

# **BUSINESS HEALTH CARE GROUP 2021 PHYSICIAN PERFORMANCE STUDY**



# Study Objectives That I'll Address Today

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1. What is the quality and efficiency of each PCP, looking at data from 2018-2019 combined?
2. What is the cost-efficiency of individual specialists when performing certain procedures, looking at data from 2018-2019 combined?
3. What is the cost savings potential of incenting patients to see higher efficiency PCPs/Specialists and/or improving the performance of lower performing PCPs/Specialists?

# STUDY METHODOLOGY



# Data Source, Optum Episode Treatment Groups (ETGs) and Optum Evidence-Based Quality Measures (EBMs)

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- Data Source: Wisconsin Health Information Organization (WHIO), Wisconsin All-Payer Claims Database
- Data for 2 years (2018 and 2019) were used
- Patients were included if they had both medical and pharmacy benefits throughout all of 2018 and 2019
- Attribution of patients to PCPs
  - Used assigned PCP if the patient had one
  - If no assigned PCP, used imputed PCP (based on most cost)
- Episodes of care were included in our cost-efficiency analysis if a) they were completed, b) were not cost outliers (determined by outlier flag in the database), c) there were  $\geq 500$  episodes for that ETG across all PCPs included in our analysis, and d) we believed that a PCP could reasonably be held accountable for the cost of an episode in that ETG. 151 ETGs met these criteria.
- We used 294 EBMs related to management of preventive care and diseases commonly managed by PCPs to evaluate quality of care.

# Calculation of PCP Quality & Cost-Efficiency Scores

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- Quality scores for each PCP were calculated as  $\text{sum}(\text{compliant EBM results}) / \text{sum}(\text{total compliant and non-compliant EBM results})$  based on all EBMs that were relevant to that PCP's patients. The overall mean, 25<sup>th</sup> percentile, median, and 75<sup>th</sup> percentile values were calculated for the entire population of PCPs.
- Cost-efficiency scores were calculated for each ETG for each PCP using this formula:

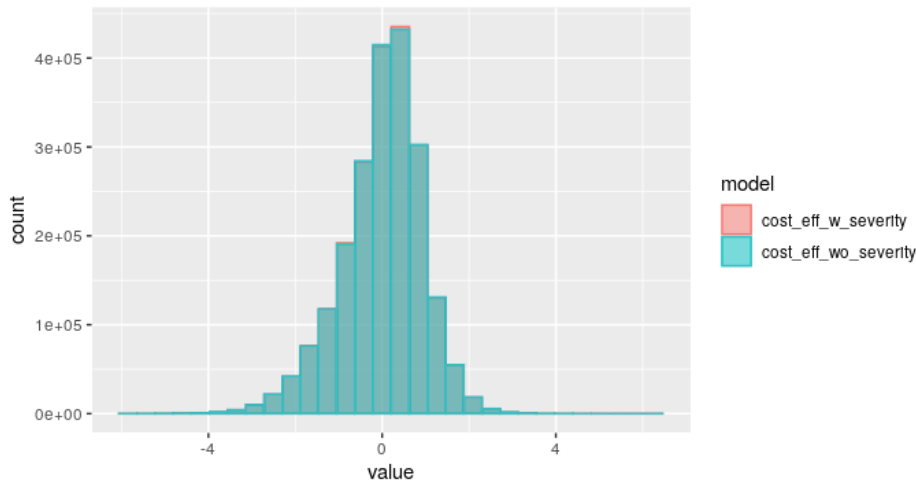
$$\text{cost efficiency score} = \ln \frac{\text{predicted cost}}{\text{actual cost}}$$

- Actual cost was normalized cost. Predicted cost was estimated using the GNS artificial intelligence (AI) platform.
- The following variables were controlled for explicitly in the models: age, gender, line of business, specific comorbidities, number of comorbidities, specific complications, number of complications, and single-level CCS diagnosis. Other potential confounders were controlled for by our AI-platform.
- An overall cost-efficiency score for an individual PCP was derived by taking a weighted average of that PCP's ETG-specific cost-efficiency scores, where the weight was the number of episodes in each ETG for which the PCP was responsible.

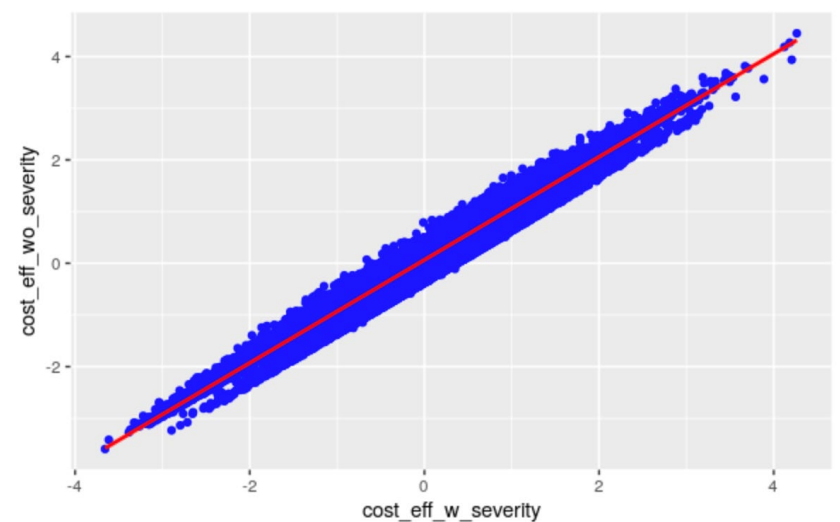
# Optum Severity Score and ERG

- REFS models with and without Optum severity score or patient level ERG score were compared.
- No difference adding this information to the models.
- Models with and without severity score or ERG gave very similar distribution in episodes cost efficiency scores.

2018 and 2019 episodes cost efficiency scores with and without Optum severity scores



2018 and 2019 cost efficiency scores with and without Optum severity scores (Hypertension, wo comp, w comorb episodes)



# Calculation of Cost-Efficiency Scores for Specialists

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- We calculated MD-specific cost-efficiency scores for specialists who performed any of 10 procedures using the same methodology as we used to calculate cost-efficiency scores for PCPs.
- The 10 procedures we examined were:
  1. Cataract surgery
  2. Vaginal deliveries
  3. C-sections
  4. Total hip replacement
  5. Total knee replacement
  6. Coronary angioplasty
  7. Coronary artery bypass surgery
  8. Hysterectomy
  9. Cholecystectomy
  10. Laminectomy and spinal fusion

# Estimation of Potential Cost Savings Opportunities

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- Using the GNS AI platform simulation capability, we estimated the potential cost savings that could be realized if all MDs practiced in a fashion that was comparable to the 50<sup>th</sup> percentile in the distribution of cost-efficiency scores for a) PCPs and b) each type of specialist-procedure combination.



# REFS is GNS' Causal AI Platform

- Learns mechanisms/drivers – not just patterns -- directly from the data
- Predictions explained
- Allows for counterfactual simulations

- **The only commercially available, scalable causal AI platform**

- Extensive peer reviewed publications
- KOLs
- Various validation methodologies

**Advanced AI**



**REFS**

**Model Validation**

**Transparent & Scalable Mathematics**

**Technical Capabilities**

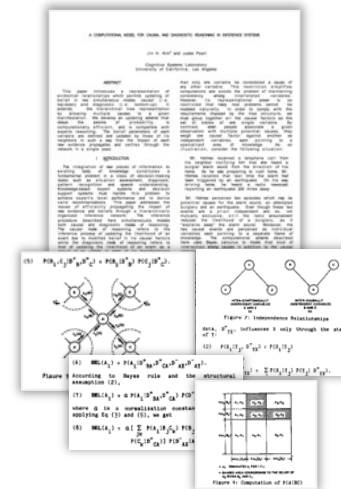
- Based on Judea Pearl's Turing award-winning mathematics
- Based on Bayesian Network Inference and Global Optimization
- Accounts for known and unknown confounders

- Multidimensional data sets
- Handles a large number of data modalities and >10k variables

# Underpinnings of the REFS Platform: Award Winning Mathematics - Scaled

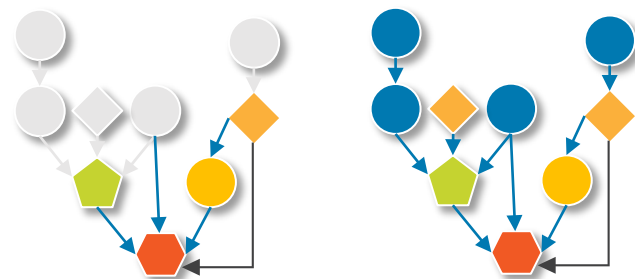


- Judea Pearl wins of 2011 Turing Award for *Probabilistic Cause and Effect Mathematics*
- Mathematical technique doesn't scale to large datasets – making its use impractical
- GNS integrates statistical physics techniques + super-computing to create its **GNS' REFS Platform**



# The REFS Advantage

REFS' causal approach **reverse engineers the mechanisms underlying patient response** and allows for "what if" simulations, unlike more common "black box" predictive methods



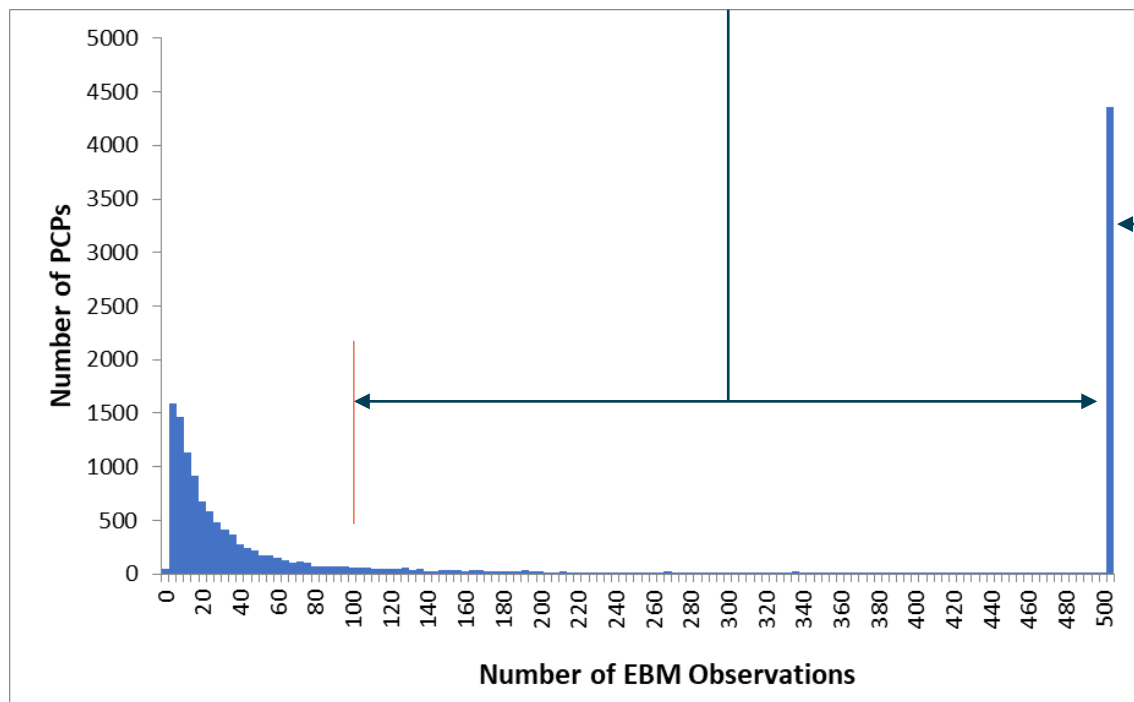
Key Questions	Predictive	Causal
What <b>subpopulations</b> with differentiated prognosis exist?	✓	✓
Which patients <b>do/do not respond</b> to an intervention?	✓	✓
What <b>causes a patient to respond</b> to the intervention?	X	✓
<b>Why</b> is a patient part of a subpopulation?	X	✓
<b>What if</b> I change the treatment or treatment protocol?	X	✓

# METHODS & RESULTS



# PCP Eligibility for Study - Criteria for Evaluating PCPs for Quality of Care

For a PCP to be included in the quality analysis, he or she needed to have  $\geq 100$  observations on Optum Evidence Based Measures (EBMs) related to Optum Episode Treatment Groups (ETGs) we considered AND  $\geq 30$  episodes of care



Note that the x axis has been truncated. The bar at 500 represents all providers with  $\geq 500$  observations.

PCPs with  $\geq 100$  observations on EBMs

**6,027**

PCPs with  $\geq 100$  observations on EBMs  
And  $\geq 30$  Episodes

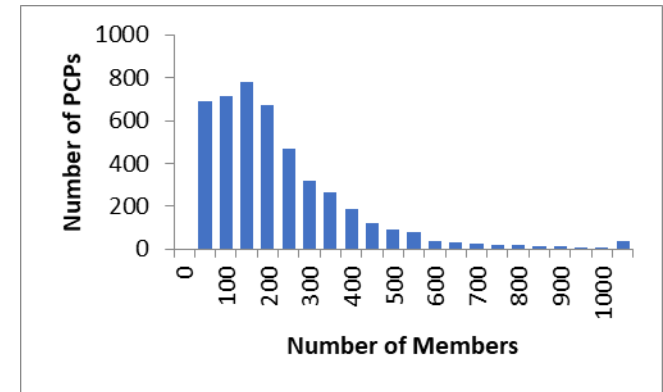
**4,587** ← **PCPs analyzed in Quality analysis  
(20% of all PCPs in dataset)**

# Overview of PCPs & Members Evaluated

PCP Specialty	Number of PCPs	Percent of PCPs
Family Medicine	2,583	56.3%
Internal Medicine	1,202	26.2%
Pediatrics	736	16.0%
General Practice	37	0.8%
Adolescent Medicine	28	0.6%
Osteopathic Medicine	1	0.0%
<b>Total</b>	<b>4,587</b>	

Member Summary
1,543,551 episodes
737,946 members
Mean Age: 43
Female: 56% Male: 44%

# of patients per PCP
Mean: 205

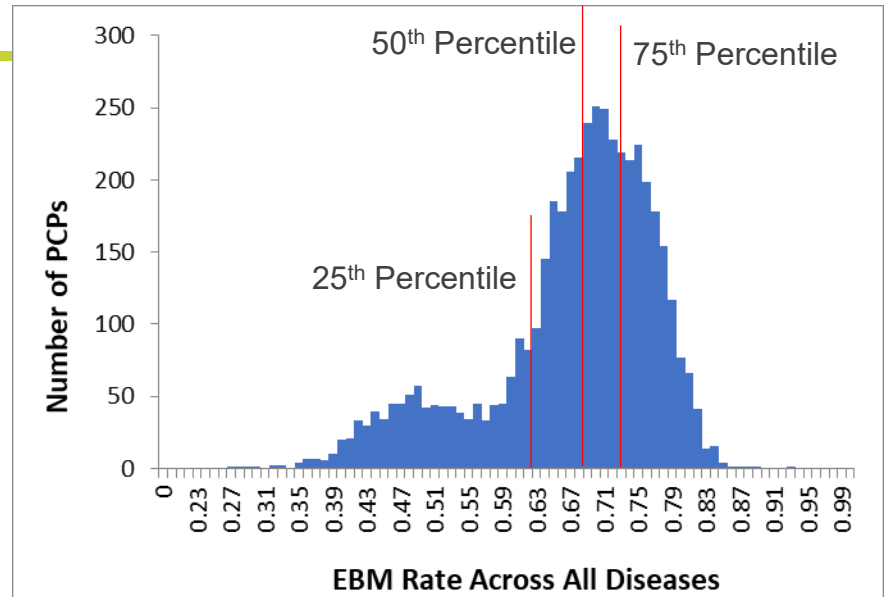


Line of Business	Number of Episodes	Percent of Episodes	Member Count*	Total Annual Cost (\$M)
COMMERCIAL	492,595	32%	248,974	\$293
MEDICAID	692,347	45%	347,545	\$639
MEDICARE	245,434	16%	100,456	\$218
Null	113,175	7%	59,309	\$103

\* Some members are counted more than once in this table, since they had episodes while in different LOBs.

# PCP Quality Ranking Distribution

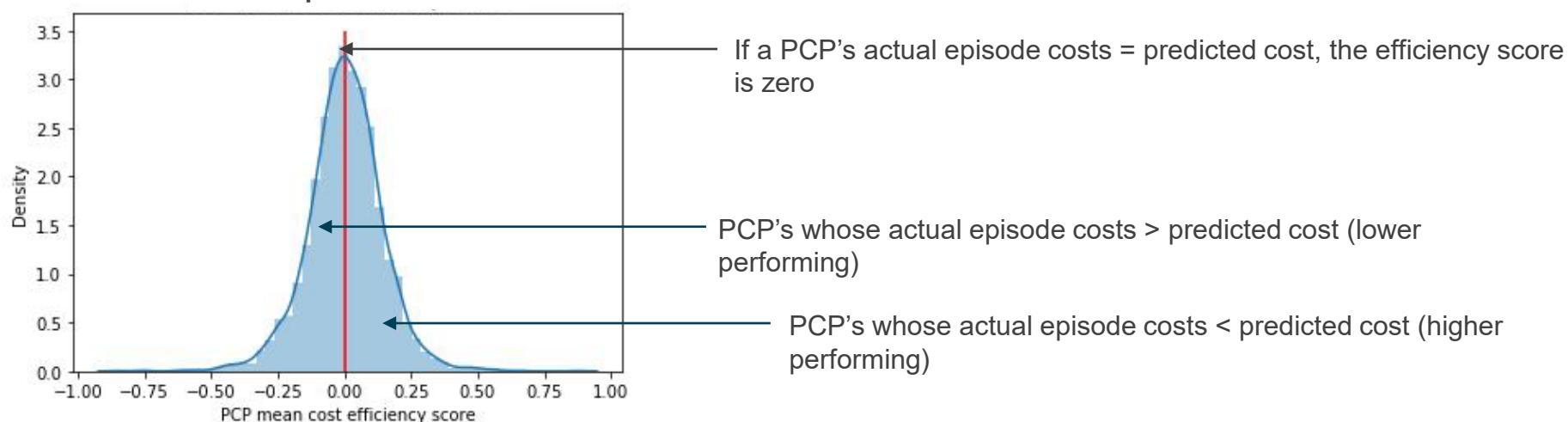
Percentile	EBM Rate
25 <sup>th</sup>	0.629
50 <sup>th</sup>	0.688
75 <sup>th</sup>	0.737



PCP New Ranking	PCP Count	Quality Ranking Name	Quality Ranking Description
1	925 (20%)	Outstanding Performers	we're 80%* confident these providers perform better than the 75th percentile
2	1,060 (23%)	Good Performers	we're 80%* confident these providers perform better than the 50th percentile, but are not in Rank 1
3	621 (14%)	Typical Performers	we're neither 80%* confident performance is better than the 50th percentile nor 80%* confident performance is worse than the 50th percentile
4	1,981 (43%)	Below Average Performers	we're 80%* confident performance is worse than the 50th percentile

# Approach to Assessing Cost-Efficiency

- Utilized GNS' causal learning platform (REFS) to predict the cost for each patient for each disease after adjusting for potential confounders (e.g., age, gender, severity, complication, comorbidity, diagnoses, line of business etc.)
- Cost efficiency score =  $\ln(\text{predicted\_cost} / \text{actual\_cost})$
- Patient cost efficiency scores were aggregated to the attributed PCP and then an overall efficiency score was calculated based on actual costs relative to predicted costs





# PCP Cost Efficiency Ranking – Percentile Categories

PCP Cost Ranking	PCP Count	Ranking Name	Ranking Description
1	678 (14%)	Outstanding Performers	we're 80% confident these providers perform better than the 75th percentile
2	982 (20%)	Good Performers	we're 80% confident these providers perform better than the 50th percentile, but are not in Rank 1
3	1,458 (30%)	Typical Performers	we're neither 80% confident performance is better than the 50th percentile nor 80% confident performance is worse than the 50th percentile
4	1,711 (35%)	Below Average Performers	we're 80% confident performance is worse than the 50th percentile

Total # of PCPs included in the Cost Efficiency Analysis = 4,829. This number is greater than the number of PCPs included in the Quality Analysis b/c we did not require  $\geq 100$  observations on Optum EBMs in order to be included in the Cost Efficiency Analysis.

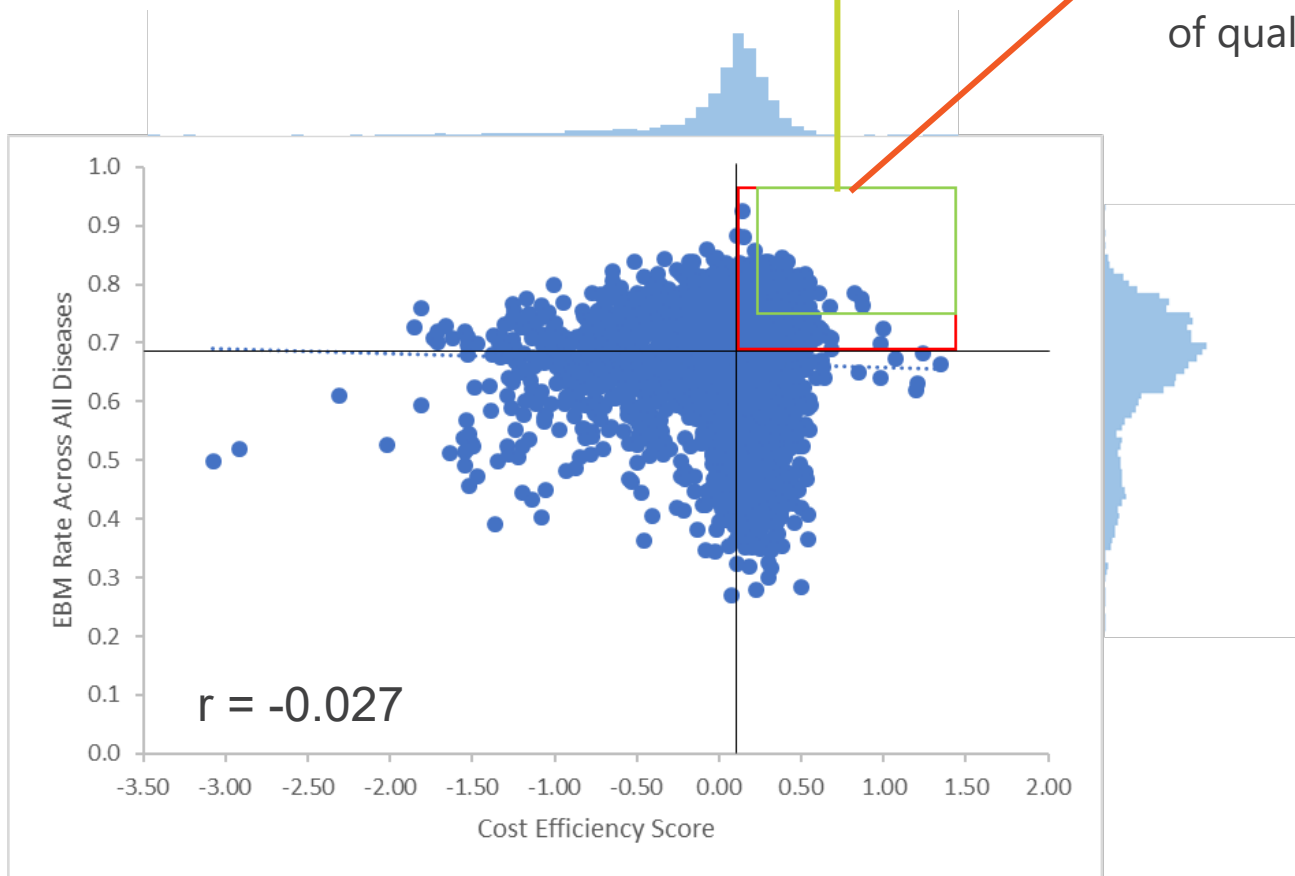
# Number of Providers, Patients and Episodes in Particular Cost Efficiency %-ile Groups

Cost efficiency score percentile	# of PCPs in this cohort	# of patients corresponding to PCPs in this cohort	# of episodes corresponding to PCPs in this cohort
Full Population (Everyone)	4,829	1,039,183	2,112,863
80 <sup>th</sup> percentile and above (Top 20%)	966	239,432	385,151
60 <sup>th</sup> percentile and above (Top 40%)	1,932	485,308	853,593
50 <sup>th</sup> percentile and above (Top 50%)	2,415	590,899	1,072,253

# Relationship Between Cost and Quality

There were 190 PCPs who were both better than 80<sup>th</sup> percentile of cost efficiency and 80<sup>th</sup> percentile of quality.

There were 1,083 PCPs who were both better than 50<sup>th</sup> percentile of cost efficiency and 50<sup>th</sup> percentile of quality.



# Potential Annual Savings by Steering Patients or Improving PCP Provider Performance

- Total annual cost across all diseases evaluated = **\$810M**

## 1 Yr Savings Potential from Moving Patients to More Efficient Providers Based on Analysis of 2018-2019 Data Combined

Percentile	Mean Savings (\$M)
80	\$455.5
60	\$369.1
50	\$324.7

Even a shift from moving all patients to the PCPs in the top 50<sup>th</sup> percentile could have a significant savings impact

# Overview of Specialty Cost Efficiency Analysis

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GNS performed a cost efficiency analysis on specialists who perform the following procedures:

1. Cataract surgery performed by ophthalmologists
2. Deliveries performed by obstetricians (separately for C-sections and vaginal births)
3. Total hip replacement performed by orthopedic surgeons
4. Total knee replacement performed by orthopedic surgeons
5. Coronary angioplasty performed by interventional cardiologists
6. Hysterectomy performed by gynecologists (separately for abdominal vs vaginal)
7. Cholecystectomy performed by a general or gastrointestinal surgeon
8. Coronary artery bypass surgery performed by a cardiac surgeon
9. Combined laminectomy and spinal fusion performed by either a neurosurgeon or an orthopedic surgeon

# Overview of Specialty Cost Efficiency Analysis

Specialist	Procedure	# of Episodes	# of Providers	Total Cost
Ophthalmology	Cataract Surgery	17,474	642	\$102M
Obstetrics Obstetrics and Gynecology Family Medicine	C-Section Delivery	4,576	842	\$121M
Obstetrics Obstetrics and Gynecology Family Medicine	Vaginal Delivery	10,734	1,190	\$179M
Orthopedic Surgery	Hip Replacement	4,899	365	\$161M
Orthopedic Surgery	Knee Replacement	6,923	416	\$209M
Interventional Cardiology Cardiology	PTCA	5,674	405	\$277M
Thoracic Surgery	CABG	1,345	108	\$131M
Gynecology	Hysterectomy	586	246	\$8M
General Surgery	Cholecystectomy	5,405	524	\$78M
Neurosurgery Orthopedic Surgery	Spinal Fusion and Laminectomy	2,095	176	\$96M

Specialists were included in the analysis if they performed  $\geq 1$  procedure.

**Total spending = \$681M/yr**

# 2018 and 2019 Combined Annual Cost & Annual Potential Cost Savings Summary

	PCPs	All Specialist Procedures	PCPs + Specialist Procedures
Total Annual Cost	\$810M	\$681M	\$1.49B
Annual Savings by Improving Performance to 50 <sup>th</sup> %-ile or above or Steering Pts to Providers at the 50 <sup>th</sup> %-ile or above	\$324.7M (40%)	\$57.65M (8.5%)	\$382.35 (25.7%)

# CONCLUSIONS

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- There is substantial variation across PCPs in both quality and cost-efficiency of care
- There is substantial variation across specialists in cost-efficiency of care (We didn't assess their quality of care.)
- >\$382M/yr in savings could be realized if PCPs and specialists who scored below the 50<sup>th</sup> %-ile changed their patterns of practice so they scored above the 50<sup>th</sup> %-ile of cost-efficiency scores.
- Our estimate of potential savings would be even greater if we added 1) episodes of care that were below the 50<sup>th</sup> %-ile that were attributable to MDs who, overall, were  $\geq$  the 50<sup>th</sup> %-ile and 2) an assessment of appropriateness of care to our specialist cost-efficiency analysis.