

DEFY AUGURY?



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Not a whit. We defy augury. There's a special providence in the fall of a sparrow. If it be now, 'tis not to come. If it be not to come, it will be now. If it be not now, yet it will come—the readiness is all. Since no man of aught he leaves knows, what is 't to leave betimes? Let be.

- Hamlet, Act 5, Scene 2

ICD-10 : W61: Contact with
birds (domestic) (wild) →
W61.99XA Other contact with
other birds, initial encounter



Whither Accuracy?



“City vs Highway Mileage”

EPA DOT Fuel Economy and Environment Gasoline Vehicle

Fuel Economy
26 MPG combined city/hwy
22 MPG city
32 MPG highway
3.8 gallons per 100 miles

Small SUVs range from 16 to 32 MPG. The best vehicle rates 99 MPGe.

You save \$1,850 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,150

Fuel Economy & Greenhouse Gas Rating (tailpipe only)
7 (Best)

Smog Rating (tailpipe only)
6 (Best)

This vehicle emits 347 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions; learn more at fueleconomy.gov.

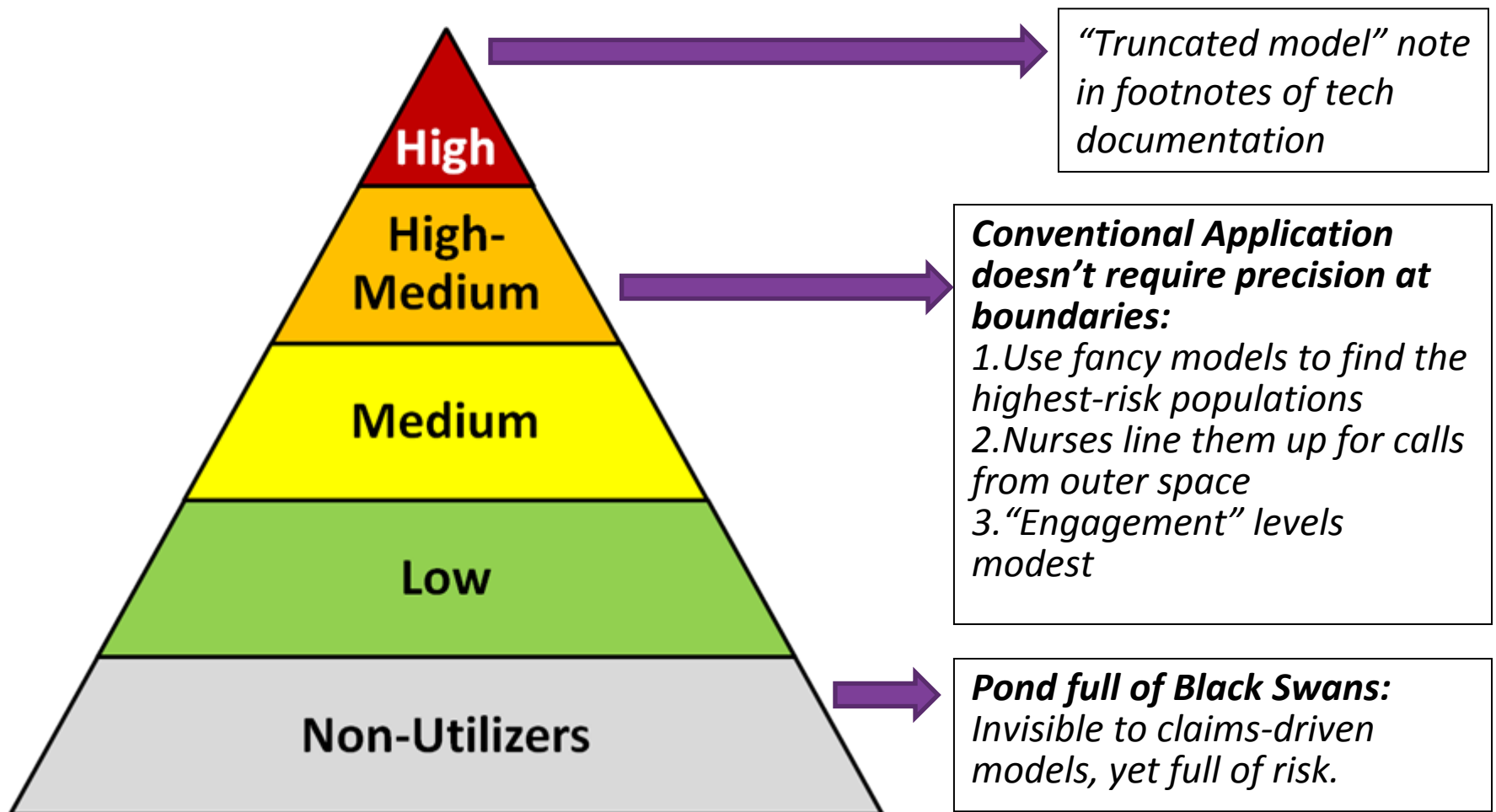
Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 22 MPG and costs \$12,600 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.70 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

1 2 3 4 5 6 7 8 9 10 11 12

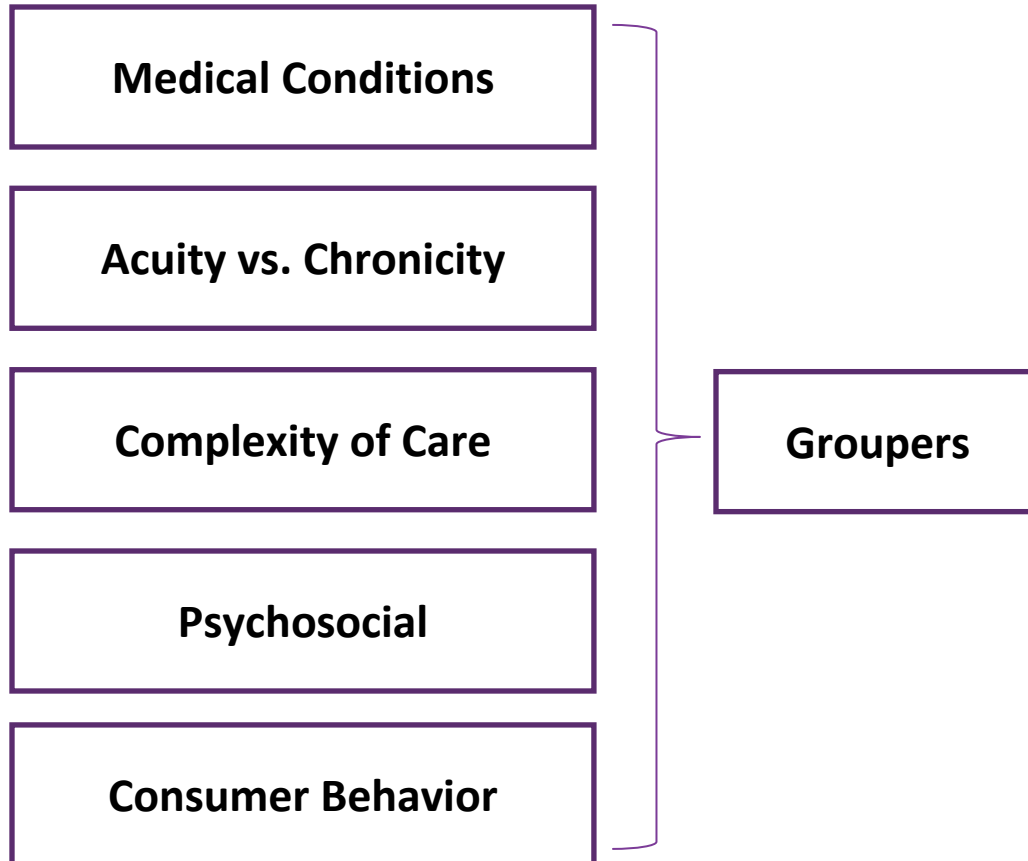
We all love this pyramid



Clinically-Derived Inputs

How sick is this population?

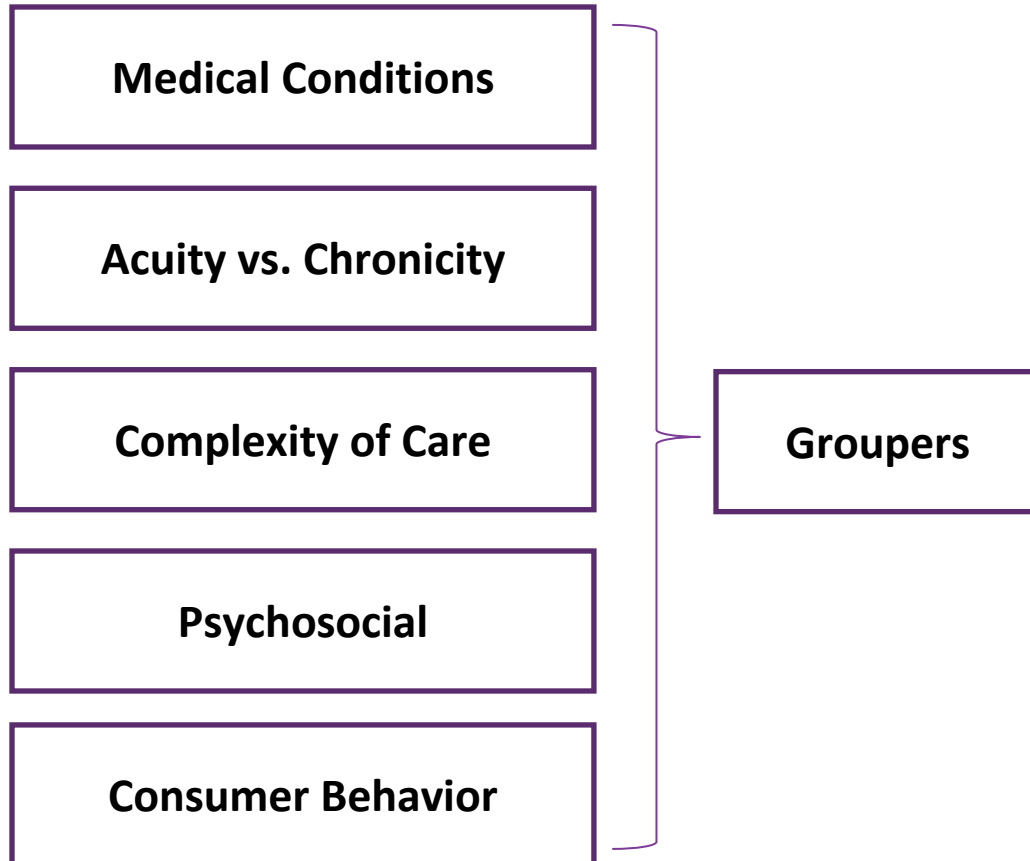
Who are the sickest?



e.g. ACG, ERG, DxCG, CDPS, 3M

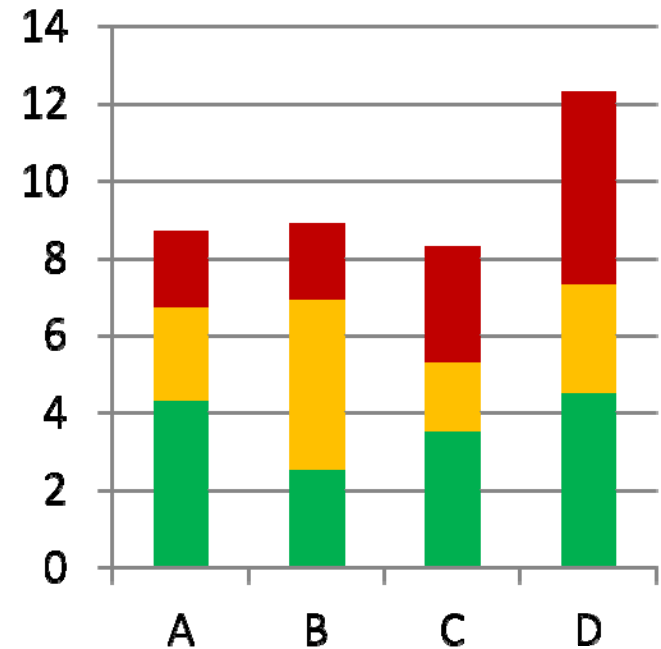
Clinically-Derived Inputs

*How sick is this population?
Who are the sickest?*

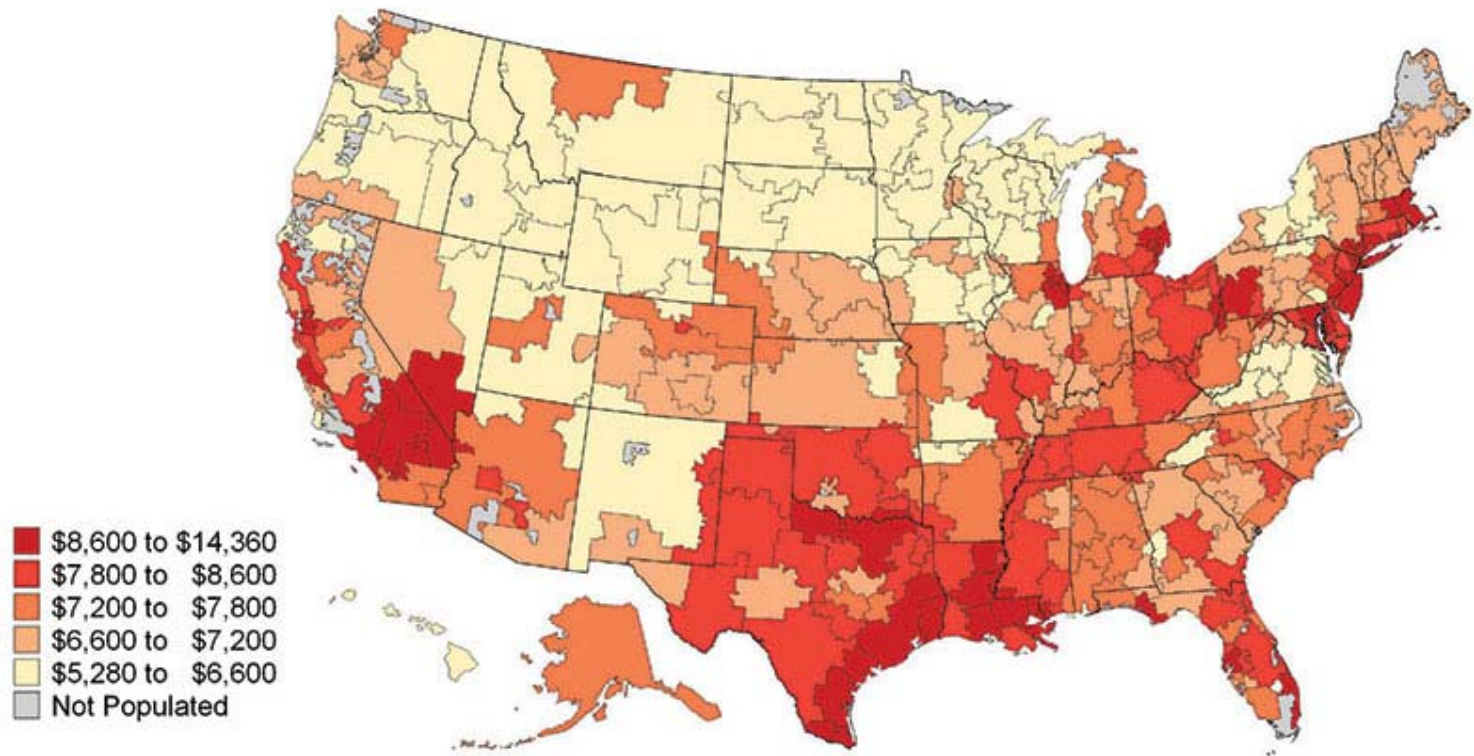


e.g. ACG, ERG, DxCG, CDPS, 3M

*“Actionable Insight” =
Prioritized lists? That’s it?*



*Typical “dashboard” graph from
100s of startups and well-
established analytics companies*



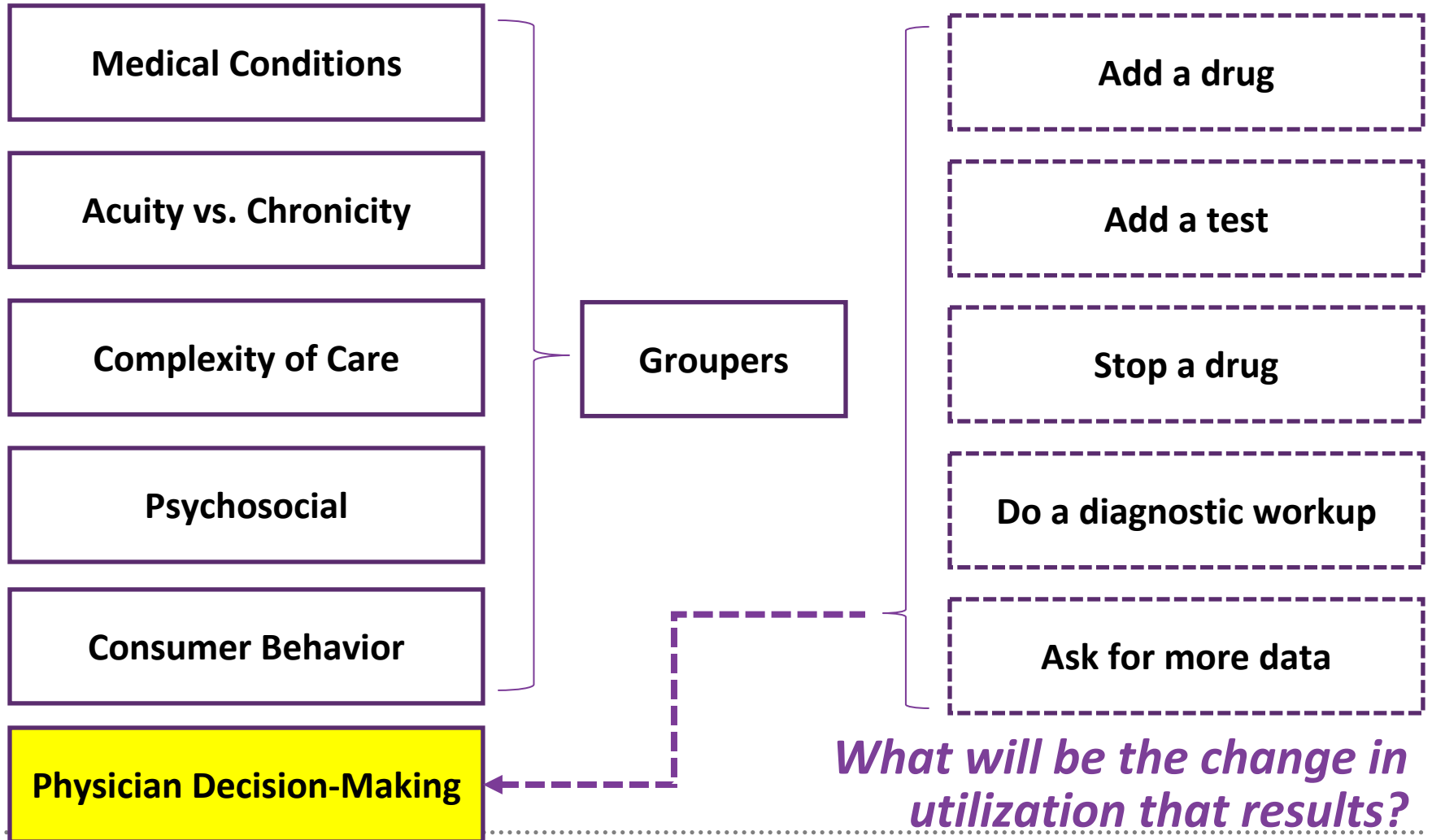
Physician Decision-Making

(Provider Contracting)

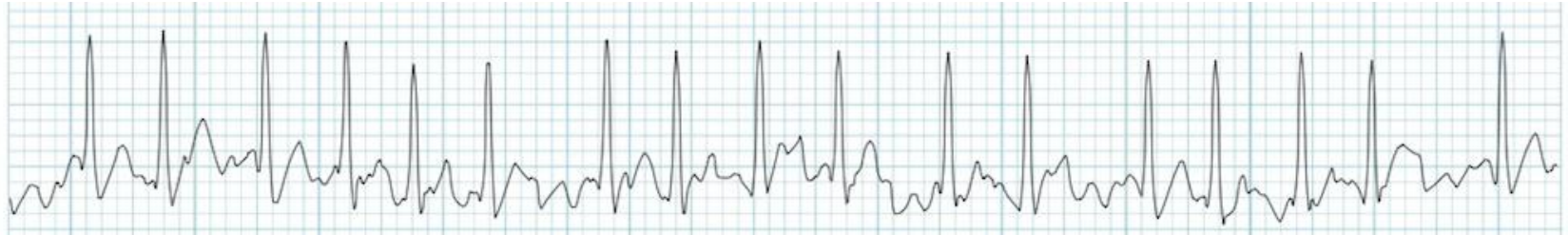
Clinically-Derived Inputs

*How sick is this population?
Who are the sickest?*

*How well-managed are they?
What intervention are needed?*



Example: Stroke Prevention





**ATRIAL
FIBRILLATION
427.31**



**STROKE
434.11**

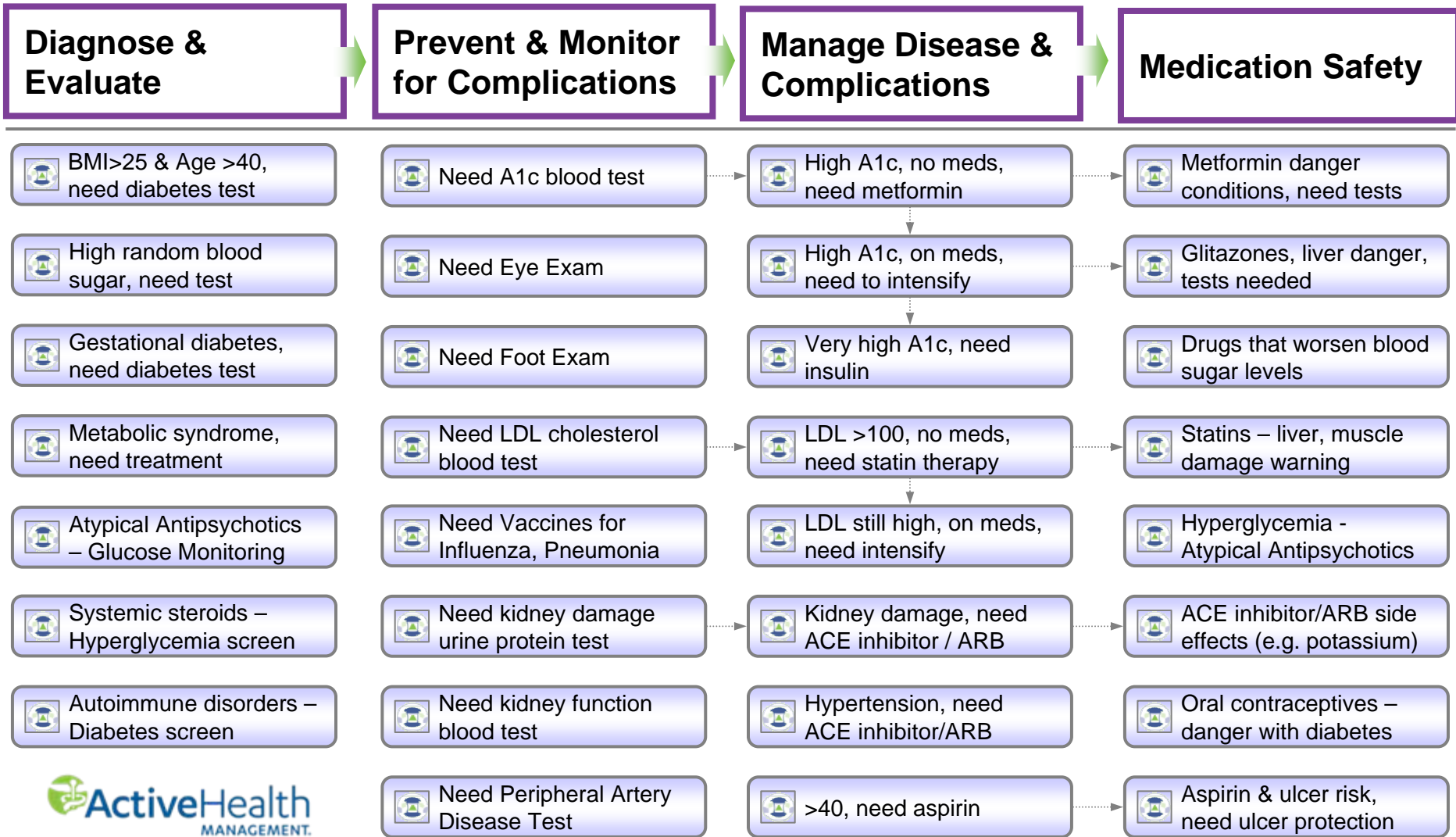


**AVOIDED
STROKE**



Example of Clinically-Derived Inputs

Feature Extraction for Diabetes



EBM Gaps in Care: Cousins of Quality Measures



Patient Data



CareEngine Logic



Clinical confirmation

- Age 18+
- ICD-9 claims for Diabetes
- Diabetes medications or supplies or DME
- Micro-albuminuria ≥ 30 mL/day
(Also with specific timeframe criteria)

Validated

- Diabetes
- Diabetic nephropathy

Exception screening

- Current ACE Inhibitor/ARB
- Angioedema
- Pregnancy
- Hyperkalemia
- Renovascular disease

Excluded

- Already on medication or equivalent
- Contraindications to medication
- Similar CC sent

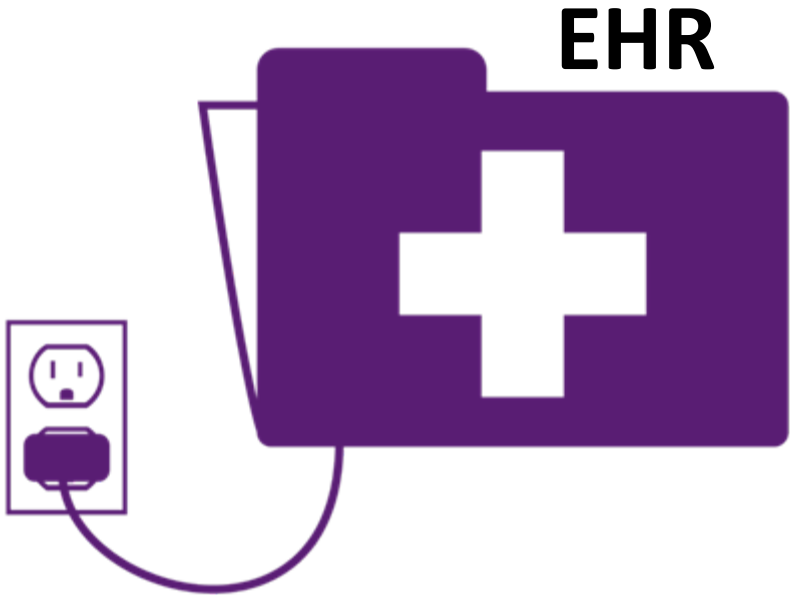
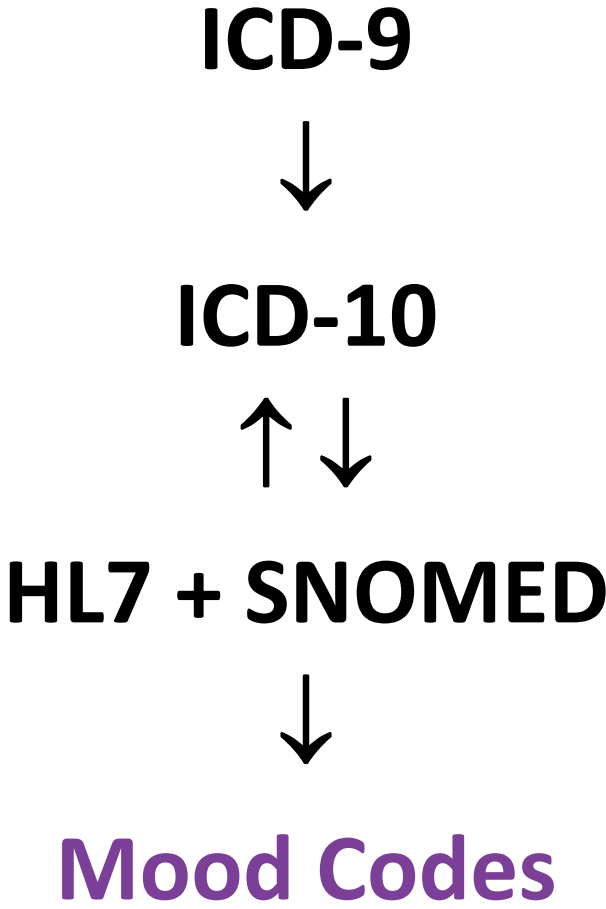
Alert generation

- What data was found (claims for diabetes, labs for micro-albuminuria, no claims for ACE inhibitor or ARB)
- Literature and guidelines (American Diabetes Association recommendation)

Message

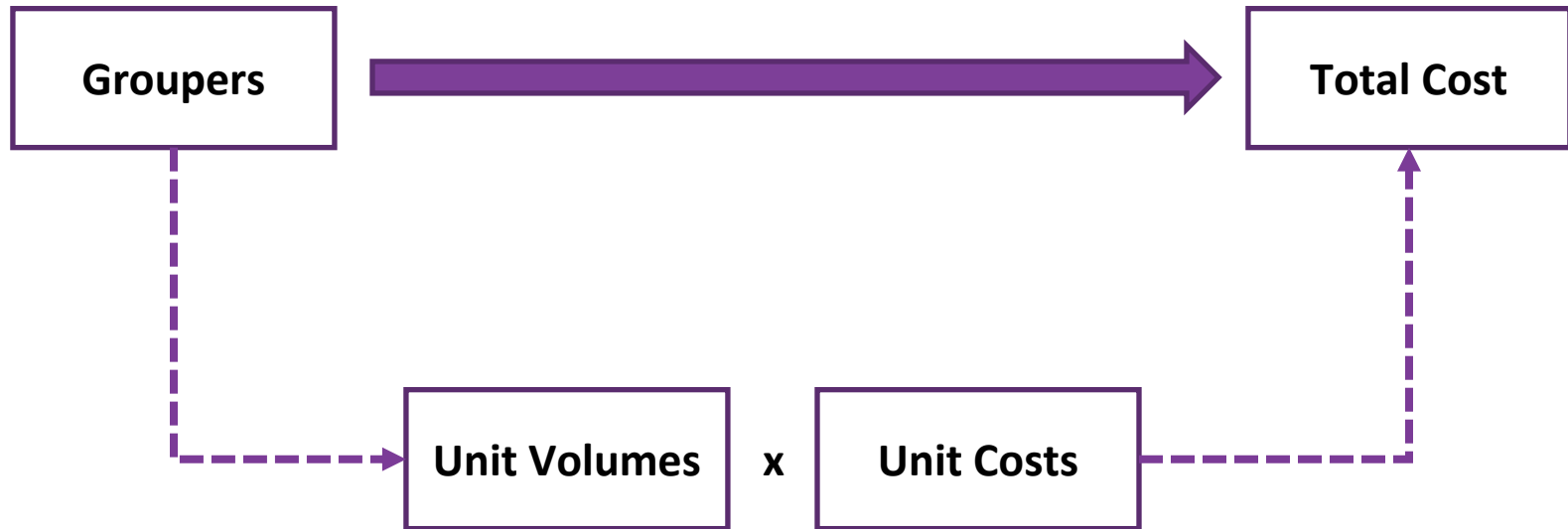
- Relevant data
- Applicable literature and guideline(s)

Note on ICD code specificity & clinical data

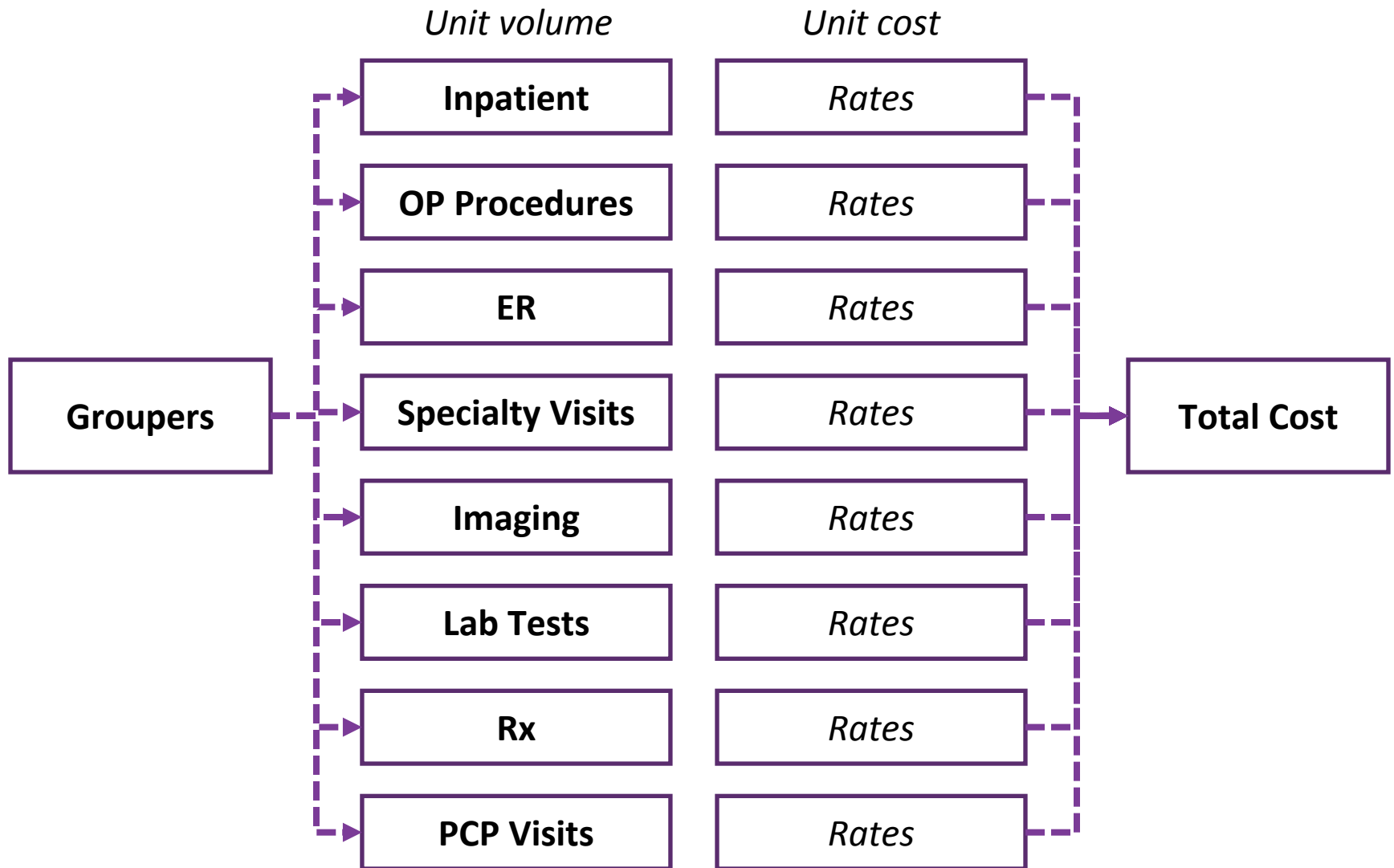


Sensitivity vs. Specificity

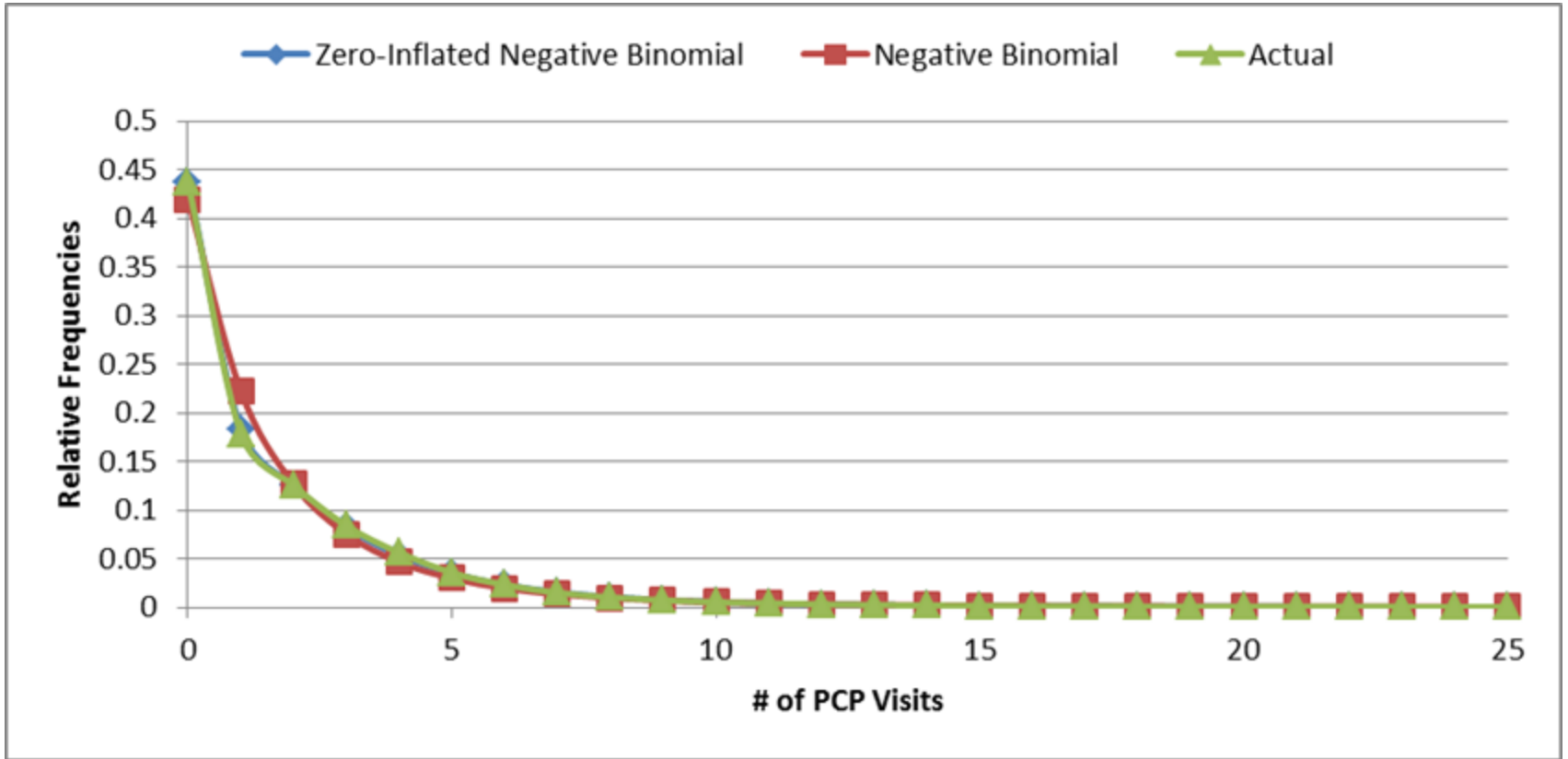
Clinically-Relevant Outputs



Clinically-Relevant Outputs



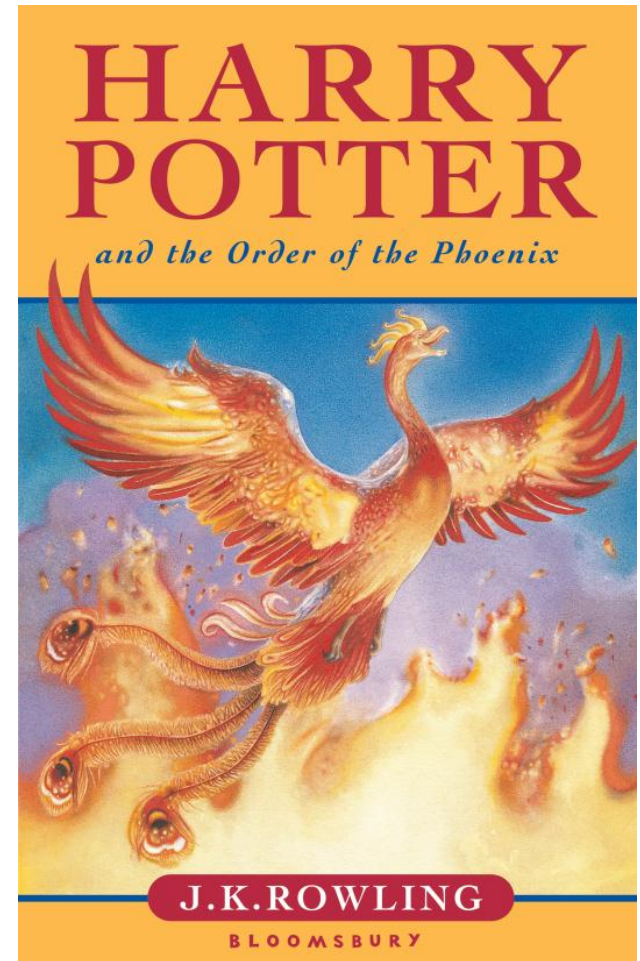
	Inpatient Acute	Inpatient Non-Acute	OP Procedures & Facility	ER
ROC (C-stat)	0.82	0.84	0.79	0.84
PPV	53%	48%	59%	63%
Sensitivity	28%	23%	35%	60%
Specificity	96%	99%	95%	95%
<i>% of overall spend</i>	~39%		8.4%	3.8%



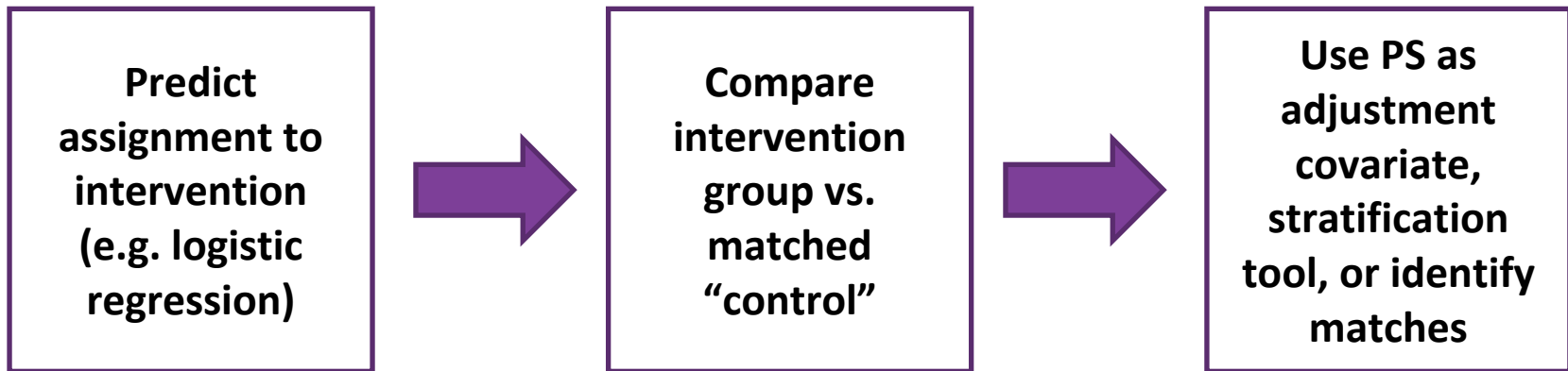
Shouldn't our predictive models keep breaking down if we're doing our job?

- If Risk Adjustment models change only modestly year-over-year... are we actually making progress?
- Do we inadvertently remove the most important predictor features / variables because they're so good at reducing costs?

In other words, if we don't believe there are modifiable risk factors... then all of this healthcare business is just an academic exercise.



Real-World Outcomes & High-Dimensional Propensity Scoring: A Wish to the Predictive Modeling Community



How might we bring the strength of the predictive modeling community to bear, with opportunity for massive automation & ways to solve for hidden bias?

A Final Note: Patient-Centered Predictive Modeling

