same in m0 and m1 - Below threshold of RID gain of 2 or 3% - Above threshold	 m0 m1	 81 15	 3 3
4	N DRGs increase	m1	25	
5	N DRGs decrease	m1	31	11
6	ECCS plus or Non-ECCS ADRGs	m0	6	
7	Neonates	m0	11	

Accepted models: Summary

Number of ADRGs that preserved the logical structure (Model 0) increased from potential 211 to the final 318

Distribution of the final models over ADRGs



Thank you

Acknowledgement to Dr Trent Yeend who created an excellent software for generating candidate models during development of AR-DRG v8.0 and to John Pilla and Peter Tyler from KPMG who contributed to the development of both AR-DRG Version 8.0 and 9.0

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ADRG Statistical summary example

No	ADRG	Description
349	T60	Septicaemia

Default Model	m1		
ACCD Preferred Model	m0	Exclusion	**Accepted**
DTG Accepted Model	m0	Exclusion	

Comment delta RID=4.1%; high cost ADRG;
Main group g5 N DRGs decrease
Main w details g5 N DRGs -1 or -2

	Model	All crits
v80 - Accepted, v80 DCLs (as m0)	A	✗
- ECCS only, Optimal (as m1	B	✓
v80 - Accepted - v90 DCLs	0	✗
v90 - ECCS only, Optimal	1	✓
n DRGs= m1+1*	2	✗

Δ Logic	Δ DRGs	ΔRID	DRGs	RID	Logic
≠	-1	-4.8%	3	25.1%	If (ECCS >= 3.5) then drg3; else if (ECCS >= 2.0) then drg2; else drg1
			2	20.2%	If (ECCS >= 2.5) then drg2; else drg1
≠	-1	-4.1%	3	24.1%	If (ECCS >= 3.5) then drg3; else if (ECCS >= 2.0) then drg2; else drg1
			2	20.1%	If (ECCS >= 2.5) then drg2; else drg1
			3	24.2%	If (ECCS >= 4.0) then drg3; else if (ECCS >= 2.0) then drg2; else drg1

ADRG Summary	Per Annum
Total episodes, v90, 2011-14	14,873
Change due to regrouping	-0.1%
Mean Cost, $	11,100
Total cost $/year	165,086,553

Criteria Summary	A	B	0	1	2
1a - Eps/year >=200	✓	✓	✓	✓	✓
1b - Tot cost/y>= $1 ml	✓	✓	✓	✓	✓
1c - Eps/drg >= 10 %	✓	✓	✓	✓	✓
2 - 2a or 2b	✓	✓	✓	✓	✓
3a - Rel ΔCV >= 1.3	✓	✓	✓	✓	✓
4a - ΔRID >= 5%	✗	✓	✗	✓	✗

Model: Mean cost, $	A	B	0	1	2
drg 1 - min	7,079	8,043	6,104	6,994	6,104
drg 2	12,130	18,745	11,110	17,763	11,803
drg 3	24,175		22,934		26,031
drg 4 - max					

Episodes per year	A	B	0	1	2
drg 1	5,366	7,524	6,544	9,203	6,544
drg 2	4,300	4,082	5,570	5,670	6,442
drg 3	1,939		2,758		1,886
drg 4	.				

Desined by M Navakatikyan, 2016, NCCH