

Efficiency Methodology

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Overview

- Definition
- Clinical Grouping Methods
- Implementation Considerations
- Reporting to Physician Organizations
- Example Analysis: Hypertension

Definition

$$\frac{\text{Output}}{\text{Inputs}} \Rightarrow \frac{\text{Episode}}{\text{Services}}$$

Clinical Grouping

- Clinical Condition
- Episode building
- Accounting for Comorbidities

Disease Staging Methodology

Disease Staging Framework

- Initially developed under contract to NCHSR with ongoing private development by Medstat/Jefferson teams
- Software converts a stream of claims into clinically homogeneous groups
- Takes over 15,000 ICD-9-CM codes to 560 disease categories
- Independent of setting or treatment
- Etiology assigned to each category
- Severity stratification based on robust clinical criteria
- Predicts a balanced set of outcome measures

Disease Staging

Disease Staging Severity Stratification

Stage 0	History of a disease
Stage 1	Conditions with no complications or problems of minimal severity
Stage 2	Problems limited to an organ system; significantly increased risk of complications
Stage 3	Multiple site involvement; generalized systemic involvement; poor prognosis
Stage 4	Death

DISEASE: **Coronary Artery Disease with prior Coronary Revascularization**

ETIOLOGY: **Degenerative, Genetic**

STAGE	DESCRIPTION	DIAGNOSTIC FINDINGS	ICD-9-CM CODES
1.1	Coronary atherosclerosis or asymptomatic chronic ischemic heart disease or old myocardial infarction	Coronary atherosclerosis OR asymptomatic chronic ischemic heart disease OR old myocardial infarction OR history of myocardial infarction ≥30 days old AND ejection fraction ≥ 50% [echocardiogram report or nuclear ejection fraction report]	Dx V4581, 99603, 41402-41407; (Dx 41181, 412, 41400-41405, 4292) + (Dx V4581, 99603)
1.2	Chronic stable exertional angina or chronic ischemic heart disease	Chronic stable exertional angina OR chronic ischemic heart disease	(Dx 4139, 4148-4149) + (Dx V4581, 99603)
2.1	Progressing angina pectoris or exertional myocardial ischemia at low workload or old myocardial infarction with low ejection fraction	Progressing angina pectoris OR exercise induced myocardial ischemia at < 6 METS [stress test report] OR history of prior myocardial infarction ≥ 30 days AND left ventricular ejection fraction < 50% [echocardiogram report or nuclear ejection fraction report] AND left ventricular ejection fraction >= 30% [echocardiogram report or nuclear ejection fraction report]	(Dx 4110, 41189) + (Dx V4581, 99603)
2.2	Prinzmetal's variant angina	Change in nature of onset of symptoms and severity of known anginal pain AND past history of angina OR angina occurring at rest AND ST-T elevations at time of pain [EKG report] OR Prinzmetal's variant angina	Dx 4130-4131 + (Dx V4581, 99603)

Medical Episode Grouper (MEG) Methodology

Episodes of Care

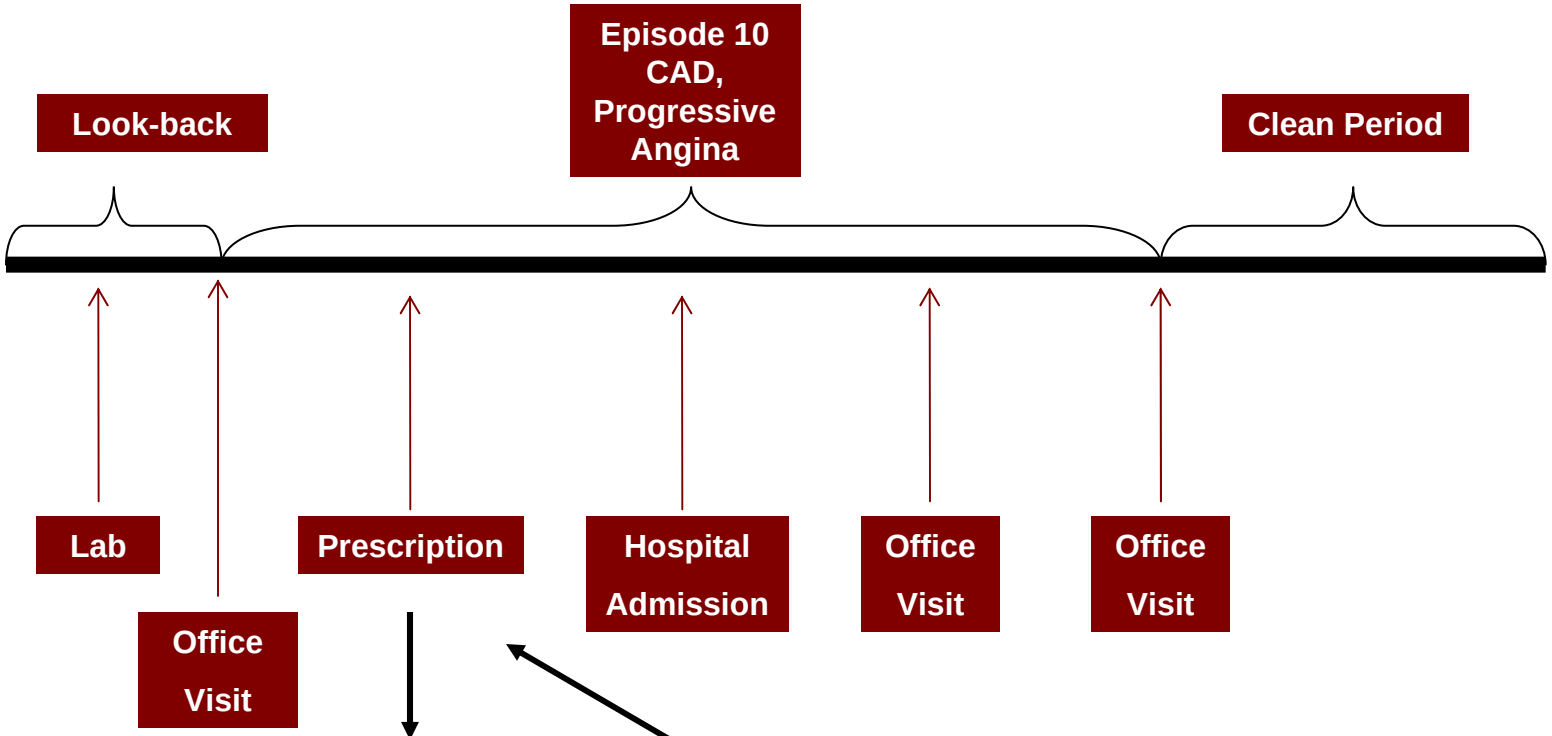
- Health care is typically provided in a series of separate but related services
- All of these services must be included to produce a comprehensive economic analysis of care provided to patients
- Using an episode approach enables an assessment of costs of care and lends itself to the analysis of the processes as well as the outcomes of care

Source: Hornbrook MC, Hurtado AV and Johnson RE, Health care episodes: definition, measurement and use, *Medical Care Review* 42:2 (Fall 1985)

Episode Construction

- Case Mix Adjustment - Diagnosis codes from health care claims and other administrative data are grouped into one of over 560 Disease Staging disease categories and severity stages
- Clean periods unique to each disease category are used to develop boundaries around the episode
- Mappings of National Drug Codes (NDCs) and laboratory/diagnostic procedure codes enable pharmacy/lab/diagnostic claims to be grouped to relevant episodes
- Lab and diagnostic imaging claims preceding an episode are examined to determine whether they should be combined with the episode

MEG—Putting it All Together



DRUG TRANSACTION FILE

PATID	*NDC*	SERVDATE
01	ISDN	95-01-15
01	INSUL	95-02-15
01	INSUL	95-04-15
01	AMOX	95-04-15
01	AMOX	95-11-15
01	GRHORM	95-11-15

LOOKUP TABLE

NDC	EPGRP
ISDN	10
INSUL	359
INSUL	360
INSUL	361
AMOX	484
AMOX	86

Coronary Artery Disease Episodes

Stage	Description	Episodes	Mean Payments
1	Stable Angina	80,470	$2,657
2	Progressive Angina	14,599	$11,017
3	AMI	7,749	$16,811
Total		102,818	$4,911

MarketScan 2002

Patient-Level Complexity Adjusted Episodes

The Challenge

Patient A

Progressive Angina
2005 Costs ~ $15,323

62 year old, Male

Comorbidities
- Congestive Heart Failure
- Type 1 Diabetes
- Vascular disease
- Renal failure

Relative Risk Index = 29.62

Patient B

Progressive Angina
2005 Costs ~ $5,576

58 year old, Female

Comorbidities
- Hypertension, minimal

Relative Risk Index = 2.54

Patients with at the same severity level within an episode can have significant cost variance….

...due to different comorbidity profiles.

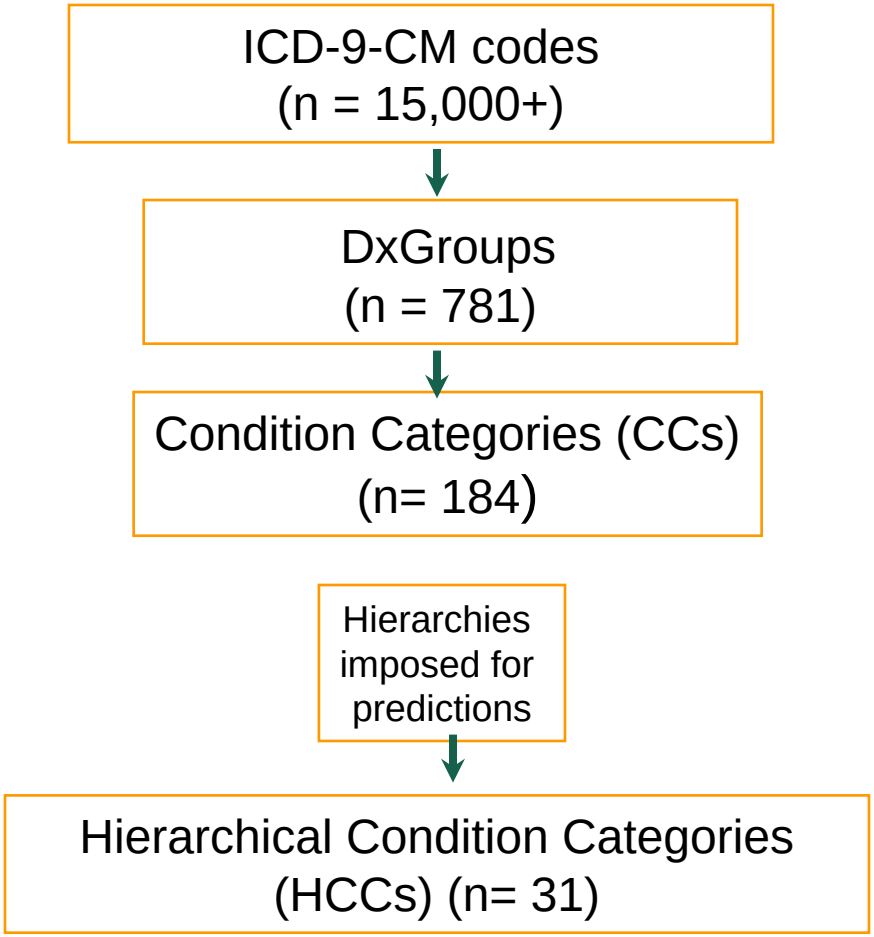
Episodes and Patient-Level Risk Adjustment

- MEG
  - Disease-based episodes of care, e.g., Coronary Artery Disease and Diabetes
  - Disease severity predicated on the progression of medical complications of a disease, e.g., Coronary Artery Disease:
    - Stage 1: Stable angina
    - Stage 2: Progressive Angina
    - Stage 3: AMI
  - Unit of analysis – an episode

Episodes and Patient-Level Adjustment (cont'd)

- Diagnostic Cost Groups (DCGs)
  - Risk adjustment methodology used to predict current or future patient costs, e.g. relative risk score (RRS)
  - Unit of analysis – the patient
  - Based on all prior or current year claims to identify patient-level complexity/comorbidities
- Together, MEG and DCGs provide a complete picture of a patient

DCG Model – Clinical Output



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- Each ICD-9-CM code maps to one DxGroup (clinically homogeneous). Most members have multiple DxGroups.
- CCs are clinical groupings of DxGroups that are related and imply similar resource use (organized by body system or disease group). Each DxGroup maps to only one CC.
- 31 Hierarchies are imposed on the CCs to produce HCCs. These clinical hierarchies identify the most costly manifestation of each distinct disease. A member is only assigned the highest CC in each hierarchy. A member will likely have multiple HCCs.

DCG Relative Risk Score (RRS)

Risk Categories	Relative Risk Score
62 year old male	.45
HCCs	
Diabetes with renal manifestations	5.71
Type 1 diabetes	.95
Congestive heart failure	1.84
Unstable angina	.92
Vascular disease with complication	1.20
Vascular disease	0 (h)
Dialysis status	18.09
Diabetes with congestive heart failure	.46
	29.62

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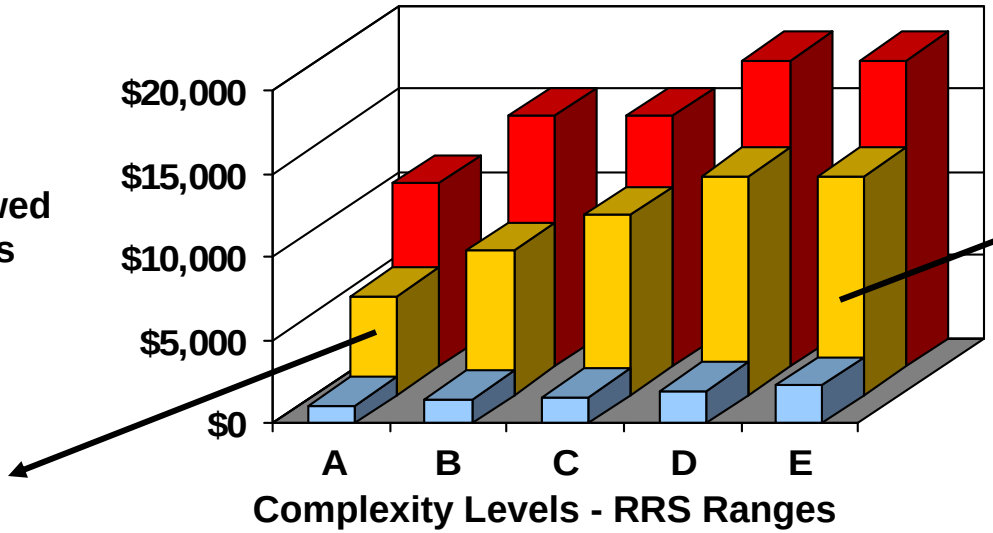
Coronary Artery Disease: Severity Stages and Complexity Levels

		Complexity Levels – RRS Ranges Mean Allowed Payments				
	Disease Severity Stage	**A**	**B**	**C**	**D**	**E**
Stable Angina	**1**	$1,080	$1,424	$1,679	$1,940	$2,246
Progressive Angina	**2**	$5,974	$8,704	$10,825	$13,173	$13,173
Acute Myocardial Infarction	**3**	$11,041	$15,041	$15,041	$18,423	$18,423

Source: Medstat Health Plan Customer, 83 million claims, 2003-2004

Dimensions of Risk – Coronary Artery Disease



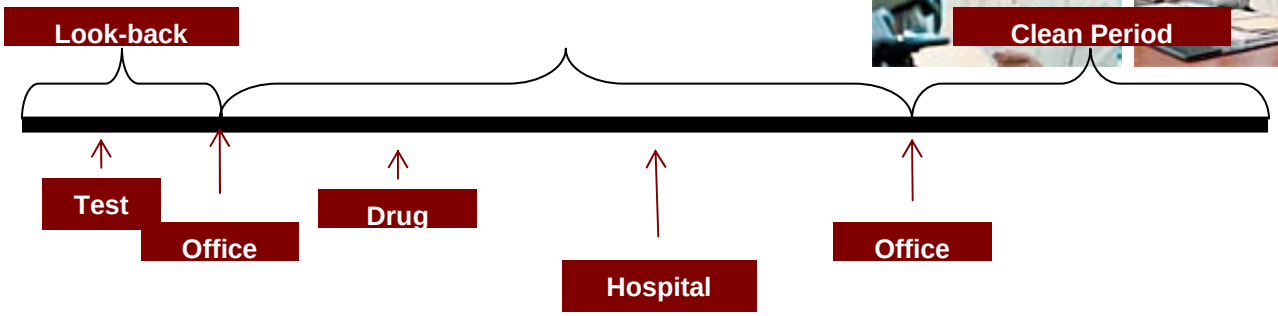
Source: Medstat Health Plan Customer, 83 Million Claims, 2003-2004

Episode 496
Asthma

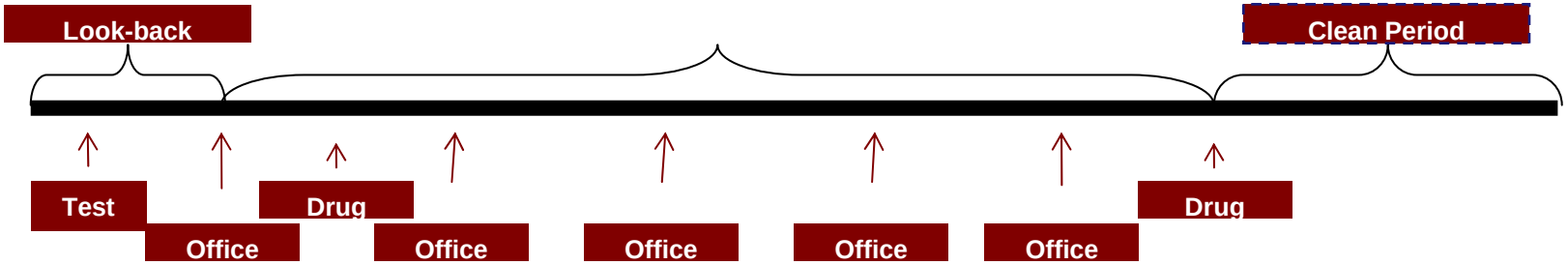
Which Physician is most Efficient?



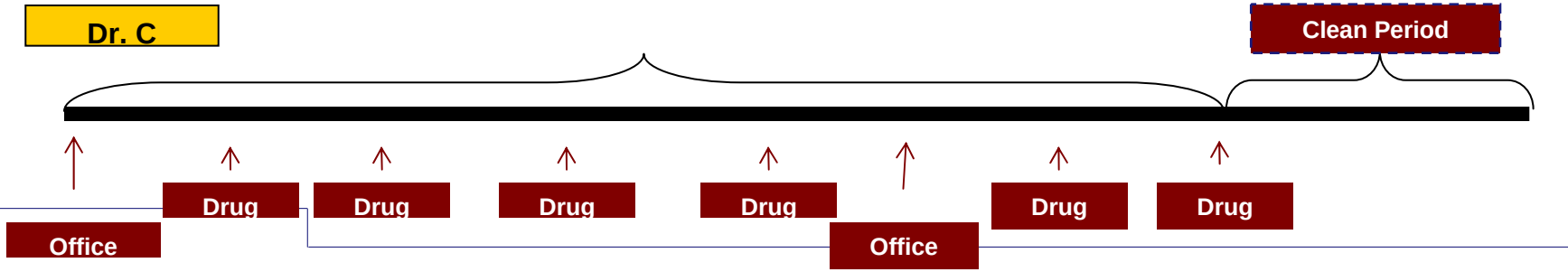
Dr. A



Dr. B



Dr. C



Implementation Issues

- Standardized Pricing
  - Capitated encounters do not contain actual charges
  - Appropriate standard costs are developed to convert utilization to dollars
  - For example, Resource Based Relative Value Units to convert CPT codes to dollars
- Outlier Trims
  - Exclude episodes with extreme high and low costs (top and bottom percentiles)
- Ensuring Stability and Reliability
  - Minimum sample size per analytic unit (30 episodes but for full scale test results will report all episodes, regardless of sample size)
  - Risk adjustment process applies statistical methods to ensure reliability
- Comparisons to Norms and Benchmarks
  - Internal norms vs external norms
  - Geographic differences to be evaluated
- Attribution:
  - Enrollment information from health plans used to attribute members to POs (requires continuous one year enrollment)

Standardized Pricing

Service Type	Coding	Standard Pricing Methodology	Notes
Facility Inpatient	DRG	CMS DRG Relative Weights and LOS Groups	Scaled by MarketScan™-based conversion factor
Facility Outpatient	CPT, HCPCS	CMS APC and ASC weights	Scaled by MarketScan™-based conversion factor
Professional Fee	CPT	CMS RBRVU weights	CMS RBRVU weights, conversion factor
Lab/Radiology/ Ancillary	CPT	CMS RBRVU weights	CMS RBRVU weights, conversion factor
Pharmacy	NDC + Quantity	Average Allowed Price	MarketScan™ Average (NDC + Quantity)



Physician Organization Reporting

Reporting Results to Physician Organizations

Objectives:

1. Provide meaningful information about overall performance in all efficiency measures
2. Provide enough information to make results actionable, targeting areas for improvement.

Report Formats:

1. Summary document (.pdf) of PO results and relevant benchmark information for all efficiency measures:
   - Generic prescribing
   - Population-base efficiency
   - Episode-based efficiency
   - Efficiency by selected clinical area
2. Excel file of episode results, with detail at episode group level and service type.
3. Reference documentation with information on all measures and methods

Levels of Aggregation

- Methodology produces a common “building block” that can then be aggregated in different ways to produce different measures/measure breakdowns
- Building block is, for each patient episode, the risk adjusted comparison of actual to expected costs by service type:
  - Inpatient
  - Pharmacy
  - Outpatient
  - etc.
- See following slide for illustrative example

Illustrative Episode-Level Results

A	B	C	D	E	F
Patient ID	Episode Start Date	Episode	Disease Stage	Relative Risk Score	Complexity Level
12345	25-Jan-06	10 - Coronary Artery Disease	2.1 Progressive Angina	29.62	5

G	H	I	J	K	L
Total Observed (Standard) Inpatient Costs	Total Expected (Standard) Inpatient Costs	Inpatient Cost-Efficiency	Total Observed (Standard) Pharmacy Costs	Total Expected (Standard) Pharmacy Costs	Pharmacy Cost-Efficiency
$12,000	$6,300	1.90	$1,200	$2,400	0.50

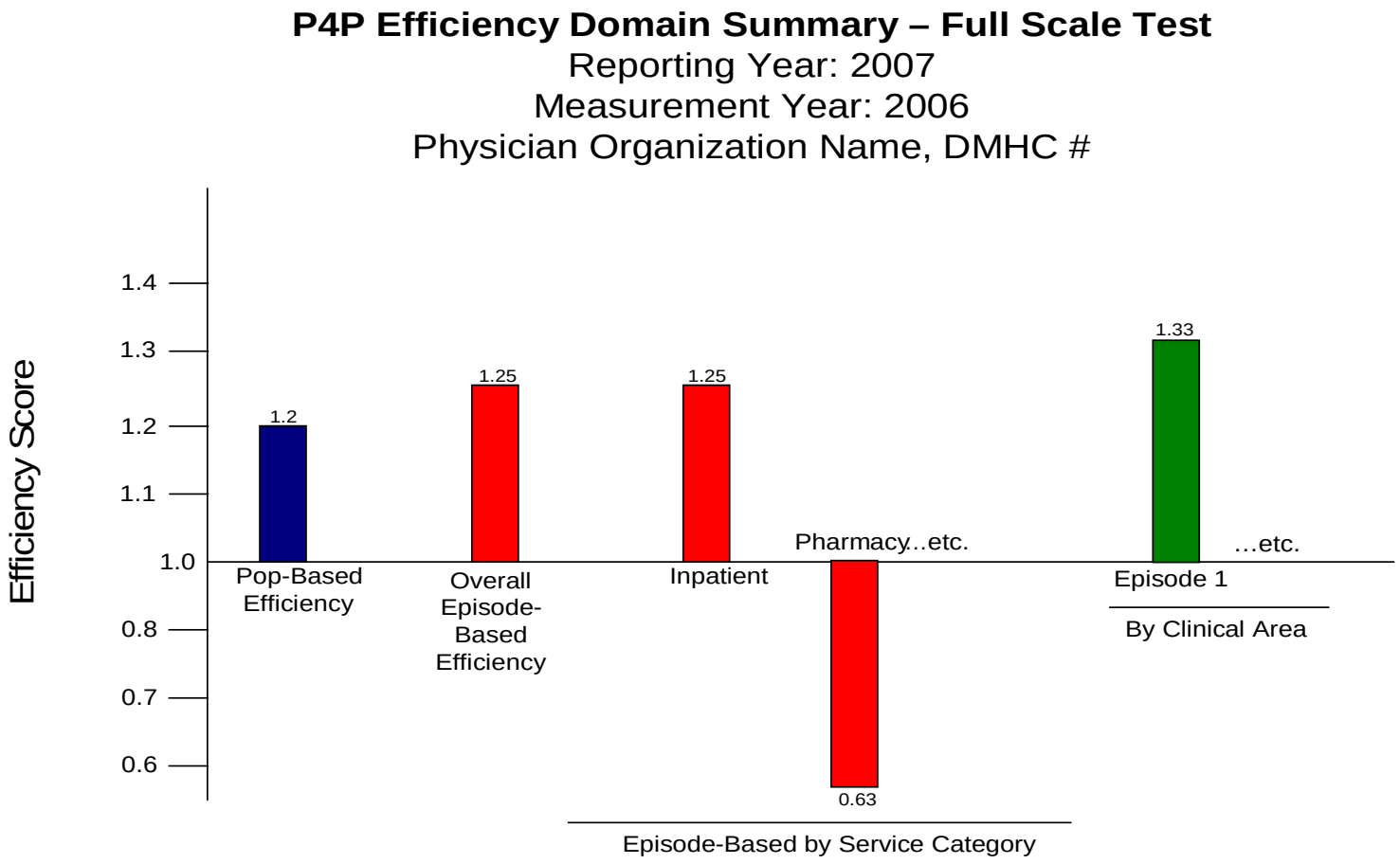
M	N	O	P	Q	R
Total Observed (Standard) Outpatient Costs	Total Expected (Standard) Outpatient Costs	Outpatient Cost-Efficiency	Total Observed (Standard) Costs	Total Expected (Standard) Costs	Overall Episode Cost-Efficiency
$3,500	$4,473	0.78	$16,700	$13,173	1.27

Note: Cost Efficiency = Observed/Expected. Therefore, lower rate is better. Final calculation algorithm TBD.

Level of Aggregation – Service Type: Example

- For all episodes assigned to a group for the measurement year, can:
  - Sum total expected costs for each service type
  - Sum total observed costs for each service type
  - Divide observed by expected costs to get score for each service type and total
- Service types include:
  - Inpatient
  - Prescription Drug
  - Office Visit
  - ER
  - Lab
  - Radiology
  - Outpatient Surgery
- Final set of service types to be informed by pilot test results

Summary Report



Population-Based Efficiency Summary

Group	Number of Members	Ave Observed (Standardized) Cost/Member	Ave Expected (Standardized) Cost/Member	Overall Efficiency
Group A	7,000	$6,000	$5,000	1.20

Percentile	Number of Members	Ave Observed (Standardized) Cost/Member	Overall Efficiency
Minimum			
10th percentile			
25th percentile			
50th percentile			
Mean			
75th percentile			
90th percentile			
Maximum			
Standard Deviation			

Episode-Based Efficiency Summary

Group	Number of Episodes	Ave Observed (Standardized) Cost/Episode	Average Expected (Standardized) Cost/Episode	Overall Efficiency
Group A	50,000	$500	$400	1.25

Percentile	Number of Episodes	Ave Observed (Standardized) Cost/Episode	Overall Efficiency
Minimum			
10th percentile			
25th percentile			
50th percentile			
Mean			
75th percentile			
90th percentile			
Maximum			
Standard Deviation			

Episode Efficiency by Service Type

Group	Number of Episodes	Ave Observed (Standard) Inpatient Cost/Episode	Ave Expected (Standard) Inpatient Cost/Episode	Inpatient Efficiency	Ave Observed (Standard) Pharmacy Cost/Episode	Ave Expected (Standard) Pharmacy Cost/Episode	Pharmacy Efficiency	Ave Observed (Standard) Office Visit Cost/Episode	Total Expected (Standard) Office Visit Cost/Episode	etc.	Ave Observed (Standard) Cost/Episode	Ave Expected (Standard) Cost/Episode	Overall Cost-Efficiency
Group A	50,000	$150	$120	1.25	$100	$160	0.63	$140	$180		$500	$400	1.25

Percentile	Inpatient Efficiency	Pharmacy Efficiency	.etc	Overall Cost-Efficiency	Avg Observed Cost per Episode
Minimum					
10th percentile					
25th percentile					
50th percentile					
Mean					
75th percentile					
90th percentile					
Maximum					
Standard Deviation					

Excel File of Episode Results

- One row for each Episode Group (560 groups) (e.g. Essential Hypertension)
- Data Elements:
  - Episode name
  - Type (e.g. Chronic)
  - Number of Episodes
  - Total Observed Cost
  - Mean Observed Cost
  - Mean Expected Cost
  - Overall Efficiency Index
  - Percent of Episodes
  - Percent of Costs
  - Mean Episode Length
  - Observed and Expected Costs and Efficiency Score by Service Type
- Summary Group Roll-Ups
  - Episode Summary Group (192 groups)
  - Body System

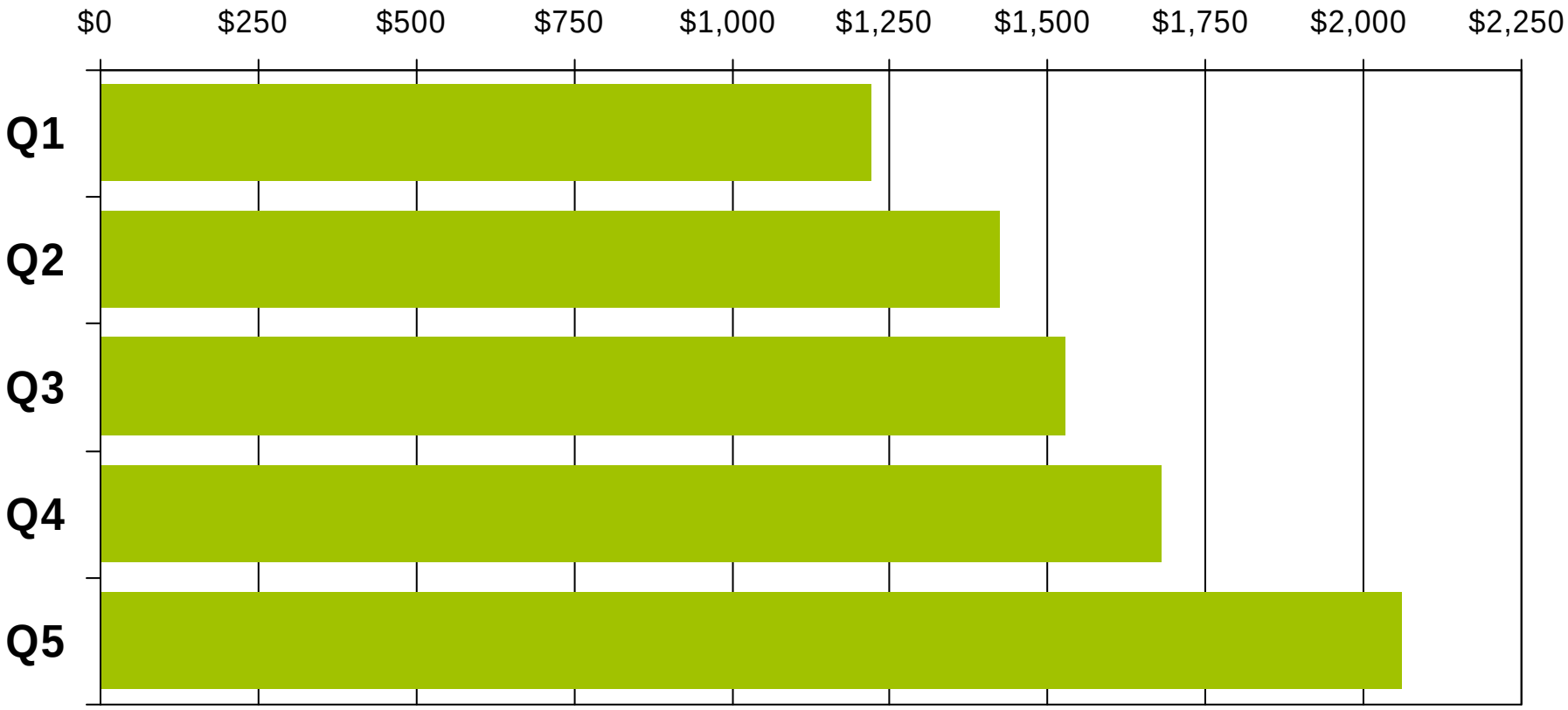
Example Analysis of Episodic Efficiency Results: A Study of Treatment Patterns

- Standard reports to Physician Organizations will include service type benchmark data for a number of high impact episode groups.
- Considering deeper investigation into specific sources of variation in costs between high and low performing benchmark groups.
- Results could provide useful insights to PO improvement initiatives.

Study Methodology

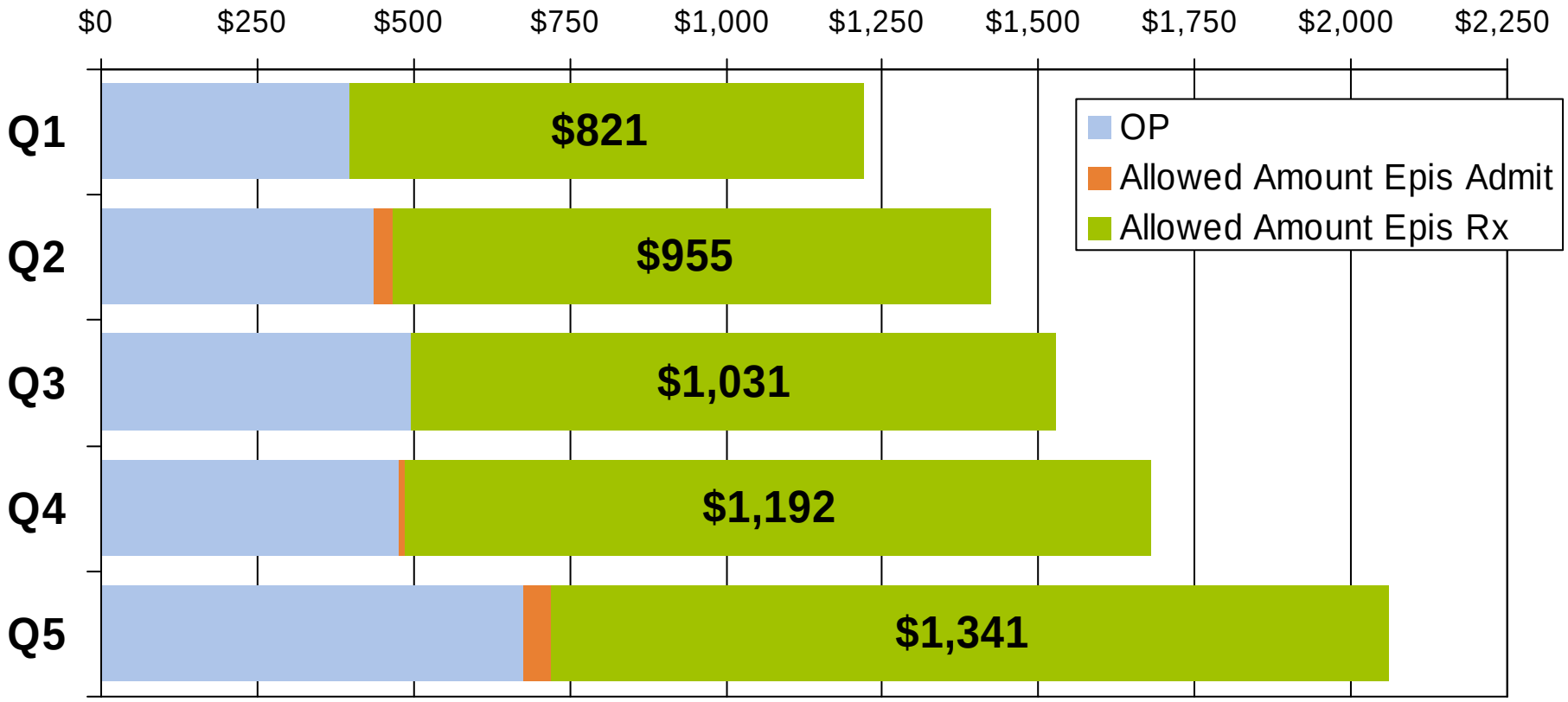
- Select episode groups for investigation:
  - High variability in provider results
  - High volume
  - High cost
- Calculate overall performance index for each provider (e.g. physician group)
- Sort by performance index and categorize into “tiers” (e.g. quintiles)
- Profile tiers by service category
  - Performance index
  - Costs
  - Utilization
- Identify specific sources of variation in costs by service category

Hypertension:
Average Total $/Episode by Provider Quintile



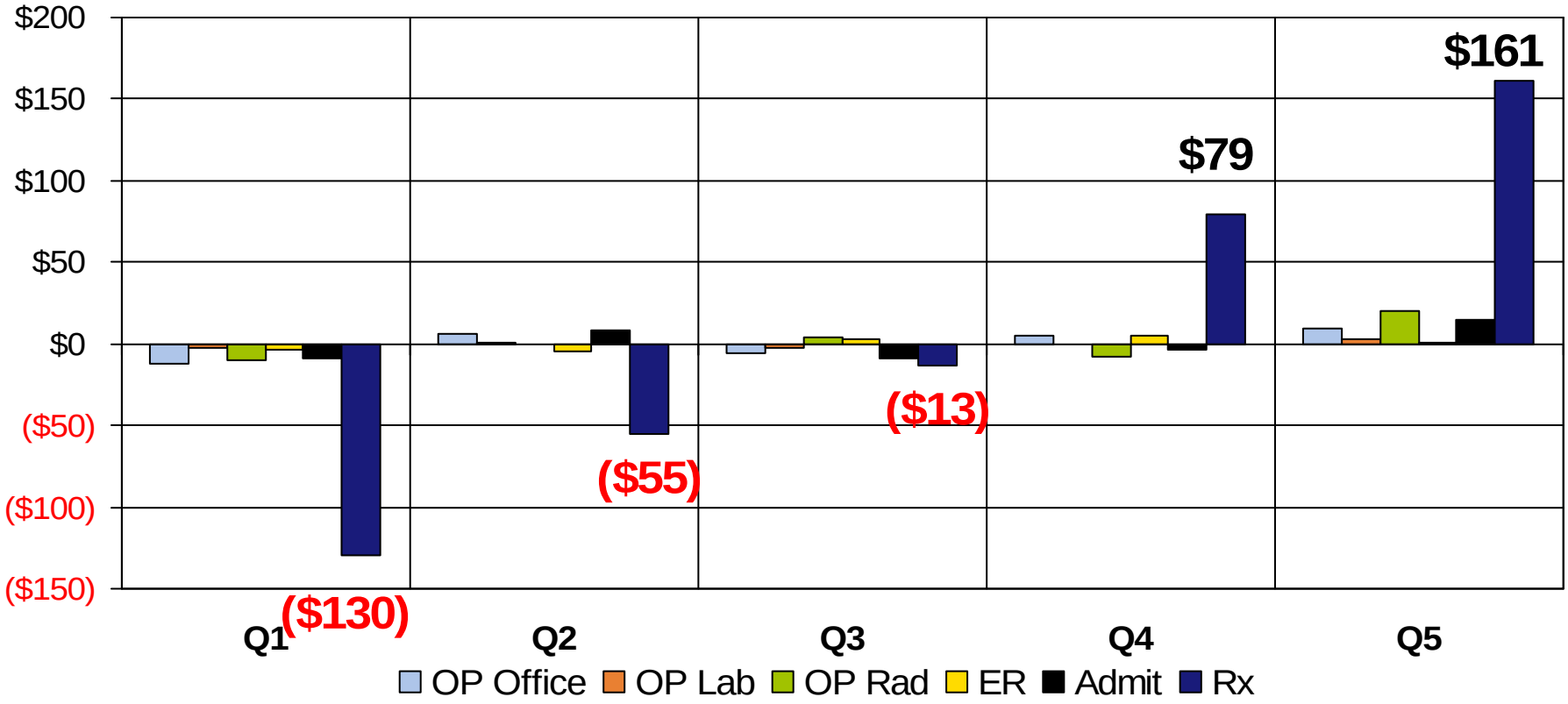
- Average cost per episode is standardized for patient risk
- Excludes outliers and incomplete episodes

Hypertension:
Average $/Episode by Provider Quintile



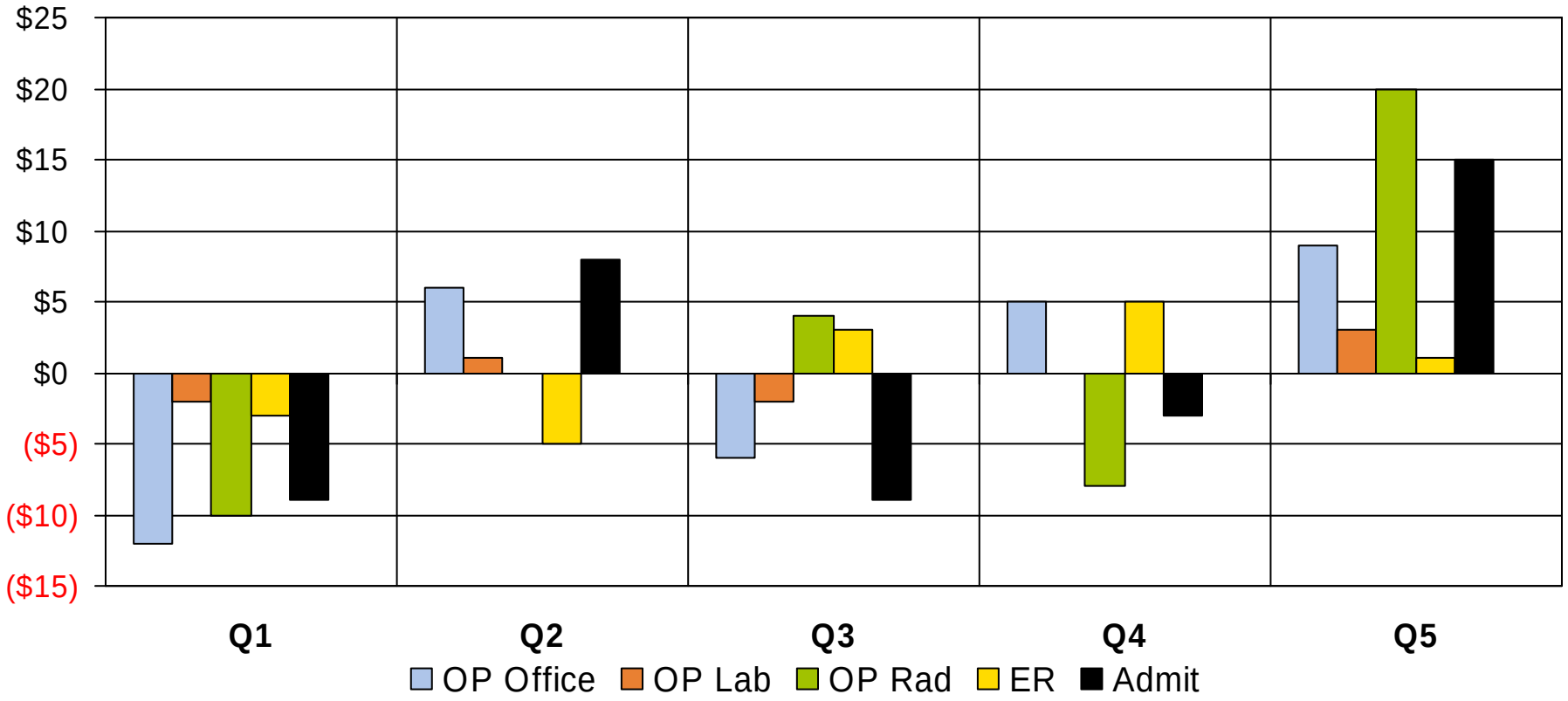
- Prescription Drug accounts for ~70% of costs

Hypertension Episode Variance Analysis



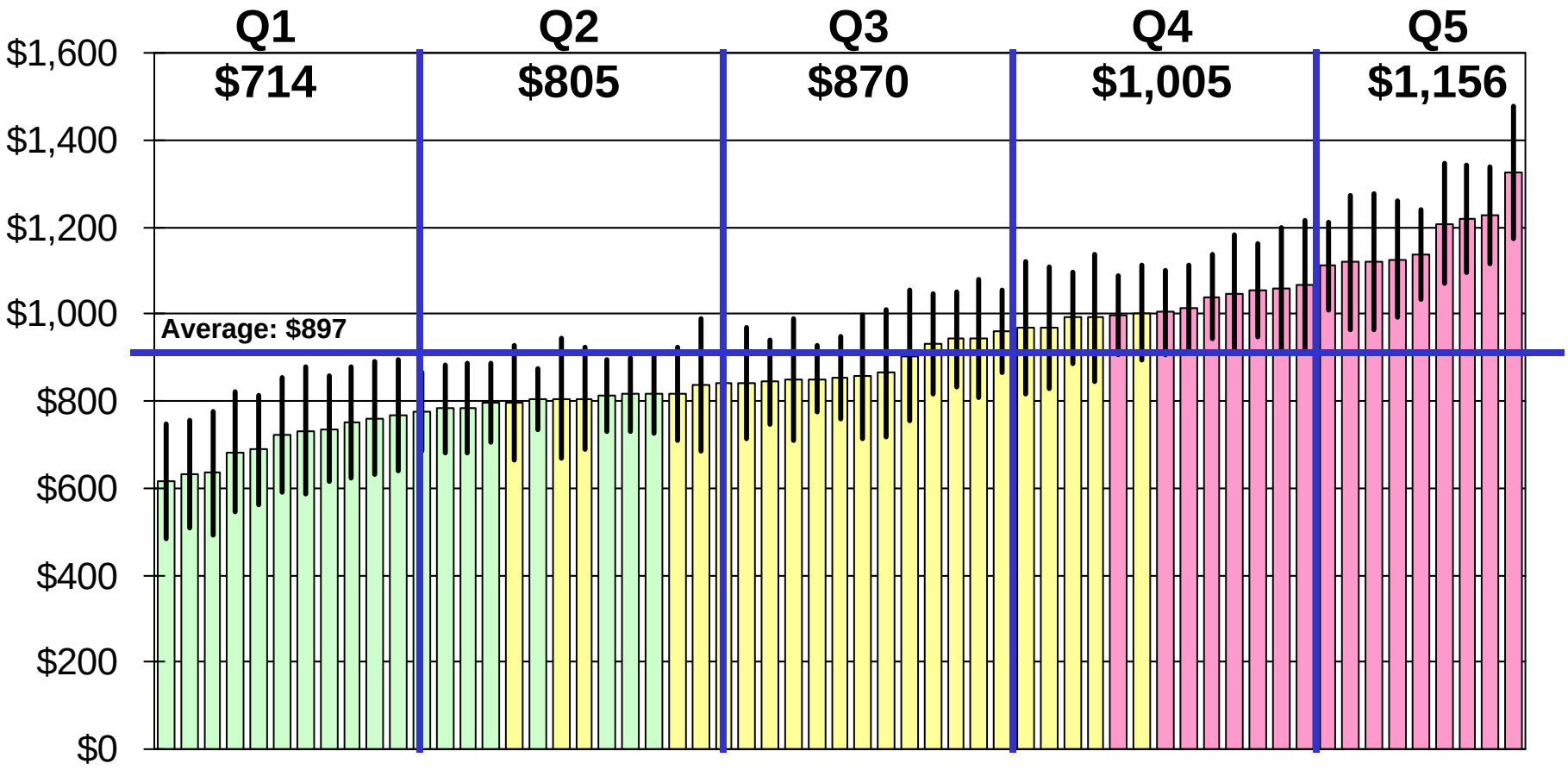
- As it accounts for the majority of cost, Rx accounts for most of total variance
- Question: Are high drug costs allowing for efficiency elsewhere?

Hypertension Episode Variance Analysis – No Rx



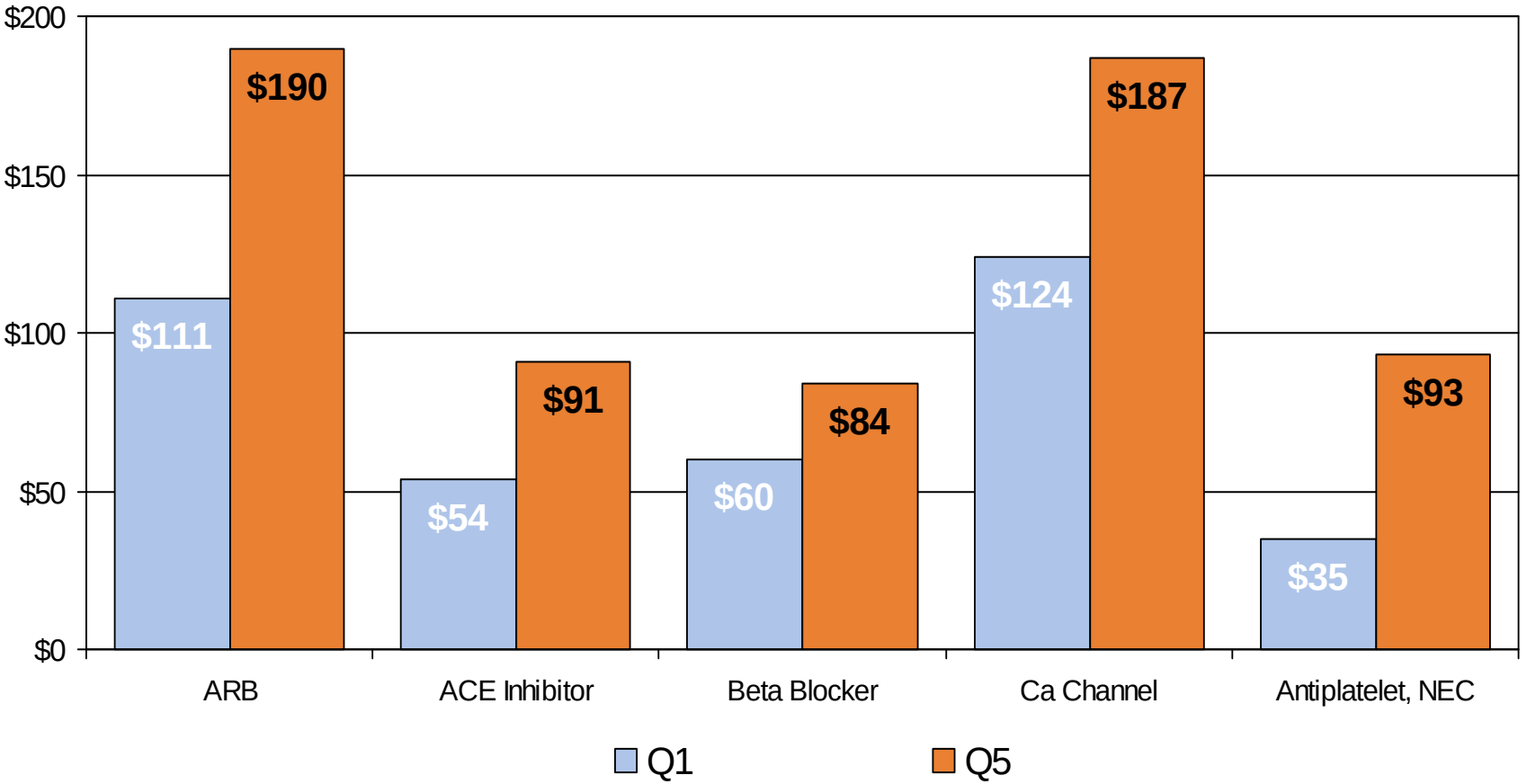
- Similar variation is seen in cost for medical care, particularly for Quintiles 1 & 5
- Differences in Quintiles 2 – 4 are less consistent

Hypertension:
Provider Variance: Prescription Drug $ per Episode



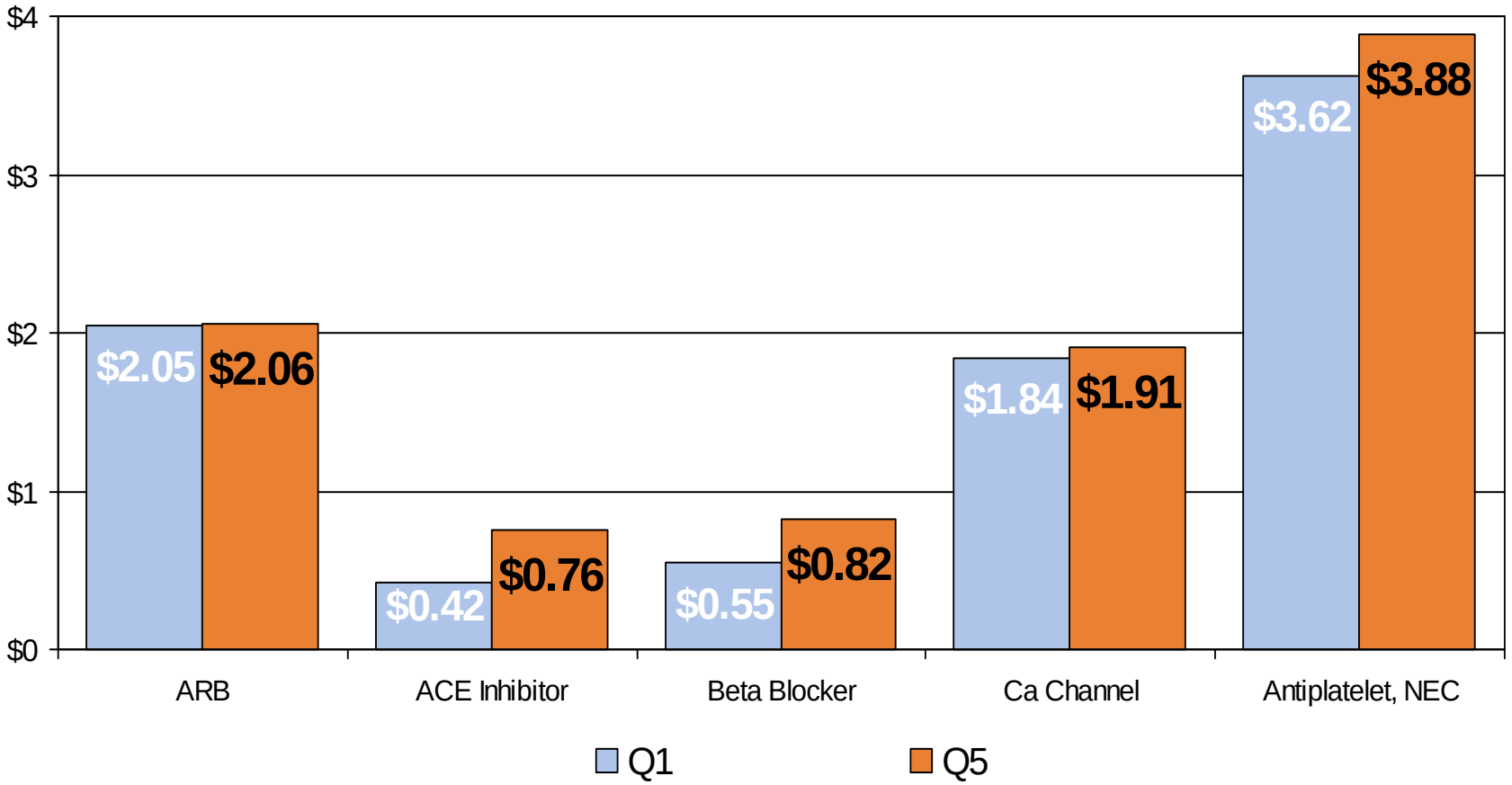
- Sample of 59 providers managing 30+ stage 1.01 hypertension patients
- Prescription drug payments standardized for price and patient risk

Average Prescription Drug $/Epis for 1st and 5th Quintiles



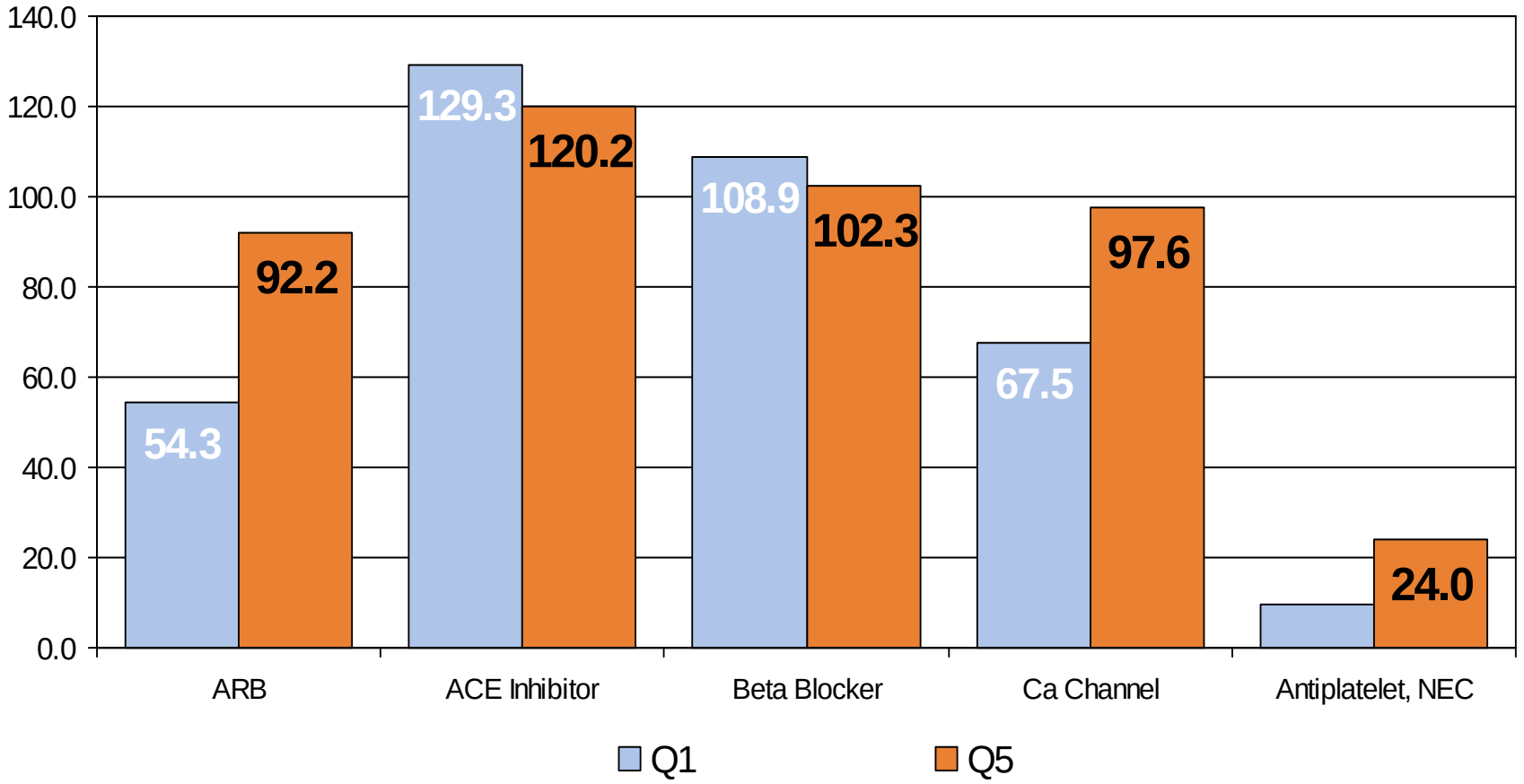
Compared to Q1, Q5 had higher $/Episode in all 5 major classes

Average Prescription Drug $/Day for 1st and 5th Quintiles



Use of more costly drugs within each class contributed to Q5's higher costs

Average Days Supply/Episode for 1st and 5th Quintiles



However, higher use was a greater factor for ARB and Ca Channel drugs

Summary

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